

उत्पादनोन्मुखी सर्वेक्षण

Production Oriented Survey

सहयोग: राज्य कृषि विश्वविध्यालय एवं कृषि विभाग

In collaboration with

State Agricultural Universities and Department of Agriculture

अखिल भारतीय समन्वित चावल सुधार परियोजना

All India Co-ordinated Rice Improvement Project

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PRODUCTION ORIENTED SURVEY 2022

In collaboration with

AGRICULTURAL UNIVERSITIES

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STATE DEPARTMENTS OF AGRICULTURE

All India Coordinated Research Project on Rice (AICRPR)

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Production Oriented Survey-2022

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Production Oriented Survey-2022

SUMMARY

Production oriented survey is conducted by a team of subject matter experts (from different state agricultural universities and ICAR Institutes) along with officials from state department of agriculture with an objective to collect information on different aspects of rice cultivation from different rice growing states of India. The survey is based on both eye-ball survey and questionnaire based survey. The different aspects that are covered in the survey are prevailing climatic conditions for rice cultivation, varietal profile in a particular region, extent of use of organic manure and inorganic fertilizers, occurrence of different biotic and abiotic problems and their management and various needs of the farmers and problems faced by the farmers. During 2022, the survey was conducted in **16 states of India viz., Andhra Pradesh, Bihar, Chhattishgarh, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal** by **18 AICRIP centres**. A total of **110 Scientific staffs** from the different cooperating centres and **several officials from state department of agriculture surveyed 833 villages in 121 districts in 16 states**.

The Southwest monsoon seasonal rainfall during June to September for the country as a whole had been above normal (105 -110% of Long Period Average (LPA)). Quantitatively, all India monsoon seasonal rainfall during 1 June to 30 September 2022 had been 92.5 cm against the Long Period Average of 87.0 cm based on data of 1971-2020 (106% of its LPA). The Southwest monsoon seasonal (June to September) rainfall had been Above Normal over South peninsula (122% of LPA) and Central India (119 % of LPA). Seasonal rainfall had been Normal over Northwest India (101%) and Below Normal over East and Northeast India (82%). Out of the total 36 meteorological subdivisions, 12 subdivisions constituting 40% of the total area of the country received excess, 18 subdivisions (43% of the total area) received normal rainfall and 6 subdivisions (17% of the total area) received deficient season rainfall. These 6 Met subdivisions which got deficient rainfall are West Uttar Pradesh, East Uttar Pradesh, Bihar, Jharkhand, Gangetic West Bengal, and Nagaland, Manipur, Mizoram & Tripura. Out of these six Subdivisions, majority of them lie in the Gangetic Plains. Considering month to month rainfall variation over the country as a whole, the season was very unique with contrasting month to month variation. **The rainfall over the country as a whole was 92%, 117%, 104% and 108% of LPA during June, July, August and September respectively (IMD, 2022).**

In addition to several monsoon depressions in Bay of Bengal, there were three major cyclones during 2022. Cyclone ‘Asani’ occurred during May 7-12, 2022 affecting parts of Andaman and Nicobar Islands, Andhra Pradesh, Tamil Nadu, Karnataka and Odisha. Cyclone ‘Sitrang’ occurred during October 22–25 and affected parts of Andaman and Nicobar Islands, West Bengal, Odisha, Jharkhand, Meghalaya, Assam and Tripura. Another cyclone ‘Mandous’ from December 6-10, 2022 affected parts of Andaman and Nicobar Islands and Tamil Nadu (IMD, 2022). **Predominant rice varieties cultivated by the farmers in different states are presented in Table 2.** The prevalence of different diseases and insect pests in different rice growing regions of India is presented in Table 3 and Table 4. **Hybrid rice varieties occupied a significant area in states like**

Uttar Pradesh, Haryana, Chhattishgarh, Gujarat and Bihar and its area is increasing in states like Karnataka, Himachal Pradesh, West Bengal and Maharashtra. Among the diseases, leaf and neck blast, brown spot, sheath blight, false smut, grain discoloration and bacterial blight were widespread. High intensity of neck blast was noticed in some parts of Kerala and Telangana. High intensity of false smut was recorded in parts of Chhattishgarh and Jammu while bacterial blight was severe in parts of coastal Andhra Pradesh, Chhattishgarh, Kerala and Konkan region of Maharashtra. Moderate to high intensity of a new virus disease called **Southern rice black-streaked dwarf virus (SRBSDV) was recorded in some parts in Jammu, Punjab and Himachal Pradesh.** Among the insect pests, stem borer, leaf folder and BPH were very wide spread. Intensity of stem borer was more in Parts of Chhattisgarh, Jammu, Telangana and West Bengal. High incidence of BPH was noticed in parts of Chhattishgarh and West Bengal. The researchable issues varied from region to region. Overall we can put the researchable issues as varieties suitable for DSR and short and medium duration varieties with salinity and drought/submergence tolerance and with MS grains; varieties resistant/tolerant to different biotic stresses especially blast/neck blast, bacterial blight, false smut, sheath blight and plant hoppers and bio-fortified rice varieties.

Andhra Pradesh: Production Oriented Survey (rice) was conducted during November 2022-23 in the Godavari Zone (East Godavari, Kakinada, Konaseema, Eluru and West Godavari districts) of Andhra Pradesh. Seasonal conditions (rainfall and temperature) were favourable for paddy cultivation. However, in some areas, excess rainfall resulted in loss of crop due to complete submergence in early stages of crop growth particularly in tail end areas (canal irrigation) of West Godavari district. Commonly cultivated varieties were MTU 7029 (Swarna), MTU 1318, PLA 1100, MTU 1064, MTU 1061, Sampada Swarna, RGL 2537, BPT 5204, RP Bio 226, MTU 1262, MTU 1224, NP 9558, Sadhana, Amulya, PR 126, SL 10, MTU 1001 and others. Mega variety, Swarna (MTU 7029) was the most preferred variety in Godavari zone of Andhra Pradesh. Common crop rotations followed by the farmers were rice-rice, rice-pulse and rice-maize. Most of the farmers resorted to soaking, incubation and broadcasting seed in nursery without any chemical seed treatment. Only 30% of the farmers under survey have adopted seed treatment with carbendazim. Most of the farmers followed random method of transplanting. Due to shortage of labours most of the farmers followed herbicide application for weed management. N application was comparatively more. Farmers applied different fertilizers like DAP, 14-35-14, 10-26-26, 28-28-0 or 20-20-0 for top dressing along with nano-urea. Bacterial blight, sheath blight and neck blast were the major diseases recorded in most locations. BPH was the major pest constraint as opined by the farmers. Most of the farmers adopted plant protection measures. Farmers in the Godavari zone of Andhra Pradesh resorted to 2-5 foliar sprays for protection against pests and diseases. Potassium and zinc deficiency symptoms were recorded in many fields in the surveyed areas. Some of the constraints faced by the farmers were increase in cost of hiring combined harvesters, contract labour wages and marketing of produce.

Bihar: Production oriented survey was conducted in three rice growing districts of Bihar viz., Samastipur, Darbhanga and Muzaffarpur. In general, rainfall was low throughout the season and overall crop conditions were not good resulting in reduction in rice yield. The crop rotation practices were rice-wheat, rice-mustard, rice-pulse, rice-potato and rice-rabi maize. Common rice varieties cultivated by the farmers were HYVs like Rajendra Bhagwati, Rajendra Sweta, Rajendra Mansuri, Sugandha, Swarna, Rajendra Nilam, Rajendra Kasturi, Rajshree, BPT 5204, MTU-7029,

Rajendra Subhasini and Dhanalaxmi and hybrids like Arize 6444, 27P31, Arize 6129, PHB 71, Pusa RH-10, JK-401, AZ-6453, AZ-8433DT, Arize 6201, Hybrid 27P37, Hybrid-2731, NK 5251 and PA-6444. The average yield of different rice hybrids was 4000-6000 kg/ha. In high yielding and local varieties of rice the average yield varies from 3000-5000 kg/ha. In general, sowing was taken up in the month of June and most of the plantings were done in the month of July. Only progressive farmers applied organic manure and neem and castor cake. The common weeds were *Ipomoea* spp., *Cyprus rotundus* and *Cynodonn dactylon*. Hand weeding is local practice for removal of weeds from rice field within 45 days after transplanting. However, some farmers used weedicides like pendimethelene (Stamp and Pendsta), 2,4-d, Nominee gold and Adora for management of weeds. In general, the intensity of different diseases and insect pests was low and about 5-10% farmers adopted plant protection measures.

Chhattishgarh: Production oriented survey was conducted in five districts viz., Gariaband, Balod, Janjgir, Korba and Sarguja when most of the crops were in heading to maturity stage. The fields surveyed were in irrigated and rainfed lowland ecosystems. Weather conditions were in general favourable for rice cultivation in the region. Commonly cultivated varieties were HYVs or improved varieties like Swarna, Shri Ram, Asmita, MTU 1010, Jordar, MTU 1153, Mahamaya, Vishnubhog, HMT, DRK, OM 3, Manju Gold, Swarna Sub-1, MTU 1001, Rajeswari, Vikram TCR (developed through IGKV-BARC collaboration), Samba Mahsuri, MTU 1153, Ramjeera, Summer King, Trombay Dubraj mutant (TCDM-1: developed through IGKV and BARC collaboration), Indira Aerobic-1, Saroj, Ankur Shree 101, Devbhog, Daftari Shree 1008, Bamleshwari, Dubraj and others and hybrids like Raja 44, Arize 6444, Kaveri 468, Hybrid 2828 (Trust Grow Seeds), US 362, Sava 7301, Arize AZ 8433, Arize Dhani, US 312, Suruchi, Mahendra 1233, KRH-1 and others. Common crop rotation practices followed by the farmers were rice-rice, rice-wheat, rice-wheat + mustard, rice-pulses, rice-vegetables, rice-lathyrus, rice-chickpea, rice-mustard, rice-linseed, rice-potato and others. Average per capita consumption of rice per month was 6-12 kg rice. More than 80% of the farmers contacted told that their main meal consisted of both rice and wheat. About 60-100% farmers in different districts told that they used polished rice. Practice of seed treatment was not very common among the farmers and about 15-50% of the farmers contacted treated the seeds with carbendazim (1-2 g/kg), thiram (1-2 gm/kg) and *Trichoderma* (10 g/kg). Majority of the farmers applied organic manure like FYM and vermicompost both in nursery and main fields. Overall, intensity of different weeds like *Echinochloa colona*, *Cyperus rotundus*, *Cynodon dactylon*, *Eragrostis* spp., *Ischaemum rugosum*, *Convolvulus arvensis*, *Commelina benghalensis*, *Euphorbia hirta*, *Eleusine indica* and others was low to medium. Most of the farmers practiced one hand weeding along with herbicide application. Some of the common needs of the farmers timely availability of fertilizers and pesticides, availability of good quality seeds of HYVs, improvement in the irrigation facilities, need for broad spectrum herbicides suitable for rice, disease resistant and drought tolerant rice varieties, subsidy in inputs, short duration rice varieties and technical guidance. Among different diseases recorded, sheath blight, false smut and bacterial blight were recorded in high intensities in some areas. Among insect pests, stem borer and BPH were recorded in higher intensities in some areas. Most of the farmers adopted plant protection measures.

Gujarat: Production oriented survey was conducted in the 11 major rice growing districts of Gujarat State viz., Ahmedabad, Anand, Dang, Kheda, Mahisagar, Navsari, Valsad, Panchmahals, Vadodara, Surat and Tapi when the crops were in milk to maturity stage. Overall, climatic

conditions were favorable for rice crop cultivation. Varieties like Gurjari, GAR 13, GAR 14, Mahisagar, GNR 3, GR 7, GR 11, GR 101, Mahsuri, Jaya, Narmada, Arize 6444 (hybrid), Moti Gold, Surya Moti, Sonam, Sriram 125, Kaveri, Versha, NathPauha, Krishna Kamod, Pioneer 121 (hybrid), US-312 (hybrid), MC-13 (hybrid), 25P25 (hybrid), Laxmi, Gangamani and others were mainly cultivated in different districts of Gujarat. crop rotations were rice-wheat, rice-onion/garlic, rice fodder, rice-chick pea, rice-pigeon pea, rice-Indian bean, rice-rabi maize, rice-cowpea, rice-sugarcane, rice-sunhemp, rice-wheat-green gram, rice-castor, rice-niger, rice-mustard and rice-vegetables and others. The average yield among different HYVs and hybrids in different surveyed districts ranged from 3000-5500 kg/ha. Average per capita consumption of rice per month ranged from 3-5 kg rice in different districts except Dang where per capita consumption of rice was more. Majority of the farmers except Dang district told that their main meal consisted of both rice and wheat. Average seed rate used by the farmers in different districts ranged from 20-30 kg/ha. The practice of treating the seeds before sowing was not very common among the farmers. Application of organic manure both in the nursery and in the main fields was common among the farmers. In the main fields, fertilizers were applied @ 32-150 kg N/ha, 15-69 kg P₂O₅/ha and 10-20 kg ZnSO₄/ha. In general, the intensity of common weeds like *Echinochloa crusgalli*, *E. colona*, *Eclipta alba*, *Cynodon dactylon* and *Cyperus rotundus* was low to medium. Hand weeding (1-2) was the most common practice for weed management. Some of the common needs of the farmers were short duration rice varieties, fine grain and early maturing high yielding varieties, varieties with resistance to different diseases and insect pests, high yielding black/coloured rice, bio-fortified varieties, increase in minimum support price, subsidy in fertilizers and other inputs, improvement in irrigation facilities, varieties suitable for organic rice cultivation and technical support to farmers. Average seed replacement rate was 25-40%. In general, the intensity of different diseases and insect pests was low to moderate. Farmers used different pesticides for managing different pests and diseases. Farmers want short duration rice varieties, varieties with lodging resistance, varieties having tolerance leaf and neck blast, sheath rot, BLB, false smut, leaf folder, stem borer and plant hoppers. Farmers also expressed the need for varieties having tolerance to salinity, drought and high temperature, varieties with medium slender grains and with high zinc and low GI.

Haryana: Production oriented survey was conducted in 8 rice growing districts of Haryana viz., Kaithal, Kurukshetra, Karnal, Jind, Yamunanagar, Ambala, Panipar and Sonapat during Kharif season of 2021 when the crops were booting to dough stage. The fields surveyed were under irrigated ecosystem and in general the weather conditions for rice cultivation were favourable except there were reports of excess rainfall in some places in Kaithal, Jind and Panipat. Widely prevalent rice varieties were HYVs like PR 114, PR 121, PR 126, PR 128, PR 129 and PR 201; hybrids like 25p35, 28p67, Hybrid 8433, Sava 127, Sava 7301, Sava 134, Sava 7501, Hybrid 468, 90m100, Hybrid (VNR) 2222, Arize 6129, 27p22, 27p31, Hybrid JKRH 2082, Hybrid 7299, Arize 6444, Hybrid 117 (Rashi RRX 117), Hybrid 4040, Swift Gold and VNR 2111 and basmati varieties like Pusa Basmati 1718, Pusa Basmati 1509, Pusa Basmati 1121, Pusa Basmati 1, Pusa Basmati 1401, Pusa Basmati 1692, CSR 30 and Pusa Basmati 1728. The main crop rotation followed by the farmers was rice-wheat. Some farmers also followed rice-mustard, rice-potato, rice-mustard-sunflower and rice-sugarcane. Average per capita consumption of rice per month was 1-4 kg rice. All the farmers contacted told that their main meal consisted of both rice and wheat. About 50-90% farmers in different districts told that they preferred basmati rice. On an average about 57%

of the farmers contacted told that they treated the seeds. Application of organic manure in the nursery was not common. However, most of the farmers contacted applied chemical fertilizers in the nursery. N application in the main field was more than recommended dose. Intensity of commonly recorded weeds like *Echinochloa colona*, *Dactyloctenium aegyptium*, *Cyperus rotundus*, *Cynodon dactylon* and some unidentified weeds was low to medium. About 80-100% farmers in different districts applied weedicides. Some of the common needs of the farmers were increase in the price of basmati rice, subsidy on DSR cultivation, timely availability of quality inputs and seeds, practical solution for residue management, availability of DAP, subsidy on implements, short duration rice varieties, subsidy on fertilizers and pesticides and reduction in the cost of cultivation. Most of the biotic stresses were recorded in low to moderate intensities. All the farmers contacted applied different pesticides for the management of different diseases and insect pests. The number of pesticide application in different districts ranged from 2-7.

Himachal Pradesh: Production-oriented survey was conducted in 7 districts viz., Kangra, Mandi, Shimla, Bilaspur, Hamirpur and Sirmour of which Kangra and Mandi are the leading districts for rice cultivation accounting for around 71 and 70 per cent of the area and total production of the State, respectively. Rice-wheat, maize-wheat and rice-potato were the prevailing crop rotations. Commonly cultivated rice varieties were HYVs like Palam Lal Dhan-1, Him Palam Dhan-1, HPR 1156, HPR 2143, HPR 1068, Sharbati, Pusa 44, PR 121, 126, 128 and 129, hybrids like Arize 6129, Arize 6444, PAC 807 plus, Hybrid 834, Arize Swift Gold, Sri Ram Khushbu, Shahi Dawat, US 312, Hyb. 2266, SAWA 134, Buland Raja 88 etc. and basmati/scented varieties like Palam Basmati-1, Kasturi, Pusa Basmati 1509 and Pusa Basmati 1121. Commonly observed weeds were *Cyperus iria*, *Echinochloa colona*, *E. crusgalli*, *Monochoria vaginalis*, *Paspalum* spp., *Eragrostis japonica*, *Alternanthera echinata*, *A. sessilis*, *Digitaria sanguinalis*, *Ageratum conyzoides* and wild rice. Two species of alligator weed, *Alternanthera echinata* and *A. sessilis* continued to predominate in Kangra district. Herbicides like butachlor and bispyribac sodium were commonly used by the farmers. Use of chemical fertilizers was less than recommended. Majority of the farmers used FYM. Some of the major constraints in rice cultivation in Himachal Pradesh were widespread incidence of false smut on inbred as well as hybrid varieties ranging between low to moderate and severe outbreak of neck blast on susceptible varieties like, Shahi Dawat, Sri Ram Khushbu, Pusa 1121, Pusa 1509 etc. and local cultivars in some places and moderate to severe incidence of rice hispa, leaf folder, black beetle and stem borer during early phase of growth. Farmers also faced severe outbreak of stunting/ dwarfing disease in many parts of Kangra, Sirmour and Solan districts. Continuous rains during dough stage onwards resulted in lodging of crop and heavy sheath rot infection resulting in discolored grains in some parts of the State.

Jammu and Kashmir: An extensive production-oriented survey was conducted during *kharif* 2022 in the three basmati growing districts viz., Jammu, Samba and Kathua of Jammu and Kashmir. In general, weather conditions were normal in all the three districts surveyed with well distributed rainfall. Predominant rice varieties cultivated by the farmers were basmati varieties like Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129 and HYVs like Sarbati, PR 131, Ch 1039, Jaya and others. Some farmers also cultivated hybrids like Arize 6444, PHB 71, Vijetha and others. Basmati rice varieties occupied more than 90% of the rice area. Some of the crop rotation practices followed by the farmers were Rice-wheat, rice-barbeem, rice-potato, rice-wheat-sunflower, rice-cauliflower-black gram/green gram, rice-potato-black gram/green gram, rice-wheat-vegetables, rice-mustard and rice-vegetables. Average per capita consumption

of rice per month was 10-12 kg rice. All the farmers contacted told that their main meal consisted of both rice and wheat and all of them told that they used polished rice. Average seed rate was 25-40 kg/ha. Farmers followed random planting where plant population per unit area was not maintained. Application of organic matter in the nursery was not common. In the main fields, fertilizers were applied @ 20-80 kg N/ha, 20-80 kg P₂O₅/ha and 30-50 kgK₂O/ha. Application of potash was followed by less number of farmers. About 30-70% of the farmers contacted applied zinc sulphate. Overall, intensity of weeds was low to medium. Most of the farmers practiced hand weeding along with herbicide application. Some of the common needs of the farmers were creation of FPOs for basmati rice, soil testing, farm mechanization, timely availability of inputs like seeds, fertilizers and pesticides, small size tractor operated harvester, training program on plant protection methods and rice production technologies, solution for lodging problem in basmati and kisan credit cards. Among the diseases, brown spot, grain discoloration, false smut and bacterial blight were recorded in moderate to severe intensity in all the districts surveyed. High intensity of rice dwarf (Southern Rice Black-streaked dwarf virus) was also recorded from Jammu and Kathua districts in early transplanted Pusa 1121. Moderate to high intensity of stem borer and rice bugs were recorded in many places. Farmers applied different pesticides for plant protection.

Karnataka: Production oriented survey was conducted in eight districts of Karnataka viz., Shivamogga, Hassan, Chikmagalur, Mandya, Mysuru, Chamarajanagara, Davangere and Tumakuruduring *Kharif* 2022. The south west monsoon entered the Karnataka state during June and the onset of monsoon was timely and more than normal rainfall was recorded in all the districts surveyed. Commonly cultivated varieties were HYVs like RNR15048, Super Amman, Jyothi, JGL 1798, MTU1001, Jaya, KPR1, BR 2655, Tunga, IR64, Thanu, DR 8336, Meenakshi, GK Chethan, Sowbhagya, MPR 606, Adithya, Amulya, MTU 1010, BPT 5204, Kaveri Sona, Jaishree Sona and TellaHamsa and hybrids like Arize6444 Gold, VNR2233 and others. The prevailing cropping pattern in the districts surveyed is Rice-Rice followed by Rice-sugarcane, rice-vegetables, rice-maize, rice-pulses, rice-ragi and rice-fallow. Average per capita consumption of rice per month was 7-12 kg rice. Some of the farmers from Mandya and Tumakuru told that they are consuming ragi (finger millet) along with rice. In general, planting was done from 1st week of July to 2nd week of August. Average seed rate used by the farmers ranged from 40-70 kg/ha and most of the farmers adopted seed treatment. Fertilizers were applied @ 100-125 kg N/ha, 50-60 kg P₂O₅/ha and 45-60 kg K₂O/ha. Most of the farmers contacted applied zinc sulphate. Majority of the farmers contacted applied FYM or green manure in the field depending on availability. Overall, intensity of weeds was medium. Most of these farmers also followed 1-2 hand weeding along with herbicide application for management of weeds. Some of the common needs of the farmers were timely availability of quality seeds and other inputs like fertilizers and pesticides, potassic fertilizers and micronutrients, mechanization in rice farming, high yielding non-lodging rice varieties, less spacing mechanical transplanter, fixed market price and high yielding pest and disease resistant rice varieties. Overall, intensity of different biotic constraints was low to moderate. However, high intensity of neck blast, bacterial blight, stem borer, leaf folder and BPH were recorded in some areas. Most of the farmers adopted chemical plant protection measures.

Kerala: The Production oriented survey was conducted in Palakkad, Thrissur and Malappuram districts of Kerala. The survey was conducted at tillering to maturity stage of the crop. Uma, Jyothi, Kanchana, Aishwarya, Aathira, Ponmani and Manurathna were the predominantly cultivated varieties of these districts. Seed rate adopted by the farmers ranged from 65-120 kg/ha. The

fertilizer application ranged from 0 to 150 kg N/ha, 0-80 kg P₂O₅/ha and 0-150 kg K₂O/ha as basal. Many of the farmers applied fertilizer in three split doses, one as basal and the other two as top dressing. The first top dressing ranged from 0-110 kg N/ha, 0-75 kg P₂O₅/ha and 0-150 kg K₂O/ha. Second top dressing ranged from 0-70 kg N/ha, and 0-70 kg K₂O/ha. Even though farmers know about the importance of applying organic manure, difficulty in getting good quality manure in large quantities was a problem raised by them. Some farmers applied farmyard manure, poultry manure, goat manure, vermicompost and green leaf manure basally. Most of the farmers followed transplanting. Direct sowing and mechanical transplanting were followed in some places. Farmers were using the agricultural implements like tractor, tiller, transplanter and combined harvester on hiring. The common weeds observed were *Isachne miliacea*, *Sacciolepis indica*, *Eichhornia crassipes*, *Echinochloa crusgalli*, *Echinochloa colona*, *Cyperus* spp., *Marsilia quadrifolia*, *Fimbristylis miliacea*, *Monochoria vaginalis*, *Paspalum digitatum* and weedy rice. Hand weeding and chemical herbicides such as 2,4-D, Cyhalofop-butyl 5.1% + penoxsulum 1.02% (Vivaya), Sathi (bensulfuronethyl+pretilachlor), Nominee Gold (bispyribac sodium) and Rifit (1.5 lit/ha) were used for weed management. Diseases such as bacterial leaf blight, sheath blight, brown spot, blast and false smut were commonly observed from low to high intensities. The fungicides such as propiconazole, trifloxistrobin+ tebuconazole (Nativo), tebuconazole and carbendazim were commonly used. For the management of bacterial blight streptomycin spray and application of bleaching powder in the field was followed. The biocontrol agent, *Pseudomonas fluorescens* was used by farmers mainly for seed treatment. The major pests were leaf folder, stem borer, BPH and rice bug in low to high intensities. Flubendiamide, chlorantraniliprole, cartap hydrochloride and synthetic pyrethroids were commonly used insecticides. In general, problems faced by rice farmers are acute labour shortage, high labour cost, climate variability and crop damage due to attack of vertebrate pests particularly wild boar. High yielding, short/medium duration varieties with resistance to drought, lodging and bacterial blight are immediate requirements. In specific ecosystem such as kule lands farmers requested to develop farm machineries suited to marshy fields.

Maharashtra: Production oriented survey was conducted in the Konkan region of Maharashtra which is predominant rice growing belt. The region comprises of five districts viz. Thane, Raigad, Palghar, Ratnagiri and Sindhudurg. Weather conditions were in general favourable for rice cultivation in the region. In few places in Raigad district there was heavy rainfall in the month of July and in Palghar district in some places, there was heavy rainfall in the month of September resulting in lodging of the crop and delay in harvesting. Commonly cultivated varieties were HYVs like Jaya, Jordar, YSR, Ankur Rupali, MTU 1010, Karjat# -2, 3, 5, 7, 8, 184, Daptari-125, Om shriram, Daptari 100, Komal 101, Spriha 911, Shriram, Jai Shriram, Suvarna, Trupti, Sairam, Jyotika, Sonam, Ratnagiri-1, Ratnagiri 24/711, Ratnagiri-5, HMT Sona, Ankur Sonam, Vijaya, Shubhangi, Mahsuri, Silky 277, Shatayu, Poonam, Samba Mahsuri, Saurabh Vaishnavi, Ratna, Indrayani, Jyothi and Vada Kolam and hybrids like Arize 6444, Kaveri KPH 9090, NPH 242, NPH 30, Syn NPH 5251, Sahyadri, Sahyadri-1, Sahyadri-3, Sahyadri-4, Upaj, Ankur-744, Loknath-509, Loknath-505, Ankur 7434, Ankur 7576, Suruchi and Gorakhnath. The most common cropping pattern adopted by farmers in the region is Rice-Fallow, Rice-Pulses, Rice-Vegetables, Rice groundnut and rice-finger millet. Pulses after Kharif rice on residual moisture is a common practice in Palghar, Raigad, Thane and Ratnagiri districts. The average seed replacement ratio in the region during Kharif 2022 was 44% (according to Maharashtra state agriculture department). Average rice yield was low in the region and ranged from 2000-3000 kg/ha. Average per capita consumption of rice per month was 4-6 kg rice. More

than 85% of the farmers contacted told that their main meal consisted of both rice and wheat. Average seed rate used by the farmers ranged from 30-40 kg/ha. About 18-75% farmers in different districts told that they treated the seeds with thiram or carbendazim or Captan. Some of the farmers told that they purchased fungicide treated seeds. Fertilizers were applied @ 11.5-182 kg N/ha, 7-75 kg P₂O₅/ha and 7-75 kg K₂O/ha. None of the farmers contacted applied zinc sulphate. Many farmers used complex fertilizers like 15:15:15 18:18:18 and 19:19:19. Few farmers applied only urea. Overall, intensity of weeds was low to medium. None of the farmers contacted applied any herbicides and all of them followed 1-2 hand weeding for managing the weed problem. Some of the common needs of the farmers were subsidy on inputs, good market price, irrigation facilities, financial support, low cost mechanization and availability of seeds and fertilizers in time. During 2022, intensity of most of the diseases was low to moderate except bacterial blight was high in different fields in Thane, Raigad and Palghar. Intensity of different insect pests like stem borer, mealy bugs, gall midge, cundhi bug, army worm, rice hispa and blue beetle was in low to moderate intensities. Very few farmers adopted plant protection measures.

Punjab: Production oriented survey was conducted in 14 districts of Punjab viz., Fatehgarh Sahib, Ludhiana, Patiala, SAS Nagar, Rupnagar, Hoshiarpur, Faridkot, Moga, Firozpur, Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur during tillering to heading stage. The fields surveyed were under irrigated ecosystem. The climatic conditions were favourable for rice cultivation. During *Kharif-2022* in Punjab state, paddy was cultivated on an area of around 30 lakh hectares of which 80 percent area was under non-Basmati rice and 20 percent area was under Basmati rice. Among non-basmati rice, PR126 was the most popular variety occupying 22 per cent area. Other popular non-Basmati varieties cultivated in the state were PR 121, PR128, PR 130, PR 131, PR 122, PR 114 and Pusa44. Pusa Basmati 1121 was most popular variety among basmati rice followed by Pusa Basmati 1718, Pusa Basmati 1509 and Punjab Basmati 7. Predominant crop rotation remained the rice-wheat system. Average rice yield among the HYVs ranged from 6000-9000 kg/ha while in case of basmati varieties, the yield ranged from 3500-5000 kg/ha. Most of the farmers used 12-15 kg/ha of seed rate for nursery sowing but for direct seeding they used 15-20 kg seed per ha. On an average 37% farmers in different districts told that they adopted seed treatment. Very few farmers applied organic manure in the nursery. However, most of them applied chemical fertilizers. During Kharif 2022, an area of about 2.0 lakh ha was under direct seeded rice (DSR), whereas rest was under puddled transplanted rice. Most of the surveyed farmers used over dose of nitrogen but many farmers skipped the application of P₂O₅ and K₂O in paddy crop, owing to higher status of these nutrients in their soils. Some farmers applied P₂O₅ in transplanted paddy fields. Application of Zinc sulphate (either 21 or 33%) is practiced by farmers. Overall, intensity of weeds was low-medium throughout Punjab. Herbicide application was main method of weed management. Overall intensity of different diseases and insect pests was low to moderate. Intensity of SRBSDV (Southern Rice Black Streak Dwarf Virus) was recorded in higher intensity in parts of Fatehgarh Sahib and Hoshiarpur district. Most of the farmers adopted chemical plant protection measures.

Tamil Nadu-1 (Aduthurai): Production oriented survey was conducted in fourteen districts of Cauvery delta zone in Tamil Nadu viz., Thanjavur, Thiruvarur, Nagappattinam, Mayiladuthurai, Tiruchirappalli, Ariyalur, Pudukkottai, Perambalur, Cuddalore, Villupuram, Vellore, Thiruvannamalai, Kancheepuram and Thiruvallur. Area under rice was marginally increased because of normal rains in the state. Commonly cultivated varieties were ADT 36, ADT 43, ADT

(R) 45, TKM 13, CR 1009 Sub 1, ADT 38, ADT 39, ADT (R) 46, ADT (R) 49, CO 43, CO 51, NLR 34449, CO (R) 51, Improved White Ponni, CR 1009 and BPT 5204. Commonly followed cropping sequences in the region were Rice-rice-pulses/gingelly, rice-pulses, rice-rice-rice, rice-sugarcane-rice, rice-onion and others. Pest and disease incidences were noticed in all districts. Among the insects, leaf folder, stem borer, BPH, thrips, gall midge were recorded. Mild incidence of bacterial leaf blight, false smut, blast, sheath blight, sheath rot, bacterial leaf streak diseases were recorded. Labour scarcity was the major constraint to the farmers. Farmers from certain places reported that inputs were not available in time.

Tamil Nadu-2 (Coimbatore): In the Production Oriented Survey (POS) programme during the year 2022-23, eight districts viz., Erode, Coimbatore, Dharmapuri, Thiruvannamalai, Karur, Dindigul, Tenkasi and Salem were surveyed. Good monsoon from both South West and North East monsoon after long gap ensured very good coverage in Kuruvai and Samba seasons. Farmers solely depended on canal irrigation were able to cultivate rice during Kuruvai season. During 2022-23, short and medium duration varieties were generally chosen by the farmers for cultivation. Seed rate used by the farmers were varied from 50 to 70 kg per hectare. Seed rate of 10 kg/ha was adopted by farmers wherever the SRI method of cultivation was practiced. Herbicides butachlor (pre-emergence) and bispyribac sodium (early post-emergence) were used along with one or two hand weeding for the control of weeds. Cono weeder was used by the farmers who adopted SRI method of rice cultivation. Complex fertilizers containing 17:17:17 (NPK) was applied by the farmers along with DAP as basal fertilizers. Urea and potash along with neem cake 50 kg/ha was also applied as top dressing in some of the rice growing areas. Micro nutrients, ZnSO₄ were also applied as basal fertilizer by many farmers. Zinc deficiency was noticed in some pockets. Farmers are facing insufficient labour for rice cultivation. Machine planting method of cultivation was also observed in few places in the surveyed district. In the mechanized cultivation farmers are using the agricultural implements viz., power tiller, tractor and machine harvester. In most of the places, farmers are advised by the pesticide dealers for the usage of fertilizers, pesticides and seed. Mechanical planter was used in some pockets where labour shortage was acute particularly in Delta districts. Harvesting is done by combine harvester and the use of combine harvester is gaining momentum among the various categories of farmers and getting an average yield of 5000-7000kg/ha. Stem borer, Blast and bacterial blight emerged as major biotic problems during this year. Farmers used different pesticides for management of biotic stresses. Seed treatment with *Bacillus subtilis* @ 10 gm/kg was practiced by several farmers across the state. Inadequate price, delayed water supply in tail end areas due to poor canal maintenance and labour shortage are the common constraints faced by many farmers. Farmers are in need of premium varieties with short duration which can fetch higher prices in the market and non-lodging type suitable for machine harvest.

Telangana: Survey of rice growing areas was conducted in 11 districts viz., Nizamabad, Kamareddy, Karimnagar of Northern Telangana Zone, Siddipet and Khammam of Central Telangana Zone, Yadadri Bhuvanagiri, Rangareddy, Mahabubnagar, Wanaparthy Nagarkurnool and Nalgonda of Southern Telangana Zone covering 53 villages. Overall, the weather conditions are highly favorable for growth of paddy crop. However, excess rainfall in September and October months posed the several biotic constraints in paddy. The major fine varieties grown in the surveyed districts during *kharif*, 2022 were Samba Mahsuri (BPT 5204), Telangana Sona (RNR

15048), Jai Sreeram type (Cintoo, Pooja, Sriram gold, Ankur Sona, Super Aman, Sowbhaya, Aman gold), HMT Sona, MTU 1061, MTU 1262, MTU 1224, MTU 1064, RNR 21278, MTU 1271 and other fine varieties, whereas coarse varieties are Kunaram Sannalu, MTU 1010, IR 64, Jagtial Rice-1, Tellahamsa, Bathukamma, MTU 1061, MTU 1153, MTU 1156, 7029 and MTU 1001 *etc.*, whereas the private hybrids grown particularly in Yadadri Bhuvanagiri, Musi belt of Ranga Reddy and Nalgonda districts were Kaveri 272, Kaveri 175, VNR 22258, Rasi 113, Mahindra 303, Kaveri 468, 27P31, RX 100 and Bio 799 during *rabi* season. Rice-rice was the predominant cropping system in all the surveyed districts varying from 80-90%. The other systems were green manure-rice-rice, rice-fallow, rice-pulses, rice-sesame, rice-zero tillage sunflower, rice-rice-vegetables depending on the water availability and other factors. In Telangana state, the coarse grain varieties occupied 63.72% of total area during *kharif*, 2022, whereas fine grain varieties occupied only 36.28% of the total area. The farmers are adopting the seed rate of 50-60 kg/ha for fine grain varieties, whereas 75 kg/ha for coarse grain varieties in transplanting method. About 8-12% farmers adopted seed treatment. Majority of the farmers are applying the complex fertilizers (50-150 kg/acre) as basal followed by top dressing of Urea (150-200 kg/acre) in 2-3 split doses at tillering stage, booting and just before panicle initiation depending on duration of the varieties, while potash is applying in the form of MOP (15-50 kg/acre). The use of DAP was drastically reduced in the surveyed villages due to cost of the fertilizer or non-availability. Some farmers have also applied nono-urea. Intensity of common weeds like *Echinochloa colanum*, *E. crusgalli*, *Cyandon dactylon*, *Cyprus rotundus*, *Leersia hexandra*, *Panicum ripens*, *Euphorbia spp.* and *Parthenium spp.* was low to medium. Majority of the farmers used different herbicides for the management of different weeds. The insect-pests scenario across the surveyed districts revealed that, incidence of insect-pests is comparatively less during *kharif*, 2022 except gall midge and yellow stem borer (white ears) in some parts. Among the diseases, bacteria blight was severe in some parts. Severe neck blast was observed in some parts of Mahboobnagar district. Abiotic stresses like salinity, cold injury and sulphide injury was observed during *rabi* in parts of Karimnagar and Siddipet.

Uttar Pradesh: Production-oriented survey of rice growing areas was conducted in the Ayodhya, Sultanpur, Ambedkar Nagar, Barabanki, Basti, Sant Kabir Nagar and Siddharthnagar districts of eastern Uttar Pradesh from tillering to maturity stage. Initially rainfall was very less up to the month of August and as a result, some resource poor farmers could not save their crop from drought. Commonly cultivated varieties were HYVs like Sarjoo 52, BPT 5204, NDR 97, Samba Mahsuri Sub 1, Purva, Khushi 27, NDR 359, NDR 2064, NDR 2065, Swarna, Pusa Basmati 1, Damini, KN-3, Chintu, KN3, Kalanamak Kiran, Sampoorana, and Moti and hybrids like Arize 6444 Gold, 27P63, Kaveri 9090, 27P65, 27P67, Dhanya 8666, Bayer 6633, Syngenta 6302, Gorakhnath-509, 27P31. Major crop rotations followed by the farmers were rice-wheat, rice-sugarcane rice-mustard, rice-pulses, rice-potato and rice-vegetables. Average rice yield among different HYVs and hybrids ranged from 3000-5600 kg/ha while in case of aromatic short grains the yield was 1900-3000 kg/ha. Average per capita consumption of rice per month was 3.5-5.5 kg rice and 100% of the farmers contacted told that their main meal consisted of both rice and wheat. Majority of the farmers preferred polished rice over parboiled rice. Average seed rate used by the farmers ranged from 28-35 kg/ha for HYVs while in case of hybrids it was 15 kg/ha. About 12.5-25% of the farmers contacted from Ayodhya, Sultanpur, Basti, Sant Kabir Nagar and Siddharth Nagar told that they adopted seed treatment with carbendazim. Application of FYM was common in both nursery

and main fields. In the main fields, fertilizers were applied @ 100-130 kg N/ha, 40-65 kg P₂O₅/ha and 40-65 kg K₂O/ha. Overall intensity of weeds was low to medium. Majority of the farmers contacted applied herbicides and all of them also adopted hand weeding for the management of weeds. Some of the common needs of the farmers were timely availability of seeds HYVs, timely availability of fertilizers and other inputs, medium duration HYVs, marketing facility, technical assistance. Overall, the incidences of different diseases like brown spot, sheath blight, false smut and bacterial blight were low to moderate. Among the insect pests, stem borer, leaf folder, gundhi bug and green leaf hoppers were observed in low to moderate intensities. On an average 50% of the farmers contacted adopted plant protection measures. In many places, deficiency symptoms of zinc and sulphur were observed. Some of the common problems were shortage of labours and their high wages, damage by stray animals, poor electricity supply, unavailability of fertilizers and quality seeds in time and micronutrient deficiency.

Uttarakhand: Production oriented survey was conducted in two rice growing districts of Uttarakhand viz., Udham Singh Nagar and Nainital at crop maturity. In Nainital, survey was mainly conducted in Bhabarplain including foot hills, and lower hills (rainfed and irrigated) at crop maturity. Major rice varieties cultivated by the farmers in plains were HYVs like PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130, NDR 359 and Pant Dhan 23 and basmati or scented rice varieties like Pusa Basmati 1509, Pusa Basmati 1121 and Pant Sugandh Dhan 27. While in lower hills, varieties like Govind, VL Dhan 210 and VL Dhan 211 were cultivated by the farmers. Common crop rotations followed by the farmers in the plains were adopted rice-wheat, rice-sugarcane, Sugarcane-toria/lentil-sugarcane and maize-wheat-rice-vegetable pea. In plains, farmers applied recommended dose of fertilizers (120 kg N/ha, 60 kg P₂O₅/ha and 40 kg K₂O/ha). In general, crop conditions were good in irrigated areas of plain. Expected rice yield was 4.5-5 t/ha. Most of the farmers applied zinc sulphate (either as basal or foliar). Majority of the farmers in plains applied weedicides like pretilachlor (pre-emergence) and bispyribac sodium (post-emergence) at most of the places. Diseases like blast, sheath blight, brown spot, false smut, sheath rot and bacterial blight were observed in low to moderate intensity while insect pests like stem borer, leaf folder, BPH and WBPH were observed in low to moderate intensities. Mysterious rice dwarfing problem with less than 1% incidence was also noticed at few places in US Nagar. Most of the farmers used cartap hydrochloride, Fipronil and chlorantraniliprole to control stem borer and thiamethoxam or acephate to manage hoppers. Fungicides like hexaconazole, propiconazole, validamycin, azoxystrobin + difenoconazole were used by some of the farmers to manage different rice diseases.

West Bengal-1 (Bankura): Production oriented survey was conducted in three rice growing districts of this part of West Bengal viz., Bankura, Purulia and Purba Medinipur when the crops were in dough to maturity stage. Most of the fields surveyed were under rainfed (upland or lowland) ecosystem. In general, weather conditions were favourable for rice cultivation. Predominant rice varieties were Swarna, Lalat, MTU-1017, MTU-1010, GB-1, Super Shyamali, MTU 1001 and Sahabhazi Dhan. Some other varieties primarily found in Purba Medinipur district were IR 36, BB-11, GS-4, Pratik, CR 1009, SS-1, Mali-4, MTU 1075, CR 1018, IET 4756, IET 1064, Rajendra Bhagwat, IET 23467, Sabita, CR 1017, IET 4786 and MTU 1153. Varieties like Lalat, MTU 1010, Super Sankar, IET 4786, GMS 386, Super Lalat, IR 64, WGL 20471 and MTU 1156 were cultivated during boro season. Common crop rotations followed by the farmers were rice-mustard, rice-mustard-fallow, rice-lathyrus, rice-pulse, rice-rice, rice-vegetables, rice-fallow

and rice-flowers. Average rice in farmers' field ranged from 3500-6000 kg/ha in case of HYVs. Average per capita consumption of rice per month was 6-12 kg rice. About 54-80% of the farmers contacted told that their main meal consisted of both rice and wheat. In general, planting was done from middle of July to middle of August. Average seed rate ranged from 30-45 kg/ha. Practice of seed treatment was not very common among the farmers. Farmers applied FYM and chemical fertilizers in the nursery. Planting was random where proper plant population per unit area was not maintained. Fertilizers were applied @ 20-110 kg N/ha, 12-55 kg P₂O₅/ha and 12-45 kg K₂O/ha. Very few from Purba Medinipur applied zinc sulphate as foliar application. Overall, intensity of weeds was low to medium. Most of the farmers practiced one to two hand weeding for managing weeds. Some of the common needs of the farmers were good market facility, improvement in irrigation facilities, timely availability of good quality seeds, fertilizers and other inputs, availability of farm labours, drought/submergence tolerant rice varieties, short duration varieties and lodging resistant rice varieties. Diseases like blast, neck blast, sheath blight, false smut, grain discoloration and insect pests like stem borer were recorded in low to moderate intensities. However, intensity of brown spot and bacterial blight was more in some fields in Purba Medinipur. Farmers applied different pesticides for management of different biotic stresses.

West Bengal-2 (Chinsurah): Production oriented survey was conducted in four districts of this part of West Bengal viz. Nadia, Howrah, Hooghly and Purba Bardhaman when the crops were in heading to maturity stage. Most of the fields surveyed were under irrigated ecosystem while some fields were under upland or rainfed lowland ecosystem. In general, weather conditions were not very favourable for rice cultivation as there was incidences of drought like situations in early part of the season resulting in delayed planting. Commonly cultivated varieties were HYVs like Swarna (MTU 7029), Lalat, Khitish, Swarna Sub-1, Kanak, GS-4, Bullet, Ratna, Jamuna, MTU 1017, CR 1017, Shatabdi (IET 4786), Swarna Sub-1, Pratiksha, CR Dhan 800, RajendraMahsuri, IET 4096, MTU 1001 and MTU 1010. Some farmers also cultivated hybrids like Arize 6444 Gold, Arize 6129 Gold, Arize 6201, KRH 2, Bio 453 and PAC 8744. Common crop rotation practices followed by farmers were rice-mustard, rice-jute, rice-onion-rice, rice-rice-jute, rice-mustard-vegetables, rice-pulses, rice-vegetables-rice, rice-potato-rice, rice-potato-sesame, rice-mustard-rice and rice-fallow. Average per capita consumption of rice per month was 4-15 kg rice. More than 90% of the farmers from Nadia and Purba Bardhaman told that they consumed only rice while about 80% of the farmers contacted from Howrah and Hooghly told that their main meal consisted of both rice and wheat. Average seed rate used by the farmers ranged from 30-80 kg/ha for HYVs while in case of hybrids it was 15-20 kg/ha. About 50% of the farmers contacted adopted seed treatment. Some farmers told that they treated the seeds with *Trichoderma* formulation. Planting was done from 1st week of July to 3rd week of August. In many areas planting was delayed due scarcity of rain in early part of the season. In the main fields, fertilizers were applied @ 50-175 kg N/ha, 40-100 kg P₂O₅/ha and 37.5-75 kg K₂O/ha. Overall intensity of weeds was low to medium except in Nadia where weed intensity was recorded high in some places. Hand weeding was a common practice for weed management in the surveyed districts. However, some of the farmers used herbicides like pretilachlor, Saathi (pyrazosulfuran Ethyl), pendimetalin, bispyribac Sodium and paraquat for weed control. Some of the common needs of the farmers were proper supply of electricity for irrigation, subsidy in fertilizers and seeds, availability of solar pump and biofertilizers, improvement in irrigation facilities, timely availability of power tillers and tractors on hire basis, proper availability of labours, timely availability of seeds and other inputs and

technical knowledge in vermicompost preparation. Overall, the incidences of different diseases were low to moderate except high incidence of sheath rot was recorded in some fields in Purba Bardhaman. Among insect pests stem borer was very wide spread in moderate to high intensity. High intensity of BPH was also recorded in some fields of Purba Bardhaman. Majority of the farmers adopted chemical plant protection measures.

Table 1: Production oriented survey, 2022-2023: Name of the state, districts surveyed, survey period and survey personnel

State/Region	District surveyed	Survey period	Survey Personnel
Andhra Pradesh	East Godavari, Kakinada, Konaseema, Eluru and West Godavari	November, 2022	R.A.R.S (ANGRAU), Maruteru-534 122, Andhra Pradesh Dr. V. Bhuvaneswari, Sr. Scientist (Plant Pathology) Dr. P V. Ramana Rao, Sr. Scientist (GPBR) Dr. A D V S L Anand Kumar, Scientist (Entomology) Dr. M. Ramabhadra Raju, Sr. Scientist (Pl. Pathology) Dr. A. Rajesh Kumar, SMS (Crop Prot), KVK, Undi Dr. Phani Kumar, Coordinator, DAATTC, Eluru ADAs, A.Os and Department Staff of five districts
Bihar	Samastipur, Darbhanga and Muzaffarpur	Kharif, 2022	Dr. R. P. Central Agricultural Univ, Pusa, Bihar-848125 Dr. R. K. Ranjan, Assistant Professor (Rice Pathology)
Chhattishgarh	Gariaband, Balod, Janjgir, Korba and Sarguja		IGKV, Raipur-492012 Dr. P. K. Tiwari, Pr. Scientist, Pl Path Dr. Sanjay Sharma, Pr. Scientist, Entomology Dr. Sunil Nair, Pr. Scientist, Genetics & Pl Breeding Dr. H. L. Sonboir, Principi Pl Scientist, Agronomy Dr. Abhinav Sao, Asst. Prof, Plant Breeding Dr. Dipak Gauraha, Sr. Scientist, Genetics & Pl. Breeding
Gujarat	Ahmedabad, Anand, Dang, Kheda, Mahisagar, Navsari, Valsad, Panchmahals, Vadodara, Surat and Tapi	Sept 9, 26; Oct 1, 4, 12- 14; Nov 7, 11, 14, 17, 19; 2022	Main Rice Research Station, AAU, Nawagam-387 540 Dr. M. B. Parmar, Research Scientist, Rice I/C Dr. Rakesh K Gangwar, Asso. Res Scientist (Pl Pathology) Dr. D. G. Kachha, Asst Res Scientist (Agronomy) Sr. S. G. Patel, Asst. Res Scientist (Pl Breeding) Dr. D. B. Prajapati, Asso. Res Scientist (Pl. Breeding) Shri S. S. Thorat, Asso. Res Scientist (Entomology)
Haryana	Kaithal, Kurukshetra, Karnal, Jind, Jamunanagar, Ambala, Panipat and Sonapat	Aug 22, 24; Sept 7, 29, 30; Oct 1, 21; 2022	CCS HAU, Rice Research Station, Kaul 136 021 Dr Mahaveer Singh Bochalya, Plant Pathologist Dr. Sumit Saini, Entomologist Dr. Rakesh Kumar, Plant Breeder Dr. Amit Kumar, Agronomist
Himachal Pradesh	Kangra, Mandi, Shimla, Bilaspur, Hamirpur and Sirmour	Aug 30; Sept 3, 16; Oct 10-13; 2022	Rice and Wheat Research Centre, CSKHPKV, Malan, Kangra-176 047 Dr. A. D. Bindra, Principal Scientist, Agronomy Dr. D.P. Pandey, Principal Scientist, Plant Breeding Dr. Neelam Bhardwaj, Scientist, Plant Breeding Dr. Sachin Upmanyu, Scientist, Plant Pathology

Production Oriented Survey-2022

State/Region	District surveyed	Survey period	Survey Personnel
Jammu & Kashmir	<i>Jammu, Samba and Kathua</i>	Oct 19-21; 2022	SKUAST-Jammu, Chatha-180 009, Jammu Dr. Vijay Bahadur Singh, Chief Scientist, Pl. Path Dr. Ravinder Singh Sudan, Chief Scientist, Pl. Breed Dr. Rajan Salalia, Chief Scientist, Entomology Dr. Bupesh Kumar, Asst. Prof., Plant Breeding Dr. Sanjay Khajuria, Head, KVK, Samba Dr. Vishal Sharma, SMS, Agronomy, KVK, Karhua
Karnataka	Shivamogga, Hassan, Chikkamangalur, Mandya, Mysuru, ChamaraJanagara, Madikeri, Davangere and Tumkuru	Oct 20; Nov 21; Dec 8, 9, 21, 27; 2022 Jan 24; 2023	ZARS, VC Farm, Madya-571405, Karnataka Dr. V. B. Sanath Kumar, Prof. Plant Pathology Dr. G. R. Denesh, Agronomist Dr. M. S. Kitturmatt, Entomologist Dr. A. Deepak, Rice Breeder Dr. H. R. Savitha, Soil Scientist
Kerala	Palakkad, Thrissur and Malappuram	September 2022 to February 2023	RARS, Pattambi, Kerala- 679 306 Dr. P. Raji, Professor (Plant Pathology) Dr. Karthikeyan.K, Professor (Entomology) Dr. Biji K.R, Asst Professor (Pl Breed and Genetics) Dr. Malini Nilamudeen, Asst. Prof (Entomology) Dr. Sumbula Asst. Professor (Pl. Pathology) Dr. Jiji Allen Asst. Professor (Horticulture) Ms. Hani Babu, Asst Professor (Pl Breed & Genetics), Ms. Ashwathy T.S. Asst. Professor (Horticulture) Ms. Roshny Vijayan, Asst Prof (Pl Breed & Gen) Ms. Nisha N.S, Assistant Professor (Plant Physiology) Ms. Ramjitha P Asst Prof (Pl. Biotech & Mol. biol) Mr. Tijesh V, Lab Assistant Ms Fathima Fairroosa, Farm Officer Mr. Vipin B Anilkumar (Farm Officer) Ms Mirfath E K, Instructor, IAT and RARS, Pattambi Ms. Mirfath (Agrl. Instructor, IAT & RARS Pattambi Ms Veena Viswan, Skilled Assistant Ms. Anupama Skilled Assistant Department of Agriculture Ms. Reshma Francis, Agricultural Officer, Anthikkad Mr Randeep K. R, Agricultural Officer, Thanniyam Ms. Lintu P Agricultural Officer, Pattancherry Ms. Rajeena Vasudevan, Ag off. Perinthal manna KB Mr. Sakker, Agricultural officer Mankada KB Ms. Risa Mol, Agricultural Officer, Mullassery Ms Jisha V, Agricultural Assistant, Chazhur Sri. Satheesh Agricultural Assistant, Pattancherry Sri. Sreejith Agricultural Assistant, Koduvayoor Ms. Oormila, Agricultural Officer, Koorkanchery Mr Arjun, Agricultural Officer, Paralam Ms Fathima, Agricultural Assistant, Cherpu Ms. Riya Joseph, Agricultural Officer, Tholur Ms. Aswathi Gopinadhan, Agricultural Officer, Adat Mr. Rajive, Ag Assistant, Perinthal manna KB. Ms. Babitha, Agricultural officer Puzhakkattitri KB Mr. Siddique, Ag Assistant, Puzhakkattitri KB Ms. Jayanthi Agricultural Assistant Kuruva KB

Production Oriented Survey-2022

State/Region	District surveyed	Survey period	Survey Personnel
Maharashtra	Thane, Raigad, Palghar, Ratnagiri and Sindhudurg	Oct 11, 13-15, 27; Nov 1, 3, 4, 16; 2022	RARS, KARJAT, Raigad, Maharashtra 410201 Dr. (Smt.) P. D. Patil, Plant Pathologist Dr. V. N. Jalgaonkar, Entomologist Dr. S. B. Gangawane, Agronomist Dr. J. P. Devmore, Jr. Rice breeder
Punjab	Fatehgarh Sahib, Ludhiana, Patiala, SAS Nagar, Rupnagar, Hoshiarpur, Faridkot, Moga, Firozpur, Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur	Khariif, 2022	Punjab Agricultural University, Ludhiana-141004 Dr. R. S. Gill, Principal Rice Breeder Dr. Jagjeet Singh Lore, Principal Plant Pathologist Dr. P. S. Sarao, Principal Entomologist Dr. Buta Singh Dhillon, Agronomist Dr. Jyoti Jain, Plant Pathologist Dr. Rupinder Kaur, Principal Rice Breeder Dr. Renu Khanna, Plant Breeder Dr. Navjot Sidhu, Plant Breeder Dr. Gurpreet Kaur, Agronomist
Tamil Nadu-1 (Aduthurai)	Thanjavur, Thiruvavur, Nagappattinam, Mayiladuthurai, Tiruchirappalli, Ariyalur, Pudukkottai, Perambalur, Cuddalore, Villupuram, Vellore, Thiruvannamalai, Kancheepuram and Thiruvallur	Nov 23, 24, 30; Dec 28; 2022 Jan 2; 2023	TNRRI, TNAU, Aduthurai-612 101, Tamil Nadu Dr. K. Rajappan, Professor (Plant Pathology) Dr. S. Elamathi, Associate Professor (Agronomy) Dr. P. Anandhi, Associate Professor (Entomology) Dr. M. Dhandapani, Assistant Professor (PB&G) Dr. R. Pushpa, Assistant Professor (PB&G)
Tamil Nadu-2 (Coimbatore)	Erode, Coimbatore, Dharmapuri, Thiruvannamalai, Karur, Dindigul, Tenkasi and Kallakurichi	Nov 2022 to Jan 2023	TNAU, Coimbatore - 641 003. Tamil Nadu Dr. S. Manonmani, Professor and Head, Dr. C. Gopalakrishnan, Professor (Plant Pathology) Dr. R. Pushpam, Professor (PB&G) Dr. K. Suresh, Associate Professor (PB&G) Dr. G. Senthil Kumar, Assoc Professor (Agronomy) Dr. N. Sridharan, Assoc Professor (Crop Physiology)
Telangana	Nizamabad, Kamareddy, Karimnagar, Siddipet, Khammam, Yadadri Bhuvanagiri, Rangareddy, Mahabubnagar, Wanaparthy, Nagarkurnool and Nalgonda	Sept 11, 22-23, 26; Oct 7, 11, 14, 18, 27; Nov 4, 10, 25; 2022 Jan 24, 21; Feb 1, 6, 24; March 1; 2023	Rice Research Center, ARI, Rajendranagar, Hyderabad-30, TS Dr. T. Kiran Babu, Scientist (Pl. Path.), Dr. N.R.G. Varma, Principal Scientist (Ento) Dr. Y. Chandramohan, Pr. Scientist (Pl. Br.) Dr. L. Krishna, Pr. Scientist (Pl. Br.) Dr. P. Spandana Bhatt, Scientist (Agro) Dr. P. Raghu Rami Reddy, PS (Rice) and Head Dr. K. Ravi Kumar, Dr. J. H. Kumar, KVK, Wyr Dr. S. Naveen Kumar Dr. B. V. Raj Kumar Sri. P. Vijay Kumar Dr. S. Sridevi, ARS, Tornala Dr. J. Vijay, DAATTC, Tornala Dr. Ramakrishna Babu, Coordinator, DAATTC, Mahbubnagar Scientists from Research Stations, DAATTCs and KVKs of PJTSAU DAO, ADAs, MAOs and AEOs of concerned districts.

Production Oriented Survey-2022

State/Region	District surveyed	Survey period	Survey Personnel
			Progressive farmers Print and electronic media
Uttar Pradesh	Ayodhya, Sultanpur, Ambedkar Nagar, Barabanki, Basti, Sant Kabir Nagar and Siddharth Nagar	Sept 13, 29, 30 Oct 1, 7, 8, 11, 28, 29; 2022	Crop Research Station, Masodha-224 133 (ANDUAT), Ayodhya, Uttar Pradesh Dr. V. Prasad, Pathologist & Team Leader Dr. D.K. Dwivedi, Officer In-charge Dr. Saurabh Dixit, Rice Breeder Dr. S. K. S. Rajpoot, Asstt. Entomologist Sri Birender Kumar Singh, Field Assistant Sri Akhilesh Kumar Singh, Field Assistant Dept. of Agriculture, Govt. of U.P.
Uttarakhand	Udham Singh Nagar and Nainital	Kharif 2022	GBPUA&T, Pantnagar-263145, Uttarakhand Dr. Bijendra Kumar Associate Professor, Plant Pathology
West Bengal-1 (Bankura)	Bankura, Purulia and Purba Medinipur	Nov 21, 22, 29	Rice Research Station, Bankura-722101, WB Dr. Chandan K Bhunia, Plant Pathologist & JDA Dr. G. K. Mallick, Economic Botanist Dr. V. Mandi, Asst. Botanist Sri G. Sardar, Jr. Soil Scientist Sri M. Bandopadhyay, Investigator
West Bengal-2 (Chinsurah)	<i>Nadia, Howrah, Hooghly and Purba Bardhaman</i>	Nov 4, 9, 21; 2022; Jan 2; 2023	Rice Research Station, Government of WB, Chinsurah 712102 Dr. Dilip Patro, Plant Pathologist Dr. Rajib Das, Asst. Botanist Dr. Keya Banerjee, Asst. Agronomist Dr. Chiroshree Ganguli, Asst. Entomologist Dr. Suparna Gupta, Asst. Botanist Dr. Kaushik Majumdar, Jr. Soil Scientist Dr. Suman Debnath, Asst. Botanist Dr. Arindam Ghosh, Asst. Botanist Dr. Mitali Kundu, ADA, Uluberia I Dr. Suresh Chatterjee, Asst. Entomologist Dr. Mitali Chatterjee, Asst. Botanist

Table 2: Widely prevalent rice varieties cultivated in surveyed districts of India during 2022-2023

Districts	Varieties
Andhra Pradesh	HYVs: MTU 7029 (Swarna), MTU 1318, PLA 1100, MTU 1064, MTU 1061, Sampada Swarna, RGL 2537, BPT 5204, RP Bio 226, MTU 1262, MTU 1224, NP 9558, Sadhana, Amulya, PR 126, SL 10, MTU 1001 and others
Bihar	HYVs: Rajendra Bhagwati, Rajendra Sweta, Rajendra Mahsuri, Sugandha, Swarna, Rajendra Nilam, Satyam, Parimal, Swarna sub-1, Rajendra Kasturi, Rajshree, BPT 5204, MTU-7029, Rajendra Subhasini and Dhanalaxmi; Hybrids: Arize 6444, 27P31, Arize 6129, PHB 71, Pusa RH-10, JK-401, JK-401, Panseeds hybrids, Hybrid 1001 AZ-6453, NK 5251, AZ-8433DT, Arize 6201, Hybrid 27P37, Hybrid-2731 and PA-6444
Chhattishgarh	HYVs/Improved: Swarna, Shri Ram, Asmita, MTU 1010, Jordar, MTU 1153, Mahamaya, Vishnubhog, HMT, DRK, OM 3, Vikram TCR (developed through IGKV-BARC collaboration), Indira Aerobic-1, Jadugiri, Komal, Bamleshwari, Tulsi, Saroj, Ankur Shree 101, Devbhog, Daftari Shree 1008, Ankur Sonam, Samba Mahsuri, Mahto, Ramjeera, Indira Barani, Summer King, Manju Gold, Swarna Sub-1, MTU 1001, Rajeswari, TrombayDubraj and others; Hybrids: Raja 44, US 362, ArizeDhani, Ankur 13555, Sava 7301, US 312, Suruchi, Mahendra 1233, KRH-1, Hybrid 2828 (Trust Grow Seeds), Arize 6444, Arize AZ 8433, Kaveri 468 and others; Local: Jeeraphool, Jawaphhol and others
Gujarat	HYVs: GR 7, GR 11, GNR 6, GNR-3, GNR-7, Gurjari, GAR 13, GAR 14, GR 101, GAR 14, Moti Gold, Sonam, Surya Moti, Pusa 1638, Kiran 3, Punjab S, Nath Pauha, Nath Pawan, Shri 101, JK Suraksha, MC-13, 716, Swetaand, Gangamani, Versha, Laxmi, GR 21, NAUR1, Gold 807, S 251, Vada Colum, Krishna Kamod, Sriram 125, Mahisagar, Moti, Masuri, Jaya, Desi colum, Ambemore, Dhanya Gold, Annapurna, Kaveri and Navtej, Hybrids: US-312, Arize-6111, KPH 471 (Kaveri), DRRH-3, Arize 6129 Gold, Siri 5123, PAC-807, Ankur2666, Hyb. 716, JKRH-2082, Hyb.745, Tara 786, Reshma, Gorakhnath, Syngenta S 9001, Hyb. 471, PAC 801, Syngenta S 9001, Kaveri, 2333, US-316, Arize6201, Kabir 508, Hyb. 5151, US 25 P 25, Pioneer varieties, Suruchi, Arize 6444, Buland 5050, MC-13 and others
Haryana	HYVs: PR 114, PR 121, PR 126, Pusa 44, PR 128, NDR 359, PR 129 and PR 201; Hybrids: 27p22, 90m100, Sava 134, Sava 127, Arize 6444, Hyb 359, Hybrid 117 (Rashi RRX 117), Hybrid 468, Sava 7501, Hybrid 8433, Hybrid 4040, Swift Gold, VNR 2111 Hyb. 7299, Hybrid (VNR) 2222, Arize 6129, Hybrid JKRH 2082, 25p35, Sava 7301, Hybrid 927, 28p67 and 27p31; Basmati/Scented: Pusa Basmati 1728, Pusa Basmati 1509, CSR 30, Pusa Basmati 1401, Pusa Basmati 1, Pusa Basmati 1692, Pusa Basmati 1718, Pusa Basmati 1121 and Pusa Basmati 1847
Himachal Pradesh	HYVs/Improved: Palam Lal Dhan-1, Him Palam Dhan-1, HPR 1156, HPR 2143, HPR 1068, HPR 2880, Sharbati, PR 121, Chhohartu, Pusa 44, PR 126, 128 and 129; Hybrids: Arize 6129, Arize 6444, Dhanya 834, Varsha Gold, Hyb. 25P35, PAC 807 plus, Hybrid 834, Hybrid 734, 748, 786, Sudha 999,

	Arize Swift Gold, Shree Ram Khushbu, Shahi Dawat, US 312, US 305, Hyb. 2266, SAWA 134, BULAND RAJA 88 and others; Basmati/Scented: Palam Basmati-1, Sugandha , Sharbati , CSR 30, Kasturi, Pusa Basmati 1509 and Pusa Basmati 1121
Jammu and Kashmir	HYVs/Improved: PR 131, Sarbati, Ch 1039, Jaya, PC 19 and others; Hybrids: Arize 6444, PHB 71, PAC802, Vijetha and others; Basmati/scented: Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129; Local: Lal Mundi
Karnataka	HYVs: Jyothi, IR64, MTU 1001, MTU 1010, Jaya, KPR1, JGL1798, RNR15048, Tanu, BR 2655, Cauvery Rice, Adithya, Amulya and C468, IET Sanna, Tunga, Super Amman, Kaveri Sona, Jaishree Sona, VNR2233 (Hybrid), JGL 1798, BPT 5204, Tella Hamsa, DR 8336, Meenakshi, GK Chethan, Sowbhagya, MPR 606, Virat Siri (hybrid) and Arize 6444 Gold (hybrid)
Kerala	HYVs: Uma, Jyothi, Jaya, Kanchana, Manurathna, Aathira, Aiswarya, ASD 16, Supriya, Matta Triveni, Kunju Kunju Varna and Ponmani, Scented rice varieties like Jeerakasala and Gandhakasala were grown in few pockets
Maharashtra	HYVs: Jaya, Jordar, Devaki, YSR, Rupali, MTU 1010, Karjat-3, Karjat-7, Karjat-5, Karjat-2, Daptari 108, Daptari 100, Daptari 125, Daptari, Suvarna, Krushidhan Komal 101, Spriha 911, Shabri, Ratna, Chintu, Yarana, Sonam, Masuri, Panvel-1, HMT Sona, Indrayani, Karjat-184, Punam, YSR, Shubhangi, Ankur Sonam, Gujrat-11, Ratnagiri-5, Swabhagya, Ratnagiri711, Pooja, Sadhana, Prasanna, 241, Karjat-8, Karjat -9, Palghar-1, R.J.95, Rupali, Amani, Sarthi, Jai Shriram, Ashmitha, Purva, Suprim Sona, Kanchan, Kuber, Radha, Ratnagiri 6, Ratnagiri-24, Bahubali, 2020, Ratnagiri 3, Ratnagiri -68, Shubhangi, Sonal, Sprihya, Suma, NPH 256, Awani, Kranti, Sarathi, Shubhangi, Ratnagiri 8, Avani, Devki, Rupali, Pranali, Vaishnavi, Trupti, Silky-277, Om Sairam, Gangotri, Puja, Coimbatore-51, Super Sona, Dapturi, Sindhu, Palghar-1, Avani, Laxmi, Shatayu, Shabari, Om Shriram and Jyotika; Hybrids: Arize 6444, Kaveri KPH 9090, NPH 242, Upaj, Sahyadri-1, Sahyadri-3, Surchi MRP 5629, Loknath – 509, Ankur 744, NK 5251, Ankur 7576, Suruchi, Sahyadri-4, Loknath 505, Ankur 7434, NPH 30 and Gorakhnath; Locals: Vada Kolam and Vada Zini
Punjab	HYVs: Pusa 44, PR 114, HKR 47, PR 129, PR 131, PR 122, PR 128, PR 126, PR 130, PR 121 and PR 114; Hybrids: Sava 134, Arize 6129 and Sava 127; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1401, Punjab Basmati 7, Pusa Basmati 1509, and Pusa Basmati 1718
Tamil Nadu-1 Aduthurai	HYVs: ADT 51, VGD 1, ADT 54, CR 1009 Sub 1, ADT 38, Savithiri, CO (R) 50, CO (R) 51, CO 43, ADT 39, BPT 5204, Swarna Sub 1, MTU 7029, TRY 3, NLR 34449, ADT 37, ADT 43, ADT 42, ADT (R) 46, ADT (R) 45, ADT 49, RNR, BPT 5204, TKM 13, IR 20, RNR 15048, MTU 1010, Mahendra, Improved White Ponni, Seeraga Samba, MDU 5, MDU 1271, CO 52 and some varieties from private companies

Tamil Nadu-2 Coimbatore	HYVs: CO 51, BPT5204, White ponni, ASD 16, ADT 49, ADT 53, CO(R) 51, Vasundra, Dhanuska, Archana, ADT 43, NLR 3449, ASD 16, Sadana, NLR, Anna 4, ADT 37, NLR, Tirupthi, Paiyur 1, Akshaya, ADT 39, Ponni, Amman, Sowbackya and Dhanista
Telangana	HYVs: Samba Mahsuri (BPT 5204), Telangana Sona (RNR 15048), Jai Sreeram type (Cintoo, Pooja, Sriram gold, Ankur Sona, Super Aman, Sowbhaya, Aman gold), HMT Sona, MTU 1061, MTU 1262, MTU 1224, MTU 1064, RNR 21278, MTU 1271, Kunaram Sannalu, MTU 1010, IR 64, Jagtial Rice-1, Tellahamsa, Bathukamma, MTU 1061, MTU 1153, MTU 1156, 7029 and MTU 1001; Hybrids: were Kaveri 272, Kaveri 175, VNR 22258, Rasi 113, Mahindra 303, Kaveri 468, 27P31, RX 100 and Bio 799
Uttar Pradesh	HYVs: NDR 97, NDR359, NDR2064, NDR2065, NDR 3112-1, Swarna, Narendra Lalmati, Sonam, Sarjoo 52, Sampoorana, Moti Gold, Pusa Basmati 1, Damini, Sambha Mahsuri, Purva, Khusi 27, BPT 5204, KN-3, Chintu, Swarna Sub-1, Dhanrekha, Chintu, Kiran, Jamuna, and Samba Mahsuri-Sub 1; Hybrids: Gorakhnath 509, US 305, Gorakhnath 510, Arize 6444 Gold, Dhanya 8666, Bayer 6633, Syngenta 6302, Kaveri 9090, VNR 2377, 27P63, 27P65, GangaKaveri, 27 P 31, Nandi 333, 27P67 and others; Locals: Kalanamak
Uttarakhand	HYVs: PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130, NDR 359 and Pant Dhan 23; Bhabar area: HYVs: Pant Dhan 11, Govind, Pant Dhan 18; Hilly area: HYVs: Govind, VL Dhan 210 and VL Dhan 211; Basmati/Scented: Pusa Basmati 1509, Pusa Basmati 1121 and Pant Sugandh Dhan 27.
West Bengal-1 Bankura	HYVs (Kharif): Swarna (MTU 7029), GB-1, IR 36, BB-11, GS-4, Pratik, Super Shyamali, CR 1009, SS-1, Mali-4, Banstara, Varsha, Gitanjali, Lalat, MTU 1010, MTU 1075, Sampriti, BB-11, Sahabhagi Dhan, IR 64, Parijat Ananda, CR-1018, IET 4756, IET 1064, MTU 1017, Rajendra Bhagawati, Santoshi, IET 23467, MTU 1001, Sabita, IET 4786 and MTU 1153, Boro: Lalat, MTU 1010, Super Sankar, IET 4786, GMS-386, Super Lalat, IR 64, WGL-20471, MTU 1156 and some hybrids; Local: Palui, Dudheswar and Raniakundi; Scented: Badshabhog; Few are cultivating private hybrids
West Bengal-2 Chinsurah	HYVs: Poushali, Swarna Mahsuri, GS-4, Santoshi, Mali-4, Bullet, Ratna, Jamuna, MTU 1017, CR 1017, Shatabdi, Lalat, Kanak, Lal Swarna, Swarna Sub-1, Swarna, Khitish, IR 64, MTU 1010, GB-1, GB-2, Pratiksha, CR Dhan 800, Rajendra Mahsuri, IET 4096, MTU 1001, MTU 1010 and others; Hybrids: Arize 6201, Arize 6444 Gold, Arize 6129 Gold, Bio 453, PAC 8744, KRH 2 and others; Local: Gobindobhog, Patnai, Madhuri and Nayanmani

Table 3: Biotic constraints (diseases) in different states of India during 2022

Sates	BI	NBI	BS	ShBI	ShR	FS	GD	StR	BAK	NBLS	Khaira	UDB	BLB	SRBSDV
Andhra Pradesh		L		L-M	L	L-M	L						L-S	
Bihar			L-M	L-M	L	L							L	
Chhattishgarh	L-M	L-M	L-M	L-S	L-M	L-S	L-S		L-M				L-S	
Gujarat	L-M	L-M		L-M	L-M	L-M	L-M						L-M	
Haryana	L-M	L		L-M		L-M	L		L-M		L		L-M	L-M
Himachal Pradesh	L-M	L-M	L-M	L-M	L-M	L-M	L-M			L-M				L-S
Jammu & Kashmir	L		M-S		L	M	M-S		L-M				M-S	M-S
Karnataka	L-M	L-S	L-M	L-M	L	L-M	L-M			L-M		T	L-M	
Kerala	M-S		L-S	M		L-M	L-M						M-S	
Maharashtra	L			L-M	L-M	L-M	L						L-S	
Punjab	L	L-M	L-M	L-M	L-M	L-M			L-M					L-S
Tamil Nadu-1 (ADU)	L			L	L	L							L	
Tamil Nadu-2 (CBT)	L-M	L-M	L-M	L	L	L							L-M	
Telangana-RNR	L-M	L-S	L	L-M		L	L-M						L-M	
UP (FZB)			L-M	L-M		L-M							L-M	
Uttarakhand	L	L	L-M	L-M	L	L-M	L						L-M	L
WB-1 (BNK)	L-M	L	M	M	L-M	L	L-M						M	
WB-2 (CHN)	L-M	L-M	L-M	M	L-S	L							L	

Low incidence of leaf scald in Himachal Pradesh; T-L incidence of BLS in Tamil Nadu (AdU)

BI: Blast, **NBI:** Neck Blast, **BS:** Brown spot, **ShBI:** Sheath blight, **ShR:** Sheath rot, **FS:** False smut, **GD:** Glume discoloration, **LS:** Leaf scald, **StR:** Stem rot, **NBLS:** Narrow brown leaf spot, **BAK:** Bakanae, **KSm:** Kernel Smut, **LSm:** Leaf Smut, **CR:** Crown Rot, **BLB:** Bacterial leaf blight, **BLS:** Bacterial leaf streak, **RTD:** Rice tungro disease, **SRBSDV:** Southern rice black-streaked dwarf virus; L: Low; M: Moderate; S: Severe.

Table 4: Biotic constraints (insect pests) in different states of India during 2022

Sates	SB	LF	BPH	WBPH	GLH	GM	RH	WM	GH	CW	GB	LM/ PM	AW/ SC	Rats	BB
Andhra Pradesh	L-M	L-M	L-M			L-M						L		L-M	
Bihar	L-M	L-M									L			L	
Chhattishgarh	L-S	L-S	L-S	L-M					L-M			L-M	M-S	L	
Gujarat	L-M	L-M		L-M	L						L	L			
Haryana	L	L	L-M	L-M					T						
Himachal Pradesh	L-M	L-M					L-M	L	L-M						
Jammu & Kashmir	M-S	M-S		L-M		L-M		L-M	M		M-S				
Karnataka	L-M	L-M	L-M	T		L				L				L	
Kerala	M	M-S	M							M-S	L-S				
Maharashtra	L-M					L	L				L		L		L
Punjab	T	T	T-L	T-L	L										
Tamil Nadu (ADU)	L	L	L			L									
Tamil Nadu (CBT)	L-M	L-M	L			L				L					
Telangana-RNR	L-S	L-M	L			L-S	L-M	L				L-M			
UP (FZB)	L-M	L-M			L-M						L-M				
Uttarakhand	L-M	L	L-M	L			L				L				
WB (BNK)	L-M														
WB (CHN)	M-S	L-M	M-S	L-S	L-M		L								

Low intensity of mealy bugs crabs in Maharashtra; T-L incidence of thrips in Tamil Nadu (ADU & CBT); Low incidence of ear cutting caterpillar in West Bengal

T-L intensity of termite in Haryana; Low incidence of crabs in Maharashtra; T-L intensity of mealy bug in West Bengal; Low intensity of leaf mite in parts of Telangana; SB: Stem Borer, **LF:** Leaf Folder, **BPH:** Brown Plant Hopper, **WBPH:** White Backed Plant Hopper, **GLH:** Green Leaf Hopper, **GM:** Gall Midge, **RH:** Rice Hispa, **WM:** Whorl Maggot, **GH:** Grass Hopper, **CW:** Case Worm, **GB:** Gundhi Bug, **PM:** Panicle Mite, **MT:** Mite, **RT:** Rice Thrips, **RB:** Rice Bug, **AW:** Army Worm, **SC:** Swarming caterpillar, **Term:** Termites; **EHB:** Ear head bugs; **MB:** Mealy Bug, **WTN:** White Tip Nematode, **LM:** Leaf Miner; **BB:** Blue beetles: **T:** Traces, **L:** Low, **M:** Moderate, **S:** Severe.

INTRODUCTION

The primary aim of Production oriented survey (POS) is to collect information on various aspects of rice cultivation *viz.*, general weather and crop conditions, varieties cultivated in a particular region and yield range, extent of use of organic manure and inorganic fertilizer, different inputs and their availability, different biotic and abiotic problems and their management in different states. The survey assesses the needs and problems of the farmers and determines their degree of knowledge and perceptions of crop management problems. POS gives information about the various constraints faced by the farmers in dealing with the problems. The survey also provides information on various indigenous technical knowledge of the farmers regarding rice cultivation. These surveys can help to identify the gaps in knowledge that need to be addressed by research and extension. The main objectives of the survey are:

1. To undertake extensive periodical survey in rice growing areas of the country, and to study the practices and constraints in rice cultivation.
2. To suggest suitable remedial measures on the spot to solve the farmers' problems, if any.
3. To minimize input costs and suggest methods to avoid any wasteful practices.

Survey team included scientists from co-operating centres of All India Co-ordinated Rice Improvement Programme of the ICAR-Indian Institute of Rice Research and the agricultural and extension officials of respective State Departments of Agriculture. The report contains the names of districts and subunits covered during survey and also the period of survey. Further, it describes the particulars of rice areas, popular varieties under cultivation, and crop production and management technologies adopted in respective regions. In addition, information on different biotic and abiotic production constraints prevalent in different rice growing states during the crop season and usage of plant protection chemicals are also described.

Andhra Pradesh-2022-2023 (Maruteru)

Districts surveyed: *East Godavari, Kakinada, Konaseema, Eluru and West Godavari*

Particulars of survey

Districts	Mandals surveyed
East Godavari	Peddapuram
Kakinada	-
Konaseema	-
Eluru	Bhimadolu, Unguturu, Pedapadu and Eluru
West Godavari	Tanuku, Undi and Yeletipadu

Varieties grown in Godavari zone of Andhra Pradesh (*Kharif*, 2022)

Areas	Varieties
Godavari zone (East Godavari, Kakinada, Konaseema, Eluru and West Godavari)	HYVs: MTU 7029 (Swarna), MTU 1318, PLA 1100, MTU 1064, MTU 1061, Sampada Swarna, RGL 2537, BPT 5204, RP Bio 226, MTU 1262, MTU 1224, NP 9558, Sadhana, Amulya, PR 126, SL 10, MTU 1001 and others

A Production Oriented Survey (rice) was conducted during November 2022-23 in the Godavari Zone (East Godavari, Kakinada, Konaseema, Eluru and West Godavari districts) of Andhra Pradesh. The team of Scientists from RARS, Maruteru, DAATTC Scientists (Eluru and Peddapuram) and KVK, Undi had participated in the survey. Preference towards pre released culture MTU 1318 (Non lodging, medium duration, medium slender grain category) was observed in all the five districts. The variety occupied 2 – 25.7% of the paddy area in the Godavari Zone of Andhra Pradesh. However, Swarna (MTU 7029) was found to be the most preferred variety in the zone. Seasonal conditions (rainfall and temperature) were favourable for paddy cultivation. Over reliance on migrant labour for transplanting operations and preference for mechanization (combined harvester) was observed in all the locations. Among the biotic constraints, sheath blight, bacterial leaf blight and false smut were major disease problems, whereas, rodent damage, stem borer and gall midge were the major pest problems in many locations surveyed.

A. GENERAL INFORMATION:

A1. Seasonal conditions:

Early onset of monsoon in comparison to previous year has been recorded. Excess rainfall was recorded during most part of *kharif* 2022, except in August and November months. The season witnessed excess rainfall characterized by uniform distribution for most of the season in the way of cyclones during active tillering stage of crop growth (July, September and October) which was beneficial to paddy cultivation. However, in some areas, excess rainfall resulted in loss of crop due to complete submergence in early stages of crop growth particularly in tail end areas (canal irrigation) of West Godavari district. Cyclonic weather in December had some impact on open air dried paddy grain and late transplanted crop.

Table 1: Rainfall pattern in the Godavari zone of Andhra Pradesh (2022-23)

Month	East Godavari District			Kakinada District			Konaseema District		
	Normal (mm)	Actual (mm)	% deviation	Normal (mm)	Actual (mm)	% Deviation	Normal (mm)	Actual (mm)	% Deviation
June	117.0	153.3	31.0	112.8	174.6	54.8	111.4	188.6	69.0
July	247.1	346.2	40.1	198.0	271.9	37.3	241	323.6	34.3
August	238.6	147.1	-38.0	179.9	136.8	-24.0	144.8	107.6	-25.7
September	173.2	231.5	23.0	179.5	237.4	32.3	196.8	273.4	38.8
October	169.1	181.6	7.4	201.3	249.7	24.1	150.5	242.2	60.9
November	56.8	12.1	-78.7	92.1	18.9	-79.5	118.1	14.7	-87.5
December	6.7	26.5	295.5	7.1	32.4	356.0	18.9	28.3	49.7
January	6.5	1.2	-81.5	5.8	4.9	-15.6	-	-	-
Total	1015	1107	8.31	976.5	1126.7	15.4	981.5	1178.4	20.06

Table 1a: Rainfall pattern in the Godavari zone of Andhra Pradesh (2022-23)

Month	Eluru District			West Godavari District		
	Normal (mm)	Actual (mm)	% deviation	Normal (mm)	Actual (mm)	% Deviation
June	112.0	136	21.4	53.0	81.0	52.2
July	224.5	327.4	45.8	246.2	272.3	10.6
August	239.3	179	-25.2	250.2	144.3	-42.3
September	171.1	236.9	38.5	186.9	247.4	32.4
October	134.4	189.8	41.2	203.0	228.1	12.4
November	42	13.9	-66.9	93.6	26.5	-71.7
December	7.6	25	228.9	16.2	44.0	171.6
January	5.0	0.2	-96.0	9.7	1.3	-86.6
Total	935.9	1108.2	18.4	1084.8	1090	0.5

A2. Crop coverage

Godavari zone of Andhra Pradesh earlier comprising of two districts (East and West Godavari) was reorganized into five districts (Kakinada, Konaseema and East Godavari; Eluru and West Godavari districts). Decrease in total cultivated area and area under paddy was observed in all the five districts of Godavari zone. Decrease in total cropped area and proportionate decrease in paddy area was highest in Konaseema district which could be attributed to reluctance of some farmers to undertake cropping as a mark of protest for solving local problems. However, late transplanting was observed in this region. In Kakinada district, although total cropped area decreased (89.2% of the normal area), 98% of paddy area was retained. In other districts, viz., Konaseema, East Godavari and Eluru, paddy was cultivated to the tune of 85% of the normal area. However, West Godavari district witnessed 20% reduction in paddy area during *kharif* 2022.

Table 2: Details of total cultivated area and area under rice cultivation in 5 districts of Godavari zone of Andhra Pradesh during *Kharif* 2022

District	Total Cultivated Area			Area under Rice		
	Normal	2022	% Area Covered	Normal	2022	% Area Covered
Kakinada	104947	93650	89.23	92498	90676	98.03
Konaseema	75226	57693	76.69	74959	57568	76.79
East Godavari	87228	77674	89.04	79639	73024	91.69
Eluru	121018	101987	84.27	107021	92801	86.71
West Godavari	101177	82036	81.08	100617	81916	81.41

A3. Varietal spread

Mega variety, Swarna (MTU 7029) was the most preferred variety in Godavari zone of Andhra Pradesh. In terms of percentage of area covered, the variety occupied 77% in Konaseema followed by Kakinada district (61.1%). Relatively, Swarna was less popular to PLA 1100 in Eluru district. Predominantly, Swarna Sampada (private hybrid), MTU 1061, MTU 1064 and pre release culture MTU 1318 (recently the variety was released) were popular among farmers of Godavari Zone. Preference towards pre released culture MTU 1318 (Non lodging, medium duration, nitrogen responsiveness, medium slender grain category) was observed in all the five districts. It was observed that 5-10 years is the mean time for varietal replacement in the zone. The variety occupied area 2 – 25.7% of the paddy area in the Godavari zone of Andhra Pradesh. RGL 2537 variety (high yielding, long duration, non lodging and medium slender variety) was preferred in Kakinada district in areas adjacent to Visakhapatnam and Anakapalle. The variety was grown in areas where rice-pulse cropping system is popular.

Farmers of East Godavari District were giving preference to fine grain varieties cultivating different varieties of paddy, preference of varieties was based on marketability, millers' preference, personal consumption and seed sale. During rabi, 2022-23, MTU 1121 is the dominant variety in the Godavari Zone. Specificity for cultivation of RP Bio226 (2.2%) was shown by some farmers of E.G. Dist. During *kharif* 2022, similarly, Sadhana and Amulya (private varieties) were preferred in some areas of Kakinada district, MTU 1224, MTU 1262 (1.9%) and MTU 1001 were preferred in Eluru district, NP9558 (1.2% of rice area in the district) was grown by some famers of Konaseema district and PR 126 (1.0%) and SL 10 were preferred by farmers of Tadepalligudem and adjoining areas of West Godavari district.

Table 3: Varietal Pattern: variety wise area in Godavari Zone of Andhra Pradesh (*Kharif*, 2022)

Variety	% Area Covered (District wise) of different Paddy Varieties under cultivation				
	Eluru	West Godavari	Kakinada	Konaseema	East Godavari
MTU 7029	19.3	37.2	61.1	77.0	42.7
MTU 1318	8.6	25.7	5.0	2.0	6.2
Sampada Swarna	7.7	18.4	20.7		12.3
PLA-1100	21.5	8.1			31.7
MTU 1064	13.9	6.3		18.6	
MTU 1061	22.4	2.7	1.7		2.4
BPT 5204	0.8		2.0		1.6
RGL 2537			6.3		

Source: Department of Agriculture, Andhra Pradesh

Table 4: Varietal Pattern: variety wise area in Godavari zone of Andhra Pradesh (Rabi 2022-23)

Eluru district		West Godavari District	
Rabi 2022-23		Rabi 2022-23	
Variety	Area(ha)	Variety	Area (ha)
MTU 1121	103390	MTU 1121	59468
MTU 1153	896	PR 126	2541
MTU 7029	350	MTU 1156	2476
SL-10	319	MTU 1153	2316
Sampada Swarna	244	MTU 3626	1435
MTU 1064	200	Sampada Swarna	597
PLA1100	163	SL 10	423
MTU 1061	161	MTU 1318	208
MTU 1010	145	Total	70330
MTU 1156	54		
Total	105922		

A4. Crop condition

Early monsoon and release of canal water during *kharif*, 2022 resulted in timely transplanting i.e., II fortnight of June to I fortnight of July. In the tail end areas (canal irrigation), transplantations were delayed. Crop damage was observed in Narsapur (West Godavari district) due to flooding. The year 2022-23 witnessed uniform distribution of rainfall in most areas, making good crop stand. Kresek phase of BLB was observed during initial stages of crop growth in West Godavari, East Godavari and Konaseema districts of Andhra Pradesh. Comparably low to moderate incidence of BLB was observed. Yields in the range of 25-45 bags/acre (75 kg bags) were recorded during the season.

A5. Cropping pattern

Emphasis was laid out by State Agricultural Department for early transplantations for accommodating three crops in a year. In the West Godavari district of Andhra Pradesh, rice-rice is the predominant cropping pattern in majority of the locations. Rice-pulse, Rice-Maize cropping system was also prevalent in Kakinada and East Godavari districts. Traditionally, farmers in the zone preferred high yield varieties viz., Swarna, PLA 1100, MTU 1061, MTU 1064, MTU 3626, MTU 1010, MTU 1121, MTU 1153 and MTU 1156, However, preference for varieties in medium duration segment, fine grain, good cooking quality and marketability (price wise) were preferred.

A6. Crop establishment methods

Transplantation was found to be the preferred method of crop establishment in rice. Migrant labour from Bengal, Chhattisgarh were the major contributors for timely transplantation in Godavari zone of Andhra Pradesh during *kharif*, 2022. Majority of the transplantation was done using migrant labour, commonly called as Bengal transplantation, the cost of pulling and transplantation per acre has ranged from Rs. 3500-4200/acre. Direct seeding is practiced in some locations of East Godavari and Kakinada.

B CROP MANAGEMENT

B1. Seed rate

Majority of farmers purchased seed locally from dealers/ farmers/ research stations of ANGRAU. However, 25% of the farmers utilized own seed from the previous crop season. Seed rate used was 8-45 kg/acre for transplanted rice. Average seed rate adopted by farmers is in the range of 15-20 kg/ac from the locations surveyed. However, for Bengal mode of planting, a seed rate of 8-15 kg/acre was used.

B2. Seed treatment

Most of the farmers resorted to soaking, incubation and broadcasting seed in nursery without any chemical seed treatment. Only 30% of the farmers under survey have adopted seed treatment with carbendazim @ 1.0 g/kg seed. Farmers invariably would undertake nitric acid seed treatment during *rabi*, for seed procured from previous season crop (*kharif*).

B3. Transplanting

Seedlings with an age of 18-25 days were transplanted in most of the locations in Godavari zone. Migrant labour preferred <20 day old seedlings for transplanting. Whereas, seedling length was taken into consideration for planting by local labour. Random transplantation was the most common practice in the Zone. Bengal planting is the most preferred method in Godavari zone. In this method, although random transplantation was done, alleys were strictly adopted by using ropes at regular intervals during planting.

B4. Plant Population

In the system of planting done by migrant labour from Chhattisgarh, Bengal etc. population per square meter ranged from 14 to 18 in Bengal transplanting in comparison to 20-25 seedlings in random transplanting done by local labour. Alley ways were maintained by majority of the farmers of the Zone.

B5. Weed management

Awareness among farmers on possible benefits of herbicides and shortage of labour lead to wide scale adoptability of herbicides viz., Topstar (oxadiargyl), Rifit (pretilachlor), Sofit (pretilachlor with safener), Londax Power (Bensulfuron methyl 0.8% + pretilachlor 6%), Sathi (pyrazosulfuran ethyl), Nominee gold (bispyribac sodium), Almix (Metsulfuran methyl + Chlorimuran ethyl) in most of the locations surveyed. Pre emergence and post emergence weedicides were used and mostly in conjunction with fertilizer for saving labour cost. Use of 2-3 weedicides in combination was noticed in some instances.

B6. Fertilizer application

The use of chemical fertilizer was reduced for *kharif* paddy (3-4 bags were used by majority of farmers) with a view that yields in *kharif* would not sustain for increasing cost of cultivation and non availability of labour. Only 1/3 of farmers surveyed resorted to application of organic manures. Farmers commonly applied DAP, 14-35-14, 10-26-26, 28-28-0 or 20-20-0 for top dressing in all installments. Recent innovation, nano urea was applied through mixing with other

fertilizers. Farmers received nano urea under promotion by local dealers. Farmers applied more than recommended dose of N and Phosphorus in the surveyed locations.

B7. Plant Protection

Farmers in the Godavari zone of Andhra Pradesh resorted to 2-5 foliar sprays for protection against pests and diseases. Pesticides viz., Pexalon, Pulsar, copper hydroxide, Plantomycin, Azoxystrobin, Token, Chess, Fipronil, Bifenthrin, Profenofos, Carbofuran, Acephate, Monocrotophos, Hexaconazole, Custodia, Chlorantrinirole etc. were used against biotic constraints. Farmers adopted pesticide sprays immediately after observation of first symptoms or prophylactically in most instances. Farmers resorted to mixing of 2-4 chemicals for management of biotic constraints. Farmers' reliance on pesticide dealers was observed in most of the locations. State Department Officials, Krishi vigyan Kendra, Undi and scientists from DAATTC and RARS, Maruteru were also instrumental in educating farmers regarding decision on pesticide use in agriculture.

C PRODUCTION CONSTRAINTS

C1. Abiotic constraints

Deficiency of Potassium and zinc were reported during *rabi* season. Farmers necessarily resort to 1-3 sprays with zinc sulphate during *rabi* season. However, need based potassium sprays were taken up in certain locations. Periodic rains during the *Kharif* 2022 season resulted in healthy paddy crop. Water stress was not observed. However, continuous inundation in tail end areas resulted in mortality of seedlings. Sulphide injury was observed certain location in *rabi* crop.

C2. Biotic constraints

Major biotic constraints – bacterial leaf blight, sheath blight and neck blast were the major diseases recorded in most locations. BPH was the major pest constraint as opined by the farmers. Kresek phase of bacterial leaf blight was observed on 20-40 DAT crop in West Godavari, East Godavari and Konaseema districts. Tank mixture of fungicide and insecticide combinations (3-5 chemicals) were taken up indiscriminately on advice of local pesticide dealers for management of BLB. However, University staff (RARS, Maruteru, DAATTC and KVK) through State Agricultural Department has taken up steps for timely identification and management of the problem. In most of the locations, low incidence of false smut was recorded. Gall midge problem was observed in Konaseema and Kakinada districts. Low to moderate Rodent damage was reported in all the districts. BPH and stem borer were effectively managed through use of latest available pesticides. Low stem borer infestation was observed in all the districts.

C3. Other constraints

Increase in cost of hiring combined harvesters, contract labour wages and marketing of produce. Late payments after paddy sale, shift towards prawn and fish culture was observed during survey. Some of the rice farmers nearby fish ponds complained of poor growth owing to seepage from the ponds.

D. MECHANIZATION

Knowledge of seed to seed mechanization was available for farmers. However, depending on soil condition, water level, labour availability during the period, majority of farmers hired different implements viz., power tillers, tractors (mini and big), battery sprayers, combined harvesters, bund formers for crop operations in Godavari Zone of Andhra Pradesh. Drone technology for pesticide spraying was practiced by farmers. ANGRAU was in forefront in educating and creating awareness of extension functionaries (State Agricultural Department) and farmers on possibility of utilization/ replacement of drones for pesticide spraying operations. Demonstrations were conducted by RARS, Maruteru during T & V workshops to Department staff and farmers on use of drone technology.

E. PLANT PROTECTION

Indiscriminate application of pesticides was noticed. Local dealers played a crucial role in planning pesticide sprays. Farmers in general, adopted 2-5 sprays during crop season. Community rodent management campaigns were undertaken by Agricultural Department in coordination with ANGRAU. Farmers paid competitive price of Rs. 30 – 100 per catch depending on the need. In some locations, rat catchers were offered 2-3 bags of paddy per season for services during the season. Progressive farmers adopted drone spraying by hiring from private startups @ Rs.400-500/- per acre.

Table 5. Prevalence of different diseases in Godavari region of Andhra Pradesh in 2022

District	Diseases					
	SHBL	NBL	ShR	FS	GD	BLB
Eluru	L-M	L	L	L-M	L	L-M
West Godavari	L-M	L	L	L	L	M-S
Kakinada	L-M	L	L	L	L	L-M
Konaseema	L-M	L	L	L-M	L	L-M
East Godavari	L-M	L	L	L	L	L-S

SHBL: Sheath blight; **BLB:** Bacterial leaf blight; **NBL:** Neck blast; **Sh. R:** Sheath rot and **FS:** False smut.

Table 6. Prevalence of different insect pests in Godavari region of Andhra Pradesh in 2022

District	Pest					GM
	BPH	SB	LF	Rats	Mite	
Eluru	L-M	L-M	L-M	L-M	L	L
West Godavari	L	L-M	L	L-M	L	L
Kakinada	L	L	L	M	L	L-M
Konaseema	L	L	L	M	L	L-M
East Godavari	L	L	L	M	L	L

F. MARKETING

Rice farmers in the Godavari Zone faced problems in marketing of produce during *Kharif*, 2022. Farmers sold the produce below MSP. Farmers sold the produce to RBK's. They are in need of early payment of money after selling of their produce.

G. YIELDS

The season (*Kharif*, 2022) witnessed periodical rains starting from June 2022 to September, 2022. Increase in number of rainy days encouraged farmers to go for paddy cultivation. Pest and disease incidence was also low – moderate during the season. At initial stages the kreshek phase of BLB was observed. In addition, continuous intermittent rains favoured the development and rapid spread of bacterial leaf blight resulting in marginal loss. Farmers reported 26-45 bags/ acre due to cultivation of non-lodging variety MTU 1318, when compared to Swarna. Swarna growing farmers also reported 25-35 bags due to favourable weather during November and lack of rainfall at fag end season.

H COST OF CULTIVATION

A number of factors viz., hike in fertilizer costs, limited labour availability, increase in labour wages, increased machine hiring costs, indiscriminate use of pesticides etc influenced the cost of cultivation. Farmers reported incurring an amount of Rs. 28000 – 35000 per acre towards cultivation of rice.

I GENERAL NEEDS OF THE FARMERS OF GODAVARI ZONE

- Minimum support price for the produce
- Timely and prompt or early payment of money after selling of produce
- High yielding and biotic stress resistant varieties suitable to local needs
- Supply of seeds, inputs, fertilizers through Rythu Bharosa Kendras under subsidy basis
- Farm mechanization due to labour problem
- Drones availability at low cost for spraying.
- Marketing of newly released varieties with proper co-ordination with millers through awareness campaigns
- Salinity problems related to fish ponds to be addressed
- High yielding BPH and BLB resistant varieties
- High yielding medium duration varieties (135-140 days)
- Custom hiring centres (mechanization)
- Need for supply of farm machinery individually for better maintenance.
- Provision for proper drainage facilities, timely cleaning of drainage channels

J. SPECIFIC NEEDS OF THE FARMERS FROM GODAVARI ZONE (DISTRICT WISE) – *KHARIF* 2022

District	Need of the Farmer
Konaseema and Kakinada	Reclamation of saline soils and evaluating varieties for salinity tolerance
	Flood tolerant varieites
	Non loding varieites (resistant to cyclonic rains)
	Effective chemicals for the management of <i>Eichornia</i> , <i>Pistia</i> etc.
	Effective BLB management practices
	Measures for rapid decomposition of stubbles
East Godavari District	Need for medium duration fine grain varieties
	New chemicals for BLB management
	Farm mechanization (Implements availability at low cost)

	Implements and sprayers individually
West Godavari District	Cleaning of drainage channels as submergence is a problem in some mandals
	Flood tolerant varieties
	Tolerant varieties to submergence
	Medium grain quality and medium duration (130-145 days) varieties
Eluru	Non-lodging varieties, fine grain varieties in medium duration varieties
	Varieties with resistance to BLB and BPH

K REASONS FOR DEVIATION FROM THE RECOMMENDED MANAGEMENT PRACTICES

S. No.	Practice	Reasons for non adoption/ deviation by farmers
1.	Use of fungicides/other practices for bacterial blight diseases	Farmers do not have awareness on kresek phase of disease and they are confusing with stem rot of rice and adopting fungicides and insecticides for control. Recommendation by local pesticide dealers.
2.	Complex fertilizer use as top dressing also, use of excess fertilizers	Non availability of recommended chemicals locally. Lack of awareness.
3.	Indiscriminate use of combination of pesticides for pest management.	Lack of knowledge on role of weather on development of pests coupled with fear of crop damage. Saving labour cost.
4.	Application of Zinc + Fertilizers/ Zinc + pesticides	Lack of knowledge on synergistic and antagonistic effects during mixing of chemicals. Farmers incurring costs with less added advantage.

L RESEARCHABLE ISSUES AS REPORTED BY FARMERS

Rice is majorly cultivated under irrigated conditions (canal irrigation), however, rainfed upland was also prevalent in the zone. Rice is taken up as single crop in certain locations of East Godavari, Kakinada and Eluru. However, rice-rice is popular in most locations of West Godavari district. Most of the farmers surveyed had 10-20 years of experience in rice farming. Bacterial leaf blight followed by sheath blight were considered major biotic constraints. Farmers were confident on management of other biotic constraints due to availability of specific chemicals for their management. Farmers have expressed that there could be 10-25% damage due to pests (BLB, BPH, Sheath blight etc.). A number of abiotic constraints effected paddy cultivation (submergence, salinity, flooding, cyclonic rains during maturity stage resulting in lodging and crop loss). Canal irrigation through Godavari river is a blessing for paddy cultivation for most of the farmers of Godavari zone, however, farmers depend on rainfed + irrigation system in the upland regions of Eluru and East Godavari districts. Scarcity of local agricultural labour, micronutrient deficiencies etc., were the major production constraints observed. However, unavailability of fertilizers, poor drainage facilities were the other constraints. Farmers require medium duration high yielding varieties, with resistance to BLB and BPH for *Kharif* season and resistance to leaf blast and BPH for *rabi* season. Varieties with tolerance to submergence and salinity would be required for low lying areas and for varieties adjacent of fish culture ponds. Medium slender grain quality was the most preferred by farmers and millers in the zone.

Bihar-2022-2023 (Pusa)

Districts surveyed: Samastipur, Darbhanga and Muzaffarpur

Details of survey

Districts	Villages surveyed
Samastipur	Ladaura, Phulhara, Kalyanpur, Malinagar, Saidpur, Deopar, Harpur, Dighra, Tajpur and others
Darbhangha	Bishanpur, Atarbel, Uchauli, Hanumannagar and others
Muzaffarpur	Dholi, Bakhri, Dholi Farm, Sakra, Sabha, Mirapur, Muroual, Pilkhi and others

Widely prevalent rice varieties

Districts	Rice varieties
Samastipur	HYVs: Rajendra Bhagwati, Rajendra Sweta, Rajendra Mansuri, Sugandha, Swarna, Rajendra Nilam, Rajendra Kasturi, Rajshree, BPT 5204, MTU-7029, Rajendra Subhasini and Dhanalaxmi; Hybrids: Arize 6444, 27P31, Arize 6129, PHB 71, Pusa RH-10, JK-401, AZ-6453, AZ-8433DT, Arize 6201, Hybrid 27P37, Hybrid-2731 and PA-6444
Darbhangha	HYVs: Rajendra Bhagwati, Rajendra mansuri, MTU-7029, Rajshree and Rajendra Sweta Hybrids: Arize 6444, PHB 71, Pusa RH-10, Arize 6129, JK-401, Hybrid 1001 and Panseeds hybrids
Muzaffarpur	HYVs: Rajendra Bhagwati, MTU 7029, Rajendra Nilam, Rajshree, Satyam, Rajendra Subhasini, Dhanalaxmi, Parimal, Swarna sub-1 and BPT 5204; Hybrids: Arize-6444, PHB-71, Arize-6129 and NK 5251

Varieties recommended for different ecosystem

Type of land	Recommended varieties
Upland	HYVs: Sahbhagi, Prabhat, Dhanalaxmi, Turanta, Richhariya, Saket 4 and Rajendra Bhagwati
Aerobic	HYVs: Rajendra Neelam, Vandana and Rajendra Bhagwati
Middle land	HYVs: Santhosh, Sita, Saroj, Sahabhagi, Rajendra sweta and IR 36; Aromatic varieties: Rajendra Subasini, Rajendra Kasturi, Rajendra Bhagwati, Kamini and Sugandha
Lowland	HYVs: Rajshree, Rajendra Mahsuri, BPT 5204, Swarna, Swarna Sub 1, Satyam and Kishori
Deep water land	HYVs: Sudha, Vaidehi, Janki, Jalmagna and Jallahari

Particulars of rice area in the surveyed districts (in hectares)

Districts	Total geographical area (ha)	Total cultivable land (ha)	Total cultivated area (ha)	Total irrigated area (ha)	Area under Rice (ha)
Samastipur	262390	172873	162500	108176	97110
Darbhangha	254000	172716	158200	102087	79959
Muzaffarpur	315351	218850	191100	96908	162920

Weather data for the district surveyed: 2022

Weather parameters	Months					
	Jun	Jul	Aug	sep	Oct	Nov
Rainy days	6	11	11	16	7	0
Total rainfall (mm)	2.5	205.3	162.5	167.6	64.3	0
Monthly mean temperature						
Maximum	34.6	34.5	33.6	32.6	32.1	29.3
Minimum	25.2	25.9	25.1	24.6	20.5	14.1
Monthly mean RH (%)						
Morning	88	87	91	94	95	96
Evening	66	68	73	77	63	48

Average rice yield of different rice varieties as reported by cooperator

Varieties	Av. yield (q/ha)	Varieties	Av. yield (q/ha)
Rajendra Bhagwati	50	Rajendra Kasturi	45
Rajendra Mahsuri	50	Rajendra Sweta	45
Rajendra Subhasisni	45	Rajshree	50
Sudha	30	Janki	25
Kamini	30	Turanta	30
Sita	50	Goutam (Boro Dhan)	80
Dhanlaxmi	45	Santosh	50
Saroj	50	Rajendra Nilam	45

Production oriented survey was conducted in three rice growing districts of Bihar viz., Samastipur, Darbhanga and Muzaffarpur. In general, rainfall was low throughout the season and overall crop conditions were not good resulting in reduction in rice yield. The crop rotation practices were rice-wheat, rice-mustard, rice-pulse, rice-potato and rice-rabi maize. Common rice varieties cultivated by the farmers were HYVs like Rajendra Bhagwati, Rajendra Sweta, Rajendra Mansuri, Sugandha, Swarna, Rajendra Nilam, Rajendra Kasturi, Rajshree, BPT 5204, MTU-7029, Rajendra Subhasini and Dhanalaxmi and hybrids like Arize 6444, 27P31, Arize 6129, PHB 71, Pusa RH-10, JK-401, AZ-6453, AZ-8433DT, Arize 6201, Hybrid 27P37, Hybrid-2731 and NK 5251. The average yield of different rice hybrids was 4000-6000 kg/ha. In high yielding and local varieties of rice the average yield varies from 3000-5000 kg/ha. In general, sowing was taken up in the month of June and most of the plantings were done in the month of July. Only progressive farmers applied organic manure and neem and castor cake. The common weeds were *Ipomoea* spp., *Cyperus rotundus* and *Cynodon dactylon*. Hand weeding is local practice for removal of weeds from rice field within 45 days after transplanting. However, some farmers used weedicides like pendimethelene (Stamp and Pendsta), 2,4-d, Nominee gold and Adora for management of weeds. In general, the intensity of different diseases and insect pests was low and about 5-10% farmers adopted plant protection measures.

District wise details

Samastipur: Production oriented survey was conducted at flowering stage in nine villages of Samastipur district of Bihar during *Kharif*, 2022. This year low rainfall was received in Samastipur district during the rice season. Sowing and transplanting of rice was delayed due to low rainfall. Overall rice production was not very good primarily because of less rainfall. However, those farmers having irrigation facility harvested good yield. The crop rotation practices were rice-wheat, rice-mustard and rice-rabi maize. Common rice varieties in the district were HYVs like Rajendra Bhagwati, Rajendra Sweta, Rajendra Mansuri, Sugandha, Swarna, Rajendra Nilam, Rajendra Kasturi, Rajshree, BPT 5204, MTU-7029, Rajendra Subhasini and Dhanalaxmi and hybrids like Arize 6444, 27P31, Arize 6129, PHB 71, Pusa RH-10, JK-401, AZ-6453, AZ-8433DT, NK-147221, Arize 6201, Hybrid 27P37, Hybrid-2731 and PA-6444. Mostly farmers were interested in cultivation of Hybrid rice due to high yield. The average yield of different rice hybrids was 4000-6000 kg/ha. In high yielding and local varieties of rice the average yield varies from 3000-5000 kg/ha. The normal time of sowing of rice seeds was June and transplanting in month of July. The average seed rate was 25-30 kg/ha of high yielding varieties of rice. Many farmers of Samastipur district applied FYM, vermicompost and chemical fertilizers in rice field. Progressive farmers also applied neem cake and castor cake. The common weeds were *Ipomoea* spp., *Cyperus rotundus* and *Cynodon dactylon*. Hand weeding is local practice for removal of weeds from rice field within 45 days after transplanting. However, some farmers used weedicides like pendimethelene (Stamp and Pendsta), 2,4-d, Nominee gold and Adora for management of weeds. The disease incidence in the early season was very low primarily because of low rainfall and unfavorable climatic condition. But, later on major diseases like Brown spot, BLB, Sheath rot and false smut were observed but intensity was low. Among the insect pests, stem borer, gundhi bugs, leaf folder and rats were major problems. Fungicides like propiconazole (1 ml/litre of water), Saaf (2 gm/lit of water), hexaconazole (2 ml/lit of water), mancozeb (2 gm/lit of water) and Bavistin (1 gm/lit of water) were used by some of the farmers for controlling the diseases. However, the rate of adoption of plant protection measures against pest/diseases/weeds among farmers was very limited up to 3-5% only.

Darbhanga: Four villages of Darbhanga districts were surveyed during *Kharif*, 2022 under production oriented survey of rice. This year low rainfall was received throughout the season i.e. from the month of June to October. In the early cropping season crop condition was not very good due to low rainfall and farmers expected poor yield. Sowing and transplanting was delayed due to low rainfall. The cropping system being followed in the area were rice-wheat, rice-pulse, rice-mustard and rice-maize. Common rice varieties in the district were HYVs like Rajendra Bhagwati, Rajendra mansuri, MTU-7029, Rajshree and Rajendra Sweta and hybrids like Arize 6444, PHB 71, Pusa RH-10, Arize 6129, JK-401, Hybrid 1001 and Panseeds hybrids. Generally sowing of rice seeds were done in the month of June and transplanting in July. Most of the farmers used hybrid seeds. Most of farmers adopted random method of planting. Farmers used higher doses of nitrogen (Urea). Only few farmers applied recommended dose of fertilizers. A few farmers applied FYM, neem cake and vermicompost in rice field. Hand weeding was common practice by farmers for removal of weeds in field. For pesticides most of farmers were taking advice from local shops of insecticides/fungicides. Some of the farmers visited the University and KVK with their problems. Diseases like bacterial blight, sheath rot, sheath blight, brown spot and false smut and insect pests

like leaf folder, stem borer and rodent were major problem in rice field. In some fields, symptoms of zinc deficiency was observed. Fungicides like carbendazim, Saaf, mancozeb, hexaconazole and propiconazole were commonly used by 5-10% farmers. Farmers were interested in high yielding seeds, good quality chemical and pesticides availability in time. Marketing facility is also a major constraint among rice growers.

Muzaffarpur: Production oriented survey was conducted in eight villages in this district from flowering to maturity stage of rice crop. In general, rainfall was low during *Kharif*, 2022. Due to low rainfall received during early rice growing season transplanting was delayed and farmers were expecting low yield. The common crop rotation was rice-wheat, rice-potato and maize and rice-mustard. Common rice varieties cultivated by the farmers were HYVs like Rajendra Bhagwati, MTU 7029, Rajendra Nilam, Rajshree, Satyam, Rajendra Subhasini, Dhanalaxmi, Parimal, Swarna sub-1 and BPT 5204 and hybrids like Arize-6444, PHB-71, Arize-6129 and NK 5251. The normal date of sowing is June and transplanting is in July. Fertilizers were applied @ 100-150 kg N/ha, 30-50 kg P/ha and 15-20 kg K₂O/ha in the form of urea, SSP and MOP. Hand weeding practice was common method for removal of weeds from field. Generally, only one weeding was practiced by farmers after 45 days of transplanting. Only progressive farmers were using weedicides like butachlor, Nominee gold and Adora. Good quality seeds and fertilizers were major constraints among the farmers. The average yield among the hybrids was 5500-6000 kg/ha while in case of local varieties, the yield was 3000-3500 kg/ha. Some of the farmers applied carbendazim, Saaf, mancozeb, streptocycline, hexaconazole and propiconazole for management of different diseases. Blue bull (Nilgai) is the major problem in field. Rodents caused 5-10% economic damage in rice from field. Symptoms of Zn and Fe deficiency were also constraint in rice crop after transplanting in field.

Chhattisgarh-2022-2023 (Raipur)

Districts surveyed: Gariaband, Balod, Janjgir, Korba and Sarguja

Table 1: Particulars of survey

Districts	Blocks	Villages
Gariaband	Fingeshwar and Gariaband,	Kopra and Pathar Mohanda
Balod	Gundardehi and Balod	Pangri and Hirapur
Janjgir	Akaltara, Nawagarh, Naila and Kisod	Kotgarh, Khaira, Mahant, Kisod and Pirsod
Korba	Pondi Uprora and Pali	Sonpur, Bhanwar and Rajkamba
Sarguja	Sitapur	Bithuwa, Sur, Devagarh, Raytans and Rakera

Table 2: Widely prevalent rice varieties

Districts	Varieties
Gariaband	HYVs/Improved: Swarna, Shri Ram, Asmita, MTU 1010, Jordar, MTU 1153, Mahamaya, Vishnubhog, HMT, DRK, OM 3, Manju Gold, Swarna Sub-1, MTU 1001, Rajeswari, Dubraj and others; Hybrids: Raja 44, Arize 6444, Kaveri 468 and others
Balod	HYVs/Improved: Swarna, HMT, MTU 1010, Vikram TCR (developed through IGKV-BARC collaboration), HMT, MTU 1001, Samba Mahsuri, Summer King, Mahamaya and others; Hybrids: Hybrid 2828 (Trust Grow Seeds), US 362, Arize 6444, Sava 7301 and others
Janjgir	HYVs/Improved: Mahamaya, Swarna, HMT, Mahto, Vikram TCR, Rajeswari, MTU 1001, Swarna Sub-1, MTU 1153, Ramjeera, MTU 1010, TrombayDubraj mutant (TCDM-1: developed through IGKV and BARC collaboration), Vishnubhog, Indira Barani and others; Hybrids: Arize AZ 8433, Arize 6444 and others
Korba	HYVs/Improved: MTU 1010, Indira Aerobic-1, Saroj, HMT, Ankur Shree 101, Devbhog, Daftari Shree 1008, MTU 1001, Vishnubhog, Swarna, Ramjeera, Ankur Sonam, Hybrids: Arize Dhani, Arize AZ 8433, Arize 6444, Ankur 13555 and others
Sarguja	HYVs/Improved: Swarna, Jadugiri, Sonam, MTU 1010, Shree Ram, Komal, Mahamaya, Bamleshwari, Tulsi and others; Hybrids: Arize 6444, US 312, Suruchi, Kaveri 468, Mahendra 1233, KRH-1 and others; Local: Jeeraphool, Jawaphhol and others

Production oriented survey was conducted in five districts viz., Gariaband, Balod, Janjgir, Korba and Sarguja when most of the crops were in heading to maturity stage. Seventeen villages in 11 blocks were covered during the survey. A total of 50 farmers were contacted during the survey. The details of the survey are presented in Table 1. The fields surveyed were in irrigated and rainfed lowland ecosystems. Weather conditions were in general favourable for rice cultivation in the region. However, in some places Balod, there was cyclonic effect in some areas and in Korba and Sarguja, there was less and delayed rainfall in few places. Most predominant rice varieties cultivated by the farmers were HYVs or improved varieties like Swarna, Shri Ram, Asmita, MTU 1010, Jordar, MTU 1153, Mahamaya, Vishnubhog, HMT, DRK, OM 3, Manju

Gold, Swarna Sub-1, MTU 1001, Rajeswari, Vikram TCR (developed through IGKV-BARC collaboration), Samba Mahsuri, MTU 1153, Ramjeera, Summer King, Trombay Dubraj mutant (TCDM-1: developed through IGKV and BARC collaboration), Indira Aerobic-1, Saroj, Ankur Shree 101, Devbhog, Daftari Shree 1008, Bamleshwari, Dubraj and others and hybrids like Raja 44, Arize 6444, Kaveri 468, Hybrid 2828 (Trust Grow Seeds), US 362, Sava 7301, Arize AZ 8433, Arize Dhani, US 312, Suruchi, Mahendra 1233, KRH-1 and others. The details of the varieties are presented in Table 2. Common crop rotation practices followed by the farmers were rice-rice, rice-wheat, rice-wheat + mustard, rice-pulses, rice-vegetables, rice-lathyrus, rice-chickpea, rice-mustard, rice-linseed, rice-potato and others. The particulars of rice area are presented in Table 3. The details of district wise area of predominant rice varieties are presented in Table 6. The details of rice yield of different varieties in different rice growing districts of Chhattishgarh are presented in Table 8. Average rice in farmers' field ranged from 3000-6500 kg/ha in case of HYVs, 2500-3000 kg/ha in case of local varieties and 5000-10,000 kg/ha in case of hybrids.

Table 3: Particulars of rice areas in the surveyed districts of Chhattisgarh during 2022

District	Total geographical area (ha)	Total cultivable area (ha)	Total cultivated area (ha)	Total irrigated area (ha)	Area under paddy (ha)
Gariaband	582300	149553	144337	73600	104132
Balod	352700	183700	281526	115963	175243
Janjgir	385300	258062	238317	190400	195310
Korba	714544	185287	160280	153120	107090
Sarguja	573200	270315	161028	65300	105346

Table 4: Details of weather data in the surveyed districts

Weather parameters	Months						
	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Gariyaband							
Total rainfall (mm)	139.8	317.5	351.2	231.2	46.0	0.0	0.0
Maximum temp (°C)	38.6	30.8	31.3	31.5	3.0	30.0	
Minimum temp (°C)	24.7	23.1	22.6	22.2	18.6	11.1	
Balod							
Rainy days	7	14	15	12	5	2	2
Total rainfall (mm)	179.6	385.3	374.7	221.3	79.8	15.8	16.4
Janjgir							
Total rainfall (mm)	196.0	468.4	492.2	163.8	85.5	0.0	0.0
Maximum temp (°C)	38.0	31.7	31.1	31.7	31.4	29.8	
Minimum temp (°C)	29.4	26.9	26.6	26.0	22.4	15.2	
Korba							
Rainy days							
Total rainfall (mm)	147.2	416.3	295.05	236.1	80.4	0.0	
Sarguja							
Rainy days	9	12	13	16	6	0	0
Total rainfall (mm)	93.7	143.6	369.2	406.2	109.8	0	0
Maximum temp (°C)	36.1	30.9	29.4	29.7	28.9	27.0	
Minimum temp (°C)	21.8	24.9	23.3	22.7	18.7	11.2	

Table 5: General Question of Rice Cultivation In District (To Be Filled By The Cooperator In With The Officials From State Department of Agriculture

Parameters	Districts		
	Gariaband	Balod	Janjgir
Total Area under HYVs in the district (ha)	80453 ha	152945 ha	80520 ha
Most prevalent HYVs in the District	MTU 1010	Mahamaya, MTU 1010	Mahamaya
Total area under rice hybrids in the district (ha.	7500 ha	22298 ha	47337 ha
Most prevalent rice hybrids in the district	Arize 6444	Arize 6444, Kaveri 468	Arize 6444
Total area under basmati/scented in the district	125 ha	286 ha	-
Most prevalent basmati varieties in the district	Pusa Basmati 1	Pusa Basmati 1	-
Seed replacement rate	56.50%	67.59%	NA
Whether farmers are using any heavy equipments like transplanted/combine harvester	Yes	Yes	Yes; Combine harvester
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	SRI	Seed Drill	SRI, Laser technology
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Yes; Balanced use of fertilizers and pesticides	Yes; Recommendation for soil testing	Use of farm machineries
What are the general problems in rice cultivation in the district?	Grain discoloration	Insects pests and disease problems	Erratic rainfall
Please provide any farmers association in the district		-	FPOs
Whether availability of labors is sufficient?	Yes	Yes	Yes
Whether there is any marketing problem of the produce?	No	No	No
Any major irrigation/power generation project in the district	IWMP (Integrated Watershed Management Programme)	IWMP, MIP (Minor/micro Irrigation project)	HasdeoBangodam
Any soil testing program undertaken?	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/ University	Yes	Yes	Yes; by Ag Dept and Univeristy

Table 5-Contdd..:

Parameters	Districts	
	Korba	Sarguja
Total Area under HYVs in the district (ha)	45920 ha	21270 ha
Most prevalent HYVs in the District	MTU 1010	Swarna
Total area under rice hybrids in the district (ha)	45307 ha	12970 ha
Most prevalent rice hybrids in the district	Arize 6444	Arize 6444
Total area under basmati in the district	-	-
Most prevalent basmati varieties in the district	-	-
Seed replacement rate	NA	NA
Whether farmers are using any heavy equipments like transplanted/combine harvester	Yes; Combine harvester	Yes; Combine harvester
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	SRI, Laser levelling	SRI, DSR
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Yes; mechanical weeding	Yes; Organic farming and green manuring
What are the general problems in rice cultivation in the district?	BPH and stem borer	-
Please provide any farmers association in the district	-	FPOs
Whether availability of labors is sufficient?	Yes	Yes
Whether there is any marketing problem of the produce?	No	No
Any major irrigation/power generation project in the district	HasdeoBango dam	Minor irrigation projects
Any soil testing program undertaken?	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/ University	Yes; by state dept	Yes

Table 6: Variety wise area coverage (ha) in different districts of Chhattishgarh during *Kharif* 2022

Variety/hybrid	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
Swarna	31750	32294	33720	39500	11500
Swarna Sub-1	3500	11751			
Mahamaya	15612	28980	18280		7390
MTU-1010	17232	6651	28520	6420	1580
MTU-1001	10512	5462			
Rajeshwari	8562				
Summer King		6132			
Vishnubhog			1368	3137	
Indira Barani			1350		
HMT			11500		
Ram Jeera				5420	

Variety/hybrid	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
Sonam				350	
Bamleshwari					800
JeeraPhool					26963
JawaPhool					21293
Dubraj					5035
Tulsi					13900
Arize 6444		8237	26537	25050	12290
Arize AZ 8433			20800	16137	
Sava 7301		1509			
ArizeDhani				4120	
Ankur 13555				1500	
KRH 1					680
Hybrids	7500				
Others	9464	74227	53285	5456	3915

Table 7: General informations

Parameters	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
# of talukas/blocks covered	2	2	4	2	1
# of villages surveyed	2	2	5	3	5
# of farmers interviewed	9	10	13	10	8
Field ecosystem	IR (89%); RL (11%)	IR (100%)	IR (92%); RL (8%)	IR (50%); RL (50%)	RL (88%) IR (12%)
Weather conditions during cropping season	Weather conditions were in general favourable for rice cultivation in the region. However, in some places Ballod, there was cyclonic effect in some areas and in Korba and Sarguja, there was less and delayed rainfall in few places				
Crop stage when survey was made	Milk to Heading	Dough to maturity	Tillering to heading	Maturity	Dough to maturity
Crop rotations	Common crop rotation practices followed by the farmers were rice-rice, rice-wheat, rice-wheat + mustard, rice-pulses, rice-vegetables, rice-lathyrus, rice-chickpea, rice-mustard, rice-linseed, rice-potato and others				

IR: Irrigated; RL: Rainfed lowland

A. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of Chhattishgarh. Majority of the farmers contacted were in the medium income group. Average per capita consumption of rice per month was 6-12 kg rice (Table 9). More than 80% of the farmers contacted told that their main meal consisted of both rice and wheat (chapatti). About 60-100% farmers in different districts told that they used polished rice and 10-30% of the farmers contacted in the districts of Gariyaband, Balod, Janjgir and Sarguja districts told that they used parboiled rice. Regarding grain quality, most of the farmers expressed that though they preferred fine grain, but they used both fine and coarse grain rice. In general, there was no change in the food habit.

Table 8: Average yields of different rice varieties as reported by the cooperators/farmers

Varieties	Yield (kg/ha)					Remarks
	Gariaband	Balod	Janjgir	Korba	Sarguja	
Swarna	5000-6000	3800-5000	3000-6250	4500-5000	6500	Some of the farmers are still growing local varieties for taste, low maintenance and their tolerance to pests and diseases
MTU 1010, MTU 1001	5500-6000	5000-6000	5250	3000-4500		
Mahamaya	3000		3300			
Rajeswari			4200			
Devbhog				3500		
Jeeraphool					2500	
Vishnubhog				3000		
DRK	3750					
OM-3	5000					
HMT	5500	4375	2800	3000-4000		
Samba Mahsuri		4300-4500				
Mahto			6250			
Vikram TCR			3350-3500			
Annapura			4000			
Saroj				3750		
Indira Aerobic 1				3750-5000		
Shree 101				4400		
Daftari				3000		
Arize 6444					6250	
US 312					5000	
Kaveri 468					8750	
VNR hybrids					10000	
Suruchi					5500	
Raja-44	6500					
Hybrids (general)	6000-6500	4000-7000	4200			

Table 9: Details of rice consumption pattern

Parameters	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
Status of farmers	Medium income (89%); Rice (11%)	Medium income (70%); Rice (30%)	Medium income (84.6%); Poor (15.6%)	Medium income (7%); Poor (20%); Rich (10%)	Medium income (87.5%); Poor (12.5%)
Per capita monthly rice consumption (kg)	6-10 kg	6-13 kg	7-15 kg	6-10 kg	6-12 kg
Composition of main meal	Only rice: 22% Rice + Wheat: 78%	Rice + Wheat: 80%; only rice (20%)	Only rice: 7.7% Rice + Wheat: 92.3%	Only rice: 10%; Rice + Wheat (90%)	Only rice (12.5%); Rice + Wheat (87.5%)
Preferred rice types	Polished rice (67%); parboiled rice (33%)	Polished rice only (100%) Polished + Parboiled: 10%	Polished rice only (77%); parboiled: 23%	Polished rice only (100%)	Polished (62.5%); Parboiled (37.5%)
Rice grain type preference	Fine grain (77.7%);	Fine grain only (60%); Fine +	Fine grain (54%)	Fine grain only (80%);	Fine grain (50%); Coarse (50%)

Parameters	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
	Coarse grain: 33.3%	Coarse grain: 40%	coarse grain (61.5%)	Fine + Coarse (20%)	
Any changes in food habit in last 10 years	~33% farmers told that they have shifted from coarse to fine grain rice	No (100%)	No (100%)	~ 20% shifted from coarse grain to fine grain	No (100%)

Table 10: Details of nursery management

Parameters	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
Planting time	1 st week of July to 1 st week of Aug	3 rd week of July to 1 st week of Aug	3 rd week of July to second week of Aug	3 rd Week of July to 1 st week of Aug	Middle of July to 1 st week of Aug
Seed rate	50-70 kg/ha; hybrids: 20-25 kg/ha	37.5-80 kg/ha	35-75 kg/ha	30-75 kg/ha Hybrids: 15-25 kg/ha	30-80 kg/ha; For hybrids: 8-20 kg/ha
Seed treatment (% farmers adopted)	Yes (~33% only)	Yes (20% only)	Yes (~15%)	Yes (30%)	Yes (50%)
Chemicals used for seed treatment	Carbendazim (1-2 g/kg), thiram (1-2 gm/kg), Trichoderma (10 g/kg)	Carbendazim; mancozeb (2 g/kg)	imidacloprid	Thiram (2.5-3 g/kg), Trichoderma (10 g/kg)	Bavistin (2 g/kg), Trichoderma (10 g/kg)
Organic manure in nursery (% farmers adopted)	89%% (FYM, poultry manure)	100% (FYM)	~85% (FYM)	80% (FYM; Poultry manure)	100 % (FYM, Poultry manure)
Inorganic manure in nursery (% farmers adopted)	100% adopted Urea (15-45 kg/acre) and DAP (25-45 kg/acre); Few applied MOP	100% adopted DAP + urea	100% adopted DAP (20-50 kg /acre) + urea (45-50 kg/acre); Some SSP (20-25 kg/acre)	100% adopted DAP (15-40 kg/acre) + urea (15-75 kg/acre); Some also applied MOP and SSP	DAP (20-50 kg/acre) + urea (20-60 kg/acre)

B. Nursery and main field Management: In general, planting was done from middle of July to 1st week of August. Average seed rate ranged from 30-80 kg/ha depending on planting method. Practice of seed treatment was not very common among the farmers and about 15-50% of the farmers contacted treated the seeds with carbendazim (1-2 g/kg), thiram (1-2 gm/kg) and Trichoderma (10 g/kg). More than 80% of the farmers applied organic manure (mainly FYM) in the nursery bed and also applied chemical fertilizers like DAP and/or urea. Some farmers also applied MOP and SSP. Direct sowing was practiced by 20-66% farmers contacted in different districts. Fertilizers were applied @ 40-169.75 kg N/ha, 23-115 kg P₂O₅/ha and 11.5-50 kg K₂O/ha. Majority (~80%) of the farmers contacted applied FYM (2-8 trolley/ha) in the main field. Some

farmers applied vermicompost. Few added mycorrhizal formulation in vermicompost; Very few adopted green manuring.

Table 11: Details of main field management

Details	Districts					Remarks
	Gariaband	Balod	Janjgir	Korba	Sarguja	
Planting method	Direct sowing (66%); Transplanting (55.5%)	Direct sowing (40%); Transplanting (90%)	Direct sowing (~54%); Transplanting (~61%)	Direct sowing (20%); Transplanting (100%)	Direct sowing (25%); Transplanting (75%)	Very few adopted SRI
Total N applied	40-131 kg/ha	75-169.75 kg/ha	47.10-137.5 kg/ha	57.5-110 kg/ha	64-125 kg/ha	Urea
Total P ₂ O ₅ applied	23-115 kg/ha	50-55 kg/ha	30-57.5 kg/ha	50-57.5 kg/ha	30-60 kg/ha	DAP
Total K ₂ O applied	11.5-28.75 kg/ha	15-50 kg/ha	10-50 kg/ha	17.25-50 kg/ha	30-50 kg/ha	MOP
ZnSO ₄ applied	-	8 kg/ha	-			Very few applied
Organic fertilizers applied	Majority (~80%) of the farmers contacted applied FYM (2-8 trolley/ha) in the main field. Some farmers applied vermicompost. Few added mycorrhizal formulation in vermicompost; Very few adopted green manuring					

Table 12: Weeds and weed management

Details	Districts					Remarks
	Gariaband	Balod	Janjgir	Korba	Sarguja	
Weed intensity	Medium to high	Low to medium	Low to medium	Medium	Low-medium	
Names of the weeds	<i>Echinochloa colona</i> (Sanwa), <i>Cyperus rotundus</i> (Motha), <i>Cynodon dactylon</i> (Doob grass), Chuhka weed (Local name), Kutki (<i>Eragrostis</i> spp.), <i>Ischaemum rugosum</i> (Badauri), <i>Convolvulus arvensis</i> (Hirankhuri), <i>Commelina benghalensis</i> (Kankawa), <i>Euphorbia hirta</i> (Badi dudhi), <i>Eleusine indica</i> (Bankado) and some unidentified narrow and broad leaved weeds					Weeds were common in most of the fields surveyed
Weedicides used	Rifit (pretilachlor), Remix (Butachlor 50% EW), Basagran (Bentazon), Rice Up (penoxulam 2.67%), Sunrice (ethoxysulfuron 15% WDG), Nominee Gold (bispyribac Sodium), Saathi (Pyrazosulfuron Ethyl 10% WP), Almix (metsulfuron methyl 10% + chlorimuron ethyl 10% WP), Affinity (carfentrazone ethyl 40%), 2,4-D and others					Most of these farmers also followed one hand weeding additionally
%age farmers applied herbicides	66.6%	92.3%	40%	70%	50%	
Wild rice incidence	Few fields in Gariyaband, Balod and Sarguja (Ambikapur and Sitapur) were infested with wild rice					

C. Weeds and their Management: Overall, intensity of weeds was low to medium. The details of different weeds recorded in different districts are presented in Table 12. Weeds were common in most of the fields surveyed. The details of different weedicides used by the farmers are presented in Table 12. Most of the farmers practiced one hand weeding along with herbicide application. Few fields in Gariyaband, Balod and Sarguja (Ambikapur and Sitapur) were infested with wild rice.

Table 13: Details of inputs used

Details	Districts				
	Gariaband	Balod	Janjgir	Korba	Sarguja
Implements used	Tractor with cultivator (own or hire), seed drill (own or hire), thresher (own or hire), sprayer (own), power tiller (own), rotavator (own or hire) and harvester (own or hire)				
Source of seeds	Farmers used mostly previous years' seeds except for rice hybrids				
Source of irrigation	Canal (89%), Deep tube well (89%)	Canal (90%), Deep tube well (60%)	Canal (61.5%), Deep tube well (38.5%)	Canal (20%), Deep tube well (30%), Shallow tube well (20%)	Canal (25%), Deep tube well (12.5%), Shallow tube well (50%)
Availability of fertilizers/pesticides	Available (78%)	Available (80%)	Available (61.5%)	Available (100%)	Available (100%)
Quality of fertilizers/pesticides	Yes (78%)	Yes (100%)	Yes (92.3%)	Yes (90%)	Yes (87.5%)
Advisors to the farmers	Own decisions (55%); State dept (66.6%); University (78%)	Own decisions (60%); State dept (100%); University (50%); Dealers (20%)	Own decisions (31%); State dept (61.5%); University (23%); Dealers (15%)	Own decisions (20%); State dept (30%); University (80%); Dealers (20%)	State dept (50%); University (100%); Dealers (25%)

D. Specific needs of farmers: Some of the common needs of the farmers timely availability of fertilizers and pesticides, availability of good quality seeds of HYVs, improvement in the irrigation facilities, need for broad spectrum herbicides suitable for rice, disease resistant and drought tolerant rice varieties, subsidy in inputs, short duration rice varieties and technical guidance.

F. Input use: Farmers used different equipments like tractor with cultivator, seed drill, thresher, sprayer, power tiller, rotavator and harvester. In majority cases, farmers used their own (previous years seeds). However, they purchased hybrid rice seeds. Seed replacement rate in Gariyaband and Balod ranged from 56-67%. More than 80% farmers expressed that fertilizers and pesticides were available and they were happy with their quality. In addition to their own decisions, farmers took advices from officials of state department of agriculture and university staffs.

Table 14: Prevalence of diseases and insect pests in Chhattisgarh during *Kharif* 2022

Districts	Diseases								
	BI	NBI	BS	ShBI	ShR	FS	GD	Bak	BB
Gariaband	L-M (3-10%)	M (10-15%)	M (20-25%)	L-S (3-40%)	M (20-25%)	M-S (15-35%)	L-S (2-33%)	S (30-40%)	L-S (5-35%)
Balod	L (2-5%)	L-M (2-10%)	L-M (2-25%)	L-M (3-15%)	L-M (2-10%)	L (4-5%)	L-M (5-10%)		L-M (5-10%)
Janjgir	L-M (5-12%)	-	-	M (15-20%)	L-M (2-10%)	L-M (5-10%)	-	-	M-S (10-100%)
Korba	L-M (5-20%)	-	L-M (5-10%)	L (5-8%)	-	L-M (5-10%)	L-M (5-10%)	-	L-M (5-20%)
Sarguja	L-M (5-20%)	-	-	L (5%)	-	L-M (2-20%)	-	-	L-S (5-50%)

There was tungro like symptoms in some fields of Gariaband; Symptoms of bacterial leaf streak (up to 10%) was noticed in some fields of Gariaband

G. Biotic stress and their management: District wise prevalence of different diseases and insect pests are presented in Table 14. Diseases like leaf blast, neck blast, brown spot and sheath rot were recorded in low to moderate intensities. High intensity of sheath blight (35-40%) and bakanae (30-40%) were recorded in some fields of Swarna in Kopra and Pathar Mohanda village in Gariaband district. False smut was severe in some fields of Swarna in Kopra village in Gariaband district while high intensity of bacterial blight (35-100%) was recorded in Swarna, Vikram TCR and Kaveri 468 varieties in some fields in Kopra (Gariaband), Kotgarh and Khaira (Janjgir) and Rakera (Sarguja). Among the insect pests, stem borer was severe in varieties like Swarna in Kopra (Gariaband) and Kotgarh (Janjgir). Moderate to high intensity of leaf folder damage was recorded in Swarna in Kopra in Gariaband. Moderate to high intensities of BPH, WBPH, mite and cut worm were recorded in some fields in Gariaband. Most of the farmers adopted plant protection measures. The details of different pesticides used are presented in Table 15. The number of pesticide application ranged from 1-4 and mixing of different pesticides before application was not very common among the farmers.

Table 14: Contd..

Districts	Insect pests							
	SB	LF	BPH	WBPH	Cut Worm	Mt	GH	Rats
Gariaband	L-S (3-40%)	M-S (20-35%)	L-S (50%)	S (40%)	M-S (15-30%)	M-S (20-30%)	M (10-20%)	L (2%)
Balod	L-M (2-10%)	M (15%)	L (2-5%)	-	-	-	-	L (5%)
Janjgir	L-S (6-40%)	L (3-5%)	L-M (4-8%)	-	-	-	-	L (2-5%)
Korba	L-M (5-25%)	-	L-M (5-15%)	-	M (10-25%)	-	-	L-M (5-10%)
Sarguja	L-M (5-10%)	L (2%)	L-M (5-20%)	-	-	-	T (1%)	-

Table 15: Details of pest Management

Details	Districts					Remarks
	Gariaband	Balod	Janjgir	Korba	Sarguja	
% age farmers adopting plant protection	89%	100%	100%	100%	100%	
Names of pesticides	Insecticides: Imidacloprid (0.5 ml/l), pymetrozin (120 g/acre), pexalon (90-100 ml/acre) and thiamethoxam for BPH/WBPH; profenophos (2 ml/l), cypermethrin (2 ml/l), Ferterra (4 kg/acre), bifenthrin (200 ml/acre), cartap hydrochloride (6-8 kg/ha), Hamla/Koranda 505 (chlorpyrifos + lambda cyhalothrin) @ 250 ml/acre and fipronil (250 g/acre) for stem borer and leaf folder; propargite (2 ml/l) for mite Fungicides: Nativio (0.4 g/l), hexaconazole (2 g/l), carbendazim (1 ml/l), tebuconazole (200 g/acre) and validamycin (2 g/l) for sheath blight, sheath rot, brown spot and grain discoloration; tricyclazole (0.6 g/l) for blast; azoxystrobin + propiconazole (200 ml/acre) and propiconazole (1 ml/l) for false smut and Streptomycin (0.5 ml/l) and copper oxychloride (2 g/l) for BLB					Some farmers applied Trichoderma formulation (10 g/l) for managing diseases
# of pesticide sprays	2-4	1-3	1-3	1-2	1-2	
Mixing of pesticides before application	Yes (33%)	No (100%)	Yes (~8%)	No (100%)	No (100%)	

Gujarat-2022-2023 (Nawagam)

Districts surveyed: Ahmedabad, Anand, Dang, Kheda, Mahisagar, Navsari, Valsad, Panchmahals, Vadodara, Surat and Tapi

Table 1: Particulars of survey

District	Taluka	Villages
Ahmedabad	Daskroi and Bavla	Jetalpur, Gamadi, Chosar, Devdi and Khicha
Anand	Anand, Umreth, Tarapur, Borsad and Sojitra	Jahangirpura, Chikodra, Badwa, Rasnol, Jakhla, Lingda, Untkara, Haripura, Udai farm, Khanpur, Valli Shankarpura, Dedida and Ishnak
Dang	Aahwa, Subir and Waghai	Dhhungeamba, Garkhadi, Subir, Bardipada, Sajupada, Katmal, Kalibel and Bhalkhet
Kheda	Kheda and Matar	Nawagam, Bidaj, Bhagupura, Sankhej, Vashna Khurd, Umiyapur, Lali, Vadala, Nayka, Dharoda, Dethali, Vastana, Baroda and Hadeva
Mahisagar	Balasinor and Lunavada	Jorapura, Raiyali, Kothamba, Khatpadi na muwada, Raghava na muwada, Kharol and Rawadiya
Navsari	Navsari, Jalalpur, Vansda, Chikhli and Khergam	Munsad, Sarpar, Maroli, Kavdej, Sadakpur, Matwad and Peldi Bhervi
Valsad	Dharampur	Makadban, Bhesdara and Bhambha
Panchmahals	Sehra	Nandisar, Gokalpura, Vakhtapura, Morva and Guneli
Vadodara	Dabhoi and Karjan	Kukad and Khandha
Surat	Mahuva and Bardoli	Nihaliya, Dholikui, Kharvan and Allu
Tapi	Valod and Vyara	Ambach, Hathuka, Mordevi, Golan, Chikhlanda and Karanjvel
Districts: 11	Talukas: 27	Villages:75

Production oriented survey was conducted in the 11 major rice growing districts of Gujarat State viz., Ahmedabad, Anand, Dang, Kheda, Mahisagar, Navsari, Valsad, Panchmahals, Vadodara, Surat and Tapi when the crops were in milk to maturity stage. A total of 27 talukas and 75 villages were covered during this survey. The details of the survey are presented in Table 1. The rain was sufficient and well distributed during the season at Nawagam, where as in some of the areas it was scattered. This year the climatic conditions were favorable for rice crop cultivation. The details of different weather parameters in different surveyed districts are presented in Table 4. A total of 154 farmers were contacted during the survey. Varieties like Gurjari, GAR 13, GAR 14, Mahisagar, GNR 3, GR 7, GR 11, GR 101, Mahsuri, Jaya, Narmada, Arize 6444 (hybrid), Moti Gold, Surya Moti, Sonam, Sriram 125, Kaveri, Versha, Nath Pauha, Krishna Kamod, Pioneer 121 (hybrid), US-312 (hybrid), MC-13 (hybrid), 25P25 (hybrid), Laxmi, Gangamani and others were

mainly cultivated in different districts of Gujarat. The details of different varieties cultivated in different surveyed districts are presented in Table 2. Variety wise are coverage in different surveyed districts are presented in table 6.

Table 2: Widely Prevalent varieties

Districts	Varieties
Ahmedabad	HYVs: Gurjari, GAR 13, GAR 14, Mahisagar, Jaya, GR 101, GR 11, GAR 14, Moti Gold, Sonam, Surya Moti and others
Anand	HYVs: GAR 13, GAR 14, GR 11, Mahisagar, GR 21, Moti, Krishna Kamod, Gurjari, Sriram 125, Jaya, Masuri, Moti Gold, Sonam, and others; Hybrids: Arize 6444, Buland 5050 and others
Dang	HYVs: GR 7, GR 11, GNR 6, Mahisagar, Masuri, Jaya, Desi colum, Ambemore, Dhanya Gold, Annapurna, Kaveri and Navtej, Hybrids: US-312, Arize-6111, Arize 6129 Gold, Siri 5123, PAC-807, Syngenta S 9001, Suruchi, Arize 6444, MC-13 and others
Kheda	HYVs: Gurjari, GAR 13, GAR 14, Mahisagar, GR 11, Pusa 1638, Mahsuri, Kiran 3, Punjab S, Surya Moti, Nath Pauha, Moti Gold, Sonam, GR 101, Shri 101, Krishna Kamod, JK Suraksha, Gangamani and others
Mahisagar	HYVs: Gurjari, GAR 13, NathPauha, Versha, Laxmi, GR 11 and others; Hybrids: Arize6444 and Pioneer varieties
Navsari	HYVs: Gurjari, GAR 13, GR 11, Jaya, Masuri, GNR-3, NathPauha, Kaveri, MC-13, GNR-7, 716, Sweta and others; Hybrids: US-312, KPH 471 (Kaveri), DRRH-3, Arize 6444 and others
Valsad	HYVs: GNR 3, GAR 13, GR-11, Gurjari, Masuri, Jaya and others; Hybrids: Hyb. 471, Kaveri, 2333, US-316, Arize6201, Hyb. 5151, US 312, Arize 6444, Ankur2666, Hyb. 716, JKRH-2082, Hyb.745, Tara 786, Reshma, Gorakhnath and others
Panchmahals	HYVs: Gurjari, GAR 13, GR 11, Jaya, Masuri, Mahisagar, Versha, Sonam, Moti Gold and others
Vadodara	HVs: GAR 13, Jaya, Gurjari, NathPauha and others; Hybrids: US 312, US 25 P 25 and others
Surat	HYVs: Gurjari, GAR 13, Vada Colum, Jaya, GR 11, GNR 3, Nath Pawan etc.; Hybrids: US 312, Kabir 508 and others
Tapi	HYVs: Gurjari, Masuri, NAUR1, GAR 13, Jaya, Gold 807, S 251, Annapurna, Navtej and others; Hybrids: US 312, Arize 6111, PAC 801, Syngenta S 9001 and others

Table 3: Particulars of rice area in the surveyed districts

Name of District	Total geographical area (ha)	Total cultivable area (ha)	Total cultivated area (ha)	Total Irrigated area (ha)	Area under rice (ha)
Ahmedabad	6,79,414	4,97,532	3,91,485	-	1,51,525
Anand	2,94,760	2,16,870	1,76,439	2,08,320	1,21,907
Dang	1,76,000	57,843	57,424	15,275	26,800
Kheda	3,39,271	2,43,972	2,38,262	1,72,405	1,13,422
Mahisagar	1,98,973	1,50,550	1,16,807	75,742	32,106
Navsari	2,20,458	1,33,763	57,559	89,799	50,322
Valsad	2,94,412	1,52,115	1,00,151	61,751	75,689
Panchmahals	3,21,656	1,81,800	1,68,267	83,948	45,582
Vadodara	4,06,700	2,93,687	2,47,333	2,08,000	30,260
Surat	4,32,697	2,36,528	1,19,137	1,62,534	39,025
Tapi	3,43,474	1,60,401	1,11,845	80,596	64,477

Table 4: Weather data for different districts of Gujarat during *Kharif* 2022

District/ Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ahmedabad							
RD	4	19	7	4	1	0	0
TR (mm)	81.2	201.5	16.4	49.6	13.4	0	0
T. Max (⁰ C)	39.8	32.7	34.1	34.1	35	32.9	30.9
T. Min (⁰ C)	26.2	25.1	25.2	25.3	21.6	16.6	16.2
Anand							
RD	3	22	13	5	2	0	0
TR (mm)	90.0	483.4	161.0	89.4	87.3	0	0
T. Max (⁰ C)	37.5	31.7	31.9	33.4	34.0	32.6	29.4
T. Min (⁰ C)	27.7	25.9	25.8	25.7	21.9	16.2	15.7
SH	8.0	2.8	3.7	5.9	8.8	9.4	8.6
Dang							
RD	8	26	23	16	8	-	-
TR (mm)	116	1576	369	550	103	-	-
T. Max (⁰ C)	37.0	33.0	32.5	33.0	34.0	35.0	34.5
T. Min (⁰ C)	25.0	22.5	23.5	19.0	18.0	15.0	13.0
SH							
Kheda							
RD	2	26	12	3	2	0	0
TR (mm)	480	677.6	207.0	95.4	35.7	0	0
T. Max (⁰ C)	39.5	32.2	31.8	33.3	34.0	32.6	30.4
T. Min (⁰ C)	26.5	25.7	25.6	25.0	20.8	20.8	15.0

Production Oriented Survey-2022

District/ Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SH	8.7	5.1	6.9	10.1	9.3	9.2	8.5
Navsari							
RD	11	20	16	15	3	0	0
TR (mm)	164	995	527	660	74	0	0
T. Max (°C)	33.3	29.4	30.07	31.04	33.6	33.7	29.3
T. Min (°C)	25.5	24.3	24.0	23.7	21.3	16.9	15.6
SH	6.4	1.7	3.4	3.9	7.7	8.9	6.3
Valsad							
RD	8	23	18	15	4	0	0
TR (mm)	257.8	1782.9	578.5	678.5	41.1	0	0
T. Max (°C)	33.89	29.91	32.27	31.87	33.65	34.97	34.36
T. Min (°C)	23.9	22.74	22.55	22.5	18.59	12.56	11.60
SH	7.11	1.42	4.02	2.99	7.40	8.90	8.62
Panchmahals							
RD	5	18	15	6	3	0	0
TR (mm)	31	331	166	245	108	0	0
T. Max (°C)	37.82	30.33	30.23	32.32	32.88	31.71	29.56
T. Min (°C)	26.94	25.30	26.65	25.19	20.45	15.08	13.91
SH	7.26	2.59	2.77	4.67	7.14	7.51	7.82
Vadodara							
RD	7	20	14	6	3	0	0
TR (mm)	63	745.6	246.6	94.0	66.5	0	0
T. Max (°C)	36.93	31.49	32.64	32.25	34.06	34.33	-
T. Min (°C)	27.38	25.73	26.19	25.03	27.78	18.33	-
SH	0	0.7	1.38	4.66	7.39	7.39	-
Surat							
RD	11	21	17	12	4	0	0
TR (mm)	172.0	749.0	420.0	192.5	79.5	0	0
T. Max (°C)	35.9	33.7	33.7	36.5	35.8	37.0	35.40
T. Min (°C)	23.6	24.3	24.7	23.6	18.8	14.7	13.8
SH	3	1.5	3.3	4.0	7.1	7.9	7
Tapi							
RD	6	26	17	15	4	0	0
TR (mm)	75	959	658	404	32	0	0
T. Max (°C)	36.2	29.7	30.7	32.5	33.5	32.5	31.6
T. Min (°C)	21.9	18.6	17.9	16.4	14.7	10.6	14.8
SH	6.1	1.6	4.6	3.8	7.8	7.7	6.8

RD: Rainy days; TR: Total rainfall; T. Max: Maximum temperature; T. Min: Minimum temperature; SH: Sunshine hours/day

Table 5: General question on rice cultivation in district (to be filled by the cooperator in consultation with the officials from state department of agriculture)

Parameters	Districts			
	Ahmedabad	Anand	Dang	Kheda
Total area under HYVs (ha)	1,51,525 hac	77,561 hac	6,800 hac	1,13,422 hac
Most prevalent HYVs in the district	Gurjari,GAR-13, Sonam etc.	GAR-13, Gurjari.	GR-7, GR-13, GNR-6 etc.	Gurjari,GAR-13, Mahisagar etc.
Total area under rice hybrids	-	44,346 hac	20,000 hac	-
Most prevalent rice hybrids in the district	-	Bayer-6444, Sri Ram-125 etc.	US-2121, US-312, US-9001 etc.	-
Total area under basmati in the district	-	-	-	-
Most prevalent basmati	-	-	-	-
Seed replacement rate	20-50%	30-100%	50-100%	20-50%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Yes Transplanter, combine harvester	Yes	Yes	Yes
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	Yes	Yes	Yes	Yes
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	IDM, IPM, INM, HYV's etc.	University Hybrids, HYV, IDM, IPM etc.	IDM, IPM, HYV and Govt hybrids etc.	IDM, IPM, INM, HYV's etc.
What are the general problems in rice cultivation in the district?	No any	N.A	No	N.A
Please provide any farmers association in the district	Yes (FPO)	Yes	N.A	Bartiya Kisan Sangh.
Whether availability of agricultural labours is sufficient?	Yes But during transplanting poor availability.	Farmers facing at T.P and Harvesting.	Yes	Yes during transplanting.
Whether there is any marketing problem of the produce?	No	No	No	No
Any major irrigation/power generation project in the district	Yes	Yes	Yes	Wanak bori Thermal Project.
Any soil testing program undertaken?	Yes	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	Yes	Yes	Yes	Yes

Table 5 contd..

Parameters	Districts		
	Mahisagar	Navsari	Valsad
Total area under HYVs (ha)	-	27,800 hac	7,143 hac
Most prevalent HYVs in the district	GAR-13, Gurjari etc.	GAR-13, Gurjari, GNR-3 etc.	GNR-3, Gurjari, GR-11 etc.
Total area under rice hybrids	-	23,522 hac	68,484 hac
Most prevalent rice hybrids in the district	Versha, Bayer-6444 etc.	6444, US-312 etc.	Goraknath, US-312 etc.
Total area under basmati in the district	-	-	-
Most prevalent basmati	-	-	-
Seed replacement rate	20-100%	50-100%	80-100%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Yes	Yes	Yes
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	No	No	No
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	IDM, IPM etc.	IDM, IPM, INM, HYV's etc.	IDM, IPM, INM, HYV's etc.
What are the general problems in rice cultivation in the district?	N.A	N.A	No any
Please provide any farmers association in the district	Yes	Yes	No
Whether availability of agricultural labours is sufficient?	Yes	Yes	Yes
Whether there is any marketing problem of the produce?	No	No	No
Any major irrigation/power generation project in the district	Yes	Yes	Yes
Any soil testing program undertaken?	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	Yes	Yes	Yes

Table 5 contd..

Parameters	Districts			
	Panchmahals	Vadodara	Surat	Tapi
Total area under HYVs (ha)	32,215 hac	30,260 hac	39,025 hac	25,679 hac
Most prevalent HYVs in the district	GR-10, GAR-13, Gurjari, Jaya etc.	GR-11, GAR-13, Surya moti etc.	Gurjari, Jaya etc.	Gurjari, Jaya, IR-28, GAR-13 etc.
Total area under rice hybrids	13,367 hac	322 hac	-	38,686 hac
Most prevalent rice hybrids in the district	Gangamani, 6444, Varsha.	Bayer-6444, Kaveri etc.	US-312, 6444 etc.	US-312, Bayer 6444 etc.
Total area under basmati in the district	-	-	-	-
Most prevalent basmati	-	-	-	-
Seed replacement rate	50-100%	50-60%	20-60%	50-100%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Combine harvester.	Combine harvester.	Yes	-
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	No	Yes	Yes	-
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	About Sh B, Sh R, GD & FS, Management and IPM.	IDM, IPM, INM.	IDM, IPM, IWM, INM etc.	IDM, IPM, INM etc.
What are the general problems in rice cultivation in the district?	Diseases and Insect-pest.	-	-	N.A
Please provide any farmers association in the district	FIG youth.	Yes	-	Yes
Whether availability of agricultural labours is sufficient?	Yes	Yes	Yes	Yes
Whether there is any marketing problem of the produce?	No	No	No	No
Any major irrigation/power generation project in the district	Ponam and Hadak Irrigation Project.	Yes	Yes	Yes
Any soil testing program undertaken?	Yes	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	NFSM	Yes	Yes	Yes

Table 6: Variety/hybrid wise area coverage (ha) in different districts of Gujarat during 2022

Variety/hybrids	Districts/area (ha)					
	Anand	Kheda	Valsad	Panchmahals	Vadodara	Tapi
HYVs/Improved						
GR-11	18369				2594	
GAR 13	46986	26771		6790	16104	3666
GAR-14		651			2	
Gurjari	6925	51619	1046	17888		5596
Mahsuri	3265	3655				
Krishna Kamod	2016					
Guj-3			1068			
Jaya			1264	2570		6786
GAR-4				645		
Mahisagar				4322	228	
Moti Gold					3777	
Surya Moti					2459	
IR 28						4593
Others		30726	3827		5096	16487
US 312 (Hybrid)						11398
Arize 6444 (Hybrid)						8253
MC 13 (Hybrid)						7698
Other Hybrids	44346		68484	13367		

Table 7: General information

Parameters	Ahmedabad	Anand	Dang	Kheda
# of talukas/blocks covered	2	5	3	2
# of villages surveyed	5	13	8	14
# of farmers interviewed	11	31	18	27
Field ecosystem	Irrigated (100%)	Irrigated (100%)	RL (100%); Hilly ecosystem	Irrigated (100%)
Weather conditions during cropping season	Normal (91%)	Normal (100%)	Normal (100%)	Normal (100%)
Crop stage when survey was made	Milk to Heading	Milk to mature	Dough to maturity	Milk to Heading
Crop rotations	Rice-wheat, rice-rice, rice-vegetables, rice-fodder (lucerne), rice-castor, rice-tobacco, rice-fodder sorghum, rice-pearl millet, rice-sunhemp, rice-pulses, rice-sugarcane and rice-pigeon pea			

DLS: Drought like condition; RL: Rainfed lowland; UL: Upland

A. Cropping system and rice yield: The fields surveyed were mostly under irrigated ecosystem and some fields were under hill ecosystem in Dang and some were under rainfed lowland ecosystem in Valsad. The prevailing crop rotations were rice-wheat, rice-onion/garlic, rice fodder, rice-chick pea, rice-pigeon pea, rice-Indian bean, rice-rabi maize, rice-cowpea, rice-sugarcane, rice-sunhemp, rice-wheat-green gram, rice-castor, rice-niger, rice-mustard and rice-vegetables and others adopted in different districts of Gujarat (Table 7). Among the varieties, Gurjari and GAR 13 were widely cultivated. The average yield among different HYVs and hybrids in different surveyed districts ranged from 3000-5500 kg/ha (Table 7)

Table 7 contd..

Parameters	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
# of talukas/blocks covered	2	6 (5 + 1)	3 (1 + 2)	4 (2 + 2)
# of villages surveyed	7	10 (7 + 3)	7 (5 + 2)	10 (4 + 6)
# of farmers interviewed	13	20 (14 + 6)	17 (10 + 7)	17 (5 + 12)
Field ecosystem	Irrigated (100%)	Irrigated (100%) in Navsari and RL (100%) in Valsad	Irrigated (100%)	Irrigated (100%)
Weather conditions during cropping season	Normal (100%)	Normal (100%)	Normal (100%)	Normal (100%)
Crop stage when survey was made	Milk to dough	Milk to dough	Milk to dough	Dough
Crop rotations	Rice-wheat, rice-onion/garlic, rice fodder, rice-chick pea, rice-pigeon pea, rice-Indian bean, rice-rabi maize, rice-cowpea, rice-sugarcane, rice-sunhemp, rice-wheat-green gram, rice-castor, rice-niger, rice-mustard and rice-vegetables			

Table 8: Average yields of different rice varieties as reported by the cooperators/farmers

Variety/hybrids	Yield (kg/ha)			
	Ahmedabad	Anand	Dang	Kheda
HYVs				
GAR-13	4000-4500	3900-4950		4100-5100
Gurjari	3500-4500	4000-4500		3950-6500
Moti Gold	4000-4500	4250		
Mahisagar	3850-4500	4500		
Sonam		3700-4000		4000
GAR-14		4300		
Krishna kamod		2400-3000		2400-2800
Sri Ram 101		4200-4500		4300
Sri Ram-125		4500		
GR-11		2500-4000		4350
SL 51			3300	
Jaya			2500	
Ambemohar			3200	
Doodhmalai			3000	
Mahsuri			3600	3250
Annapurna			3100	
Ganganagri				5200
Kiran-3				3800
Hybrids				
Arize 6444		4400-4500	3400	
US 312			2750-3500	
Dhananjay Gold			3200-4000	
Hyb 5123			3500	
Kaveri			3000-3200	

Table 8 contd..

Variety/hybrids	Yield (kg/ha)			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
HYVs				
GAR-13	4000-5000	4300-4800	4200-4550	4500
Gurjari	3000-5000	4000-4950	3250-5500	5200
Moti Gold	4100			
GR-11		4000		
Versa			4300-4500	
Jaya				3750-4600
Nath Poha		3900		
Mahsuri	4300			3850
Vada Kolam				5250
Sweta	4000			
Hybrids				
Arize 6444	4000-4500	4300	4350-5100	
US 312		3500-4500		4250-5250
MC 13				4750
Kaveri		4200-4700		
Ankur 2666		4100		
Pac 807				4500
NK 5251				5100
Mahyco Navtej				4500

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of Gujarat. Majority of the farmers contacted were in the medium income group. Average per capita consumption of rice per month ranged from 3-5 kg rice in different districts except Dang where per capita consumption of rice was more (8-17 kg) as most of the farmers contacted told that they prefer to consume only rice. Majority of the farmers (almost 100%) from Ahmedabad, Anand, Kheda, Mahisagar, Panchmahals and Vadodara told that their main meal consisted of both rice and wheat (chapatti) (Table 9). Almost all the farmers contacted in different districts told that they used polished rice. Regarding grain quality, most of the farmers expressed that though they preferred fine grain. However, many farmers used both fine grain rice varieties and also basmati rice for consumption. In general, there was no change in the food habit.

Table 9: Details of rice consumption pattern in different districts of Haryana

Parameters	Districts			
	Ahmedabad	Anand	Dang	Kheda
Status of farmers	Medium Income (91%); Poor (9%)	Medium Income (77.4%); Poor (22.6%)	Medium Income (27.8%); Poor (72.2%)	Rich (3.7%); Medium Income (55.6%); Poor (40.7%)
Per capita monthly rice consumption (kg)	3-5 kg	3-5 kg	8-17 kg	3-5 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Only Rice (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)
Rice grain type preference	Fine grain (91%), Basmati (9%)	Fine grain (67.7%), Fine grain + Basmati (32.3%)	Fine grain (100%)	Fine grain (37%), Basmati (33.3%); Fine + Basmati (29.6%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (100%)	Yes (7.4%); included millets

Table 9 contd..

Parameters	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Status of farmers	Medium Income (84.6%); Poor (15.4%)	Medium Income (40%); Poor (60%)	Medium Income (94.1%); Poor (5.9%)	Medium Income (29.4%); Poor (70.6%)
Per capita monthly rice consumption (kg)	3-5 kg	3-5 kg (50%); 9-15 kg (50%)	3-5 kg	3-5 kg (41%); 6-10 kg (59%)
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (50%); only rice (50%)	Rice + Wheat (100%)	Rice + Wheat (41%); Only rice (59%)
Preferred rice types	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)
Rice grain type preference	Fine grain (100%)	Fine grain (45%), Fine + Basmati (50%), coarse (5%)	Fine grain (100%)	Fine grain (17.7%), Fine grain + Basmati (82.3%)
Any changes in food habit in last 10 years	No (100%)	Yes (10%)	No (100%)	No (100%)

C. Nursery and main field Management: Average seed rate used by the farmers in different districts ranged from 20-30 kg/ha. The practice of treating the seeds before sowing was not very common among the farmers. None of the farmers contacted from Anand, Dang, Panchmahals, Vadodara, Surat and Tapi adopted any seed treatment. Majority of the farmers from Ahmedabad and 5-23% farmers from the remaining districts adopted seed treatment with thiram and mixture of carbendazim and mancozeb (Table 10). Planting was mainly done during 1st week of July to 4th week of July. Application of organic manure in the nursery was common among the farmers

and almost all the farmers contacted applied FYM in the nursery. Almost all the farmers contacted applied chemical fertilizers like urea, DAP and ammonium sulphate in the nursery. Most of the farmers adopted random method of planting where proper plant population was not maintained. Very few adopted line planting. In the main fields, fertilizers were applied @ 32-150 kg N/ha, 15-69 kg P₂O₅/ha and 10-20 kg ZnSO₄/ha (Table 11). Application of potassic fertilizers were not common among the farmers. All the farmers contacted applied organic manure like FYM (mainly) and/or green manure in the main field. Fertilizers like urea, DAP and ammonium sulphate were used by the farmers.

Table 10: Details of nursery management

Parameters	Ahmedabad	Anand	Dang	Kheda
Planting time	1 st week to last week of July	1 st week to last week of July	1 st week to last week of July	1 st week to last week of July
Seed rate	20-30 kg/ha (HYVs)	20-30 kg/ha (HYVs)	20-30 kg/ha (HYVs)	20-30 kg/ha (HYVs)
Seed treatment (% farmers adopted)	Yes (91%)	Nil (100%)	Nil (100%)	Yes (7.4%)
Chemicals used for seed treatment	Thiram @ 2-3 g/kg			
Organic manure in nursery (% farmers adopted)	Yes (91%) FYM	Yes (100%) FYM	Yes (100%) FYM	Yes (96.3%) FYM
Inorganic manure in nursery (% farmers adopted)	Yes (100%); Urea (135-180 kg/ha) or DAP (40-150 kg/ha), Ammonium sulphate	Yes (100%); Urea (135-270 kg/ha) or DAP (43-150 kg/ha), Ammonium sulphate, 19:19:19	Yes (44.4%); Urea (25-160 kg/ha) or DAP (30-54 kg/ha)	Yes (100%); Urea (90-240 kg/ha) or DAP (50-150 kg/ha), Ammonium sulphate

Table 10 Contd..

Parameters	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Planting time	1 st week to 3 rd week of July	1 st week to last week of July	1 st week to last week of July	1 st week to last week of July
Seed rate	20-35 kg/ha (HYVs)	20-30 kg/ha (HYVs)	20-30 kg/ha (HYVs)	20-30 kg/ha (HYVs)
Seed treatment (% farmers adopted)	Yes (23.1%)	Yes (5%)	No (100%)	No (100%)
Chemicals used for seed treatment	Thiram @ 2-3 g/kg; carbendazim (12%) + mancozeb (63%) @ 2 g/kg			
Organic manure in nursery (% farmers adopted)	Yes (100%) FYM	Yes (100%) FYM	Yes (100%) FYM	Yes (100%) FYM
Inorganic manure in nursery (% farmers adopted)	Yes (100%); Urea (90-180 kg/ha) or DAP (25-100 kg/ha), Ammonium sulphate	Yes (100%); Urea (50-200 kg/ha) or DAP (25-100 kg/ha), Ammonium sulphate	Yes (100%); Urea (90-190 kg/ha) or DAP (40-100 kg/ha), Ammonium sulphate	Yes (88.2%); Urea (45-180 kg/ha) or DAP (50-100 kg/ha), Ammonium sulphate; SSP, NPK

Table 11: Details of main field management

Details	Districts			
	Ahmedabad	Anand	Dang	Kheda
Planting method	Majority (94-100%) of the farmers adopted random planting where plant population per unit area was not maintained. About 6% farmers contacted in Dang adopted line planting			
Total N applied	60-105 kg/ha	51-125 kg/ha	50-80 kg/ha	40-120 kg/ha
Total P ₂ O ₅ applied	Yes (100%) @ 23-69 kg/ha	Yes (100%) @ 19-69 kg/ha	Yes (44.4%) @ 15-20 kg/ha	Yes (100%) @ 20-69 kg/ha
Total K ₂ O applied	Nil	Yes (~3%)	Nil	Nil
ZnSO ₄ applied (21% or 33%)	Yes (100%) @ 10-20 kg/ha	Yes (100%) @ 15-40 kg/ha	Nil	Yes (92.6%) @ 10-20 kg/ha
Organic fertilizers applied	Yes (100%); FYM (10-13 t/ha), GM	Yes (100%); FYM (10-13 t/ha), GM	Yes (88.9%); FYM (10-20 t/ha)	Yes (100%); FYM (11-20 t/ha), GM
Remarks	Nutrients were applied in the form of urea, DAP, SSP, Ammonium sulphate and zinc sulphate, NPK (19:19:19)			

Table 11 Contd..

Details	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Planting method	Majority (100%) of the farmers adopted random planting where plant population per unit area was not maintained. Very few in Navsari adopted direct sowing			
Total N applied	70-95 kg/ha	42-120 kg/ha	50-120 kg/ha	32-150 kg/ha
Total P ₂ O ₅ applied	Yes (100%) @ 18-46 kg/ha	Yes (100%) @ 12-53 kg/ha	Yes (100%) @ 11.5-46 kg/ha	Yes (100%) @ 23-86 kg/ha
Total K ₂ O applied	Nil	Yes (5%); 42 kg/ha	Nil	Yes (5.8%)
ZnSO ₄ applied (21% or 33%)	Yes (100%) @ 20 kg/ha	Yes (50%) @ 20-25 kg/ha	Yes (100%) @ 15-23 kg/ha	Yes (76.5%) @ 20 kg/ha
Organic fertilizers applied	Yes (100%); FYM (10-13 t/ha), GM	Yes (100%); FYM (10-13 t/ha), GM	Yes (100%); FYM (10-20 t/ha) + GM	Yes (100%); FYM (10-20 t/ha)
Remarks	Nutrients were applied in the form of urea, DAP, SSP, Ammonium sulphate and zinc sulphate, NPK (19:19:19)			

D. Weeds and their Management: In general, the intensity of common weeds like *Echinochloa crusgalli*, *E. colona*, *Eclipta alba*, *Cynodon dactylon* and *Cyperus rotundus* was low to medium. Hand weeding (1-2) was the most common practice for weed management. About 53-91% farmers from different districts followed only hand weeding. Remaining farmers practiced herbicide application along with hand weeding. Commonly used herbicides were pendimethalin and bispyribac Sodium 10 SC (Table 12).

D. Needs of the farmers: Some of the common needs of the farmers were short duration rice varieties, fine grain and early maturing high yielding varieties, varieties with resistance to different diseases and insect pests, high yielding black/coloured rice, bio-fortified varieties, increase in minimum support price, subsidy in fertilizers and other inputs, improvement in irrigation facilities, varieties suitable for organic rice cultivation and technical support to farmers.

Table 12: Weeds and weed management

Details	Districts			
	Ahmedabad	Anand	Dang	Kheda
Weed intensity	Low	Low to medium	Low to high	Low to medium
Names of the weeds	Commonly recorded weeds were <i>Echinochloa colona</i> , <i>E. crusgalli</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotundus</i> and others			
Weedicides used	pendimethalin (0.5-2.5 l/ha), bispyribac Sodium 10 SC (200 ml/ha)			
%age of farmers applied herbicides	Only hand weeding (91%); Hand weeding + herbicide (9%)	Only hand weeding (93.5%); Hand weeding + herbicide (6.5%)	Only hand weeding (83.3%); Hand weeding + herbicide (16.7%)	Only hand weeding (70.4%); Hand weeding + herbicide (29.6%)
Wild/weedy rice incidence	Nil	Nil	Nil	Nil

Table 12 contd..

Details	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Weed intensity	Low	Low to medium	Low	Low to medium
Names of the weeds	Commonly recorded weeds were <i>Echinochloa colona</i> , <i>E. crusgalli</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotundus</i> , <i>Eclipta alba</i> and others			
Weedicides used	pendimethalin (1.25-2.5 l/ha), bispyribac Sodium 10 SC (200 ml/ha)			
%age of farmers applied herbicides	Only hand weeding (53.8%); Hand weeding + herbicide (46.2%)	Only hand weeding (60%); Hand weeding + herbicide (35%); only herbicide (5%)	Only hand weeding (76.5%); Hand weeding + herbicide (23.5%)	Only hand weeding (76.5%); Hand weeding + herbicide (23.5%)
Wild/weedy rice incidence	Nil	Nil	Nil	Nil

E. Input Use: Different Implements like sprayer, tractor, cultivator, rotavator, laser leveler, puddler, thresher, combine harvester were used by the farmers. Progressive farmers had some of their own equipment and other farmers hired the implements (Table 13). Average seed replacement rate was 25-40%. Major sources of irrigation were canal followed by deep and shallow tube wells. Very few farmers contacted expressed that there was scarcity of irrigation water. Majority of the farmers told that inputs like fertilizers and pesticides were available in time and they were happy with their quality. In addition to their own decisions, farmers took advices from private dealers and officials from university and state department of agriculture.

Table 13: Details of inputs used

Details	Districts			
	Ahmedabad	Anand	Dang	Kheda
Implements used	Implements like sprayer, tractor, cultivator, rotavator, laser leveler, puddler, thresher, combine harvester were used by the farmers. Progressive farmers had some of their own equipment and other farmers hired the implements			
Seed replacement (as reported by farmers)	20-30%	25-50%	50-70%	20-30%
Source of seeds	More than 50% of the farmers in different districts told that they purchased part of their seed requirement.			
Source of irrigation	Deep tube well (18.2%); Canal (81.8%); shallow tube well (54.5%)	Deep tube well (19.4%); Canal (96.8%); shallow tube well (77.4%)	Deep and shallow tube well, canal, pond and river	Deep tube well (25.9%); Canal (81.5%); shallow tube well (59.3%)
Scarcity of irrigation water	Yes (~9%)	Yes (6.5%)	No (100%)	No (100%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (96.8%)	No (27.8%)	No (3.7%)
Quality of fertilizers/pesticides	Satisfied (100%)	Satisfied (100%)	Not Satisfied (22.2%)	Satisfied (100%)
Advisors to the farmers	Own decisions (27%); Dealers (45%); Univ (36%); State dept (18%)	Own decisions (19.4%); Dealers (45.2%); Univ (16.1%); State dept (19.4%)	Own decisions (27.8%); Dealers (44.4%); Univ (11.1%); State dept (16.7%)	Own decisions (14.8%); Dealers (29.6%); Univ (37.1%); State dept (48.2%)

Table 13 contd..

Details	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Implements used	Implements like sprayer, tractor, cultivator, rotavator, laser leveler, puddler, thresher, combine harvester were used by the farmers. Use of heavy equipments in Valsad was comparatively less. Progressive farmers had some of their own equipment and other farmers hired the implements			
Seed replacement (as reported by farmers)	20-50%	30-100%	20-50%	20-100%
Source of seeds	Many farmers expressed that they purchased part of their seed requirement.			
Source of irrigation	Deep tube well (7.7%); Canal (84.6%); shallow tube well (84.6%)	Deep tube well (10%); Canal (85%); shallow tube well (80%)	Deep tube well (11.8%); Canal (100%); shallow tube well (88.2%)	Deep tube well (11.8%); Canal (82.4%); shallow tube well (70.6%)
Scarcity of irrigation water	No (100%)	No (100%)	No (100%)	Yes (11.8%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (100%)	No (23.5%)
Quality of fertilizers/pesticides	Satisfied (100%)	Not Satisfied (5%)	Not Satisfied (10%)	Not Satisfied (17.6%)
Advisors to the farmers	Own decisions (53.8%); Dealers (61.5%); Univ (38.5%); State dept (7.7%)	Own decisions (35%); Dealers (65%); Univ (10%); State dept (25%)	Own decisions (47.1%); Dealers (52.9%); Univ (47.1%)	Own decisions (41.2%); Dealers (47.1%); Univ (35.3%); State dept. (29.4%)

Table 14: Prevalence of diseases and Insects in Gujarat during *Kharif*2022

Districts	Diseases							
	BI	NBI	ShBI	FS	GD	ShR	BB	
Ahmedabad	L (5-6%)	L (2-6%)	-	L-M (2-12%)	L-M (2-15%)	L-M (5-15%)	-	
Anand	L-M (2-10%)	M (10-20%)	-	L-M (2-15%)	L-M (2-12%)	L-M (4-10%)	L (2-7%)	
Dang	L-M (4-12%)	L-M (3-16%)	-	L-M (5-22%)	L-M (5-10%)	M (8-12%)	L (5-7%)	
Kheda	L (2-7%)	L-M (3-10%)	-	L-M (2-10%)	L-M (5-13%)	L-M (2-10%)	L-M (2-12%)	
Mahisagar	-	L (5-7%)	L-M (2-20%)	L-M (5-10%)	L-S (5-30%)	L-M (5-10%)	-	
Navsari & Valsad	-	L-M (2-9%)	-	L-M (3-8%)	L-M (5-10%)	L-M (4-9%)	L-M (2-8%)	
Panchmahals & Vadodara	L (4-5%)	L (5-7%)	L-M (2-17%)	L-M (5-15%)	L-M (4-15%)	L-M (3-8%)	L (5-7%)	
Surat & Tapi	-	L-M (3-8%)	-	L-M (3-10%)	L (4-7%)	L-M (3-10%)	-	

Low to moderate (5-10%) incidence of node blast was observed in Krishna Kamod variety in Anand district

Districts	Insect pests					
	SB	LF	WBPH	GLH	Leaf Mt	GB
Ahmedabad	L-M (5-12%)	L-M (6-14%)		L (3-4%)	L (4-5%)	
Anand	L-M (2-10%)	L-M (2-10%)	L-M (5-10%)	L (2-3%)		
Dang	L-M (4-13%)	L-M (4-13%)				
Kheda	L-M (2-10%)	L-M (2-12%)	L-M (2-12%)		L (3-4%)	
Mahisagar	L-M (2-15%)	L-M (2-9%)	L (3-5%)			
Navsari & Valsad	L-M (2-10%)	L-M (3-10%)				L (4-5%)
Panchmahals & Vadodara	L-M (3-10%)	L-M (4-12%)	L-M (4-10%)	L (3-4%)		
Surat & Tapi	L-M (3-12%)	L-M (4-12%)				

F. Biotic stresses and their management: In general, the intensity of different diseases and insect pests was low to moderate (Table 14). In some fields of Mahisagar district, grain discoloration problem was more (5-30%) on rice on varieties like Gurbhari, Nath Poha and Arize 6444. The intensity of other diseases and insect pests was low. Stem borer and leaf folder were wide spread in low to moderate intensities. Leaf mite was observed in low intensity in Ahmedabad and Kheda districts. Farmers used different pesticides for managing different pests and diseases (Table 15). About 76% farmers adopted chemical pest management. Pesticide use in Dang district was negligible. Iron and zinc deficiency symptoms were observed in many surveyed areas. Some of the common problems faced by the farmers were low market price for paddy, scarcity of labours, high cost of inputs resulting higher cost of cultivation, lack of irrigation water in some places and

micro-nutrient deficiency. A general view shared by most of rice growing farmers during our survey that day by day the profitability of rice cultivation is decreasing because of increase in input cost.

Table 15: Details of pest management

Details	Districts			
	Ahmedabad	Anand	Dang	Kheda
% age farmers adopting plant protection	~81%	90.3%	5.5%	100%
Names of pesticides	Insecticides: chlorantraniliprole (0.4%) @ 10 kg/ha, cartap hydrochloride 4G (20 kg/ha), carbofuran 3G (20 kg/ha) and chlorpyrifos 50% @ 700 ml/ha for stem borer and leaf folder and imidacloprid (150 ml/ha), thiamethoxam (150 g/ha) and pymetrozine 50% WG (300 g/ha) for WBPH Fungicides: tricyclazole 75 WP (300 g/ha) for blast and neck blast; propiconazole (500 ml/ha), carbendazim (12%) + mancozeb (63%) @ 1.25 kg/ha and mancozeb 75 WP @ 1.25 kg/ha, for false smut, grain discoloration and sheath rot and hexaconazole (500 ml/ha) for sheath blight			
# of pesticide sprays	1-2	1-2	1	1-2
Mixing of pesticides before application	No (100%)	Yes (6.5%)	No (100%)	Yes (3.7 %)

Table 15 contd..

Details	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
% age farmers adopting plant protection	69.2%	80%	94.1%	88.2%
Names of pesticides	Insecticides: chlorantraniliprole (0.4%) @ 10 kg/ha, cartap hydrochloride 4G (20 kg/ha), carbofuran 3G (20 kg/ha) and chlorpyrifos 50% @ 700 ml/ha for stem borer and leaf folder and imidacloprid (150 ml/ha) and thiamethoxam (250 g/ha) for WBPH Fungicides: tricyclazole 75 WP (300 g/ha) for blast and neck blast; propiconazole (500 ml/ha), chlorothalonil 75% WP @ 1 kg/ha, carbendazim (12%) + mancozeb (63%) @ 1.25 kg/ha, carbendazim (0.5 kg/ha) and mancozeb 75 WP @ 1.25 kg/ha, trifloxystrobin + tebuconazole (0.4 g/l) and copper oxychloride (2 kg/ha) for false smut, grain discoloration and sheath rot and hexaconazole (500 ml/ha), propiconazole (500 ml/ha) and trifloxystrobin + tebuconazole (0.4 g/l) for sheath blight			
# of pesticide sprays	1-2	1	1-2	1-2
Mixing of pesticides before application	No (100%)	Yes (5%)	Yes (5.9%)	Yes (11.8%)

Table 16: Researchable issues

Parameters/Issues	Districts			
	Ahmedabad	Anand	Dang	Kheda
Rice ecology in your area	Irrigated	Irrigated	Irrigated; Hilly	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif	Kharif
Number of years of experience in rice farming	5-10 years	5-10 years	5-20 years	5-10 years
Main biotic constraints (diseases) in your area according to you	Leaf blast, false smut, grain discoloration and sheath rot	Leaf & neck blast, false smut, BLB and grain discoloration and sheath rot	Leaf & neck blast, false smut, BLB and sheath rot	Leaf & neck blast, false smut, BLB and sheath rot
Extent of disease damage	<10%	<10%	10-25%	<10%
Main biotic constraints (Insect pests) in your area according to you	Stem borer, leaf folder and WBPH	Stem borer, leaf folder and WBPH	Stem borer and leaf folder	Stem borer, leaf folder and WBPH
Extent of insect pest damage	10-25%	<10%	<10%	<10%
Main abiotic constraints in your area according to you	Salinity	Salinity	Low light intensity	Salinity
Production constraints in your area according to you	Scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs, micronutrient deficiency and lack of mechanization			
Irrigation facilities in your area	Available; Bore well, canal	Available; Bore well, canal	Available (50%): Canal and bore well	Available (50%): Canal and bore well
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address				
What is urgently required in your area as far as rice varieties are concerned				
Duration	Varieties suitable for DSR, Short duration varieties and varieties resistant to lodging			
Biotic stress resistance	Varieties tolerant to blast, BLB false smut, leaf folder and stem borer			
Abiotic stress resistance	Varieties with resistance to submergence, drought, high temperature and salinity			
Preferred grain quality	MS grain rice varieties and aromatic short grain			
Nutritional quality	Varieties with high zinc, iron and low GI			

H. Researchable issues: Among the biotic stresses, major problems in the region are leaf and neck blast, sheath rot, grain discoloration, false smut and bacterial blight among the diseases and stem borer, leaf folder and WBPH among the insect pests. Among the abiotic problems, drought, salinity and high temperature were the main problem. Major problems faced by the farmers were scarcity

of agricultural labours and lack of mechanization. Farmers want short duration rice varieties, varieties with lodging resistance, varieties having tolerance leaf and neck blast, sheath rot, BLB, false smut, leaf folder, stem borer and plant hoppers. Farmers also expressed the need for varieties having tolerance to salinity, drought and high temperature, varieties with medium slender grains and with high zinc and low GI.

Table 16 contd..

Parameters/Issues	Districts			
	Mahisagar	Navsari & Valsad	Pachmahals & Vadodara	Surat & Tapi
Rice ecology in your area	Irrigated	Irrigated	Irrigated	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif	Kharif
Number of years of experience in rice farming	5-20 years	5-10 years	5-10 years	5-10 years
Main biotic constraints (diseases) in your area according to you	Sheath blight, false smut, grain discoloration and sheath rot	Neck blast, false smut, BLB and sheath rot	Leaf and Neck blast, false smut, sheath blight and sheath rot	Neck blast, false smut and sheath rot
Extent of disease damage	<10%	<10%	<10%	<10%
Main biotic constraints (Insect pests) in your area according to you	Stem borer, leaf folder and WBPH	Stem borer and leaf folder	Stem borer, leaf folder and WBPH	Stem borer and leaf folder
Extent of insect pest damage	<10%	<10%	<10%	<10%
Main abiotic constrains in your area according to you	-	Salinity	Salinity	-
Production constraints in your area according to you	Scarcity of agricultural labours and lack of mechanization			
Irrigation facilities in your area	Available; Bore well, canal	Available; Bore well, canal	Available; Bore well, canal	Available; Bore well, canal
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address				
What is urgently required in your area as far as rice varieties are concerned				
Duration	Varieties suitable for DSR, Short duration varieties and varieties resistant to lodging			
Biotic stress resistance	Varieties tolerant to blast, BLB false smut, sheath blight, BPH/WBPH, leaf folder and stem borer			
Abiotic stress resistance	Varieties with resistance to drought and high temperature			
Preferred grain quality	MS grain rice varieties and aromatic short grain			
Nutritional quality	Varieties with high zinc and low GI			

Haryana-2022-2023 (Kaul)

Districts surveyed: Kaithal, Kurukshetra, Karnal, Jind, Jamunanagar, Ambala, Panipat and Sonapat

Particulars of survey

Districts	Blocks	Villages
Kaithal	Rajaund, Pundri, Kalayat, Kaithal and Guhla Cheeka	Sherda, Krora, Ramgarh, Thana, Pai, Kathwad, Kalayat, Chandana, Bhagal and Deban
Kurukshetra	Babain, Ismailabad, Shahbad, Ladwa and Pehowa	Haripur, Ismailabad, Chhorpur, Barot, Fateh Singh Deera, Diwana, Guda, Ramnagar and Jainpur Jatan
Karnal	Karnal, Nissing, Nilokheri, Asandh and Indri	Ghogripur, Gonder, Manchuri, Billona, Asandh, Dera Gujrakhiya, Umarpur, Bhadso, Ballah and Beed Majra
Jind	Saffidon, Uchana, Alewa and Pillukhera	Hatt, Paju Khurd, Muana, Dumerkha, Alewa, Khanda, Mohmand Khera, Jamani, Baroda and Jind
Jamunanagar	Jagadhari, Mustafabad and Radaur	Golanpur, Thana Chapar, Bandi Khajuri, Uncha Chandra, Janjhera, Rajpura, Jathana, Mandebari, Lakshbans and Bareri
Ambala	Mulana, Saha, Barara, Shahzadpur and Ambala	Dhurala, Hamidpur, Adhoya, Kambas, Pathrehri, Addo Majra, Mulana, Panjeta and Dheen
Panipat	Bapoli, Panipat, Samalkha and Israna	Beholi, Dadola, Bapoli, Macchhorli, Karhans, Gaddi, Sivah, Patti Kaliyana, Bijawa and Shahpur
Sonapat	Murthal, Rai, Gannaur and Khanpur Kalan	Murthal, Hasanpur, Nara, Jagdishpur, Barhi, Butana, Kheri Sarjal, Mudlana, Chirsmi and Jaksi

Table 2: Widely prevalent rice varieties

Districts	Varieties
Kaithal	HYVs: PR 114; Hybrids: 27p22, 90m100, 28p67 and Sava 127; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1718, Pusa Basmati 1509, CSR 30 and Pusa Basmati 1
Kurukshetra	HYVs: PR 126, PR 201, PR 114 and Pusa 44; Hybrids: Sava 127, Sava 134, Hyb. 7299, 25p35, Sava 7301 and Hybrid 927; Basmati/Scented: Pusa Basmati 1509, Pusa Basmati 1, Pusa Basmati 1121 and Pusa Basmati 1692
Karnal	HYVs: PR 114, PR 121, PR 126, PR 128, PR 129 and PR 201; Hybrids: 27p22, 28p67 and 27p31; Basmati/Scented: Pusa Basmati 1728, Pusa Basmati 1509, Pusa Basmati 1718, Pusa Basmati 1121 and Pusa Basmati 1847
Jind	HYVs: PR 114; Hybrids: 27p22, 28p67, 27p31, Sava 127, Sava 134 and Hybrid JKRH 2082; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1718, Pusa Basmati 1509, Pusa Basmati 1401 and CSR 30
Jamunanagar	HYVs: PR 126 and PR 128; Hybrids: Sava 127, Arize 6444, Sava 134, Hyb 359, Sava 7301, Hybrid 117 (Rashi RRX 117), Hybrid 4040, Swift Gold and VNR

	2111; Basmati/Scented: Pusa Basmati 1, Pusa Basmati 1692, Pusa Basmati 1121, Pusa Basmati 1509 and Pusa Basmati 1718
Ambala	HYVs: NDR 359, PR 114 and PR 126; Hybrids: 25p35, 28p67, Hybrid 8433, Sava 127, Sava 7301, Sava 134, Sava 7501, Hybrid 468, 90m100, Swift Gold, Hybrid (VNR) 2222 and Arize 6129; Basmati/Scented: Pusa Basmati 1121, Local Basmati and Pusa Basmati 1509
Panipat	HYVs: PR 126; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1718, Pusa Basmati 1, Pusa Basmati 1509 and Pusa Basmati 1728
Sonepat	HYVs: PR 114, PR 128 and others; Basmati/Scented: Pusa Basmati 1718, Pusa Basmati 1509, Pusa Basmati 1121, Pusa Basmati 1692, CSR 30 and Pusa Basmati 1728

Production oriented survey was conducted in 8 rice growing districts of Haryana viz., Kaithal, Kurukshetra, Karnal, Jind, Yamunanagar, Ambala, Panipat and Sonepat during Kharif season of 2021 when the crops were booting to dough stage. A total of 78 villages in 8 districts were surveyed. The details of survey particulars are presented in Table 1 and Table 3. The fields surveyed were under irrigated ecosystem and in general the weather conditions for rice cultivation were favourable except there were reports of excess rainfall in some places in Kaithal, Jind and Panipat. Widely prevalent rice varieties were HYVs like PR 114, PR 121, PR 126, PR 128, PR 129 and PR 201; hybrids like 25p35, 28p67, Hybrid 8433, Sava 127, Sava 7301, Sava 134, Sava 7501, Hybrid 468, 90m100, Hybrid (VNR) 2222, Arize 6129, 27p22, 27p31, Hybrid JKRH 2082, Hybrid 7299, Arize 6444, Hybrid 117 (Rashi RRX 117), Hybrid 4040, Swift Gold and VNR 2111 and basmati varieties like Pusa Basmati 1718, Pusa Basmati 1509, Pusa Basmati 1121, Pusa Basmati 1, Pusa Basmati 1401, Pusa Basmati 1692, CSR 30 and Pusa Basmati 1728. The details of different rice varieties cultivated in different districts of Haryana are presented in Table 2.

Table 3: General information

Parameters	Kaithal	Kurukshetra	Karnal	Jind
# of talukas/blocks covered	5	5	5	4
# of villages surveyed	10	9	10	10
# of farmers interviewed	10	10	10	10
Field ecosystem	Irrigated	Irrigated	Irrigated	Irrigated
Weather conditions during cropping season	Normal (90%); Excess rainfall (10%)	Normal	Normal	Normal (90%); Excess rainfall (10%)
Crop stage when survey was made	Heading to dough	Booting to Heading	Booting to heading	Heading to dough
Crop rotations	Rice-wheat was the main crop rotation followed by the farmers. Some farmers also followed rice-mustard, rice-potato, rice-sugarcane, rice-wheat-vegetables			

A. Cropping system and rice yield: The main crop rotation followed by the farmers was rice-wheat. Some farmers also followed rice-mustard, rice-potato, rice-mustard-sunflower and rice-sugarcane (Table 3). The details of variety wise yield (as reported by the farmers during survey) are presented in Table 4. Average rice yield among HYVs ranged from 5750-7750 kg/ha while in

case of hybrid varieties it ranged from 6500-8500 kg/ha. In case of basmati varieties, average yield ranged from 3250-6000 kg/ha.

Table 3 Contd..

Parameters	Yamunanagar	Ambala	Panipat	Sonepat
# of talukas/blocks covered	3	5	4	4
# of villages surveyed	10	9	10	10
# of farmers interviewed	10	10	10	10
Field ecosystem	Irrigated	Irrigated	Irrigated	Irrigated
Weather conditions during cropping season	Normal	Normal	Normal (70%); Excess rainfall (30%)	Normal
Crop stage when survey was made	Booting to Heading	Booting to milk	Heading to maturity	Milk to dough
Crop rotations	The main crop rotation followed by the farmers was rice-wheat. Some farmers also followed rice-sugarcane, rice-mustard and rice-potato			

Table 4: Average yields of different rice varieties as reported by the cooperators/ farmers

Variety/hybrids	Yield (kg/ha)			
	Kaithal	Kurukshetra	Karnal	Jind
HYVs				
PR 126		6250-7500	6250-7500	
PR128			5750-7750	
PR 121				7000
PR 114	6000-7500	7000-7500	6500-7500	
PR 201		7500		
Basmati				
CSR 30	3250-3500			3500
Pusa Basmati 1121	5000-5750		5250	4000-6250
Pusa Basmati 1509	4250-5000	3750	5000-5750	4500-5000
Pusa Basmati 1		5000		
Pusa Basmati 1718	4750-6000		5000-5750	5000-5500
Pusa Basmati 1692		6000		
Pusa Basmati 1410				6250
Hybrids				
Sava 127		6500-7000		6750
Sava 134				7500
Hyb. 359		6750		
HYb. 927		7500		
Hyb. 28p67			7250	8750
Hyb. 27P31			7000	7500
Hyb. 25P35		8000		
Hyb. 27p22	6750		7000	

Table 4: Contd..

Variety/hybrids	Yield (kg/ha)			
	Yamunanagar	Ambala	Panipat	Sonepat
HYVs				
PR 126	6500-7000			
PR128	7000			7500
PR 114				7250
Basmati				
CSR 30				3250
Pusa Basmati 1121			4000-5750	4250-5500
Pusa Basmati 1509	4750		3750-5000	
Pusa Basmati 1	5500-6000		5000	
Pusa Basmati 1718	5250		5500-5750	4500-6000
Pusa Basmati 1692	6000			
Hybrids				
Sava 127	6250-7500	7000-8000		
Sava 134	8250			
Sava 7301	8000	7250-7500		
Hyb. 359	7500	6500		
Hyb. 468		6250		
Arize 6444	8500			
HYb. 2082	6750			
Hyb. 28p67		7000-7500		
Hyb. 25P35		7000-7500		
90m100		7250		
Swift Gold		7500		
Arize 6129		6750		

Table 5: Details of rice consumption pattern in different districts of Haryana

Parameters	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Status of farmers	Medium Income (90%); Poor (10%)	Medium Income (100%)	Medium Income (80%); Poor (20%)	Medium Income (80%); Poor (10%); rich (10%)
Per capita monthly rice consumption (kg)	1-4 kg	1.5-3 kg	1-3 kg	1.5-4 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (70%); Parboiled (30%)	Polished rice (70%); Parboiled (30%)	Polished rice (80%); Parboiled (20%)	Polished rice (70%); Parboiled (20%)
Rice grain type preference	Basmati (90%); Fine grain (10%)	Basmati (80%); Fine grain (20%)	Basmati (80%); Fine grain (20%)	Basmati (70%); Fine grain (30%)
Any changes in food habit in last 10 years	No (70%); 30% told quantity of basmati rice in diet increased	No (50%); 50% told quantity of basmati rice in diet increased	No (50%); 50% told quantity of basmati rice in diet increased	No (50%); 50% told quantity of basmati rice in diet increased

Table 5 contd..

Parameters	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Status of farmers	Medium Income (100%)	Medium Income (100%)	Medium Income (60%); Poor (40%)	Medium Income (90%); Poor (10%)
Per capita monthly rice consumption (kg)	1.5-4 kg	1.5-4 kg	2.5-4 kg	1.5-4 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (80%); Parboiled (20%)	Polished rice (70%); Parboiled (30%)	Polished rice (60%); Parboiled (40%)	Polished rice (60%); Parboiled (40%)
Rice grain type preference	Basmati (70%); Fine grain (30%)	Basmati (50%); Fine grain (50%)	Basmati (90%); Fine grain (10%)	Basmati (90%); Fine grain (10%)
Any changes in food habit in last 10 years	No (20%); 80% told quantity of basmati rice in diet increased	No (40%); 60% told quantity of basmati rice in diet increased	No (70%); 30% told quantity of basmati rice in diet increased	No (30%); 70% told quantity of basmati rice in diet increased

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of Haryana. Majority (average 87%) of the farmers contacted were in the medium income group while 10-40 farmers belonged to poor category. Average per capita consumption of rice per month was 1-4 kg rice (Table 5). All the farmers contacted told that their main meal consisted of both rice and wheat. About 50-90% farmers in different districts told that they preferred basmati rice and about 10-50% consumed fine grain varieties. More than 60% farmers told that they preferred polished rice. In general, there was no change in the food habit except that some farmers told that the amount of rice consumed in increased.

Table 6: Details of nursery management

Parameters	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Planting time	1 st week of June to 3 rd week of July	Middle of June to end of June	2 nd week of June to 2 nd week of July	2 nd week of June to 2 nd week of July
Seed rate	8-10 kg/ha	9-10 kg/ha	8-10 kg/ha	10-12 kg/ha
Seed treatment (% farmers adopted)	Yes (50%)	Yes (40%)	Yes (40%)	Yes (90%)
Chemicals used for seed treatment	Soaking 10 kg seeds in carbendazim (1-2 g/kg) or mixture of carbendazim (10g) + streptocycline (1g) for 24 h			
Organic manure in nursery (% farmers adopted)	Yes (20%) FYM, Poultry manure	Yes (10%) FYM	No (100%)	No (100%)
Inorganic manure in nursery (% farmers adopted)	Yes (90%); Urea (10 kg/kanal) and/or DAP @ 8-10 kg/kanal*	Yes (80%); DAP (5-10 kg) + urea (4-5 kg) per kanal	Yes (50%); DAP @ 5kg/kanal and/or urea @ 5-10 kg/kanal	Yes (90%); DAP @ 2-10 kg/kanal and/or urea @ 5 kg/kanal

* 1 Kanal = 500 m²

Table 6 contd..

Parameters	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Planting time	Middle of June to 1 st week of July	Middle of June to 3 rd week of July	3 rd week of June to 2 nd week of July	Middle of June to 1 st week of July
Seed rate	10 kg/ha	10 kg/ha	10 kg/ha	8-10 kg/ha
Seed treatment (% farmers adopted)	Yes (80%)	Yes (10%)	Yes (60%)	Yes (90%)
Chemicals used for seed treatment	Soaking 10 kg seeds in carbendazim (1-2 g/kg) or mixture of carbendazim (10g) + streptocycline (1g) for 24 h			
Organic manure in nursery (% farmers adopted)	Yes (20%) FYM	Yes (20%) FYM	Nil (100%)	Yes (10%) FYM
Inorganic manure in nursery (% farmers adopted)	Yes (90%); Urea (5-10 kg/kanal) and/or DAP @ 5-10 kg/kanal*	Yes (80%): DAP (5-10 kg) + urea (8-10 kg) per kanal; Some applied potash, SSP and ZnSO ₄ in nursery	Yes (90%): DAP (5-8 kg) + urea (5-10 kg) per kanal	Yes (80%): DAP (5-10 kg) + urea (5-10 kg) per kanal

Table 7: Details of main field management

Details	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Planting method	Almost all the farmers adopted random planting where plant population per unit area was not maintained; Some farmers in Kaithal (10%) adopted direct sowing			
Total N applied	HYVs: 61.5-195 kg/ha Basmati: 115-195 kg/ha	HYVs: 135-201 kg/ha Basmati: 80-157 kg/ha	HYVs: 144-228 kg/ha; Basmati: 57.5-166 kg/ha	HYVs: 172-195 kg/ha Basmati: 137.5-195 kg/ha
Total P ₂ O ₅ applied	Yes (70%) @ 10-57 kg/ha	Yes (70%) @ 23-57 kg/ha	Yes (70%) @ 57.5 kg/ha	Yes (70%) @ 10-57.5 kg/ha
Total K ₂ O applied	Yes (40%) @ 29 kg/ha	Yes (30%) @ 11.5-23 kg/ha	Yes (30%) @ 29 kg/ha	Yes (30%) @ 23 kg/ha
ZnSO ₄ applied (21% or 33%)	Yes (70%) @ 12.5-25 kg/ha	Yes (80%) @ 12.5-25 kg/ha	Yes (50%) @ 12.5-25 kg/ha	Yes (50%) @ 7.5-12.5 kg/ha
Organic fertilizers applied	Yes (60%); FYM (3-5 t/acre), poultry manure; Some applied FYM once in 3 years depending on availability	Yes (60%); FYM (3-5 t/acre), Vermicompost (3-4 t/acre), GM	Yes (60%); FYM (3-4.5 t/acre), Vermicompost Applied once in 3-4 years	Yes (80%); FYM (3-5 trolley/acre), V. compost (3-4 t/acre); GM with dhaincha
Remarks	Nutrients were applied in the form of urea, DAP, SSP, MOP and zinc sulphate (21% or 33%). Some farmers applied chelated zinc. Few farmers in Kaithal applied sulphur.			

C. Nursery and main field Management: Average seed rate was low (8-12 kg/ha). On an average about 57% of the farmers contacted told that they treated the seeds by soaking them in carbendazim (1-2 g/kg) or a mixture of Bavistin (10g) + streptocycline (1g) for 24 h (Table 6). Planting was

done during first week of June to third week of July. Very less number of farmers (0-20%) applied organic manure like FYM or vermicompost in the nursery. However, on an average about 81% farmers applied chemical fertilizers like urea (4-10 kg/kanal) and/or DAP (5-10 kg/kanal). Almost all the farmers adopted random planting where plant population per unit area was not maintained. The details of fertilizers applied in the main field are given in Table 7. Average nitrogen dose in case of HYVs was 61.5-252.5 kg N/ha while in case of basmati N dose was 57.5-195 kg N/ha. Other fertilizers were applied @ 10-57.5 kg P₂O₅/ha and 11.5-57.5 kg K₂O/ha. On an average about 64% farmers applied zinc sulphate (containing either 21% or 33% zinc) @ 7.5-25 kg/ha. About 62% farmers applied farm yard manure or vermicompost or green manure in the main field.

Table 7 Contd..

Details	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Planting method	Almost all the farmers adopted random planting where plant population per unit area was not maintained			
Total N applied	HYVs: 137-195 kg/ha Basmati: 109-137 kg/ha	HYVs: 115-230 kg/ha Basmati: 115-143 kg/ha	HYVs: 184-252.5 kg/ha; Basmati: 126-195 kg/ha	HYVs: 172-195 kg/ha Basmati: 69-172 kg/ha
Total P ₂ O ₅ applied	Yes (90%) @ 29-57.5 kg/ha	Yes (70%) @ 10-57.5 kg/ha	Yes (90%) @ 20-57.5 kg/ha	Yes (70%) @ 20-57.5 kg/ha
Total K ₂ O applied	Yes (60%) @ 29-57.5 kg/ha	Yes (60%) @ 28.7-57.5 kg/ha	Yes (30%) @ 29 kg/ha	Yes (30%) @ 29-57.5 kg/ha
ZnSO ₄ applied (21% or 33%)	Yes (80%) @ 10-12.5 kg/ha	Yes (60%) @ 7.5-25 kg/ha	Yes (60%) @ 12.5-25 kg/ha	Yes (40%) @ 12.5 kg/ha
Organic fertilizers applied	Yes (70%); FYM (3-5 trolley/acre), GM with dhaincha	Yes (80%); FYM (3-5 t/acre), Vermicompost (2-3 trolley/acre)	Yes (50%); FYM (2-3 trolley/acre), Vermicompost (2-3 trolley/acre)	Yes (60%); FYM (4-5 trolley/acre)
Remarks	Nutrients were applied in the form of urea, DAP, SSP, MOP and zinc sulphate (21% or 33%). Some farmers applied chelated zinc. Few farmers in Ambala, Panipat and Sonepat applied sulphur			

D. Weeds and their Management: Intensity of commonly recorded weeds like *Echinochloa colona*, *Dactyloctenium aegyptium*, *Cyperus rotundus*, *Cynodon dactylon*, Ghoda grass (local name), Chinese grass (local name), *Trillium govanianum* and some unidentified weeds was low to medium (Table 8). About 80-100% farmers in different districts applied weedicides. The details of weedicides are presented in Table 8. About 40-50% farmers in the surveyed districts also practiced hand weeding along with herbicide application.

E. Common needs of the farmers: Some of the common needs of the farmers were increase in the price of basmati rice, subsidy on DSR cultivation, timely availability of quality inputs and seeds, practical solution for residue management, availability of DAP, subsidy on implements, short duration rice varieties, subsidy on fertilizers and pesticides and reduction in the cost of cultivation.

Table 8: Weeds and weed management

Details	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Weed intensity	Low-medium			
Names of the weeds	Commonly recorded weeds were Samak (<i>Echinochloa colona</i>), Makra weed (<i>Dactyloctenium aegyptium</i>), Deela (<i>Cyperus rotundus</i>), Doob (<i>Cynodon dactylon</i>), Ghoda grass (local name), Chinese grass (local name), chhatri (<i>Trillium govanianum</i> ?) and some unidentified weeds			
Weedicides used	Pretilachlor (500 ml/acre), butachlor, Nominee Gold, Almix and others			
Percentage of farmers applied herbicides	About 80-100% farmers in different districts applied weedicides. About 40-50% farmers in the surveyed districts also practiced hand weeding along with herbicide application. About 20% farmers in Jind practiced only hand weeding			
Wild/weedy rice incidence	NA	NA	NA	NA

Details	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Weed intensity	Low			
Names of the weeds	Commonly recorded weeds were Samak (<i>Echinochloa colona</i>), Makra weed (<i>Dactyloctenium aegyptium</i>), Deela (<i>Cyperus rotundus</i>), Doob (<i>Cynodon dactylon</i>), Ghoda grass (local name), Leptochloa chinensis, Chinese grass (local name), chhatri (<i>Trillium govanianum</i> ?) and some unidentified weeds			
Weedicides used	Pretilachlor (500 ml/acre), butachlor, Nominee Gold and others			
Percentage of farmers applied herbicides	Almost all the farmers applied weedicides. About 20-30% farmers in the surveyed districts also practiced hand weeding along with herbicide application			
Wild/weedy rice incidence	NA	NA	NA	NA

F. Input Use: The details of inputs used by the farmers are presented in Table 9. Implements like harrow, rotavator, tractor, trolley, power tiller, combined harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers hired the implements. On an average 58% of the farmers in different districts told that they purchased 100% of their seed requirement. Remaining farmers told that they used part (50%) of last years harvested seeds. The main source of irrigation was deep tube well. Majority of the farmers told that there was no scarcity of irrigation water. Most of them also told that inputs like fertilizers and pesticides were available. The main advisors to the farmers were private dealers followed by officials from state department of Agriculture and Univeristy.

Table 9: Details of inputs used

Details	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Implements used	Implements like harrow, rotavator, tractor, trolley, power tiller, combined harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers hired the implements			
Source of seeds	Many farmers (70% in Kaithal, 40% in Kurukshetra, 80% in Karnal and 20% in Jind) told that they purchased 100% of their seed requirement. Remaining farmers told that they purchased part (50%) of their seed requirement.			
Source of irrigation	Deep tube well (100%); canal (10%)	Deep tube well (100%)	Deep tube well (100%)	Deep tube well (100%)
Scarcity of irrigation water	No (100%)	No (100%)	No (100%)	No (100%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Quality of fertilizers/pesticides	Satisfied (90%)	Satisfied (100%)	Satisfied (90%)	Satisfied (100%)
Advisors to the farmers	Own decisions (10%); Dealers (80%); State dept (30%); Univ (10%)	Own decisions (30%); Dealers (100%); State dept (60%)	Own decisions (30%); Dealers (90%); State dept (50%)	Own decisions (40%); Dealers (90%); State dept (30%)

Details	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Implements used	Implements like harrow, rotavator, tractor, trolley, power tiller, combined harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers hired the implements			
Source of seeds	Many farmers (50% in Yamunanagr, 100% in Ambala, 80% in Panipat and 30% in Sonepat) told that they purchased 100% of their seed requirement. Remaining farmers told that they purchased part (50%) of their seed requirement.			
Source of irrigation	Deep tube well (100%)	Deep tube well (100%)	Deep tube well (100%)	Deep tube well (100%)
Scarcity of irrigation water	No (100%)	No (100%)	No (100%)	No (100%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Quality of fertilizers/pesticides	Satisfied (100%)	Satisfied (100%)	Satisfied (100%)	Satisfied (100%)
Advisors to the farmers	Own decisions (30%); Dealers (90%); State dept (20%); Univ (20%)	Own decisions (30%); Dealers (90%); State dept (40%)	Own decisions (30%); Dealers (100%); State dept (20%); Univ. (20%)	Own decisions (20%); Dealers (90%); State dept (30%)

Table 10. Prevalence and severity of rice diseases recorded in different districts of Haryana during *Kharif* 2022

District	Sheath blight	Leaf blast	Neck blast	Bakanae	False smut	Grain Discoloration	Bacterial leaf blight	Khaira	Stunting (Out of 10)
Kaithal (20 %) ^c	70 % L-M ^b PB 1121, PB 1509, PB 1718, PR 114, Sawa 127	30 % L-M ^b CSR 30, PB 1121	20 % Tr. -L ^a CSR 30, PB 1121, PB 1509	30 % L -M ^a PB 1121, PB 1509, CSR 30, PB 1718	10 % Tr. -L ^a PR 114	30 % Tr. -L 28P67, 90M100, PR 114, PB 1509	20 % Tr. -L ^b PR 114, PB 1718	10 % Tr. -L PB 1509	2
Kuruks-hetra (20 %)	70 % L-M ^b PB 1692, PR 114, PR 126, Sawa 127, Sawa 134, Sawa 7301, 7299	40 % L-M ^b PB 1509, PB 1692, PB 1121, PB 1	20 % Tr. -L ^a PB 1121, PB 1509, PB 1	20 % Tr. -L ^a PB 1121, PB 1509	20 % Tr. -L ^a Sawa 127, Sawa 134	20 % Tr. -L PR 114, Sawa 7301	40 % Tr. -L ^b Bas. 521, PB 1692, Sawa 127, Sawa 7301	10 % Tr. -L 7299	6
Karnal (30 %)	70 % L-M ^b PB 1121, PB 1509, PB 1718, PR 114, PR 126, PR 128, PR 201, 28P67, Sawa 127	10 % L-M ^b PB 1509	10 % Tr. -L ^a PB 1509	20 % Tr. -L ^a PB 1509, PB 1718	20 % L -M ^a PR 126, Sawa 127	30 % Tr. -L PB 1121, PR 126, 28P67, 27P22	60 % L-M ^b PB 1121, PB 1509, PR 129, PR 121, PR 126, Sawa 127	-	7
Jind (20 %)	80 % L-M ^b PB 1121, PB 1509, PB 1718, PB 1401, PR 114, 28P67, 27P31	30 % L-M ^b PB 1121, PB 1509, PB 1718	20 % Tr. -L ^a PB 1121	70 % L -M ^a PB 1121, PB 1509, PB 1718	10 % L -M ^a PR 114	40 % Tr. -L PB 1121, 28P67, 27P31, PR 114, PB 1718	40 % L-M ^b PB 1121, 28P67, , PR 114	10 % Tr. -L PB 1718	3
Yamuna Nagar (30 %)	60 % L-M ^b PB 1, PR 128, Sawa 134, Sawa 7301, 6444, 359, 4040	20 % L-M ^b PB 1	10 % Tr. -L ^a PB 1	20 % Tr. -L ^a PB 1692	20 % Tr. -L ^a Sawa 127, Sawa 134	20 % Tr. -L 4040, Sawa 7301	20 % Tr. -L ^b PB 1692, Sawa 7301	-	8
Ambala (10 %)	60 % L-M ^b PB 1121, PR 114, Sawa 7301, Sawa 127, 25P35, 90M100, 28P67	20 % L-M ^b PB 1509, PB 1121	10 % Tr. -L ^a PB 1121	20 % Tr. -L ^a PB 1509, PB 1121	40 % Tr. -L ^a 25P35, Sawa 7301, Sawa 127	20 % Tr. -L Sawa 7301, Swift Gold	30 % Tr. -L ^b 2222, PB 1121, Sawa 134, Sawa 7501	20 % Tr. -L 2222, 25P35	10
Panipat (20 %)	80 % L-M ^b PB 1121, PB 1718, PR 126	30 % L-M ^b PB 1121, PB 1718	50 % Tr. -L ^a PB 1121, PB 1718	60 % L -M ^a PB 1121, PB 1718	30 % L -M ^a PR 126, PB 1718, PB 1121	30 % Tr. -L PB 1121, PR 126, PB 1718	50 % Tr. -L ^b PB 1121, PB 1718	-	2
Sonepat (30 %)	70 % L-M ^b PB 1121, PB 1509, PB 1718, PR 128, PR 114	40 % L-M ^b PB 1718, CSR 30, PB 1509	60 % Tr. -L ^a PB 1692, CSR 30, PB 1121, PB 1718	50 % L -M ^a PB 1692, PB 1121, PB 1509	10 % L -M ^a PR 114	30 % Tr. -L PR 128, PB 1718, PB 1509	20 % Tr. -L ^b PB 1121, PB 1718	10 % Tr. -L PB 1509	6

^a: Disease incidence ^b: % disease severity Severity: Tr: traces; L: low; M: moderate; S: severe Disease incidence: < 10%, 10-25% and > 25% were designated as L, M and S in case of **neck blast, stem rot, bakanae and false smut**. Likewise for **sheath blight, leaf blast and bacterial leaf blight**, disease score of 3, 5 and >5 were treated as L, M and S, respectively: ^c: Disease free locations

Table 11: Occurrence and severity of rice insect- pests recorded in different districts of Haryana during *Kharif*, 2022

District	Stem borer	Planthoppers (WBPH /BPH)	Leaf folder	Grass hopper
Kaithal	100 % Tr.- L ^b ; (0.5-2.5 % dead heart/WE) CSR 30, PB 1121, PB 1509, PB 1718, Sawa 127 & PR 114, 27P22, 28P67	80 % L- M ^b ; 10 % Tr; (1-15 nymphs/hill) CSR 30, PB 1121, Sawa 127, Sawa 127, PR 114 & PB 1509, , 27P22, 28P67	60 % Tr-L ^b ; (0.5-4.0% damaged leaves); CSR 30, PB 1121, Sawa 127, Sawa 134, PB 1692 & PR 128	
Kurukshetra	100 % Tr-L ^b ; (0.5-2.0% dead heart/WE) ^a PUSA 44, PR 126, Sawa 127& 27, 28P67, PB 1509, 1692, PR 126, 102 PR 114, PB 1, 1121, Hyb 7299, Hyb. 927, Bas 521, 25P30.,	100% Tr- L ^b ; (1-14 nymphs/hill) ^a PR 126, Sawa 127& 27, 25P30, PB 1509, 1692, PR 126, 102 PR 114, PB 1, 1121, Hyb 7299, Hyb. 927, Bas 521, 25P30	90% L ^b ; (0.5-5.0% damaged leaves) ^a PUSA 44, PR 126, Sawa 127& 27, 28P67, PB 1509, 1692, PR 126, 102 PR 114, PB 1, 1121, Hyb 7299, Hyb. 927, 25P30	10 % Tr ^b PR 126, PB 1121 & PB 1
Karnal	70 % Tr-L ^b ; (0.5-2.5 % dead heart/WE) ^a PR 114, PR 128, PB 1509, PR 126, 27P67, 27P22 & PB 1121, 1718 Sawa 127	80 % L- M ^b ; (1-38 nymphs/hill) ^a PR 114, PR 128, PB 1509, PR 126, 27P67, 27P22 & PB 1121, 1718 Sawa 127	100 % Tr-L ^b ; (0.5-5.5 % damaged leaves) ^a ; PR 114, PR 127, CSR 30, Pusa 44, PB 1509, PR 126, Virat, 28P37, 28P67 PB 1718 & PB 1121	-
Jind	80 % Tr.- L ^b ; (0.5-1.5 % dead heart/WE) ^a PB 1718, PB 1121, PB 1509 , 27P31, sawa 134, PR 1409 PR 114, Hyb 2082 & CSR 30	100 % L- M ^b ; (4-14 nymphs/hill) ^a PB 1718, PB 1121, PB 1509, PR 1409 PR 114, Hyb 2082 & CSR 30	60 % Tr-L ^b ; (0.5-3.5 % damaged leaves) ^a ; PB 1718, 1121, 1509, 27P31, sawa 134, PR 1409 PR 114, Hyb 2082 & CSR 30	10 % Tr ^b PB 1509 & PB 1121
Yamuna Nagar	90 % Tr; (0.5-2.5 % dead heart/WE) ^a SAWA 127, Hyb 6444 & 359 SAWA 134 PB 1, Rasi 117, Hyb 7301, PB 1692 Hyb 4040, PB 1509, PR 128 Sawa 7301, VNR 2111	90 % Tr- L ^b ; (2-12 nymphs/hill) ^a SAWA 127, Hyb 6444 & 359 SAWA 134 PB 1, Rasi 117, Hyb 7301, PB 1692 Hyb 4040, PB 1509, PR 128 Sawa 7301, VNR 2111, Super Gold	70 % Tr-L ^b ; (0.5-5.0 % damaged leaves) ^a ; Sawa 127, Hyb 6444 & 359 SAWA 134 PB 1, Rasi 117, Hyb 7301, PB 1692 Hyb 4040, PB 1509, PR 128 Sawa 7301	10 % Tr ^b Sawa 127, Hyb 6444 & 359
Ambala	80 % Tr.- L ^b ; (0.5-2.5 % dead heart/WE) ^a 25P35, 25 P67, Hyb 8433, Sawa 7301, 7501, Sava 127, PB1121, Swift Gold 90M100, Desi 359 PR 126, PR 114	100 % Tr- L ^b ; (1-10 nymphs/hill) ^a PR 126, PR 114, 25P35, 25 P67, Hyb 8433, Sawa 7301, 7501, Sava 127, PB1121, Swift Gold 90M100	80 % Tr-L ^b ; (0.5-6.0 % damaged leaves) ^a ; PR 126, PR 114, 25P35, 25P67, Hyb 8433, Sawa 7301, 7501, 127, PB1121, Swift Gold, 90M100	-
Panipat	70 % L.- M ^b ; (0.5-1.5 % dead heart/WE) ^a PB 1121, PB 1718, PB 1509	60 % L- M ^b ; (3.0-15 nymphs/hill) ^a PB 1121, PB 1718, PB 1509	90% L ^b -M; (0.5-4.0 % damaged leaves) ^a ; PB 1121, PB 1718, PB 1509	10 % Tr ^b PB 1121 & 1718
Sonepat	80% Tr.- L ^b ; (0.5-1.5 % dead heart/WE) ^a PB 1121, PB 1718 & PB 1692	60 % Tr-L; 20 %Tr-M ^b ; (2.0- 20 nymphs/hill) ^a ; PB 1121, 1718, 1509, CSR 30, PR 128 & PR 114	70% Tr-L ^b ; (0.5-2.0 % damaged leaves) ^a ; PB 1121, PB 1718 & PB 1692	10 % Tr ^b ; PB 1692 & PB 1121

Minor incidence of termite was recorded in some fields in Jind on varieties like PR 1409 PR 114, Hyb 2082 & CSR 30

Stem borers: Traces: <1.0% dead heart/white ear, Low: 1.0-10.0% DH/WE, Moderate: 10.1-20.0% DH/WE, Severe: > 20.0 % DH/WE. **WBPH/ BPH:** Traces: <1.0 nymphs or adults/hill, Low: 1.0-5.0 nymphs or adults/hill, Moderate : 5.1- 15.0 nymphs or adults/hill ; Severe: >15.0 nymphs or adults/hill. **Leaf folder & whorl maggot:** Traces: < 1.0% damaged leaves, Low: 1.1-10.0% damaged leaves , Moderate: 10.1-20.0% damaged leaves; Severe : > 20.0% damaged leaves. **Termites :** Traces: <1.0 % infested plants; Low : 1.0 -5.0 infested plants; Moderate: 5.1-10.0% infested plants; Severe: >10% infested plants

G. Biotic stresses and their management: The details of different diseases and insect pests in different surveyed districts are presented in Table 10 and 11. Among the disease, sheath blight, leaf and neck blast, bakanae, false smut, grain discoloration and bacterial blight were wide spread in low to moderate form. Among the insect pests, stem borer, leaf folder and plant hoppers (BPH and WBPH) were wide spread in low to moderate intensity. All the farmers contacted applied different pesticides for the management of different diseases and insect pests (Table 12). The number of pesticide application in different districts ranged from 2-7. About 75% farmers contacted told that they mixed 2-3 different pesticides while application. In few fields in Jind, Kurukshetra, Kaital and Ambala symptoms of zinc deficiency were observed. Rice stunting problem due to southern rice black-streaked dwarf virus (SRBSDV) was noticed in almost all the districts. High intensity of this problem was noticed in Ambala, Panipat and Karnal districts.

Table 12: Details of pest management

Details	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
% age farmers adopting plant protection	100% farmers adopted chemical plant protection measures			
Names of pesticides	Insecticides: cartap hydrochloride (Sanvex, Caldan, Padan: 5-7.5 kg/acre), flubendiamide 20% WG (Takumi @ 100 g/acre) , Regent (500 ml/acre), Coragen, Ferterra (4 kg/acre), Bifenthrin 10 EC, lamda cyhalothrin (300 ml/acre), cypermethrin, chlorpyrifos (200 ml/acre), Ampligo (chlorantraniliprole + lambda-cyhalothrin), profenophos + cypermethrin (500 ml/acre), Virtako (chlorantraniliprole + thiamethoxam) and acephate for stem borer and leaf folder; Emamectin Benzoate 1.9% EC (Boss), Chess (pymetrozine) (120 g/acre), triflumezopyrim 10% SC (pexalon @ 100 g/acre), thiomethoxam (100 g/acre), buprofezin (350 ml/acre) and Osheen (dinotefuran) (80 g/acre), Oskar (biopesticide), for BPH and WBPH and Chlorpyrifos for temite Fungicides: Pulsor (325-375 ml/acre), tebuconazole (1 ml/l), Thifluzamide 24% Sc (Iglare @ 375 ml/acre), amistar top (200 ml/acre), Hexaconazole 75% WDG (Epic @ 30 g/acre), Lusture (400-450 ml/acre), carbendazim (1 g/l), Sheathmar (400 ml/acre), Takeshi (azoxystrobin 11% + tebuconazole 18.3% SC), Nativo (0.4 g/l), azoxystrobin + difenconazole (Godiwa Super @ 400 ml/acre) and Picoxystrobin 7% + Propiconazole 12% SC (Gallelio Way @ 400 ml/acre) for sheath blight; copper oxychloride (500 g/acre) and propiconazole (200 ml/acre) for false smut; Kasu-B (600 ml/acre) for bacterial blight; tricyclazole (120-200 g/acre), Fuji One (300 ml/acre), carbendazim (1 g/l), picoxistrobin, amistar top (200 ml/acre) for blast and neck blast and propiconazole (200 ml/acre), carbendazim + mancozeb (Saaf: 2 g/l) for grain discoloration and brown spot			
# of pesticide sprays	2-4	2-6	2-6	2-7
Mixing of pesticides before application	Yes (70%) 2-3 pesticides	Yes (70%) 2-3 pesticides	Yes (60%) 2 pesticides	Yes (100%) 2 pesticides

Table 12 contd..

Details	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
% age farmers adopting plant protection	100% farmers adopted chemical plant protection measures			
Names of pesticides	Insecticides: cartap hydrochloride (Sanvex, Caldan, Padan: 5-7.5 kg/acre), flubendiamide 20% WG (Takumi @ 100 g/acre), Regent (500 ml/acre), Coragen, Ferterra (4 kg/acre), furadan (10 kg/acre), profenophos (400 ml/acre), Bifenthrin 10 EC, lamda cyhalothrin (300 ml/acre), Ampligo (chlorantraniliprole + lambda-cyhalothrin), Virtako (chlorantraniliprole + thiamethoxam) and acephate for stem borer and leaf folder; Chess (pymetrozine) (120 g/acre), triflumezopyrim 10% SC (pexalon @ 100 g/acre), thiomethoxam (100 g/acre), buprofezin (350 ml/acre) and Osheen (dinotefuran) (80 g/acre) for BPH and WBPH and Fungicides: Pulsor (325-375 ml/acre), tebuconazole (400 ml/acre), amistar top (200 ml/acre), hexaconazole 75% WDG (Epic @ 28-30 g/acre), Lusture (400-450 ml/acre), Sheathmar (400 ml/acre), Takeshi @ 250-300 ml/acre (azoxystrobin 11% + tebuconazole 18.3% SC), Nativo (0.4 g/l) and azoxystrobin + difenconazole (Godiwa Super @ 400 ml/acre) for sheath blight; copper oxychloride (500 g/acre) and propiconazole (200 ml/acre) for false smut; Kasu-B (600 ml/acre) for bacterial blight; tricyclazole (120-200 g/acre) and Fuji One (300 ml/acre) for blast and neck blast and propiconazole (200 ml/acre), Kocide (500 ml/acre), carbendazim + mancozeb (Saaf: 2 g/l) for grain discoloration and brown spot			
# of pesticide sprays	3-5	4-6	5-6	3-7
Mixing of pesticides before application	Yes (70%) 2 pesticides	Yes (70%) 2 pesticides	Yes (80%) 2 pesticides	Yes (80%) 2-3 pesticides

H. Researchable issues: Among the biotic stresses, major problems in the region are sheath blight followed by neck blast among the diseases and BPH, stem borer and leaf folder among insect pests. Farmers want varieties suitable for DSR and varieties resistant/tolerant to above mentioned biotic constraints.

Table 15: Researchable issues

Parameters/Issues	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Rice ecology in your area	Irrigated			
Rice cultivation only in Kharif or both Kharif and Rabi	Only Kharif season			
Number of years of experience in rice farming	5-10 years			10-20 years
Main biotic constraints (diseases) in your area according to you	Sheath blight			
Extent of disease damage	Below 10%			
Main biotic constraints (Insect pests) in your area according to you	BPH (Main), Stem borer and leaf folder			
Extent of insect pest damage	Below 10%			

Parameters/Issues	Districts			
	Kaithal	Kurukshetra	Karnal	Jind
Main abiotic constraints in your area according to you	Nil	Nil	Nil	Nil
Production constraints in your area according to you	Scarcity of agricultural labours, lack of mechanization and unavailability of fertilizers and pesticides			
Irrigation facilities in your area	Yes, Available; Bore wells			
Normally how many years it takes to change the rice variety	5-10 years			
Any other rice production issues in your area which the rice scientists need to address	NA	NA	NA	NA
What is urgently required in your area as far as rice varieties are concerned				
Duration	NA	NA	NA	NA
Biotic stress resistance	NA	NA	NA	NA
Abiotic stress resistance	NA	NA	NA	NA
Preferred grain quality	NA	NA	NA	NA
Nutritional quality	NA	NA	NA	NA

Table 15 contd..

Parameters/Issues	Districts			
	Yamunanagar	Ambala	Panipat	Sonepat
Rice ecology in your area	Irrigated			
Rice cultivation only in Kharif or both Kharif and Rabi	Only Kharif season			
Number of years of experience in rice farming	5-10 years 10-20 years			
Main biotic constraints (diseases) in your area according to you	Sheath blight (Main); Neck blast			
Extent of disease damage	Below 10%			
Main biotic constraints (Insect pests) in your area according to you	Stem borer (Main), BPH and leaf folder			
Extent of insect pest damage	Below 10%			
Main abiotic constraints in your area according to you	Nil	Nil	Low light intensity	Nil
Production constraints in your area according to you	Scarcity of agricultural labours, lack of mechanization and unavailability of fertilizers and pesticides			
Irrigation facilities in your area	Yes, Available; Bore wells			
Normally how many years it takes to change the rice variety	5-10 years			
Any other rice production issues in your area which the rice scientists need to address	NA	NA	NA	NA
What is urgently required in your area as far as rice varieties are concerned				
Duration	NA	NA	NA	NA
Biotic stress resistance	NA	NA	NA	NA
Abiotic stress resistance	NA	NA	NA	NA
Preferred grain quality	NA	NA	NA	NA
Nutritional quality	NA	NA	NA	NA

Himachal Pradesh- 2022-2023 (Malan)

Districts surveyed: Kangra, Mandi, Shimla, Bilaspur, Hamirpur and Sirmour

Particulars of survey:

District	Blocks	Villages
Kangra	Nagrota Bagwan, Kangra, Rait, Bhawarna, Indora, Dharamshala, Fatehpur and Nagrota Surian	Nagrota Bagwan, Malan, Chahri, Kawari, Massal, Rait, Shahpur, Dargela, Rehlu haar, Dhanotu, Jadrangal, Jia, Dadh, Pathiar, Mainjha, Nagri, Jawali, Chalwara, Indora, Riyali, Fatehpur, Chanaur and Badukhar
Mandi	Dharampur and Sundernagar	Sandhol, Bhambla, Sarkaghat, Galma, Balh and Sundernagar
Shimla	Rohru	Chirgaon, Peja, Gumma and Rohru
Bilaspur	Ghumarwin	Dangar and Ghumarwin
Hamirpur	Hamirpur	Tikkar and Bhira
Sirmour	Paonta Sahib	Rampur, Dhaulakuan, Puruwala, Kolar, Surajpur and
Solan	Nalagarh	Nalagarh

Widely prevalent varieties

Kangra	HYVs/Improved: Palam Lal Dhan-1, Him Palam Dhan-1, HPR 1156, HPR 2143, HPR 1068, Sharbati, PR 121, Pusa 44, PR 126, 128 and 129; Hybrids: Arize 6129, Arize 6444, PAC 807 plus, Hybrid 834, Arize Swift Gold, Shree Ram Khushbu, Shahi Dawat, US 312, Hyb. 2266, SAWA 134, BULAND RAJA 88 and others; Basmati/Scented: Palam Basmati-1, Kasturi, Pusa Basmati 1509 and Pusa Basmati 1121
Mandi	HYVs/Improved: Palam Lal Dhan-1, Him Palam Dhan-1, HPR 2143 and HPR 1156; Hybrids: US 312, US 305, Raja and others; Basmati/scented: Palam Basmati-1 and Kasturi
Shimla	Improved: Chhohartu
Bilaspur	HYVs: HPR 2143, HPR 2880
Hamirpur	HYVs: HPR 2143, HPR 2880
Sirmour	Hybrids: Arize 6444, Dhanya 834, Varsha Gold and Hyb. 25P35; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1509, Sugandha and Sharbati
Solan	Hybrids: Arize 6444, Hybrid 734, 748, 786, Sudha 999 and Arize 6129; Basmati: CSR 30

Area under rice crop in districts surveyed during *kharif* 2022

District	Area Planted (Thousand ha)	District	Area Planted (Thousand ha)
Kangra	37.5	Hamirpur	1.0
Mandi	19.0	Sirmour	5.0
Shimla	0.45	Solan	2.5
Bilaspur	1.0		
Total Area under rice in HP: 73.7 thousand ha			

The production-oriented survey was conducted in 7 districts viz., Kangra, Mandi, Shimla, Bilaspur, Hamirpur and Sirmour of which Kangra and Mandi are the leading districts for rice cultivation accounting for around 71 and 70 per cent of the area and total production of the State, respectively. Rice-wheat, maize-wheat and rice- potato were the prevailing crop rotations. Commonly cultivated rice varieties were HYVs like Palam Lal Dhan-1, Him Palam Dhan-1, HPR 1156, HPR 2143, HPR 1068, Sharbati, Pusa 44, PR 121, 126, 128 and 129, hybrids like Arize 6129, Arize 6444, PAC 807 plus, Hybrid 834, Arize Swift Gold, Sri Ram Khushbu, Shahi Dawat, US 312, Hyb. 2266, SAWA 134, Buland Raja 88 etc. and basmati/scented varieties like Palam Basmati-1, Kasturi, Pusa Basmati1509 and Pusa Basamati1121. Commonly observed weeds were *Cyperus iria*, *Echinochloa colona*, *E. crusgalli*, *Monochoria vaginalis*, *Paspalum* spp., *Eragrostis japonica*, *Alternanthera echinata*, *A. sessilis*, *Digitaria sanguinalis*, *Ageratum conyzoides* and wild rice. Two species of alligator weed, *Alternanthera echinata* and *A. sessilis* continued to predominate in Kangra district. Herbicides like butachlor and bispyribac sodium were commonly used by the farmers. Use of chemical fertilizers was less than recommended. Majority of the farmers used FYM. The major constraints in rice cultivation in Himachal Pradesh were:

Widespread incidence of false smut on inbred as well as hybrid varieties ranging between low to moderate and severe outbreak of neck blast on susceptible varieties like, Shahi Dawat, Sri Ram Khushbu, Pusa 1121, Pusa 1509 etc. and local cultivars in some places.

Moderate to severe incidence of rice hispa, leaf folder, black beetle and stem borer during early phase of growth.

Severe outbreak of stunting/ dwarfing disease in many parts of Kangra, Sirmour and Solan districts.

Continuation of rains during dough/ maturation stage onwards resulting in lodging of crop and heavy sheath rot infection resulting in discolored grains in some parts of the State.

District-wise observations:

Kangra: More than twenty locations from eight blocks of district Kangra were covered under production oriented survey during *Kharif* '2022 at different crop stages. However, information in respect of rice cultivation was collected from the farmers from Nagrota Bagwan, Indora, Nagrota Surian and Fatehpur blocks. Rice-wheat, maize-wheat and rice- potato were the prevailing crop rotations. The area under rice cultivation during *Kharif* 2022 in Kangra district was around 37,000 hectares. Three methods of rice cultivation viz., dry seeding, sowing of sprouted seeds in puddled fields and transplanting were continued to be practiced as earlier. System of rice intensification (SRI) was also observed with slight modifications by random planting. Some of the farmers were found to strictly follow the method of SRI. The varieties grown under irrigated conditions were HYVs like Palam Lal Dhan-1, Him Palam Dhan-1, HPR 1156, HPR 2143, HPR 1068, Sharbati, Pusa 44, PR 121, 126, 128 and 129, hybrids like Arize 6129, Arize 6444, PAC 807 plus, Hybrid 834, Arize Swift Gold, Sri Ram Khushbu, Shahi Dawat, US 312, Hyb. 2266, SAWA 134, Buland Raja 88 etc. and basmati/scented varieties like Palam Basmati-1, Kasturi, Pusa Basmati1509 and Pusa Basamati1121. These were cultivated over larger acreage in potential areas of Kangra. Under rain fed conditions, the most prominent cultivars were HPR 1156, HPR 2656 (Him Palam Dhan-

1) and HPR 2795 (Him Palam Lal Dhan-1). Seed replacement rate in this district has been found to increase than previous *Kharif* seasons. Amongst the weeds *Digitaria sanguinalis*, *Echinochloa colona*, *E. crusgalli*, *Cyperus iria*, *Cyperus rotundus*, *Ageratum conyzoides* and wild rice were very common under direct sown conditions. The common weeds under transplanted conditions were *E. crusgalli*, *Monochoria vaginalis*, *Cyperus iria*, *Commelina benghalensis* and *Bonnaya veronicaefolia*. Two species of alligator weed, *Alternanthera echinata* and *A. sessilis* continued to predominate in this district. Bispyribac sodium was the most common weedicide used by the farmers to check weeds under direct sown and transplanted conditions. Common fertilizers used included IFFCO 12:32:16 and urea while dose applied ranged between 0-70 kg N, 0-40 kg P₂O₅ and 0-40 kg K₂O. Diseases such as leaf blast, neck blast and false smut were observed in low to moderate proportions while brown spot and glume discoloration were low. This *Kharif* season also witnessed emergence and severe outbreak of new stunting/ dwarfing disease in rice in many fields of Nagrota Surian, Indora and Fatehpur blocks of Kangra district which appeared starting from tillering stage. There was asynchronous flowering in plants and some plants failed to flower. This stunting was reported to be caused by southern rice black-streaked dwarf virus which is transmitted by white-backed plant hopper. Stem borer and rice hispa were observed in low to moderate or moderate forms while leaf folder was low.

Mandi: During *Kharif* 2022, survey in district Mandi was conducted in Sandhol tehsil of Dharampur block; Galma, Balh and Sundernagar of Sundernagar block. Survey was conducted during booting to maturity stage of the rice crop. The farmers contacted were marginal to sub-marginal. The area under rice cultivation during *Kharif* 2022 in Mandi district was around 19,000 hectares. Rice-wheat and maize-wheat were the prevailing crop rotations. The predominant high yielding varieties in the district were Palam Basmati-1, Palam Lal Dhan-1, Him Palam Dhan-1, Kasturi, HPR 2143 and HPR 1156 and hybrids like US 312, US 315, Raja etc. Seed replacement rate in this district is quite high especially in Balh valley while it was quite low in Sandhol area. The farmers in the district mostly use FYM and NPK fertilizer in wheat crop during *rabi* season and apply urea @ 20-60 kg N/ha in 2 splits as top dressing to rice crop. IFFCO 12:32:16 was the most commonly used fertilizer, however, some farmers reported its timely unavailability also. The most common weeds found in the district were *Cyperus iria*, *Echinochloa colona*, *E. crusgalli*, *Monochoria vaginalis*, *Paspalum* spp., *Eragrostis japonica*, *Alternanthera echinata*, *A. sessilis*, *Digitaria sanguinalis*, *Ageratum conyzoides* and wild rice. Butachlor was used by almost all the farmers. Farmers had adopted a modified system of rice intensification. Diseases like sheath rot, leaf blast, neck blast, sheath blight and brown spot appeared in low to moderate intensity. However, severe outbreak of narrow brown leaf spot and grain discolouration was observed in Sandhol. False smut incidence was higher in Sundernagar block where extensive cultivation of hybrids is carried out. Stem borer was observed as low to moderate. Very few farmers adopted the control measures for diseases and pests.

Shimla: The survey was conducted at maturity stage of the crop. The farmers of this district unlike the farmers of other parts of Himachal Pradesh were cultivating Japonica red rice landrace, Chhohartu. Two villages viz., Peja and Gumma situated at >2200 mt msl were surveyed. Farmers used only FYM in the main fields. The common weeds were *Cyperus iria*, *Echinochloa* spp., *Panicum* spp. and *Paspalum* spp. Severe incidence of neck blast was observed in Gumma village while it was quite low in Peja village while no major insect pest was observed.

Sirmour: The survey was conducted at maturity stage of the crop. The farmers of this district unlike the farmers of other parts of Himachal Pradesh grow long duration varieties as this district is adjoining to Punjab, Haryana and Uttarakhand and is situated in low-hills. Nine villages from Nahan and Paonta blocks which accounts for more than 60 per cent of the total area under rice alone were surveyed. Majority of the farmers were marginal to submarginal while some of the farmers contacted were progressive. Rice was cultivated under irrigated conditions and the source of irrigation was mostly tube wells. The varieties cultivated were basmati varieties like Pusa Basmati 1121, Pusa Basmati 1509, Sugandha and Sharbati and hybrids like Arize 6444, Dhanya 834, Varsha Gold and Hyb. 25P35. The progressive farmers used recommended doses of fertilizers viz., IFFCO (12:32:16) as basal dose and top dressing of urea was done at tillering. Butachlor/ Machete granules/ Nominee Gold were used for the control of weeds. The common weeds were *Cyperus iria*, *Echinochloa* spp., *Panicum* spp. and *Paspalum* spp. The planting pattern in hybrids was similar to SRI i.e., wide spacing (25-30 cm) and planting single seedling per hill. Diseases such as neck blast and brown spot were low to moderate while grain discolouration, narrow brown leaf spot and bacterial leaf blight were recorded as low. False smut incidence was quite higher in Rampur area ranging between moderate to severe. However, incidence of neck blast was higher on Pusa Basmati 1121 and Pusa Basmati 1509. Severe stunting of rice plants was observed in farmers' fields which appeared starting from tillering stage. The farmers used Bavistin 50 WP against blast while cypermethrin and chlorpyrifos were used against stem borer and leaf folder, respectively. The yields ranged between 4-6 t/ ha. The hybrids gave yields ranging between 8-10 t/ ha.

Solan: The survey was conducted in Nalagarh area of Solan district at crop maturity stage. The predominant varieties were hybrids like Arize 6444, Hyb. 734, 748, 786, Sudha 999 and Arize 6129 and Basmati like CSR 30. The farmers used DAP and urea fertilizers. The main crop rotation was rice-wheat. The weeds like *Echinochloa* spp. and *Cyperus* spp. were in low to medium intensity. Diseases like false smut and brown spot were low to moderate while leaf blast, neck blast, grain discolouration, sheath blight and sheath rot were low. Stunting/ dwarfing of rice plants was also observed in some fields. Leaf folder and stem borer were observed in low intensity.

Very few locations were surveyed in **Bilaspur** and **Hamirpur** districts where rice cultivation was carried out adopting conventional method. Sporadic appearance of diseases and pests was observed in the locations surveyed.

Prevalence of diseases of rice in Himachal Pradesh during kharif 2022

District	Diseases									
	BI	NBI	BS	GD	FS	LS	NBLS	ShBI	ShR	SRVSDV
Kangra	M	M	L	M	M	-	L	L	M	L-S
Mandi	L	L	L-M	L-M	L	-	S	L	L-M	
Shimla	L-M	M	-	L	T	-	-	-	L	
Sirmour	L-M	M	L-M	L-M	M-S	L-M	L	L-M	L-M	L-S
Solan	L	L-M	L-M	L	L-M	-	L	-	-	L-S
Bilaspur	-	L	-	L	L	-	-	-	-	
Hamirpur	-	-	-	-	L-M	-	-	-	-	

Prevalence of insect-pests of rice in Himachal Pradesh during *kharif* 2022

District	Insect-pests				
	LF	SB	RH	GH	WM
Kangra	L-M	L-M	M	L-M	L
Mandi	L	L-M	-	L	-
Shimla	-	-	-	-	-
Sirmour	L-M	L-M	L	L	L
Solan	L-M	L-M	L	L	L
Bilaspur	-	-	-	-	-
Hamirpur	-	-	-	-	-

Jammu & Kashmir-2022-2023 (Chatha)

Districts Surveyed: *Jammu, Samba and Kathua*

Table 1: Particulars of survey

District	Block	Villages
Jammu	Miran Sahib, Bishnah, Suchetgarh, R.S. Pura, Raipur Satwari, and Marh	Tutary, Deoli Tibba, Phinder, Sanoore de Tibba, Suchetgarh, Maralian, Chatha, Lorchak, Kotli and Saharan
Samba	Vijaypur, Ghagwal, Ramgarh and Samba	Khanpur, Razwal, Mawa, Nanga, Jakh, Rayea, Chalayari, Keshav Manahasan and Preni
Kathua	Hiranagar, Mahanpur, Bani, Basohli and Marrean	Paharpur, Karmat, Rampur Vijwar, Appan Sandher, Saman, Haria Chak, Basi, Jandi and Gurha Munda

Table 2: Widely prevalent rice varieties

District	Prevalent Varieties
Jammu	HYVs/Improved: PR 131, Sarbati, PC 19 and others; Hybrids: Arize 6444, PHB 71, Vijetha and others; Basmati/scented: Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129
Samba	HYVs/Improved: PR 131, Sarbati and others; Hybrids: Vijetha, PAC802 and Arize 6444; Basmati/scented: Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129
Kathua	HYVs/Improved: Sarbati, PR 131, Ch 1039, Jaya and others; Hybrids: Vijetha, PAC802 and Arize 6444; Basmati/Scented: Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129; Local: Lal Mundi

Table 3: Particulars of Rice Area

District	Total Geographical area (ha)	Total Cultivable area (ha)	Total cultivated area (ha)	Total Irrigated Area (ha)	Area Under Rice (ha)
Jammu	237024	150312	89451	59313	50684
Samba	83095	59674	32668	10160	18881
Kathua	264626	117479	66645	27692	34329

Table 4: Weather data in surveyed districts of Jammu and Kashmir during *Kharif* 2022

District/ Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jammu							
RD	4	15	8	9	2	3	1
TR (mm)	91.8	460.4	339	137.6	48.2	24.8	9.6
MMT (°C)	31.6	29.7	30.0	28.5	24.3	17.9	13.4
T. Max (°C)	38.9	33.5	34.1	33.4	31.2	25.8	21.0
T. Min (°C)	24.3	25.8	26.0	23.6	17.3	10	5.7
SH	6.7	3.2	6.5	6.1	7.4	5.7	5.3

District/ Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Samba							
RD	4	16	6	10	3	3	1
TR (mm)	61.8	302.3	206.6	112.6	14.5	19.1	5.4
MMT ($^{\circ}\text{C}$)	31.6	29.15	30.3	27.8	24.4	19.3	13.8
T. Max ($^{\circ}\text{C}$)	39.5	33.4	35.6	33.1	30.6	26.7	20.8
T. Min ($^{\circ}\text{C}$)	23.8	29.9	25.1	22.5	18.2	11.9	6.8
Kathua							
RD	7	16	9	5	2	2	0
TR (mm)	74.5	410.5	303	180	21.0	14.5	1.5
MMT ($^{\circ}\text{C}$)	31.7	29.9	29.8	28.2	24.1	18.8	14.2
T. Max ($^{\circ}\text{C}$)	38.8	34.1	34.2	33.2	31.2	25.9	20.4
T. Min ($^{\circ}\text{C}$)	24.6	25.7	25.3	23.2	17.1	11.8	8.1

RD: Rainy days; TR: Total rainfall; MMT: Monthly Mean Temperature; T. Max: Maximum temperature; T. Min: Minimum temperature; SH: Sunshine hours

An extensive production-oriented survey was conducted during *kharif 2022* in the three basmati growing districts viz., Jammu, Samba and Kathua of Jammu and Kashmir. The details of survey are presented in Table 1. In general, weather conditions were normal in all the three districts surveyed with well distributed rainfall. However, in some places (about 40% places of the surveyed area) in Kathua there was dry spell in milk and dough stage and rain during harvesting stage resulting in reduction in rice yield. The details of different weather parameters are presented in Table 4. Predominant rice varieties cultivated by the farmers were basmati varieties like Basmati 370, Pusa Basmati 1121, Jammu Basmati 118 and Jammu Basmati 129 and HYVs like Sarbati, PR 131, Ch 1039, Jaya and others. Some farmers also cultivated hybrids like Arize 6444, PHB 71, Vijetha and others. The details of different rice varieties in different districts are presented in Table 2. Basmati rice varieties occupied more than 90% of the rice area. The farmers still opt for the old age traditional varieties of Basmati 370, Pakistani basmati for their taste preferences. Some of the crop rotation practices followed by the farmers were Rice-wheat, rice-barbeem, rice-potato, rice-wheat-sunflower, rice-cauliflower-black gram/green gram, rice-potato-black gram/green gram, rice-wheat-vegetables, rice-mustard and rice-vegetables. The yield of different rice varieties as reported by the farmers are presented in Table 7. The rice yield varied from 2800-4050 kg/ha among different basmati varieties. Yield in certain places in Kathua was affected due to sudden reduction in temperature and scarcity of irrigation at crucial stages.

Table 5: General question on rice cultivation in district (to be filled by the cooperator in consultation with the officials from state department of agriculture)

Parameters	Districts		
	Jammu	Samba	Kathua
Total area under HYVs in the district (ha)	Not available	Not available	Not available
Most prevalent HYVs in the district	Sarbati	Sarbati	Sarbati
Total area under rice hybrids in the district	Not available	Not available	Not available
Most prevalent rice hybrids in the district	Vijetha	Vijetha	Vijetha

Parameters	Districts		
	Jammu	Samba	Kathua
Total area under basmati in the district	92% of the area	90% of the area	92% of the area
Most prevalent basmati varieties in the district	Basmati 370, Jammu Bas 118 & 129, Pusa Basmati 1121	Basmati 370, Jammu Bas 118 &, Pusa Basmati 1121	Basmati 370
Seed replacement rate	16-20%	14-18%	12-20%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Yes	Yes (harvester)	Yes
Mention water saving technologies like SRI/laser leveling /DSR being used by the farmers	No	No	No
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Adoption of plant protection measures and proper agronomic practices	Adoption of proper agronomic practices	Adoption of proper agronomic practices
What are the general problems in rice cultivation in the district?	Lodging, rice dwarfing problem and BLB	Lodging problem in Basmati 370, Rice dwarfing problem	Lodging problem in Basmati 370, Rice dwarfing problem
Please provide any farmers association in the district	7 groups	5 groups	4 groups
Whether availability of agricultural labours is sufficient?	No	No	No
Whether there is any marketing problem of the produce?	No	Yes	Yes; in hill regions of Bani and Basohli
Any major irrigation/power generation project in the district	Nil	No	No
Any soil testing program undertaken?	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	Yes	Yes	Yes

Table 6: General information

Parameters	Jammu	Samba	Kathua
# of talukas/blocks covered	6	4	5
# of villages surveyed	10	9	9
# of farmers interviewed	10	10	10
Field ecosystem	Irrigated (100%)	Irrigated (100%)	Irrigated (60%); Hill (40%)
Weather conditions during cropping season	In general, weather conditions were normal in all the three districts surveyed with well distributed rainfall. However, in some places (about 40% places of the surveyed area) in Kathua there was dry spell in milk and dough stage and rain during harvesting stage resulting in reduction in rice yield		
Crop stage when survey was made	Milk to dough	Milk to dough	Dough to mature
Crop rotations	Rice-wheat, rice-barsoem, rice-potato, rice-wheat-sunflower, rice-cauliflower-black gram/green gram, rice-potato-black gram/green gram, rice-wheat-vegetables, rice-mustard and rice-vegetables		

Table 7: Average yields of different rice varieties as reported by the cooperators/ farmers

Varieties	Yield (kg/ha) in different districts of Jammu and Kashmir			Remarks
	Jammu	Samba	Kathua	
Peta	5850			Optimum yield was realized because of timely transplanting, proper weed and water management and proper fertilizer management. Yield in certain places in Kathua was affected due to sudden reduction in temperature and scarcity of irrigation at crucial stages
Sarbati	3850-4870		4250	
Lal Mundi			2280	
China 1039			3450	
Basmati 370	2850-3240	2800-3280	2850-3180	
Pusa Basmati 1121	3450-3850	3700-4050	3700-3950	
Jammu Basmati 129		3820-3950		
Jammu Basmati 118		3280-3845		
Arize 6444	6570			
Hybrids	6080		3590	

A. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of Jammu. Majority of the farmers contacted were in the medium income group. Average per capita consumption of rice per month was 10-12 kg rice (Table 8). All the farmers contacted told that their main meal consisted of both rice and wheat (chapatti) and all of them told that they used polished rice. About 90-100% farmers in Jammu and Samba and 60% farmers in Kathua told that they preferred long grain basmati rice varieties. In general, there was no change in the food habit except some farmers told that they have included maize in their diet because of diabetic problems.

Table 8: Details of rice consumption pattern

Parameters	Districts		
	Jammu	Samba	Kathua
Status of farmers	Medium income (90%); Rich (10%)	Medium income (90%); Rich (10%)	Medium income (70%); Poor (30%)
Per capita monthly rice consumption (kg)	10-12 kg	10-12 kg	10-12 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)
Rice grain type preference	Long grain basmati (100%)	Long grain basmati (90%); fine grain (10%)	Long grain basmati (60%); coarse grain (20%); Long grain + coarse grain (20%)
Any changes in food habit in last 10 years	No (90%); Few have included maize in their diet	No (70%); About 30% respondents told that they have included maize in their diet	No (100%)

B. Nursery and main field Management: Planting was done in 3rd week of June to 3rd week of July. Average seed rate was 25-40 kg/ha. Farmers followed random planting where plant population per unit area was not maintained. Quite often, farmers adopted close planting which hindered cultural operation in crucial stages. About 70-90% of the farmers contacted told that they

treated the seeds with carbendazim (2 g/kg). Application of organic manure in the nursery was not very common. However, more than 90% farmers applied inorganic fertilizers like DAP and urea in the nursery. In the main fields, fertilizers were applied @ 20-80 kg N/ha, 20-80 kg P₂O₅/ha and 30-50 kgK₂O/ha. Application potash was followed by less number of farmers. About 30-70% of the farmers contacted applied zinc sulphate. Most of the farmers applied organic manure like FYM (5-9 t/ha) or vermicompost in the main field. Some farmers also practiced green manuring.

Table 9: Details of nursery management

Parameters	Districts		
	Jammu	Samba	Kathua
Planting time	End of June to 3 rd week of July	1 st week to 3 rd week of July	3 rd week of June to 3 rd week of July
Seed rate	25-40 kg/ha	25-35 kg/ha	30-35 kg/ha
Seed treatment (% farmers adopted)	Yes (70%)	Yes (90%)	Yes (70%)
Chemicals used for seed treatment	carbendazim (2 g/kg)	carbendazim (2 g/kg)	carbendazim (2 g/kg)
Organic manure in nursery (% farmers adopted)	Yes (20% only); FYM	Yes (30% only); FYM, vermicompost	Yes (10% only); FYM
Inorganic manure in nursery (% farmers adopted)	Yes (90% farmers); urea and DAP	Yes (90% farmers); urea, DAP and zinc sulphate	Yes (100% farmers); urea and DAP

Table 10: Details of main field management

Details	Districts			Remarks
	Jammu	Samba	Kathua	
Planting method	Random transplanting (100%); Plant population per unit area was not maintained. Quite often, farmers adopted close planting which hindered cultural operation in crucial stages			
Total N applied	60-70 kg/ha (HYVs); 15-32 kg/ha (Basmati)	20-35 kg/ha (Basmati)	40-80 kg/ha (HYVs); 23-35 kg/ha (Basmati)	Urea; applied in two splits
Total P ₂ O ₅ applied	40-80 kg/ha (HYVs); 30-60 kg/ha (Basmati)	45-80 kg/ha (Basmati)	20-80 kg/ha (HYVs); 40-60 kg/ha (Basmati)	DAP
Total K ₂ O applied	30-40 kg/ha (HYVs); 25-40 kg/ha (Basmati)	30-50 kg/ha (Basmati)	40-50 kg/ha (HYVs); 25-40 kg/ha (Basmati)	MOP
ZnSO ₄ applied	20-25 kg/ha (HYVs); 10-20 kg/ha (Basmati)	20 kg/ha	10-18 kg/ha (Basmati)	Zinc sulphate; About 30-70% farmers applied
Organic fertilizers applied	Yes (100%); FYM (60%) @8-9 t/ha; vermicom-post (20%) @ 30-35 q/ha; Green manure (20%)	Yes (100%); FYM (60%) @6-8 t/ha; vermicom-post (20%) @ 40 q/ha; Green manure (20%) @ 50-60 q/ha	Yes (100%); FYM (60%) @5-6 t/ha; vermicom-post (10%) @ 40 q/ha; Green manure (30%)	

Table 11: Weeds and weed management

Details	Districts			Remarks
	Jammu	Samba	Kathua	
Weed intensity	Low to medium			
Names of the weeds	<i>Echinochloa</i> spp., <i>Cynodon dactylon</i> (dub grass), <i>Cyperus rotandrus</i> (motha) and <i>Eclipta alba</i> (Jalbhangra)			Weeds were common in most of the fields surveyed. Farmers followed hand weeding along with herbicide application.
Weedicides used	butachlor	butachlor	butachlor	
%age of farmers applied herbicides	Yes (100%)	Yes (70%)	Yes (70%)	About 30% farmers in Samba and Kathua practiced only hand weeding.
Wild/weedy rice incidence	In many fields, a mixture of seed and wild rice (Chobha: <i>Oryza sativa</i> var. <i>spontaneous</i>) was commonly observed which needs the replacement of pure seed.			

C. Weeds and their Management: Overall, intensity of weeds was low to medium. The details of different weeds recorded in different districts are presented in Table 11. Weeds were common in most of the fields surveyed. The details of different weedicides used by the farmers are presented in Table 11. About 70-100 farmers adopted herbicide application. Most of the farmers practiced hand weeding along with herbicide application. In many fields, a mixture of seed and wild rice (Chobha: *Oryza sativa* var. *spontaneous*) was commonly observed.

D. Common needs of the farmers: Some of the common needs of the farmers were creation of FPOs for basmati rice, soil testing, farm mechanization, timely availability of inputs like seeds, fertilizers and pesticides, small size tractor operated harvester, training program on plant protection methods and rice production technologies, solution for lodging problem in basmati and kisan credit cards.

Table 12: Details of inputs used

Details	Districts		
	Jammu	Samba	Kathua
Implements used	Tractor (own or hire), rotavator and sprayer (own or hire)		
Seed replacement rate in 2022	16-20%	14-18%	12-20%
Source of seeds	Farmers used their own seed or procured seed from Agriculture Department and mega seed unit, KVK's of SKUAST Jammu.		
Source of irrigation	Canal (60%); Deep tube well (60%)	Canal (50%); Deep tube well (40%); shallow tube well (30%)	Canal (20%); Deep tube well (40%); shallow tube well (20%); rain (30%)
Scarcity of irrigation water	No (100%)	No (70%)	No (40%)
Availability of fertilizers/ pesticides	No (80%)	No (40%)	No (70%)
Quality of fertilizers/ pesticides	Not happy (70%)	Not happy (40%)	Not happy (70%)
Advisors to the farmers	State dept (90%); Dealers (10%); University (90%)	Own decision (20%); State dept (60%); University (90%)	Own decision (10%); State dept (90%); University (70%); Dealers (30%)

F. Input use: Farmers used different equipments like tractor, rotavator and sprayers (either own or on hire basis). Seed replacement rate was low (12-20%) and the farmers still opt for the old age traditional varieties of Basmati 370, Pakistani basmati for their taste preferences. Farmers used their own seed or procured seed from Agriculture Department and mega seed unit, KVK's of SKUAST Jammu. Main sources of irrigation were canal and deep tube well followed by shallow well. About 30-60% farmers in Samba and Kathua expressed that irrigation water was scarce. About 40-80% of the farmers contacted told that they fertilizers and pesticides were not available in time and they were not happy with their quality. In addition to their own decisions, farmers took advices from officials of state department of agriculture and university staffs. The shortage of agricultural labour was a common problem faced by most of the farmers during transplanting, weeding and harvesting of crop

Table 13: Prevalence of diseases and insect pests in surveyed districts of Jammu and Kashmir during Kharif 2022

Districts	Diseases							
	BI	BS	ShR	FS	GD	Bak	BB	RD
Jammu	L	M-S (20-30%)	L-M (5-10%)	M-S (16-28%)	M-S (17-28%)	-	M-S (36%)	M-S (20-64%)
Samba	L	M-S (20-40%)	-	L-M (8-20%)	M-S (20-30%)	-	M-S (15-35%)	-
Kathua	L	M (12-20%)	-	M (20-22%)	M-S (20-30%)	M (10-14%)	M-S (10-35%)	S (70-80%)

RD: Rice Dwarfing (Southern Rice Black-streaked dwarf virus)

Districts	Insect pests						
	SB	LF	WBPH	GM	RB	WM	GH
Jammu	M-S (10-30%)	M-S (10-30%)	M (10-15%)	-	M-S (10-30%)	-	M (8-20%)
Samba	M-S (10-30%)	M (10-25%)	-	M (10-15%)	M-S (10-30%)	M (8-10%)	-
Kathua	M (8-18%)	M (8-20%)	-	-	-	-	M (16-18%)

G. Biotic stress and their management: District wise prevalence of different diseases and insect pests are presented in Table 13. Brown spot, grain discoloration and bacterial blight were recorded in moderate to severe intensity in all the districts surveyed. High intensity (up to 40%) of brown spot was recorded on varieties like Basmati 370, Sarbati and PB 1121 in Tutary and Lorchak villages in Jammu district and Khanpur, Pazwal, Jakh and Keshav Manahasan villages of Samba. High intensity of BB and grain discoloration was recorded in varieties like Basmati 370, Sarbati, PR 131, China 1039JB 129, JB 118, PB 1121 and hybrids in several villages in Jammu, Samba and Kathua. High intensity of false smut (up to 28%) was recorded on Basmati 370 in Lorchak village in Jammu district. A new rice dwarf (Southern Rice Black-streaked dwarf virus) was also recorded from Jammu and Kathua districts in early transplanted Pusa 1121 and severity was 20-80 percent tentensity. Upto 30% intensity of stem borer and rice bug was recorded in varieties like Basmati 370, JB 118, JB 129, Pusa Basmati 1121 and Sarbati in several villages in Jammu and Samba. About 40-90% of the farmers contacted adopted plant protection measures. The details of

different pesticides used by the farmers are presented in Table 14. In general, farmers adopted 1-2 pesticide application.

Table 14: Details of pest management

Details	Districts		
	Jammu	Samba	Kathua
% age farmers adopting plant protection	90%	80%	40%
Names of pesticides	Insecticides: imidacloprid (0.8 ml/l) and Osheen (Dinotefuran 20% SG) for rice bugs and WBPH (vector for rice dwarf/SRBSDV) and Chlorpyrifos (1 ml/l) for stem borer and leaf folder Fungicides: propiconazole (1 ml/l), copper oxychloride (2.5 g/l), carbendazim (1 g/l), azoxystrobin + diflufenconazole (0.8 ml/l) and hexaconazole (1 ml/l) for brown spot and grain discoloration; Streptomycin (0.5 g/l) and copper oxychloride (2.5 g/l) for bacterial leaf blight; Some farmers in Samba applied NSKE for managing all diseases		
# of pesticide sprays	1-2	2	2-3
Mixing of pesticides before application	Nil	Nil	Nil

H. Researchable issues: Among the biotic stresses, major problems are brown spot, bacterial blight, false smut, stem borer and leaf folder and among abiotic stresses, drought and submergence are the major problems. Farmers want varieties suitable for DSR, varieties resistant/tolerant to above mentioned biotic constraints, varieties with lodging resistance and biofortified varieties.

Table 15: Researchable issues

Parameters/Issues	Jammu	Samba	Kathua
Rice ecology in your area	Irrigated	Irrigated	Irrigated, Hill
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif
Number of years of experience in rice farming	10-20 years	10-20 years	10-20 years
Main biotic constraints (diseases) in your area according to you	Brown spot, bacterial blight and false smut	Brown spot, bacterial blight and false smut	Brown spot, bacterial blight and false smut
Extent of disease damage	10-25%	10-25%	10-25%; >25%
Main biotic constraints (Insect pests) in your area according to you	Stem borer, leaf folder	Stem borer, leaf folder	Stem borer, leaf folder
Extent of insect pest damage	10-25%	10-25%	10-25%
Main abiotic constraints in your area according to you	Submergence/ drought	Submergence/ drought	Submergence/ drought

Production Oriented Survey-2022

Parameters/Issues	Jammu	Samba	Kathua
Production constraints in your area according to you	Scarcity of agricultural labours, unavailability of quality seeds, lack of irrigation facilities and lack of mechanization		
Irrigation facilities in your area	Yes (100%); Canal, bore well	Yes (100%); Canal, bore well	Yes (60%); Canal, bore and open well
Normally how many years it takes to change the rice variety	>10 years	>10 years	>10 years
Any other rice production issues in your area which the rice scientists need to address	-	-	Southern rice black streaked dwarf virus
What is urgently required in your area as far as rice varieties are concerned			
Duration	Varieties for DSR, medium duration varieties	Short duration rice varieties and varieties with lodging resistance	Short duration rice varieties and varieties with lodging resistance
Biotic stress resistance	BLB, false smut and stem borer resistant rice varieties	BLB, false smut and stem borer resistant rice varieties	BLB, false smut and stem borer resistant rice varieties
Abiotic stress resistance	Varieties resistant to submergence and drought		
Preferred grain quality	Long grain basmati	Long grain basmati and aromatic short grain varieties	Long grain basmati and aromatic short grain varieties
Nutritional quality	Rice varieties with high Zn and iron and with low GI		

Karnataka-2022-2023 (Mandya)

Districts surveyed: Shivamogga, Hassan, Chikkamagaluru, Mandya, Mysuru, Chamarajanagara, Madikeri, Davangere and Tumkuru

Table 1: Particulars of survey:

Districts	Taluks
Shivamogga	Shivamogga, Bhadravati and Shikaripura
Hassan	Channarayapatna, Holenarsipura and Arakalgud
Chikkamagaluru	Mudigere, Chikkamagaluru and Sringeri
Mandya	Mandya, Pandavapura, Srirangapatna, Malavalli and Maddur
Mysuru	KR Nagara, HD Kote, T. Narsipura, Hunusur and Nanjanagudu
Chamarajanagara	Kollegala, Kasaba, Hanuru
Davangere	Channagiri, Harihara and Davangere
Tumakuru	Sira, Kunigal and Koratagere

Table 2: Widely prevalent rice varieties

Districts	Varieties
Shivamogga	HYVs: RNR15048, Super Amman, Jyoti and JGL 1798
Hassan	HYVs: MTU1001, Jaya, KPR1, RNR 15048, BR 2655, Tunga and IR64
Chikkamagaluru	HYVs: Tunga, KPR-1, IET Sanna and BR 2655
Mandya	HYVs: Thanu, Jyothi, MTU1001, IR64, BR 2655, Super Amman, DR 8336, Meenakshi, GK Chethan, Sowbhagya, MPR 606, Arize 6444 Gold, Cauvery Rice, Adithya, Amulya and C468
Mysuru	HYVs: Jyothi, IR64, MTU 1001, MTU 1010, Jaya, JGL1798, RNR15048, Tanu, BR 2655, Super Amman, DR 8336, Meenakshi, GK Chethan, Sowbhagya, MPR 606, Virat Siri (hybrid) and Arize 6444 Gold (hybrid)
Chamarajanagara	HYVs: IR64, RNR15048, BR 2655 and Super Amman
Davanagere	HYVs: RNR15048, JGL 1798, Jyothi, MTU1001, BPT 5204, Kaveri Sona, Jaishree Sona and VNR2233 (Hybrid)
Tumakuru	HYVs: IR64, BR 2655, Tella Hamsa, MTU1001 and VNR2233 (Hybrid)

Table 3: Particulars of Rice area in surveyed districts of Karnataka in 2022

Districts	Total geographical area (ha)	Total cultivable area (ha)	Total cultivated area (ha)	Total irrigated area (ha)	Area under rice (ha)
Shivamogga	847784	262396	226214	132166	79131
Hassan	662602	421135	421135	64631	36000
Chikkamagaluru	722075	448087	280575	79288	40051
Mandya	498244	330504	170890	89146	65200
Mysuru	685400	383544	332535	140519	120550
Chamarajanagara	569901	314460	235691	97832	8558
Davanagere	597597	559805	520000	200000	52000
Tumakuru	1059800	660580	439200	2.16000	3800

Production oriented survey was conducted in eight districts of Karnataka viz., Shivamogga, Hassan, Chikmagalur, Mandya, Mysuru, Chamarajanagara, Davangere and Tumakuru during *Kharif* 2022. The details of survey are presented in Table 1. Rice is grown in the state under Canal irrigated, rainfed and tankfed conditions. The south west monsoon entered the Karnataka state during June and the onset of monsoon was timely and more than normal rainfall was recorded in all the districts surveyed. The rainfall received between July and September was more than normal thus all reservoirs Krishna Raja Sagar, Hemavathi, Tungabhadra, Hemavathi and Bhadra project got filled. The farmer started paddy sowing and transplanting prolonged due to more number of rainy days in all the districts surveyed. At tillering stage in most of the fields the leaves showed yellowing especially in our locally developed varieties. The climatic condition prevailed during the cropping period was normal except with cold temperature during september at tillering stage in Mandya, Mysuru and Shivamogga district (Table 4). The particulars of rice area in surveyed districts of Karnataka are presented in Table 3. The details of rice varieties cultivated in different surveyed districts are presented in Table 2. Commonly cultivated varieties were HYVs like RNR15048, Super Amman, Jyothi, JGL 1798, MTU1001, Jaya, KPR1, BR 2655, Tunga, IR64, Thanu, DR 8336, Meenakshi, GK Chethan, Sowbhagya, MPR 606, Adithya, Amulya, MTU 1010, BPT 5204, Kaveri Sona, Jaishree Sona and Tella Hamsa and hybrids like Arize 6444 Gold, VNR2233 and others.

Table 4: Weather data for different districts of Karnataka during *Kharif* 2022

District/ Parameters	Months					
	Jun	Jul	Aug	Sep	Oct	Nov
Shivamogga						
RD	6	21	18	9	10	1
TR (mm)	48.0	431.2	324.9	123.0	120.4	12.4
T. Max ($^{\circ}$ C)	31.0	27.3	27.9	29.1	29.4	29.6
T. Min ($^{\circ}$ C)	21.9	21.5	21.3	20.9	19.8	18.3
SH	6.2	3.2	4.43	6.3	5.0	5.23
Hassan						
RD	8	17	18	10	7	2
TR (mm)	85.4	411.4	547.4	305.2	256.4	70.4
T. Max ($^{\circ}$ C)	32.1	29.6	31.1	31.8	31.1	31.8
T. Min ($^{\circ}$ C)	20.4	14.5	19.5	21.0	20.4	16.7
SH	6.8	6.3	8.12	7.3	7.44	7.22
Chikmagalur						
RD	12	20	15	9	7	5
TR (mm)	146.0	350.0	183.0	111.0	136.0	31.0
T. Max ($^{\circ}$ C)	26.4	23.8	24.0	25.0	25.8	26.0
T. Min ($^{\circ}$ C)	18.0	17.7	17.7	17.9	16.3	16.8
SH	8	5.6	6.0	5.8	7.2	7.0
Mandya						
RD	5	6	10	5	12	6
TR (mm)	209	127	522	54	371	50
T. Max ($^{\circ}$ C)	31	29	30	30	30	29

District/ Parameters	Months					
	Jun	Jul	Aug	Sep	Oct	Nov
T. Min ($^{\circ}$ C)	21	21	21	20	20	19
SH	6.3	2.3	4.3	5.8	5.5	5.6
Mysuru						
RD	5	16	17	8	11	4
TR (mm)	123.0	215.0	325.0	137.0	338.0	46.0
T. Max ($^{\circ}$ C)	31.2	29.4	29.5	30.9	30.2	29.5
T. Min ($^{\circ}$ C)	21.1	20.1	21.0	20.5	20.0	19.0
SH	8023	6.6	6.5	7.6	7.8	6.8
Chamarajanagara						
RD	3	13	4	4	12	3
TR (mm)	36	192.5	278.5	103	204.9	43
T. Max ($^{\circ}$ C)	34.2	33.4	32.6	33.1	32.1	31.8
T. Min ($^{\circ}$ C)	31.67	29.15	29.84	30.67	30	29.3
SH	8.9	6.2	6.35	7.51	7	6.59
Davangere						
RD	9	15	12	10	7	1
TR (mm)	117.0	140.5	219.7	124.8	155.0	9.2
T. Max ($^{\circ}$ C)	30.4	27.2	27.7	29.2	27.5	27.9
T. Min ($^{\circ}$ C)	20.4	20.4	20.3	20.1	18.5	15.2
SH	7.23	4.3	5.40	6.00	5.80	6.2
Tumakuru						
RD	10	12	16	8	14	4
TR (mm)	149	158	320	150	224	23
T. Max ($^{\circ}$ C)	30	28	29	30	30	29
T. Min ($^{\circ}$ C)	20	21	20	20	20	19
SH	8.3	8.2	8.0	7.2	7.6	6.20

RD: Rainy days; TR: Total rainfall; MMT: Monthly Mean Temperature; T. Max: Maximum temperature; T. Min: Minimum temperature; SH: Sunshine hours

A. General Information, cropping system and rice yield: The details of the number of villages surveyed and number of farmers contacted are presented in Table 6. The prevailing cropping pattern in the districts surveyed is Rice-Rice followed by Rice-sugarcane, rice-vegetables, rice-maize, rice-pulses, rice-ragi and rice-fallow. Most of the rice fields surveyed in Mandya, Mysuru, Chamrajanagar, Davangere and Tumakuru were under irrigated ecosystem while fields surveyed in Shivamogga and Chikkamagaluru were under rainfed lowland ecosystem. Average rice yield in different high yielding rice varieties and hybrids in different districts ranged from 3500-7000 kg/ha. Yield in some fields were significantly reduced due to occurrence of different biotic constraints and abiotic constraints like salinity.

Table 5: General Question of Rice Cultivation In District (To Be Filled By The Cooperator In With The Officials From State Department of Agriculture

Parameters	Districts			
	Shivamogga	Hassan	Chikkama-galuru	Mandya
Total area under rice HYV in the district	79131	36000	40051	65200
Most prevalent HYVs in the district	MTU 1001, Jyothi, Jaya, RNR 15048,	Tunga, IR-64, BR2655, IET7191, Intan, MTU 1001, Jaya, KPR1, JGL 1798, RNR 15048	Tunga, IR-64, BR2655, IET7191, Intan, Jaya, RNR 15048	MTU1001, IR64, Jaya, BR2655, Super Amman, DR 8336, Meenak-shmi, GK-Chethan,
Most prevalent rice hybrids in the district	Mahalakshmi	VNR2233	VNR2233	VNR2233
Total area under rice hybrids in the district	800 ha	1000ha	235ha	4200ha
Whether farmers are using any heavy equipments like transplanter/combine harvester	Combine harvester	Combine harvester and baler	-	Combine harvester and baler
Mention water saving technologies like SRI/ laser leveling/DSR being used by the farmers	DSR	Direct seeded Rice	-	Alternate drying and wetting method and Direct seeded Rice
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Water saving technologies and plant protection measures	Water saving technologies and plant protection measures	Acidic soil measures, Water saving technologies, plant protection measures	Application of Zn, pest and disease control Water saving technologies, crop insurance, SRI
What are the general problems in rice cultivation in the district?	Labour, Mini. Support price Wild animals menase	Labour and marketing, less minimum support price	Wild animal problems, Iron toxicity, Labour shortage, MSP	Labour marketing, less minimum support price
Please provide any farmers' association in the district	-	Karnataka Farmers association	-	Karnataka Farmers association
Whether availability of agricultural labours is the sufficient?	No	No	No	No
Whether there is any marketing problem of the produce?	Yes	Yes	Yes	Yes
Any major irrigation/ power generation project in the district	No	Hemavathi irrigation project	No	Krishna Raja Sagara
Any soil testing program undertaken?	Soil health card scheme	Soil health card scheme	Soil health card scheme	Soil health card scheme
Any farmers training program was organized by the state department of Agri/University	KSDA under ATMA	KSDA under ATMA	KSDA under ATMA	KSDA under ATMA

Table 5 Contd..

Parameters	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Total area under rice HYV in the district	120500	9558	52000	3800
Most prevalent HYVs in the district	Jyothi, IR64, MTU-1001, RNR15048 Super Amman, GK chethan, Sowbhagya MPR 606	Jyothi, IR64, MTU-1001, RNR15048 Superamman	RNR15048, Sri Ram Sona JGL1798, BPT5204, MTU1001	MTU-1001, IR64, Jaya, BR2655
Most prevalent rice hybrids in the district	VNR2233, Siri Virat	-		-
Total area under rice hybrids in the district	9000ha	-	10500ha	-
Whether farmers are using any heavy equipments like transplanter/combine harvester	Transplanter, harvester and baler	Combine harvester	Combine harvester and Baler	Combine harvester
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	AWD and DSR	-	AWD and DSR	AWD
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Water saving technologies and plant protection measures	Use of HYV, Water saving technologies and plant protection measures	Mechanized transplanting, Water saving technologies and Plant protection measures	Water saving technologies and plant protection measures
What are the general problems in rice cultivation in the district?	Labour, marketing and less MSP		Labour, marketing and less MSP	Labour, marketing and less MSP
Please provide any farmers' association in the district	Karnataka Farmers association	-	Karnataka Farmers association	Karnataka Farmers association
Whether availability of agricultural labours is the sufficient?	No	No	No	No
Whether there is any marketing problem of the produce?	Yes	Yes	Yes	Yes
Any major irrigation/power generation project in the district	Krishna Raja sagara	No	Tunga Bhadra reservoir	Hemavathi irrigation project
Any soil testing program undertaken?	Soil health card scheme	Soil health card scheme	Soil health card scheme	Soil health card scheme
Any farmers training program was organized by the state department of Agriculture/ University	KSDA under ATMA	KSDA under ATMA	KSDA under ATMA	KSDA under ATMA

Table 6: General information

Parameters	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
# of talukas/blocks covered	3	3	3	5
# of farmers interviewed	10	10	11	10
Field ecosystem	IR (10%); RL (90%)	IR (100%); RL (100%)	IR (18%); RL (100%)	IR (100%)
Weather conditions during cropping season	Normal (100%);	Normal (100%)	Normal (82%); excess rain (18%)	Normal (100%)
Crop stage when survey was made	Dough to mature	Heading	Heading to dough	Heading to mature
Crop rotations	Rice-black gram, rice-rice-maize, rice-maize, rice-groundnut, rice-cowpea, rice-beans, rice-vegetables, rice-dhaincha, rice-dhanincha-green gram, rice-ragi, rice-rice-blackgram, rice-rice-horse gram and rice-horse gram			

Parameters	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
# of talukas/blocks covered	5	3	3	3
# of farmers interviewed	12	10	10	10
Field ecosystem	IR (100%)	IR (100%)	IR (100%)	IR (90%); upland (20%)
Weather conditions during cropping season	Normal (100%)	Normal (100%)	Normal (100%)	Normal (100%)
Crop stage when survey was made	Dough to mature	Dough to mature	Heading to dough	Heading to dough
Crop rotations	Rice-tobacco, rice-rice-sugarcane, rice-dhaincha, rice-Bengal gram, rice-green gram, rice-ragi, rice-sorghum, rice-vegetables and rice-groundnut			

IR: Irrigated; RL: Rainfed lowland

Table 7: Average yields of different rice varieties as reported by the cooperators/ farmers

Variety/hybrids	Yield (kg/ha)			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
HYVs				
Jyothi	3500-6500			3035-4800
RNR 15048	3800-5500	4800-4900		
Super Amman	3880			
Rajamudi		3200-4600		
Tunga		4200-4600	3400-3800	
IR 64		4300		3000-3500
BR 2655		4600-5000		
Vajra		4800		
KPR-1			3600-3800	
Jaya				3000-3500
MTU 1010				5050-5200
MTU 1001				4840-5200
Thanu				5300
Hybrids				
VNR2233		5200		
KRH-4				5280

Table 7 contd..

Variety/hybrids	Yield (kg/ha)			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
HYVs				
Meenakshi	5620			
Jyothi	5000-5645		7000	
Sanna Madhu	5500-5800			
RNR 15048	5060-6000	5500-5800	7000-7200	
MTU 1001	4800-5400		6800	3600
Penna Super	5600			
Namdhari	5640			
Rajamudi	4300			
Sowbhagya	500			
IR 64		5000-5700		3600-4400
BR 2655		5700-5725		
MTU 1010			7000	
Sriram Sona			7200	
Samba Mahsuri			7000	
Jaya				4600
Tella Hamsa				3600-4200
Hybrids				
VNR 2233	5630			

Table 8: Details of rice consumption pattern in different districts of Karnataka in 2022

Parameters	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Status of farmers	Medium Income (100%)	Medium Income (100%)	Medium Income (100%)	Medium Income (90%); Poor (10%)
Per capita monthly rice consumption (kg)	7-8 kg	8-9 kg	7-12 kg	8-9 kg
Composition of main meal	NA	NA	NA	Only rice (10%); rice+wheat+ ragi (90%)
Preferred rice types	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)	Polished rice (100%)
Rice grain type preference	Fine grain (100%)	Fine grain (80%); coarse grain (20%)	Fine grain (100%)	Fine grain (100%)
Any changes in food habit in last 10 years	No (100%)	No (80%); 20% told they included minor millets in their diet	No (100%)	No (100%)

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different surveyed districts of Karnataka. Almost all the farmers contacted were in the medium income group. Average per capita consumption of rice per month was 7-12 kg rice. Information regarding the composition of main meal were not available from most of the districts.

However, about 40-90% of the farmers from Mandya and Tumakuru told that they are consuming ragi (finger millet) along with rice. Majority of the farmers in different districts told that they used polished rice. Regarding grain quality, most of the farmers mostly preferred fine grain quality rice. In general, there was no change in the food habit.

Table 8 contd..

Parameters	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Status of farmers	Medium Income (100%)	Medium Income (100%)	Medium Income (100%)	Medium Income (100%)
Per capita monthly rice consumption (kg)	7-9 kg	7-10 kg	7-10 kg	7-9 kg
Composition of main meal	NA	NA	NA	Rice+ Ragi (40%)
Preferred rice types	Polished rice (100%)	Polished rice (90%); Polished + parboiled (10%)	Polished rice (100%)	Polished rice (100%)
Rice grain type preference	Fine grain (100%)	Fine grain (100%)	Fine grain (100%)	Fine grain (100%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (100%)	No (100%)

C. Nursery and main field Management: In general, planting was done from 1st week of July to 2nd week of August (Table 9). However, in Mysuru and Chamrajanagar, planting was continued till October 1st week. Average seed rate used by the farmers ranged from 40-70 kg/ha. It has been reported that all the farmers contacted in different districts adopted seed treatment with carbendazim or with other chemicals. All the farmers contacted told that they applied FYM in the nursery. Some farmers in Mysuru and Chamrajanagar also applied green manures like dhaincha. All the farmers contacted also applied chemical fertilizers in the nursery. Commonly used fertilizers were 20:20:0:13, 19:19:19, 10:26:26, 15:15:15, 17:17:17, urea, SSP and MOP. Most of the farmers adopted random method of transplanting. In recent years, farmers are adopting drum seeder method of direct sowing. Alternate drying and wetting method of irrigation is slowly picking up in Mandya and Mysuru districts in Cauvery command area due to technology spread and practicing in canal tail end farmers. Farmers have adopted it mainly due to yield advantage and to save the water. Fertilizers were applied @ 100-125 kg N/ha, 50-60 kg P₂O₅/ha and 45-60 kg K₂O/ha. Most of the farmers contacted applied zinc sulphate. Majority of the farmers contacted applied FYM in the field @ 1-10 t/ha depending on availability. Some farmers in Tumakuru also practiced green manuring with dhaincha. Farmers used different fertilizers like of 20:20:0:13 (factomphos), 19:19:19, 10:26:26, 17: 17: 17, 15:15:15, urea, DAP, SSP, MOP and zinc sulphate (Table 10).

Table 9: Details of nursery management

Parameters	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Planting time	2 nd to 4 th week of July	1 st week of July to 2 nd week of August	2 nd to 3 rd week of July	2 nd week of June to 3 rd week of July
Seed rate	55-60 kg/ha	60-70 kg/ha	65-70 kg/ha	50-60 kg/ha
Seed treatment (% farmers adopted)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Chemicals used for seed treatment	carbendazim (1-4 g/kg)			
Organic manure in nursery (% farmers adopted)	Yes (100%) FYM	Yes (100%) FYM (6-7 t/ha)	Yes (100%) FYM	Yes (100%)
Inorganic manure in nursery (% farmers adopted)	Yes (100%); 20:20:0:13/19:19:19/10:26:26/15:15:15 (@ 78-150 kg/ha) or urea (40-70 kg/ha) + SSP (40-100 kg/ha) + MOP (30-35 kg/ha)	Yes (100%) 20:20:0:13/19:19:19/10:26:26/17:17:17 or urea, MOP and SSP	Yes (100%); 20:20:0:13/19:19:19 (@ 100-110 kg/acre) or urea (20-40 kg/acre) + DAP (80 kg/acre) + MOP (30 kg/acre)	Yes (100%); 20:20:0:13/10:26:26 (@ 100-110 kg/acre) or urea (60-80 kg/acre) + DAP (50 kg/acre) + MOP (30 kg/acre) + SSP (1.5 kg/acre)

Table 9 Contd..

Parameters	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Planting time	1 st week of July to 1 st week of September	September 1 st week to October 4 th week	2 nd to 3 rd week of June	1 st week of July to 1 st week of August
Seed rate	40-60 kg/ha	60-65 kg/ha	25-35 kg/ha	55-62 kg/ha
Seed treatment (% farmers adopted)	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Chemicals used for seed treatment	NA			
Organic manure in nursery (% farmers adopted)	Yes (1000%) FYM, Dhaincha	Yes (100%) FYM, dhaincha	Yes (100%) FYM (5-8 t/acre)	Yes (100%) FYM (3-8 t/acre)
Inorganic manure in nursery (% farmers adopted)	Yes (100%); 20:20:0:13/10:26:26 or urea, DAP, MOP and SSP	Yes (100%); 20:20:0:13/10:26:26 or urea, DAP, MOP and SSP	Yes (100%); 20:20:0:13/10:26:26/17:17:17 (@78-120 kg/acre) or urea, DAP and MOP	Yes (100%); 15:15:15/10:26:26/17:17:17 (@78-140 kg/acre) or urea, DAP and MOP

Table 10: Details of main field management

Details	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Planting method	Almost all the farmers adopted random planting where plant population per unit area was not maintained			
Total N applied	Yes (100%) @ 100-125 kg/ha			
Total P ₂ O ₅ applied	Yes (100%) @ 50-60 kg/ha			
Total K ₂ O applied	Yes (100%) @ 45-60 kg/ha			
ZnSO ₄ applied (21% or 33%)	Yes (80%) @ 6.5-7 kg/ha	Yes (100%) @ 6.5-7 kg/ha	Yes (100%) @ 6.5-8 kg/ha	Yes (100%) @ 6.5-8 kg/ha
Organic fertilizers applied	Yes (100%); FYM (1-3 t/acre)	Yes (100%); FYM (3-6 t/acre)	Yes (100%); FYM (3-10 t/acre)	Yes (100%); FYM (1-3 t/acre)
Remarks	Nutrients were applied in the form of 20:20:0:13 (factomphos), 19:19:19, 10:26:26, 17: 17: 17, 15:15:15, urea, DAP, SSP, MOP and zinc sulphate.			

Table 10 Contd..

Details	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Planting method	Almost all the farmers adopted random planting where plant population per unit area was not maintained. About 10% farmers in Tumakuru adopted line planting			
Total N applied	Yes (100%) @ 100-125 kg/ha			
Total P ₂ O ₅ applied	Yes (100%) @ 50-60 kg/ha			
Total K ₂ O applied	Yes (100%) @ 45-60 kg/ha			
ZnSO ₄ applied (21% or 33%)	Yes (100%) @ 6-8 kg/ha	Yes (100%) @ 5-8 kg/ha	Yes (100%) @ 6-8 kg/ha	Yes (100%) @ 5-8 kg/ha
Organic fertilizers applied	Yes (100%); FYM (3-7 t/acre)	Yes (100%); FYM (3-10 t/acre)	Yes (100%); FYM (5-10 t/acre)	Yes (100%); FYM (3-10 t/acre); dhaincha green manuring
Remarks	Nutrients were applied in the form of 20:20:0:13 (factomphos), 19:19:19, 10:26:26, 17: 17: 17, 15:15:15, urea, DAP, SSP, MOP and zinc sulphate.			

D. Weeds and their Management: Overall, intensity of weeds was medium. The details of different weeds recorded in different districts are presented in Table 11. On an average, about 54% of the farmers contacted applied herbicide like Londax Power, butachlor and Nominee Gold. Most of these farmers also followed 1-2 hand weeding for management of weeds. About 30-60% farmers contacted told that they practice only hand weeding.

E. Specific needs of the farmers: Some of the common needs of the farmers were timely availability of quality seeds and other inputs like fertilizers and pesticides, potassic fertilizers and micronutrients, mechanization in rice farming, high yielding non-lodging rice varieties, less spacing mechanical transplanter, fixed market price and high yielding pest and disease resistant rice varieties.

Table 11: Weeds and weed management

Details	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Weed intensity	Low to medium	Medium	Medium	Medium
Names of the weeds	<i>Echinochloa colona</i> , <i>Leptochloa chinensis</i> , <i>Panicum trypheron</i> , <i>Glinus oppositifolius</i> , <i>Marsilia quadrifolia</i> , <i>Ludwigia Parviflora</i> , <i>Cyperus rotundus</i> , <i>Cyperus difformis</i> , <i>Cyperus iria</i> , <i>Cyperus procerus</i> , <i>Scirpus</i> spp., <i>Spilanthus acmella</i> , <i>Fimbristylis miliacea</i> and <i>Eclipta alba</i>			
Weedicides used	Londax Power (4 kg/acre), butachlor, Nominee gold			
%age farmers applied herbicides	Yes (40%)	Yes (70%)	Yes (60%)	Yes (70%)
Wild/weedy rice incidence	Nil	Nil	Nil	Nil
Only hand weeding	Most of the farmers who applied herbicides, also adopted 1-2 hand weeding. About 30-60% farmers contacted told that they practice only hand weeding			

Table 11 Contd..

Details	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Weed intensity	Medium	Medium	Medium	Medium
Names of the weeds	<i>Echinochloa colona</i> , <i>Leptochloa chinensis</i> , <i>Glinus oppositifolius</i> , <i>Marsilia quadrifolia</i> , <i>Cyperus rotundus</i> , <i>Cyperus difformis</i> , <i>Cyperus iria</i> , <i>Cyperus procerus</i> , <i>Scirpus</i> spp., <i>Spilanthus acmella</i> , <i>Fimbristylis miliacea</i> and <i>Eclipta alba</i>			
Weedicides used	Londax Power (4 kg/acre), butachlor, Nominee gold			
%age farmers applied herbicides	Yes (42%)	Yes (50%)	Yes (50%)	Yes (50%)
Wild/weedy rice incidence	Nil	Nil	Nil	Nil
Only hand weeding	Most of the farmers who applied herbicides, also adopted 1-2 hand weeding. About 50-58% farmers contacted told that they practice only hand weeding			

F. Input use: Implements like rotavator, tractor, power tiller and combined harvester were used by the farmers mostly on hire basis. Progressive farmers had some of their own equipment. Mechanization in all the districts was adopted mainly for harvesting by using combine harvesters and baler. Mechanical rice transplanters are being promoted from state department by providing subsidies in Davangere and other districts. Drum seeding technology (wet direct) is picking up in the district however farmers are facing problem of weed management as there are no pre-emergent selective weedicides available in the market. Majority (60-100%) of the farmers told that they purchased part of their seed requirement. State department of Agriculture distributed the seeds to the farmers timely during the season. Canal and river irrigation were the main sources for irrigation. On an average, about 42% farmers expressed that irrigation water was not sufficient. Majority of the farmers expressed satisfaction on availability of fertilizers and pesticides and their quality. Major advisors to the farmers were private dealers followed by officials from university and state department of agriculture.

Table 12: Details of inputs used

Details	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Implements used	Implements like rotavator, tractor, power tiller and combined harvester were used by the farmers mostly on hire basis. Progressive farmers had some of their own equipment			
Seed replacement rate (farmer' response)	40-45%	38-52%	45-55%	40-85%
Source of seeds	Majority of the farmers (60-100%) told that they purchased part of their seed requirement.			
Source of irrigation	Canal (100%); Rivers like Sagar, Tungabhadra, Sharavathi	Canal (100%); Bore well (30%), Rivers like Hemavathi	Rainfed (100%) Canal (10%)	Canal (100%); Shallow tube wells (50%)
Scarcity of irrigation water	Yes (50%)	Yes (50%)	No (100%)	Yes (70%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (55%)	Yes (100%)
Quality of fertilizers/pesticides	Satisfied (80%)	Satisfied (100%)	Satisfied (64%)	Satisfied (100%)
Advisors to the farmers	Dealers (100%); State dept.	Dealers (100%)	Dealers (46%); Univ (46%); State dept. (46%)	Dealers (30%); Univ (60%); State dept. (80%)

Table 12 Contd..

Details	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Implements used	Implements like rotavator, tractor, power tiller and combined harvester were used by the farmers mostly on hire basis. Progressive farmers had some of their own equipment			
Seed replacement rate (farmer' response)	90-95%	85-92%	90-95%	35-42%
Source of seeds	Majority of the farmers (80-100%) told that they purchased part of their seed requirement.			
Source of irrigation	Canal (100%); Rivers like Kabini and Kaveri	Canal (80%); Kabini river (100%)	Canal (100%); River irrigation	Canal (100%); Hemavathi river (90%)
Scarcity of irrigation water	Yes (8%)	Yes (10%)	Yes (80%)	Yes (70%)
Availability of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Quality of fertilizers/pesticides	Satisfied (100%)	Satisfied (100%)	Satisfied (100%)	Satisfied (90%)
Advisors to the farmers	Dealers (100%)	Dealers and University staffs	Dealers (100%)	Dealers (100%); state dept (50%)

Table 13: Prevalence of different diseases and insect pests in surveyed districts of Karnataka in 2022

Districts	Disease									
	BI	NBI	BS	ShBI	ShR	FS	GD	UDB	NBLS	BLB
Shivamogga	L-M (6-8%)	M (8-12%)	L	L-M (4-8%)	L	L-M (2-12%)			L (4-6%)	-
Hassan	L-M (5-12%)	M (8-12%)	L-M (5-12%)	L (5-8%)	L-M (5-11%)	L (2-6%)			L-M	T (<2%)
Chikmagalur	L-M (5-12%)	L-M (5-12%)	M (8-12%)	L (4-5%)	L (4%)	T (<2%)	M (8-12%)	T (<2%)	L-M (5-10%)	-
Mandya	L-M (5-23%)	L-S (up to 45%)	L	L-M (4-15%)	L	L-M	L-M (5-23%)		L-M	L
Mysuru	L-M (4-25%)	L-M (4-25%)	L (5-6%)	L-M (6-18%)	L	T (1-2%)	L-M (2-8%)		L-M (2-8%)	L-M (5-25%)
Chamaraj-nagara	L (4-6%)	L-M (6-10%)	L (5-6%)	L-M (4-8%)	L	L	L-M (2-8%)		L (3%)	-
Davangere	L (4-6%)	L-M (5-8%)	L (4-6%)	L (4-5%)	L (4-5%)	L			L	L (2-4%)
Tumkuru	L-M (4-8%)	L-M (5-10%)	L-M (4-8%)	L (5-6%)	-	L	L-M (6-8%)		L-M (4-10%)	L (2-5%)

Minor incidence of bacterial leaf streak in Hassan and Mysuru

Districts	Insect pests						
	SB	LF	BPH	WBPH	GM	CW	Rats
Shivamogga	L-M (6-12%)	L-M (4-10%)	L (4-6%)	T (<2%)		L	L (4-5%)
Hassan	L-M (2-8%)	L (4-5%)	-			L	
Chikmagalur	L-M (4-12%)	L-M (4-12%)	L-M (2-10%)		L (6-8%)	L-M (5-10%)	L (4-6%)
Mandya	L-S (5-35%)	L-S (5-35%)	L-M (5-23%)			L	L
Mysuru	L-M (4-8%)	L-M (4-10%)	L-S (4-35%)	T (1-2%)		L	L (4-5%)
Chamarajnagara	L-M (4-8%)	L (2-5%)	L (3-5%)		L (2-5%)	L (4-5%)	L (2-5%)
Davangere	L-M (4-8%)	L (3-5%)	L (2-4%)			L	
Tumkuru	L-M (6-8%)	L-M (4-8%)	-		L (5%)	L-M (3-8%)	L (4-5%)

G. Biotic stress and their management: District wise prevalence of different diseases and insect pests are presented in Table 13. Most of the diseases like blast, neck blast, brown spot, sheath blight, sheath rot, false smut, grain discoloration, narrow brown leaf spot and bacterial blight were observed in low to moderate intensities. However, high intensity (up to 45%) of neck blast was recorded in Mandya on varieties like in the varieties MC13, Mahalakshmi and Super Amman. Relatively, higher intensities (up to 25%) of leaf and neck blast and bacterial blight were observed in some fields in Mysuru. Among the insect pests, high infestation (up to 35%) of leaf folder and stem borer were recorded in some fields of Mandya while severe BPH was recorded in some fields in Mysuru. Outbreak of brown plant hopper was recorded in T. Narasipura, Nanjungud and Bannur block of the district at dough and grain filling stage affecting to the range of 22-35%. In Mandya, during dough and grain filling stage brown plant hopper and earhead bug (Gundibug) infestation of 23-25% and 15-20% was observed in patches in Jyothi and private varieties/hybrids. The details of different pesticides used for management of different diseases and insect pests are presented in Table 14. It was reported that 90-100% of the farmers contacted adopted chemical plant protection

measures. In general, the farmers adopted 2 sprayings and most of the farmers mixed one insecticide and one fungicide during spraying.

Table 14: Details of pest management

Details	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
% age farmers adopting plant protection	100% farmers adopted chemical plant protection measures			
Names of pesticides	Insecticides: chlorpyrifos (2 ml/l), Fipronil 0.3% GR, dichlorvos 76%EC, lambda cyhalothrin 5% EC, malathion 50% EC for stem borer, leaf folder and other pests; Fungicides: carbendazim (1 g/l), tricyclazole 75WP, combination products like tebuconazole 50% + trifloxystrobin 25%, for blast, sheath blight and brown spot and tricyclazole (06 g/l) for blast			
# of pesticide sprays	2	2	2	2
Mixing of pesticides before application	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides

Table 14 Contd..

Details	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
% age farmers adopting plant protection	90-100% farmers adopted chemical plant protection measures			
Names of pesticides	Insecticides: chlorpyrifos (2 ml/l), dimethoate 30 EC (Rogar) @1ml/l, buprofezin 25EC@1.4ml/l, acephate75WP (Starthane), cartap hydrochloride 4G, Fipronil 0.3% GR, acetamiprid 20% SP, dichlorvos76%EC, lambda cyhalothrin 5% EC and malathion 50% EC for stem borer, leaf folder and other insects; Fungicides: carbendazim (1 g/l) and Nativo (0.4 g/l) for blast, sheath blight and brown spot and tricyclazole (06 g/l) for blast			
# of pesticide sprays	2	2	2	2
Mixing of pesticides before application	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides	Yes (100%) 2 pesticides

H. Researchable issues: Among the biotic stresses, major problems in the region leaf and neck blast, sheath blight, bacterial leaf blight and false smut among the diseases and BPH, stem borer and leaf folder among the insects. Different abiotic problems reported by the farmers were drought/submergence, acid sulphate soil and salinity. Farmers want varieties suitable for DSR, HYVs with lodging resistance, short duration high yielding rice varieties, varieties resistant/tolerant to above mentioned biotic constraints and bio-fortified varieties with higher zinc and protein.

Table 15: Researchable issues

Parameters/Issues	Districts			
	Shivamogga	Hassan	Chikkamagaluru	Mandya
Rice ecology in your area	Rainfed lowland	Irrigated; rainfed lowland and hilly (parts)	Rainfed lowland	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif			Kharif + rabi
Number of years of experience in rice farming	10-20 years			
Main biotic constraints (diseases) in your area according to you	Leaf and neck blast, sheath blight, false smut and bacterial blight			
Extent of disease damage	10-25%			
Main biotic constraints (Insect pests) in your area according to you	BPH, WBPH, stem borer and leaf folder			
Extent of insect pest damage	10-25%; below 10% in some places			
Main abiotic constrains in your area according to you	Drought/ submergence	Drought/ submergence and acid sulphate soil	Acid sulphate soil and iron toxicity	Acid sulphate soil
Production constraints in your area according to you	Scarcity of agricultural labours, lack of mechanization,			
Irrigation facilities in your area	Poor	Available	Poor	Available; Canal
Normally how many years it takes to change the rice variety	5-10 years			
Any other rice production issues in your area which the rice scientists need to address				
What is urgently required in your area as far as rice varieties are concerned				
Duration	Long duration rice varieties with lodging resistance			
Biotic stress resistance	Varieties tolerant to blast, BB, sheath blight, BPH and stem borer			
Abiotic stress resistance	Varieties tolerant to submergence			
Preferred grain quality	MS grain quality			
Nutritional quality	Varieties with high zinc and high protein			

Table 15 Contd..

Parameters/Issues	Districts			
	Mysuru	Chamaraja Nagara	Davanagere	Tumakuru
Rice ecology in your area	Irrigated			Irrigated; rainfed
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif + rabi	Kharif	Kharif	Kharif
Number of years of experience in rice farming	5-10 years		10-20 years	5-10 Years
Main biotic constraints (diseases) in your area according to you	Leaf and neck blast, sheath blight, bacterial blight, false smut and brown spot			
Extent of disease damage	10-25%			Below 10%
Main biotic constraints (Insect pests) in your area according to you	BPH, WBPH, stem borer and leaf folder			
Extent of insect pest damage	Below 10%		10-25%	Below 10%
Main abiotic constrains in your area according to you	Acid sulphate soil	Drought/ submergence; salinity	Alkalinity	Drought/ submergence
Production constraints in your area according to you	Scarcity of agricultural labours, lack of mechanization, micronutrient dificiency,			
Irrigation facilities in your area	Available Canal	Available	Available Canal	Available; Bore wells
Normally how many years it takes to change the rice variety	5-10 years			10-20 years
Any other rice production issues in your area which the rice scientists need to address	NA			
What is urgently required in your area as far as rice varieties are concerned				
Duration	Varieties suitable for DSR, short duration rice varieties			
Biotic stress resistance	Varieties tolerant to blast, BLB, BPH, stem borer and sheath blight			
Abiotic stress resistance	Varieties tolerant to submergence, drought and salinity			
Preferred grain quality	MS grain quality			
Nutritional quality	Varieties with high zinc and high protein			

Kerala-2022-2023 (Pattambi)

Districts surveyed: Palakkad, Thrissur and Malappuram

Particulars of survey area

District	Block	Panchayats
Palakkad	Chittur, Kollengode, Shornur, Kuzhalmannam, Malampuzha, Pattambi and Mannarkadu	Perumatty, Pulpally, Vadakarapathy, Koduvayoor, Peruvembu, Pattancherry, Vallappuzha, Chalavara, Ananganadi, Ottappalam, Vaniyamkulam, Kinaserry, Kannadi, Kodumbu, Vilayoor and Thenkara
Thrissur	Anthikkad, Cherpu, Puzhakkal, Mullassery and Pazhayannur	Anthikkad, Chazhur, Thannyam, Koorkanchery, Paralam, Cherpu, Tholur, Adat, Mullassery and Chelakkara
Malappuram	Perinthalmanna, Mangada, Ponnani and Ponnani	Pulamanthole, Perinthalmanna, Angadippuram, Puzhakkattiri, Mankada, Makkaraparambu, Kuruva, Koottilangadi, Nannamukku, Alankode, Perumpadapu, Marancherry and Edappal

Widely prevalent rice varieties

District	Varieties
Palakkad	HYVs: Uma, Jyothi, Kanchana, Ponmani, Jaya, Aathira, Aiswarya, ASD 16, Supriya and Matta Triveni
Thrissur	HYVs: Uma, Jyothi and Manuratna
Malappuram	HYVs: Uma, Jyothi, Manurathna, Kunju Kunju Varna and Ponmani, Scented rice varieties like Jeerakasala and Gandhakasala were grown in few pockets

The Production oriented survey was conducted in Palakkad, Thrissur and Malappuram districts of Kerala. The survey was conducted at tillering to maturity stage of the crop. Uma, Jyothi, Kanchana, Aishwarya, Aathira, Ponmani and Manurathna were the predominantly cultivated varieties of these districts. Seed rate adopted by the farmers ranged from 65-120 kg/ha. The fertilizer application ranged from 0 to 150 kg N/ha, 0-80 kg P₂O₅/ha and 0-150 kg K₂O/ha as basal. Many of the farmers applied fertilizer in three split doses, one as basal and the other two as top dressing. The first top dressing ranged from 0-110 kg N/ha, 0-75 kg P₂O₅/ha and 0-150 kg K₂O/ha. Second top dressing ranged from 0-70 kg N/ha, and 0-70 kg K₂O/ha. Even though farmers know about the importance of applying organic manure, difficulty in getting good quality manure in large quantities was a problem raised by them. Some farmers applied farmyard manure, poultry manure, goat manure, vermicompost and green leaf manure basally. Most of the farmers followed transplanting. Direct sowing and mechanical transplanting were followed in some places. Farmers were using the agricultural implements like tractor, tiller, transplanter and combined harvester on hiring. The common weeds observed were *Isachne miliacea*, *Sacciolepis indica*, *Eichhornia crassipes*, *Echinochloa crusgalli*, *Echinochloa colona*, *Cyperus* spp., *Marsilia quadrifolia*, *Fimbristylis miliacea*, *Monochoria vaginalis*, *Paspalum digitatum* and weedy rice. Hand weeding and chemical herbicides such as 2,4-D, Ccyhalofop- butyl 5.1% + penoxsulum 1.02% (Vivaya),

Sathi (bensulfuron ethyl+pretilachlor), Nominee Gold (bispyribac sodium) and Rifit (1.5 lit/ha) were used for weed management. Diseases such as bacterial leaf blight, sheath blight, brown spot, blast and false smut were commonly observed from low to high intensities. The fungicides such as propiconazole, trifloxistrobin + tebuconazole (Nativo), tebuconazole and carbendazim were commonly used. For the management bacterial blight streptocycline spray and application of bleaching powder in the field was followed. The biocontrol agent, *Pseudomonas fluorescens* was used by farmers mainly for seed treatment. The major pests were leaf folder, stem borer, BPH and rice bug in low to high intensities. Flubendiamide, chlorantraniliprole, cartap hydrochloride and synthetic pyrethroids were commonly used insecticides. In general, problems faced by rice farmers are acute labour shortage, high labour cost, climate variability and crop damage due to attack of vertebrate pests particularly wild boar. High yielding, short/medium duration varieties with resistance to drought, lodging and bacterial blight are immediate requirements. In specific ecosystem such as kole lands farmers requested to develop farm machineries suited to marshy fields.

Palakkad: The survey was conducted during the tillering to maturity stages of the crop. The climatic conditions were normal in both *Kharif* and *Rabi* seasons. The predominant varieties grown in the district were Uma, Jyothi, Kanchana, Ponmani, Akshaya, Pournami, Jaya and Aathira. Very few farmers were growing Basmathi rice also. The surveyed farmers were having a medium economic status and preferred rice with parboiled coarse grains. The main crop rotations followed were rice-rice-pulses, rice-rice-vegetables, and rice-rice-fallow. The average rice yield reported was 3.5 to 5.5 t/ha. Main source of irrigation was canal irrigation and electricity were the main source of power. Majority of the farmers procured seeds from National seed corporation, Krishibhavans and KAU stations. A very few farmers used seed from previous year also. Fertilizers and plant protection chemicals were mainly purchased from private agencies and co-operative societies. Some of the farmers applied biocontrol agents received from Krishibhavans. Through Padashekara Samitis, they hired machineries like tractor, tiller, transplanter and harvester. Some farmers faced difficulty in getting lime and fertilizers, especially urea in adequate quantities at correct time. Sun drying of the seeds was the sole method and due to climatic variability and unprecedented rainfall, the farmers reported proper drying as a cumbersome problem. Whenever there was delay in procurement, farmers faced difficulty for proper storage facility, especially those farmers having small holdings.

Seed rate adopted by the farmers was in the range of 65-120 kg/ ha. The fertilizer application ranged from 0-150 kg N/ha, 0-75 kg P₂O₅/ha and 0-150 kg K₂O/ha as basal. Some farmers applied a little quantity of urea in the nursery stage to get healthy seedlings whereas others opined that when they applied urea, seedling couldn't withstand transplanting shock initially. Factomphos was the main source of N and P for basal application. Some farmers skipped K₂O in basal application. Most of the farmers applied fertilizer in two splits as basal and one top dressing. The fertilizers used for top dressing were urea and MOP. For first top dressing, the range was 10-110 kg N/ha, 0-75 kg P₂O₅/ha and 15-150 kg K₂O/ha. Those farmers gave the second top dressing, applied the N and K fertilizers mainly as urea and muriate of potash in the range 10-70 kg N/ha and 15-70 kg K₂O/ha.

The major organic manures used were farm yard manure, poultry manure, green manures. In general use of organic manures is low, due to its non-availability as well as the high labour cost for the transportation of manures to the field. In some areas, farmers allowed duck growers to use the field for rearing ducks, which added to the organic manure. While after rabi, goats were allowed in the field which also added to the manure requirement. Daincha seeds were sown after the rabi season, whenever seeds were provided by the Krishi bhavans. Some farmers tried vermicompost and fish amino acid. They all found it useful but not as easy as inorganic fertilizers. Liming was done by a few farmers where acidity was a problem. The level of weed infestation was low to medium. The common weeds observed were *Echinochloa* spp., *Cyperus* spp., *Marsilia quadrifolia*, *Eichhornia crassipes*, *Fimbristylis miliacea* and *Isachne miliaceae*. Hand weeding and application of herbicide such as 2,4-D, Sathi (bensulfuron ethyl+pretilachlor), Nominee Gold (bispyribac sodium), Rifit (pretilachlor @1.5 lit/ha) were the common weed management practices followed.

The incidence of pests and diseases were low to moderate. The major disease problems observed were bacterial leaf blight, false smut brown spot and sheath blight. False smut was very high in *Kharif* season in some areas particularly in variety Uma. Some farmers used bio-control agent *Pseudomonas fluorescens* as prophylactic measure for the management of diseases. The fungicides commonly used for the management of diseases were propiconazole (500 ml/ha), carbendazim and trifloxistrobin + tebuconazole (200 g/ha). The major pests were leaf folder, stem borer and rice bug in low to moderate intensities. Incidence of BPH was noticed in certain pockets. Other pests such as case worm, grass hopper were also noticed at low level. Pesticides like quinalphos (500 ml/ha), flubendiamide (100ml/ha, 125g/ha), lambda cyhalothrin (750 ml/ ha), fenval (1 l/ha), imidacloprid (350ml/ha) and cypermethrin (300ml/ha) were used for controlling insect pests. Farmers were aware of the climate variability happening and they demanded more heat tolerant varieties for future days. They also demanded medium to long duration varieties with lodging resistance. Farmers also demanded for increase in support price of paddy as the cost of production was very high. They were satisfied about the availability of seeds and pesticides. Only a very few farmers reported low quality or varietal mixtures of seeds. But they expressed their difficulty in managing attack from wild boar, peacock, herons, rodents etc. Shortage of labourers was another problem reported by farmers.

Thrissur: The Production oriented survey was conducted in Anthikkad, Cherpu, Puzhakkal Mullassery and Pazhazyannur blocks of Thrissur district, Kerala. The survey was conducted at maturity stage of the crop. Uma, Jyothi and Manuratna were the predominantly cultivated varieties in these areas. Rice is grown mainly in an irrigated system of cultivation particularly in kole land ecosystem. Climatic conditions here were normal. Fallow-rice-fallow is the most common crop rotation practiced. In few areas, fallow-rice-rice is also practiced. In kole lands fallow-rice-fallow is the most common crop rotation practiced as Kole lands would be submerged after April. The average yield obtained ranged from 3500-7500 kg ha⁻¹. The surveyed farmers were having a medium status and their per capita monthly consumption of rice was 5-12 kg. The main meal here consisted of rice with parboiled coarse grains being the choice. Seed rate adopted by the farmers ranged from 60-100 kg ha⁻¹. Almost all the farmers are practicing seed treatment with *Pseudomonas fluorescens* @ 10-20 g per kg of seeds. The fertilizer application ranged from 50 to 100 kg N/ha, 0-50 kg P₂O₅/ha and 30-80 kg K₂O/ha. Many of the farmers applied fertilizer in two

splits as basal and one top dressing. Use of organic manure was less. Some farmers applied farmyard manure basally. Liming was also adopted by some farmers. Most of the farmers followed random method of transplanting. Direct sowing and mechanical transplanting were also followed in some places. The common weeds observed were, *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus* spp., *Monchoraia vaginalis* and weedy rice. Hand weeding was followed in most of the places. But in some area herbicides such as 2,4-D, Clincher etc were used. Farmers were using the agricultural implements like tractor, tiller, transplanter and combined harvester on rent. Majority of the farmers were freshly purchasing seeds every season. Irrigation water was available and the source was canals. Electricity is the major source of power and few farmers were using diesel as well as solar power also.

Diseases such as bacterial leaf blight, sheath blight, blast, brown spot, grain discolouration, sheath rot, brown spot and false smut were commonly observed from low to medium intensities. The use of fungicides was negligible. Streptocyclin was used for the management of bacterial blight. The commonly used fungicides were carbendazim, trifloxistrobin+tebuconazole, mancozeb and propiconazole. Majority of farmers are using biocontrol agent *Pseudomonas fluorescens*. The major pests were leaf folder, stem borer and rice bug in low to moderate intensities. Farmers applied flubendiamide @ 1ml/10 l, chlorantraniliprole @ 3 ml/10 l, malathion and acephate for controlling insect pests. *Trichogramma* egg cards were used by a few farmers for the management of stem borer and leaf folder. Rat was also a problem in a few areas. Intrusion of salt water to the fields and unforeseen rains during harvest was raised as problems by the farmers. Farmers have also raised the non-availability of inputs and machineries on time as issues. Lack of sufficient labourers and high labour cost were the two problems generally raised by the farmers. Timely availability of subsidy and insurance claims were other issues raised by the farmers. Varieties tolerant to biotic stresses like Blast, BLB were the major requirement of the farmers. A few farmers are practicing organic agricultural practices to overcome the difficulty in getting proper inputs.

Malappuram: The production-oriented survey was carried out in the Perinthalmanna and Mankada, Perumbadappu and Ponnani blocks of Malappuram district. The surveyed farmers were having a medium status. Rice is grown in a rainfed low land system. The climatic conditions were normal. The survey was carried out from the dough to the maturity stage of the *rabi* crop. Jyothi and Ponmani were the most grown varieties in these areas. In Ponnani and Perumbadappu, as ecosystem is kole land and hence late rabi and puncha crop were taken by farmers. They also cultivated local varieties, and aromatic rice varieties such as Jeerakashala and Gandhakasala in a few locations. The main crop rotations followed were rice-rice-pulses, rice-rice-vegetables, and rice-rice-fallow. The reported average rice yield was 3 to 7 t/ha. Many rice fields were rain-fed lowland or canal-irrigated, and electricity was the primary power source. Farmers relied on private agencies for farm machinery such as tractors, transplanters, and harvesters. The major source of the seeds was from Krishibhavana or their own seeds or seeds collected from neighboring farmers. Fertilizers and plant protection chemicals were mostly obtained from cooperative societies and private agencies. The seed rate adopted by the farmers mostly varied from 50-100 kg/ha. The practice of seed treatment was less among the farmers and a few of them used *Pseudomonas fluorescens* for seed treatment @ 10g/kg seed. The use of organic manure as a basal was limited due to its scarcity and high transportation costs, but during land preparation, some farmers, particularly those who practiced rice-rice-vegetable cropping systems, used organic manure in the

form of farmyard manure and poultry manure, and some farmers even used green leaf manure. Many farmers applied lime during the initial stages of land preparation to manage acidity and iron toxicity. Most farmers applied fertilizer in two splits, one basal and one top dressing, with rates ranging from 50 to 120 kg N/ha, 0-50 kg P₂O₅/ha, and 0-80 kg K₂O/ha. Factomphos was the primary source of nitrogen and phosphorous. Potash was supplied as murate of potash. Top dressing fertilizers included urea and MOP.

Many farmers used a random transplanting method, and to a lesser extent, some farmers used mechanical transplanting. Weed infestation was moderate to severe. *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus* spp. and *Eichhornia* spp. were the most common weeds found. Hand weeding was used in most areas, but in some area, herbicides such as 2, 4-D, Sathi (bensulfuron ethyl+pretilachlor), Rifit (pretilachlor) etc were used. Pest and disease incidences were low to moderate except in a few areas where the incidence of bacterial leaf blight and blast were moderate to heavy. Bacterial leaf blight was the most common disease reported in most areas. In some areas, the kresiek symptom of bacterial blight was observed. Blast, brown spots, sheath blight, and false smut are other diseases observed. There was also incidence of neck blast and grain discoloration. Streptocycline was used by the farmers against bacterial blight, and some farmers used the biocontrol agent *Pseudomonas fluorescens* as a preventative measure. The major pests were leaf folder, stem borer, and rice bug in low to moderate intensities. Incidence of BPH was reported from few locations. The insecticides used were flubendiamide, chlorantraniliprole, cartap hydrochloride, malathion and acephate.

Prevalence of diseases and insect pests in Kerala, Kharif' 2022

Districts	Diseases					
	Bl	BS	ShBl	FS	GD	BLB
Palakkad	M-S	L-S	S	L-S	L	S
Thrissur	M	M-S	L-M	L	L-M	M
Malappuram	M	L-S	L-M	L	L	M

Districts	Insect pests				
	SB	LF	BPH	CW	RB
Palakkad	S	S	L-S	M-S	L-S
Thrissur	L-M	M	L	M	M-S
Malappuram	L-M	M	L	M	L-S

Districts	Non insect pests		
	Wild boar	Peacock	Rodents
Palakkad	HS	HS	M-S
Thrissur	M	L-M	M
Malappuram	L-M	L	M

Maharashtra-2022-2023 (Karjat)

Districts surveyed: *Thane, Raigad, Palghar, Ratnagiri and Sindhudurg*

Table 1: Details of survey

Districts	Taluka/Block	Villages
Thane	Kalyan, Bhiwandi, Murbad, Shahapur and Ambarnath	Palegaon, Danbav, Nandgaon, Kandali, Dohale, Koshimbi, Kanol, Nava, Kedurle, Ravgaon, Dahiwali, Thide, Shendrunkur, Ambeshivkur, Yeranjal and Kanhore
Raigad	Karjat, Panvel, Pen, Alibag, Sudhagad Pali, Roha, Khalapur, Mahad and Uran	Potal, Aambet, Bhaliwadi, Mohili, Aadiwali, Tamnath, Karnala. Kalhe, Chinchvan, Umbarde, Karav, Hemdiwadi, Poynad, Namadevnagar, Shahbad, Kumbharshet, Karchunde, Rabgaon, Waravatane, Aamdoshi, Wangani, Halgaon, Khalapu, Kumbiwali, Nagaon, Revtale, Agryachakond, Bhom, Vesshavi, Dadirpada and Chirnar
Palghar	Palghar, Dahanu, Wada, Vasai and Vikramgad	Valan, Kolgaon, Sagave, Vetli, Kasa, Ghol, Talawade, Nare, Kudus, Khupri (Wadpada), Usgaon, Chandip, Majjiwali, Vede Alonde and Aapti
Ratnagiri	Taluka, Mandangad, Dapoli, Chiplun, Guhaghar, Ratnagiri, Lanja and Khed	Latvan, Veloth, Dhudhare, Kumbale, Umbarle, Chinchali, Kumbhave, Khershet, Anari, Mirjule, Ranave, Sakhari Bk, Malan, Kotluk, Vile, Raiwele, Aori Veralgaon, Kotharwadi, Waked, Dhamni, Sakroli, Poenar and Ayani
Sindhudurg	Kankavali, Kudal, Malvan, Sawantwadi, Vengurla and Vaibhavwadi	Wagde, Osargaon, Varasgaon, Bibawane, Bhav, Mangaon, Padve, Kasal, Thokamwadi, Kunkawale, Aachara, Salel, Nirawade, Kolgaon, Talwade, Aadel, Vajrat Math, Kelus, Kokisare, Bhanswadi and Vabhawe

Production oriented survey was conducted in the Konkan region of Maharashtra which is predominant rice growing belt with an average productivity of 2.66 (3.84 rough rice) t/ha. The region comprises of five districts viz. Thane, Raigad, Palghar, Ratnagiri and Sindhudurg. In Kharif-2022 season 362868.91 ha area was sown under rice cultivation in the region with HYV. The farmers of this region cannot grow any crop other than rice in Kharif because of high rainfall and geographically low land. The Production Oriented Survey for rice was organized at dough to maturity stage of crop during the month of October-November, 2022. The details of the places surveyed are presented in Table 1. The particulars of rice area in different districts of Konkan region are presented in Table 3. The details of different weather variables during the cropping season of 2021 in the five surveyed district are presented in Table 4. The onset of monsoon was in the month of June. Weather conditions were in general favourable for rice cultivation in the region. In few places in Raigad district there was heavy rainfall in the month of July and in Palghar district in some places, there was heavy rainfall in the month of September resulting in lodging of the crop

and delay in harvesting. The total rainfall and its distribution in Konkan region were much satisfactory.

The details of the varieties cultivated by different farmers are given in Table 2. Commonly cultivated varieties were HYVs like Jaya, Jordar, YSR, Ankur Rupali, MTU 1010, Karjat-2, Karjat-3, Karjat-5, Karjat-7, Karjat-8, Karjat-184, Daptari-125, Om shriram, Daptari 100, Shabari, Komal 101, Spriha 911, Shriram, Pranali, CO 51, Jai Shriram, Suvarna, Trupti, Sairam, Jyotika, Sonam, Sarathi, Devaki, Ratnagiri-1, Ratnagiri 24/711, Ratnagiri-5, HMT Sona, Ankur Sonam, Vijaya, Shubhangi, Mahsuri, Laxmi, Silky 277, Shatayu, Poonam, Suma, Sundar, Harshita, Samba Mahsuri, Saurabh Vaishnavi, Ratna, Indrayani, Jyothi and Vada Kolam and hybrids like Arize 6444, Kaveri KPH 9090, NPH 242, NPH 30, Syn NPH 5251, Sahyadri, Sahyadri-1, Sahyadri-3, Sahyadri-4, Upaj, Ankur-744, Loknath-509, Loknath-505, Ankur 7434, Ankur 7576, Suruchi and Gorakhnath

Table 2: Widely prevalent rice varieties

Districts	Varieties
Thane	HYVs: Jaya, Jordar, YSR, Rupali, MTU 1010, Karjat-3, Karjat-7, Karjat-5, Karjat-2, Daptari 108, Daptari 100, Daptari 125, Suvarna, Krushidhan Komal 101, Spriha 911, Shabri, Sonam, Shubhangi, Avani, Devki, Rupali, Pranali, Vaishnavi, Trupti, Silky-277, Om Shriram and Jyotika; Hybrids: Arize 6444, Kaveri KPH 9090, NPH 242, Upaj, Loknath, Ankur 7434, NPH 30 and Gorakhnath; Locals: Vada Kolam and Vada Zini
Raigad	HYVs: Jaya, Suvarna, Karjat-7, MTU 1010, Komal 101, Shriram, Jordar, Avani, Devaki, Vaishnavi, Trupti, Om Sairam, Gangotri, Sonam, Sarathi, Ratnagiri 711, Karjat-5, Parnel-1, HMT Sona, Indrayani, Karjat-184, Shubhangi, Komal, Gujrat-11, Jyotika, Swabhagya, Yarana, Daptari, Ratna, Chintu, Rupali YSR, Sonal, NPH 256, Awani, Kranti, Jyotika, Chintu, Suprim Sona, Kanchan, Kuber, Radha, Karjat-2 and Karjat -3; Hybrids: Sahyadri-1, Sahyadri-3, Sahyadri-4, Lokhnath, Ankur 744, Gorakhnath and Suruchi; Locals: Wada-kolam,
Palghar	HYVs: Jaya, Masuri, Suvarna, Karjat-2, Karjat-3, Karjat-5, Karjat-7, Ratnagiri-5, MTU-1010, Ankur Sonam, Rupali, Komal 101, Trupti, Silky 277, Shubhangi, YSR, Daptari 100, Vaishnavi, Poonam, Suma, Spriha, Puja, Jordar, Coimbatore-51, Super Sona, Jordar, Daptari, Sindhu, Palghar-1, Jyotika, Avani, Devki, Laxmi, Shatayu, Shabari and Gujrat 11; Hybrids: Arize 6444 and Upaj; Locals: Vada Kolam
Ratnagiri	HYVs: Karjat 2, Sonam, Jaya, Ratnagiri 8, Komal, Rupali, Pooja, Sadhana, Chintu, Trupti, Prasanna, Sarathi, Vaishnavi 241, Suvarna, Karjat-3, Karjat-7, Karjat-8, Karjat -9, Ratnagiri 6, Ratnagiri-24, Ratnagiri 3, Palghar-1, HMT Sona, Masuri, Indrayani, Shriram, Sarathi, Vaishnavi, Poonam, Komal 101 and YSR; Hybrids: Arize 6444, NK 5251, Ankur 7576, Gorakhnath and Loknath 505; Locals: Wada Kolam
Sindhudurg	HYVs: Jaya, Suvarna, Punam, Komal 101, Amani, Karjat-3, Sarathi, Shubhangi, Rupali, Sonam, R.J.95, Avni, Trupti, Bahubali, Vaishnavi, 2020, Shatayu, Masuri, Karjat-2, Silky – 277, Ratnagiri 6, Ratnagiri -68, Jai Shriram, Suprim Sona, Ashmitha, Prasanna, Purva, Laxmi and Jyoti; Hybrids: Surchi MRP 5629, Loknath – 509, K.P.H. 9094 and NPH 30; Locals: Wada Kolam,

Table 3: Particulars of rice area in different districts of Konkan region of Maharashtra (Kharif 2022)

District	Total Geographical Area (ha.)	Total Cultivable Area (ha.)	Total Cultivated Area (ha.)	Net Irrigated Area (ha.)	Area sown Under Rice (ha.)
Thane	955800	238621	171656	1229	54923
Raigad	715200	310500	217400	9000	101012
Palghar	517634	219980	109291	14208	76430
Ratnagiri	820800	555000	250400	4900	68088
Sindhudurg	520700	348600	159200	3530	55970

Table 4: Weather data for different districts of Maharashtra during Kharif 2022

District/ Parameters	May	Jun	Jul	Aug	Sep	Oct	Nov
Thane							
RD	9	16	28	28	23	10	0
TR (mm)	9.5	175	1147.57	519.5	787.7	164.3	0.0
MMT (°C)	30.6	28.4	27.9	27.8	27.5	28.1	28.4
T. Max (°C)	38.3	31.0	31.4	30.3	28.9	32.5	34.5
T. Min (°C)	27.5	26.75	26.55	25.3	25.05	23.4	22.12
SH	6.6	3.1	2.3	2.8	2.7	6.7	8.5
Raigad							
RD	0.0	13	28	24	23	10	0
TR (mm)	0.6	191.4	2023.6	713.4	660.2	165.6	0
MMT (°C)	34.25	28.8	25.6	26.58	26.4	27.5	25.7
T. Max (°C)	42.4	39.0	33.5	33.8	34.0	34.8	35.2
T. Min (°C)	22.8	22.8	17.4	21.8	19.6	16.2	14.2
SH	6.4	3.2	0.5	1.26	1.5	3.61	6.5
Palghar							
RD	0	17	23	23	19	4	0
TR (mm)	0	716.4	1588.4	528	462	164	0
MMT (°C)	29.7-	28.99	26.95	27.74	26.88	28.16	27.75
T. Max (°C)	32.8	33.1	29.5	30.3	30.4	33.3	33.4
T. Min (°C)	26.6	25.1	25.0	25.3	24.0	21.1	20.1
SH	3.1	1.6	0.25	0.78	2.2	6.6	7.3
Ratnagiri							
RD	2	19	26	25	16	5	0
TR (mm)	7.8	729.8	1132.8	1096.1	440.7	139.1	0.0
MMT (°C)	28	27.1	25.6	25.5	25.6	25.5	23.9
T. Max (°C)	32.9	33.2	28.9	30.1	30.2	32.3	33.0
T. Min (°C)	21.5	22.7	22.3	22.1	21.4	17.2	13.9
SH	7.3	1.1	2.8	2.2	3.3	5.9	9.6
Sindhudurg							
RD	5.0	23	28	25.0	20.0	16	3.0
TR (mm)	19.6	712.5	1176.20	567.0	598.5	244.2	5.8
MMT (°C)	35.44	27.5	26.5	26.7	26.8	27.0	26.9
T. Max (°C)	38.5	38.0	29.8	33.0	34.0	36.0	36.0
T. Min (°C)	26.00	22.0	23.1	22.0	20.5	17.0	12.5
SH	6.8	3.4	1.4	3.2	4.6	6.0	5.7

RD: Rainy days; TR: Total rainfall; MMT: Monthly Mean Temperature; T. Max: Maximum temperature; T. Min: Minimum temperature; SH: Sunshine hours

Table 5: General question on rice cultivation in district (to be filled by the cooperator in consultation with the officials from state department of agriculture)

Parameters	Thane	Raigad	Palghar
Total area under HYVs in the district (ha)	54923 ha	101012 ha	76430 ha
Most prevalent HYVs in the district	Jaya, YSR, Jordar, Karjat-3, Rupali, Karjat-7, MTU-1010, Daptari 125, Shabari, Spriha 911, Krushidhan Komal-101, Pranali, Vaishnavi, Trupti, Shubhangi, Karjat -2, Silky-277, Om Shriram, Daptari-100, Jyotika etc.	Jaya, MTU 1010, Suvarna, Vaishnavi, HMT Sona, Kranti, Trupti, Rupali, Jyotika, Suprim Sona, Komal 101 Karjat-2, 3, 4, 5, 7, YSR, Jordar, Chintu, Komal, Sarathi, Ratna, Indrayani, Shubhangi Swabhagya, Daptari	Coimbatore -51, Suvarna, Shubhangi, Karjat-2, 3, 5, 7, Jordhar Vaishnavi, Super Sona, Jaya, Ratnagiri -5, MTU-1010, Masuri, Silky, Trupti, YSR, Dafturi 100, Super Sona, Spriha and Komal
Total area under rice hybrids in the district	2562 ha	734 ha	230 ha
Most prevalent rice hybrids in the district	Arize 6444, Kaveri KPH 9090, Upaj, Loknath, Ankur 7434, Gorakhnath, NPH 30, NPH242	Sahyadri 1, 2, 3, 4, Gorakhnath, Lokhnath, Ankur 744. Suruchi	Arize 6444, Upaj
Total area under basmati in the district	Nil	Nil	Nil
Most prevalent basmati varieties in the district	Nil	Nil	Nil
Whether farmers are using any heavy equipments like transplanter/combine harvester	No	Yes; transplanter and power tiller operated harvester.	Yes; Power tiller operated harvester. Small Thresher.
Mention water saving technologies like SRI/laser leveling/ DSR being used by the farmers	Some farmers of the Thane district used DSR.	No	Nil
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Yes, IPM, and weed management, mechanization. Different methods of rice cultivation.	Different methods of rice cultivation, INM in rice IPM in rice and mechanization	Different methods of Rice cultivation, IPDM, INM and mechanization
What are the general problems in rice cultivation in the district?	Non-availability of labour and their high wages, lack of storage & irrigation facilities.	Non availability and high wages of the labour.	Due to small land holding, farmers needs low cost mechanization.
Please provide any farmers association in the district	Farmer's groups registered under ATMA and "Agricultural Tools Bank" Association.	Co-operative Rice Seed Production Society, Vadap, Karjat Shetkari Vikas Sanstha, Mahad; Vegetables growers and marketing groups under ATMA.	Farmer's groups registered under ATMA as a vegetables grower and Marketing purpose.
Whether availability of agricultural labours is sufficient?	No.	No	Non availability and High wages of the labour.
Whether there is any marketing problem of the produce?	Yes	Yes.	Lack of marketing facilities.
Any major irrigation/power generation project in the district	3 Major and 15 Small Irrigation projects.	Ravalaje, Patnus, Kal, Rajnala, Hetawane major and 28 minor irrigation projects.	Bhatsa, Surya and Wandri major and 16 minor irrigation projects in the district.
Any soil testing program undertaken?	Yes. Soil Health Improvement Program	No.	Yes. Soil Health Improvement Program
Any farmers' training program was organized by the state department of Agriculture/ University	Integrated Rice Improvement Program and demonstrations.	Hybrid Rice Improvement Program and demonstrations.	Integrated Rice Improvement Program and demonstrations.

Table 5 contdd.: General question on rice cultivation in district (to be filled by the cooperator in consultation with the officials from state department of agriculture)

Parameters	Ratnagiri	Sindhudurg
Total area under HYVs in the district (ha)	68088 ha	55970 ha
Most prevalent HYVs in the district	Komal 101, Jaya, Suvarna, Karjat-2, Karjat-3, Ratnagiri 8, Jaya Mohini, Rupali, Sarathi, Vaishnavi, Poonam, Sonam, Pooja, Kasturi, Supriya, Chintu, Trupti, Suprim Sona, Bahubali, Shewta and others	Jaya, Komal-101, Suvarna, Karjat-3, Poonam, Shubhangi, Avni, R.J.95, Rupali, Sonam, Sarath, Trupti, Vaishnavi, Mahabali, Bahubali, Sevan, Silky and others
Total area under rice hybrids in the district	1491.75 ha	868.76 ha
Most prevalent rice hybrids in the district	Gorakhnath, Arise- 6444, Arize 6129, Loknath 505, Synjenta 5251, Ankur 7576	Arize 6444
Total area under basmati in the district	Nil	Nil
Most prevalent basmati varieties in the district	Nil	Nil
Whether farmers are using any heavy equipments like transplanter/combine harvester	Use power tiller operated transplanter and harvester, electric thresher.	Use power tiller operated transplanter and harvester,.
Mention water saving technologies like SRI/laser leveling/ DSR being used by the farmers	Nil	Some farmers used DSR technique.
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Different methods of rice cultivation, INM, IPM of rice, chemical weed management and Mechanization.	Mechanization in harvesting, threshing, drumseeding and INM, IPDM in rice cultivation.
What are the general problems in rice cultivation in the district?	Shortage of labour, limitation for mechanization due to geographical situation and high labour wages.	Labour shortage, limitation on mechanization due to small land holding
Please provide any farmers association in the district	Nil	Shetkari Kharedi Vikri Sangha-8, Shraddha Swayam Sahayata Bachatagat
Whether availability of agricultural labours is sufficient?	No, Shortage of labour and high wage rate.	No, Labour shortage and high wage rate.
Whether there is any marketing problem of the produce?	Yes	Yes.
Any major irrigation/power generation project in the district	Natu nagar Irrigation Project, Ratnagiri Power Company is Major and 38 minor small scale projects.	Talamba, Aruna Tilari, Sarmala and Mahmmad wadi Irrigation projects and 28 other minor projects.
Any soil testing program undertaken?	Yes. Soil Health Improvement Programme organized by state govt.	Yes. Soil Health Improvement Programme organized by State govt.
Any farmers' training program was organized by the state department of Agriculture/ University	Integrated Rice Improvement Programme and field demonstrations.	Integrated Rice Improvement Programme and demonstrations.

Table 6: Variety/hybrid wise area coverage (ha) in different districts of Maharashtra during 2022

Variety/hybrids	Districts/area (ha)				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
HYVs/Improved					
Jaya	2337.22	6451.25	557	820.55	2467.5
Jordar	2232.57	2315	2746		
YSR	2747.28		2600		
Ankur Rupali	1875.82		1800	768.99	151.5
MTU 1010	1554.28	2622.5	1057		
Karjat-2	322.14		114	515	
Karjat-3	936.12		2157		391.87
Karjat-5	95.86	106.25	57		
Karjat-7	528.62	672.5	572		
Karjat-184		1217.5			
Daptari-108	666.85				
Daptari-125	1902.85				
Om shriram		1100			
Daptari 100	370.71		3571		
Shabari	1265.07				
Komal 101	525.50	2647.20	2143	2228.85	808.12
Spriha 911	1595.71		1843		
Shriram		2480			
Vaishnavi		625	1257	729.6	299.5
Gangotri		390			
Panvel 1		450.25			
CO 51			1029		
Suvarna	105.85	3445	55		585
Trupti		620	686	643.27	308.37
Sonam	569.37	680.5		830.0	178.12
Sarathi		726.5		894.40	313.75
Devaki	298	917.5			
Indrayani		356.75			
Ratnagiri 24/711		369.5			
Ratnagiri-5			614		
Ratnagiri-8				332.17	
HMT Sona		1347.00			
Super Sona			2786		
Ankur Sonam			1771		
Shubhangi	201.12	262.75	1143		201.25
Avani	302.5	963			138.87
Prasanya				631.11	
Mahsuri			28		
Bahubali					302.5
Silky 277			1057		244.87
Shatayu					227.5
Poonam			3100		643

Variety/hybrids	Districts/area (ha)				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
HYVs/Improved					
Suma			2643		
Sadhana				738.10	
Amani					516.87
R.J. 95					285
Puja			2143	537.59	
Chintu				254.85	
Vada kolam	768		2342	456.97	
Vada Zini	281.07				
Others		277.66	1143		10069
Hybrids					
Arize 6444	927.62		20.00	374.08	
Kaveri KPH 9090	110.97				
Kaveri KPH 9094					73.8
NPH 242	86.97				
NPH 30	90.28				56.66
Syn NPH 5251				171.9	
Sahyadri					
Sahyadri-1		74.66			
Sahyadri-3		123.0			
Sahyadri-4		97.00			
Upaj	67.97		28.30		
Ankur-744		151.00			
Loknath-509	89.11	116.55			226.66
Loknath-505				132.97	
Ankur 7434	235.94				
Ankur 7576				138.24	
Suruchi		186			250
Gorakhnath	103.17	186		88.29	
Others			146.95	586.27	261.64

A. General Information, cropping system and rice yield: The details of the number of villages surveyed and number of farmers contacted are presented in Table 7. Rice is grown as a rain fed crop due to heavy rains in the region. The most common cropping pattern adopted by farmers in the region is Rice-Fallow, Rice-Pulses, Rice-Vegetables, Rice groundnut and rice-finger millet. Pulses include dolichos bean, beans, black gram, chick pea, green gram, horse gram and kidney bean). The farming systems of Konkan was also including goat farming in Palghar district and fish farming in Raigad district. Pulses after Kharif rice on residual moisture is a common practice in Palghar, Raigad, Thane and Ratnagiri districts. Most of the farmers in Konkan region are having small land holding. The average seed replacement ratio in the region during Kharif 2022 was 44% (according to Maharashtra state agriculture department). Some farmers used their own seed especially of local varieties. Seeds of improved varieties are supplied by Government agencies viz. Panchayat Samittee, Zilla Parishad, Agricultural Department, Agricultural University, Research Stations etc. Most of the farmers purchased part of their seed requirement every season, from private agro service centers and private seed companies. Average rice yield was low in the region

and ranged from 2000-3000 kg/ha (Table 8). Rice yield in some of the surveyed places in most of the districts was affected due to low sub-normal dose of fertilizers, uneven rainfall especially during early part of the crops season and excess rainfall during maturity /harvesting stage resulting in crop lodging. Crop yield was also affected due to high incidence of stem borer, leaf folder and bacterial blight especially in Thane, Raigad and Palghar.

Table 7: General information

Parameters	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
# of talukas/blocks covered	5	9	5	7	6
# of villages surveyed	16	31	16	24	21
# of farmers interviewed	19	32	16	24	22
Field ecosystem	RL (100%)	RL (100%)	RL (100%)	RL (100%)	RL (100%)
Weather conditions during cropping season	Weather conditions were in general favourable for rice cultivation in the region. In few places in Raigad district there was heavy rainfall in the month of July and in Palghar district in some places, there was heavy rainfall in the month of September resulting in lodging of the crop and delay in harvesting. The total rain fall and its distribution in Konkan region were much satisfactory.				
Crop stage when survey was made	Maturity	Maturity	Maturity	Maturity	Maturity
Crop rotations	Rice is grown as a rain fed crop due to heavy rains in the region. The most common cropping pattern adopted by farmers in the region is Rice-Fallow, Rice-Pulses, Rice-Vegetables, Rice groundnut and rice-finger millet. Pulses include dolichos bean, beans, black gram, chick pea, green gram, horse gram and kidney bean). The farming systems of Konkan was also including goat farming in Palghar district and fish farming in Raigad district. Pulses after Kharif rice on residual moisture is a common practice in Palghar, Raigad, Thane and Ratnagiri districts.				

RL: Rainfed lowland

Table 8: Average yields of different rice varieties as reported by the cooperators/farmers

Varieties	Yield (kg/ha) in different districts of Maharashtra					Remarks
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg	
Karjat-2				2500		Rice yield in some of the surveyed places in most of the districts was affected due to low sub-normal dose of fertilizers, uneven rainfall especially during early part of the crops season and excess rainfall during maturity /harvesting stage
YSR	1000-2700	100	2500		1000	
Jordar		3000				
NB-37						
Daftari 100	2700	2100	1200-2700			
Sonam				1200-2500	1000-1500	
Rashmi	2000					
Karjat-3	2800	2500-2750	1200-2500	800-2800		
Karjat-7		1875				
Palghar-1			1500			
Palghar-2			1600			
Avani	2800	100				
Spriha 911	2200					

Varieties	Yield (kg/ha) in different districts of Maharashtra					Remarks
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg	
Indrayani		2700				resulting in crop lodging. Crop yield was also affected due to high incidence of stem borer, leaf folder and bacterial blight especially in Thane, Raigad and Palghar.
Ankr Rupali		1875-2700	2500		2000	
HMT Sona	3125					
Komal-101	1000-2700	1000-3480		3000	700-1500	
Shabari	3000					
Devki	1000					
Gongotri		1000				
Gujarath-11		1200		2400		
Jaya		800-3000		1500-2800	1000-2500	
Chintu		4800				
Wada Kolam		2700		2700		Some of the farmers are still growing local rice varieties for local preference
Silky Kolam			900			
Suvarna		2700	1000-2500	2200-3500	2200	
Nilam					1500	
Ashmitha					840	
Prasanya					9000	
Ratnagiri-7				2400		
Ratnagiri-6					1000-2200	
Ratnagiri-24				1000		
RTN-68					1500	
Punita				3500		
Gudi				1600		
Trupti				1000		
Jyothi					1000-2000	
Aamani					1200	
Arize 6444	3300	1000			2500	
Loknath		3300				
Suprim Sona		2500				
Vaishanavi				3000		
Kranthi					1000	
Ratna		2000-2500				
Subhangi					1000-2500	
Black rice		3333				
Mahsuri					3000	
Patani (Local)					2000	
Kolam			1400			

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of Konkan region of Maharashtra. Majority (>95%) of the farmers contacted were in the medium income group. Average per capita consumption of rice per month was 4-6 kg rice. More than 85% of the farmers contacted told that their main meal consisted of both rice and wheat (chapatti). Few also told that they took finger millet along with rice. About 50-89% farmers in different districts (except Sindhudurg) told that they used polished rice and remaining told that they used parboiled rice along with polished rice. Regarding grain quality, most of the farmers expressed that though they preferred fine grain, but they used both fine and coarse grain rice. In general, there was no change in the food habit.

Table 9: Details of rice consumption pattern

Parameters	Districts				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
Status of farmers	Medium income (95%); Poor (5%)	Medium income (100%)	Medium income (94%); Poor (6%)	Medium income (100%)	Medium income (95.5%); Rich (4.5%)
Per capita monthly rice consumption (kg)	4-6 kg	4-6 kg	5-6 kg	5-6 kg	4-6 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Only rice (6%); Rice + Wheat (94%)	Rice + Wheat (100%)	Only rice (9.1%); Rice + Wheat (86.4%); Rice + F. millet (4.5%)
Preferred rice types	Polished rice (89.4%); Polished + Parboiled (10.6%)	Polished rice only (87.5%); Polished + Parboiled (12.5%)	Polished rice only (50%); Polished + parboiled (50%)	Polished rice only (70.8%); Polished + Parboiled (29.2%)	Polished rice only (18.2%); parboiled only (4.5%); Polished + Parboiled (77.3%)
Rice grain type preference	Fine grain only (84%); Fine + Coarse grain (16%)	Fine grain only (34%); Fine + Coarse grain (66%)	Only fine grain (100%)	Fine grain only (70.8%); Fine + Coarse (29.2%)	Fine grain only (9.1%); Fine + Coarse (90.9%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (100%)	No (100%)	No (100%)

C. Nursery and main field Management: In general, planting was done during end of June to end of July (Table 10). Average seed rate used by the farmers ranged from 30-40 kg/ha. About 18-75% farmers in different districts told that they treated the seeds with thiram (2.5-3 g/kg) or carbendazim (2 g/kg) or Captan (2.5 g/kg). Some of the farmers told that they purchased fungicide treated seeds. On an average, about 34% farmers told that they applied organic manure (FYM) in the nursery. More than 90% farmers told that they applied urea in the nursery (@ 0.5-2 kg/R). Few also applied Suphala and 18:18:18 in the nursery. Most common practice for weed management in nursery in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg (Partly) district is burning of nursery area with organic waste referred as 'Rab'. Farmers used 25 to 32 days old seedlings for transplanting. This year the monsoon was started in time and farmers completed their transplanting in time. Transplanting was random and average plant population was 30-35 hills/m². In some part of Raigad district in saline soils farmers do not transplant the rice seedling but uprooted seedlings are uniformly scattered in the puddle fields locally called as 'Awatni'. Fertilizers were applied @ 11.5-182 kg N/ha, 7-75 kg P₂O₅/ha and 7-75 kg K₂O/ha. None of the farmers contacted applied zinc sulphate. While most of the farmers applied nitrogenous fertilizers, about 38% of the farmers applied P and K fertilizers. Many farmers used complex fertilizers like 15:15:15 18:18:18 and 19:19:19. Few farmers applied only urea. About 23% farmers applied FYM and vermicompost depending on availability (Table 10).

Table 10: Details of nursery management

Parameters	Districts				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
Planting time	1 st – 2 nd Week of July	4 th week of June to 4 th Week of July	1 st -4 th Wk of July	End of June to 2 nd Week of July	End of June to end of July
Seed rate	35-40 kg/ha	30-40 kg/ha	35-40 kg/ha	35-40 kg/ha	30-40 kg/ha
Seed treatment (% farmers adopted)	Yes (47.4%)	Yes (31.25%); Many used treated seeds	Yes (18.75% used treated seeds)	Yes (75%)	Yes (54.5% only)
Chemicals used for seed treatment	Thiram (2.5 g/kg seeds)	Thiram (2-3 g/kg seeds)	Thiram (2.5 g/kg); Captan (3 g/kg)	Thiram (2.5 g/kg); Captan (2.5 g/kg); carbendazim (1 g/kg)	Thiram (2.5-3 g/kg); carbendazim (1 g/kg)
Organic manure in nursery (% farmers adopted)	Yes (52.6% only); FYM	Yes (31.25% only); FYM; goat dung	Yes (12.5% only); FYM	Yes (62.5 %); FYM	Yes (13.6%); FYM
Inorganic manure in nursery (% farmers adopted)	Yes (100% farmers); Urea @ 1 kg/R; suphala 1R=1000 sq. ft	Yes (100% farmers); Urea @ 1 kg/R; Suphala 1R=1000 sq. ft	Yes (93.75% farmers); Urea @ 1 kg/R 1R=1000 sq. ft	Yes (95.8% farmers); Urea @ 0.5-2 kg/R 1R=1000 sq. ft	Yes (100% farmers); Urea @ 0.5-1 kg/R; Few also applied Suphala (1 kg/R) and 18:18:10 (1.2 kg/R)
Weed management in nursery	Most common practice for weed management in nursery in Palghar, Thane, Raigad, Ratnagiri and Sindhudurg (Partly) district is burning of nursery area with organic waste referred as 'Rab'.				

Table 11: Details of main field management

Details	Districts					Remarks
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg	
Planting method	Farmers use 25 to 32 days old seedlings for transplanting. This year the monsoon was started in time and farmers completed their transplanting in time. Transplanting was random and average plant population was 30-35 hills/m ² . In some part of Raigad district in saline soils farmers do not transplant the rice seedling but uprooted seedlings are uniformly scattered in the puddle fields locally called as 'Awatni'.					
Total N applied	23-115 kg/ha (94.7 % farmers applied)	15-182 kg/ha (100 % farmers applied)	46-172.5 kg/ha (100 % farmers applied)	11.5-134 kg/ha (95.8 % farmers applied)	32.5-152.5 kg/ha (100 % farmers applied)	Urea; 15:15:15 18:18:10, 19:19:19 (sarpurna)
Total P ₂ O ₅ applied	18.75-67.5 kg/ha	7-75 kg/ha (25 % farmers applied)	7.5-49 kg/ha (50% farmers applied)	7.5-50 kg/ha (29.17 % farmers applied)	9.5-37.5 kg/ha (50 % farmers applied)	Few farmers applied only urea;

Details	Districts					Remarks
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg	
	(36.8 % farmers applied)					FYM application by progressive farmers
Total K ₂ O applied	18.75-67.5 kg/ha (36.8 % farmers applied)	7-75 kg/ha (25 % farmers applied)	7.5-49 kg/ha (50% farmers applied)	7.5-50 kg/ha (29.17 % farmers applied)	9.5-37.5 kg/ha (50 % farmers applied)	
ZnSO ₄ applied	Nil	Nil	Nil	Nil	Nil	
Organic fertilizers applied	Yes (31.6%) FYM (1-3 t/ha)	Yes (12.5%) FYM (1-1.5 t/ha); vermicompost (3%); G manure (3%)	Yes (6.25%) FYM (2 t/ha)	Yes (45.8%) FYM (1-2 t/ha); Few also applied cow urine (100-200 l/ha)	Yes (18.18%) FYM (0.3-3 t/ha) Few (4.5%) applied vermicompost	

Table 12: Weeds and weed management

Details	Districts					Remarks
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg	
Weed intensity	Low to Medium	Low	Low to medium	Low	medium	
Names of the weeds	<i>Fimbristylis miliacea</i> , <i>Ischaene globosa</i> , <i>Cyperus dufformis</i> , <i>Cyperus rotundus</i> , <i>Cyperus iria</i> , <i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Eleusine indica</i> , <i>Celosia argentea</i> , <i>Ludwigia octovalvis</i> , <i>Alternanthera sessilis</i> , <i>Ischaemum rugosum</i> , <i>Eragostis major</i> , <i>Leptochloa chinensis</i> , <i>Panicum repens</i> , <i>Saccharum</i> spp., <i>Themeda cialita</i> , <i>Digitaria sanguinalis</i> , <i>Cynodon dactylon</i> and <i>Mimosa pudica</i> .					Weeds were common in most of the fields surveyed
Weedicides used	Nil; Out of 113 farmers contacted, none used weedicide for the management of weeds. All the farmers contacted practiced only hand weeding (1-2); Very few farmers applied glyphosate (5 ml/lit) for managing the weeds on bunds					
Percentage of farmers applied herbicides	Nil	Nil	Nil	Nil	Nil	
Wild/weedy rice incidence	Nil	Nil	Nil	Nil	Nil	

D. Weeds and their Management: Overall, intensity of weeds was low to medium. The details of different weeds recorded in different districts are presented in Table 12. For managing weeds in the nursery, farmers followed a local method, called *Rab*. None of the farmers contacted applied

any herbicides and all of them followed 1-2 hand weeding for managing the weed problem. Very few farmers applied glyphosate (5 ml/lit) for managing the weeds on bunds.

E. Specific needs of the farmers:

- Farmers need all inputs on subsidized rate as paddy cultivation is not profitable.
- Farmers need good market price for their produce.
- Farmers want irrigation facilities or finance for developing irrigation facilities with electricity.
- Farmers need financial support to purchase farm inputs for crop management.
- Farmers need low cost mechanization suitable for Konkan region to overcome labour problem.
- Farmers need availability of seed and fertilizers in time.

F. Input use: Most of the farmers prepared their land by own plough or hired Power Tiller/Tractor. Only few progressive farmers were having their own Power Tiller, Tractor and Harvester. In Thane and Palghar districts farmer has formed some “Farmers Agricultural Machinery and Tool Bank” to overcome labours problem in the district with support of Zilla-parishad. The average seed replacement ratio in the region during Kharif 2022 was 44% (according to Maharashtra state agriculture department). Most of the farmers in Konkan region are having small land holding. Some farmers use their own seed especially of local varieties. Seeds of improved varieties are supplied by Government agencies viz. Panchayat Samittee, Zilla Parishad, Agricultural Department, Agricultural University, Research Stations etc. Most of the farmers purchase seed every season, from private agro service centers and private seed companies. Deep and shallow tube well, canal (few), river water and natural rain water were the main sources of irrigation. On an average 60% of the farmers contacted told that there was scarcity of irrigation water. About 72-100% of the farmers in different district expressed that inputs like fertilizers and pesticides were not available in time and they were also not satisfied with their quality. In addition to their own decisions, farmers got advices from officials of state department of agriculture and university and also from private dealers.

Table 13: Details of inputs used

Details	Districts				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
Implements used	Most of the farmers prepared their land by own plough or hired Power Tiller/Tractor. Only few progressive farmers were having their own Power Tiller, Tractor and Harvester. In Thane and Palghar districts farmer has formed some “Farmers Agricultural Machinery and Tool Bank” to overcome labours problem in the district with support of Zilla-parishad.				
Seed replacement rate in 2022	The average seed replacement ratio in the region during Kharif 2022 was 44% (according to Maharashtra state agriculture department).				
Source of seeds	Most of the farmers in Konkan region are having small land holding. Some farmers use their own seed especially of local varieties. Seeds of improved varieties are supplied by Government agencies viz. Panchayat Samittee, Zilla Parishad, Agricultural Department, Agricultural University, Research				

Details	Districts				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
	Stations etc. Most of the farmers purchase seed every season, from private agro service centers and private seed companies.				
Source of irrigation	Canal (very few), deep and shallow tube well, Rain water	River/pond water, Canal, bore wells; rain water	River water Well; canal, bore well and rain water	Shallow tube wells, river, canal, bore well and rain water	Shallow tube wells, river, canal, bore well and rain water
Scarcity of irrigation water	Yes (68.4% farmers)	Yes (81.25% farmers)	Yes (68.75% farmers)	Yes (58.3% farmers)	Yes (22.7% farmers)
Availability of fertilizers/pesticides	Not Available (100%)	Not Available (100%)	Not Available (100%)	Not Available (100%)	Not Available (81.8%)
Quality of fertilizers/pesticides	Not happy (100%)	Not happy (100%)	Not happy (100%)	Not happy (100%)	Not happy (72.7%)
Advisors to the farmers	Own decisions (94.7%) Dealers (89.5%)	Own decisions (93.75%) State dept (15.6%) Dealers (96.8%) University (3%)	Own decisions (18.75%) Dealers (50%) University (12.5%)	Own decisions (95.8%) Dealers (70.8%) Univ (8.3%)	State Dept. (45.5%); Dealers (45.5%) University (77.3%)

G. Biotic stress and their management: District wise prevalence of different diseases and insect pests are presented in Table 14. During 2022, intensity of most of the diseases were low to moderate except bacterial blight was high in different fields in Thane, Raigad and Palghar. The incidence of bacterial leaf blight disease was found severe particularly in lowland areas where crop was submerged with water during heavy rainfall. Many fields were infected with bacterial blight disease in Raigad, Palghar and Thane districts, particularly on Karjat-3, Karjat-4, Karjat-7, Palghar-1, Jaya, Komal, Jyotika, YSR, Gorakhnath and Daptari to the tune of 2-50 percent. Moderate intensity of leaf blast was observed in some areas in Ratnagiri district. In Koshimbi village (Bhivandi taluka) the incidence of bacterial blight disease was more on variety YSR and Gorakhnath (5-40%). Intensity of different insect pests like stem borer, mealy bugs, gall midge, cundhi bug, army worm, rice hispa and blue beetle was in low to moderate intensities. None of the farmers contacted from Thane, Raigad, Palghar and Ratnagiri districts applied any pesticides. About 18% farmers from Sindhudurg district applied cypermethrin (3ml/l) and lamda cyhalothrin (1-2 ml/l) for blue beetle and monocrotophos (1-2 ml/l) for mealy bugs and army worm

Table 14: Prevalence of diseases and insect pests in Konkan region of Maharashtra during Kharif 2022

Districts	BI	ShBI	GD	FS	ShR	BLB
Thane	L (2%)					L-S (2-40%)
Raigad	L (2-5%)	L-M (2-10%)	L (2-5%)	L-M (2-10%)	L-M (2-10%)	M-S
Palghar	L (5%)				L (5%)	M-S
Ratnagiri	M	L-M (5-10%)		L-M (5-10%)	L-M (2-10%)	L (2-5%)
Sindhudurg	L (2-5%)			L (2%)		

Districts	SB	MB	GM	GB	AW	BB	RH	Crb
Thane	L-M (5-10%)							L
Raigad	L-M (5-10%)			L (1-5%)				L
Palghar	L-M (5-10%)		L (2-5%)	L (5%)				L
Ratnagiri	L (<5%)				L (<5%)			
Sindhudurg	L (<5%)	L (2-5%)			L (2-5%)	L-M (5-10%)	L (<5%)	

Low incidence (<5%) of GLH in some fields in Raigad

Table 15: Details of pest management

Details	Districts				
	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
% age farmers adopting plant protection	Nil	Nil	Nil	Nil	18.2%
Names of pesticides	NA	NA	NA	NA	Cypermethrin (3ml/l) and lamda cyhalothrin (1-2 ml/l) for blue beetle and monocrotophos (1-2 ml/l) for mealy bugs and army worm
# of pesticide sprays	NA	NA	NA	NA	2
Mixing of pesticides before application	Nil	Nil	Nil	Nil	Nil

H. Researchable issues: Among the biotic stresses, major problems in the region are bacterial blight, blast, false smut and stem borer and among abiotic stresses, drought, submergence and flash flood are the major problems. Farmers want varieties suitable for DSR, medium duration varieties with lodging resistance, varieties resistant/tolerant to above mentioned biotic constraints and bio-fortified varieties with higher zinc and low GI.

Table 15: Researchable issues

Parameters/Issues	Thane	Raigad	Palghar	Ratnagiri	Sindhudurg
Rice ecology in your area	Rainfed lowland				
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif				
Number of years of experience in rice farming	>20 years				
Main biotic constraints (diseases) in your area according to you	bacterial blight	bacterial blight, FS	BLB, Blast	BLB, Blast	Leaf blast
Extent of disease damage	10-25%	<10%	<10%	<10%	<10%
Main biotic constraints (Insect pests) in your area according to you	Stem borer				
Extent of insect pest damage	Below 10%				
Main abiotic constraints in your area according to you	Submergence / drought	Submergence/ drought	Submergence/ drought/flash flood	Submergence/ drought	Submergence / drought/flash flood
Production constraints in your area according to you	Scarcity of agricultural labours, unavailability of quality seeds and fertilizers, lack of irrigation facilities and lack of mechanization				
Irrigation facilities in your area	Lacking	Lacking	Lacking	lacking	Lacking in some areas
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address	-				
What is urgently required in your area as far as rice varieties are concerned					
Duration	Medium to long duration varieties with lodging resistance	Medium to long duration varieties with lodging resistance	Medium to long duration varieties with lodging resistance	Medium to long duration varieties with lodging resistance	Medium to long duration varieties with lodging resistance and varieties suitable for DSR
Biotic stress resistance	Varieties having resistance to BLB, blast, stem borer and false smut				
Abiotic stress resistance	Varieties tolerant to submergence and drought				
Preferred grain quality	MS grain rice varieties	MS grain rice varieties		MS grain rice varieties	MS grain rice varieties and aromatic short grain
Nutritional quality		Varieties with high Zn	Varieties with high Zn and low GI	Varieties with high Zn and low GI	Varieties with high Zn and low GI

Punjab-2022-2023 (Ludhiana)

Districts surveyed: Fatehgarh Sahib, Ludhiana, Patiala, SAS Nagar, Rupnagar, Hoshiarpur, Faridkot, Moga, Firozpur, Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur

Table 1: Particulars of survey

Districts	Villages
Fatehgarh Sahib	Sadomajra, Randhawa, Khedi Bir Singh, Mandofal, Kherivir, Chatamli, Bibipur, Dangherian, Rampur, Kheri Bhaika and Kheri
Ludhiana	Kular, Laudhowal and Dakha
Patiala	Loha Kheri, Kutha Kheri, Kheri Gandian, Suro and Doha Kheri
SAS Nagar	Surat Manauli
Rupnagar	Dhanauri, Oned (Morinda), Chutamali, Marauli Kalan, Banur and Naraingarh
Hoshiarpur	Shahpur, Changla, Kathana and Jhinger Kalan
Faridkot	Ahal and Sandhwan
Moga	Needawal, Kothi Polti, Mohabbat, Phulanwala,
Firozpur	Akuwala, Achhewala and Aku MatuKe
Sri Muktsar Sahib	Bhadai, RattaKhera, Chak Chubranwala, Bhunder and Sarainagar
Bathinda	Bhucho Mandi, Phul and Balluana
Barnala	Sanghera
Mansa	Ali Sher Khur, Bhai Desa and Burj Hari
Sangrur	Khetla and Banbhoda

Table 2: Widely prevalent rice varieties

Districts	Varieties
Fatehgarh Sahib	HYVs: Pusa 44, PR 131, PR 128, PR 126, PR 130, PR 121 and PR 114; Hybrids: Sava 134; Basmati/Scented: Pusa Basmati 1121 and Pusa Basmati 1718
Ludhiana	HYVs: Pusa 44, PR 131, HKR 47, PR 121, PR 130 and PR 128; Hybrids: Sava 134
Patiala	HYVs: PR 126, PR 128, PR 131, PR 121, PR 114 and others
SAS Nagar	HYVs: PR 131, PR 121, PR 130, PR 126 and Pusa 44; Hybrids: Arize 6129 and Sava 127
Rupnagar	HYVs: PR 131, PR 121, PR 126, PR 128 and PR 130; Basmati/Scented: Punjab Basmati 7, Pusa Basmati 1121 and Pusa Basmati 1509
Hoshiarpur	HYVs: PR 121, PR 114, PR 128, PR 126 and PR 129
Faridkot	HYVs: PR 126, PR 121 and PR 114; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1401 and Punjab Basmati 7
Moga	HYVs: PR 122, PR 126, PR 121 and Pusa 44; Basmati/Scented: Pusa Basmati 1121 and Pusa Basmati 1509
Firozpur	HYVs: PR 114, PR 131, Pusa 44 and PR 131; Basmati/Scented: Pusa Basmati 1121 and Pusa Basmati 1401
Sri Muktsar Sahib	HYVs: PR 126, PR 121, PR 122 and PR 131; Basmati/Scented: Pusa Basmati 1121 and Pusa Basmati 1401

Bathinda	HYVs: PR 128, PR 131, PR 126 and others; Basmati/Scented: Pusa Basmati 1121 and Punjab Basmati 7
Barnala	HYVs: PR 131, Pusa 44 and others; Basmati/Scented: Pusa Basmati 1121
Mansa	HYVs: PR 131, PR 121 and others; Basmati/Scented: Pusa Basmati 1121, Pusa Basmati 1401 and Punjab Basmati 7
Sangrur	HYVs: Pusa 44 and others; Basmati/Scented: Pusa Basmati 1401 and others

Production oriented survey was conducted in 14 districts of Punjab viz., Fatehgarh Sahib, Ludhiana, Patiala, SAS Nagar, Rupnagar, Hoshiarpur, Faridkot, Moga, Firozpur, Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur during tillering to heading stage. The fields surveyed were under irrigated ecosystem. The details of survey are presented in Table 1. The climatic conditions were favourable for rice cultivation. During *Kharif-2022* in Punjab state, paddy was cultivated on an area of around 30 lakh hectares of which 80 percent area was under non-Basmati rice and 20 percent area was under Basmati rice. Among non-basmati rice, PR126 was the most popular variety occupying 22 per cent area. Other popular non-Basmati varieties cultivated in the state were PR 121, PR128, PR 130, PR 131, PR 122, PR 114 and Pusa44. Pusa Basmati 1121 was most popular variety among basmati rice followed by Pusa Basmati 1718, Pusa Basmati 1509 and Punjab Basmati 7. The details of different rice varieties cultivated are presented in Table 2.

Table 3: General informations

Parameters	Districts		
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar
# of villages surveyed	14 (11 + 3)	5	1
# of farmers interviewed	26 (22 + 4)	8	8
Field ecosystem	Irrigated	Irrigated	Irrigated
Weather conditions during cropping season	Normal	Normal	Normal
Crop stage when survey was made	Tillering to Heading	Tillering to Heading	Tillering to heading
Main Crop rotations	Rice-wheat	Rice-wheat	Rice-Wheat

Table 3 Contd..

Parameters	Districts		
	Rupnagar & Hoshiarpur	Faridkot, Moga & Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur
# of villages surveyed	10 (6 + 4)	9 (2 + 4 + 3)	14 (5 + 3 + 1 + 3 + 2)
# of farmers interviewed	19 (14 + 5)	10 (3 + 4 + 3)	14 (5 + 3 + 1 + 3 + 2)
Field ecosystem	Irrigated	Irrigated	Irrigated
Weather conditions during cropping season	Normal	Normal	Normal
Crop stage when survey was made	Tillering to Heading	Bootling to Heading	Heading to bootling
Main Crop rotations	Rice-wheat	Rice-wheat	Rice-Wheat

Table 4: Average yields of different rice varieties as reported by the cooperators/farmers

Varieties	Yield (Kg/ha)					
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar	Rupnagar & Hoshiarpur	Faridkot, Moga & Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur
PR 126	7000-8500	7500	8000	6500-8000	7500	7000-7500
PR 128	7000-7500			6500-7000		
PR 121	7000-8500	7000-7500	7000-8000	7000-8000	7500	8000
PR 114	6500	6000-7000		6500-7000	7600	
Pusa 44	8000-9000		7000		9000	8000-8500
PR 122						8000
PB 1121					4200-4500	3500-5000
Arize 6129			8000			

A. Cropping system and rice yield: During 2022, the predominant crop rotation remained the rice-wheat system (Table 3). Average rice yield among the HYVs ranged from 6000-9000 kg/ha while in case of basmati varieties, the yield ranged from 3500-5000 kg/ha.

Table 5: Details of nursery management

Parameters	Districts		
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar
Planting time	Rice crop was transplanted between second fortnight of June and first week of July. Basmati was transplanted during first week of July to 3rd week of July at farmer's field. Majority of farmers did direct seeding from last week of May 20 to first week of June following <i>tar wattar</i> technology of direct seeded rice		
Seed rate	15-20 kg/ha	18-30 kg/ha	15-20 kg/acre
Seed treatment (% farmers adopted)	Yes (44%)	Nil	Yes (62.5%)
Chemicals used for seed treatment	NA	-	NA
Organic manure in nursery (% farmers adopted)	Yes (~8%); FYM	Nil	Yes (25%)
Inorganic manure in nursery (% farmers adopted)	Yes (100%): Urea (20-40 kg/acre) and DAP (20-50 kg/acre); Some applied MOP	Yes (100%); Urea (20-65 kg/acre)	Yes (75%); Urea (25-50 kg/acre) and DAP (10 kg/acre); some applied zinc sulphate

Table 5 Contd..

Parameters	Districts		
	Rupnagar& Hoshiarpur	Faridkot, Moga& Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur
Planting time	Rice crop was transplanted between second fortnight of June and first week of July. Basmati was transplanted during first week of July to 3rd week of July at farmer's field. Majority of farmers did direct seeding from last week of May 20 to first week of June following <i>tar wattar</i> technology of direct seeded rice		
Seed rate	15-20 kg/ha	15-20 kg/ha	13-20 kg/acre
Seed treatment (% farmers adopted)	Yes (21%)	Yes (40%)	Yes (~57%)
Chemicals used for seed treatment	NA	NA	Bavistin (0.2%)
Organic manure in nursery (% farmers adopted)	Yes (~5%); FYM	Yes (30%)	Yes (~36%)
Inorganic manure in nursery (% farmers adopted)	Yes (100%); Urea (25-50 kg/acre)	Yes (100%); Urea (25-45 kg/acre) and DAP (10-25 kg/acre)	Yes (71.5%); Urea (6-40 kg/acre) and DAP (5-15 kg/acre); some applied zinc sulphate

Table 6: Details of main field management

Details	Districts			Remarks
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar	
Planting method	Majority of the farmers followed random method of transplanting. Mostly farmers transplanted 30-40 days old nursery. In most of the cases, planting density was inadequate i.e. it varied from 18-27 plants/ m ² as against recommended density of 33 plants/ m ² . Few farmers (~16%) followed line planting			
Total N applied (Kg/ha)	HYVs(60-175 kg/ha); Basmati (75 kg/ha)	HYVs (60-75 kg/ha)	HYVs (135-200 kg/ha)	Urea, DAP
Total P ₂ O ₅ applied (Kg/ha)	10-50 kg/ha (~23% farmers)	NA	20-50 kg/ha (~87% farmers)	DAP
Total K ₂ O applied (Kg/ha)	7-20 kg/ha (~27% farmers)	NA	10-15 kg/ha (25% farmers)	
ZnSO ₄ applied (Kg/ha)	5-15 kg/ha (~ 31% farmers)	NA	10 kg/ha (12.5 % farmers)	Zinc sulphate (either 21 or 33%)
Organic fertilizers applied	Green manure (~19% farmers); Growth factors (~15%)	NA	Green manure (~19% farmers); Growth factors (~15%)	

Table 6 Contd..

Details	Districts			Remarks
	Rupnagar& Hoshiarpur	Faridkot, Moga& Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur	
Planting method	Majority of the farmers followed random method of transplanting. Mostly farmers transplanted 30-40 days old nursery. In most of the cases, planting density was inadequate i.e. it varied from 18-27 plants/ m ² as against recommended density of 33 plants/ m ² . Few farmers (~16%) followed line planting			
Total N applied (Kg/ha)	HYVs (60-175 kg/ha); Basmati (75 kg/ha)	HYVs (75-150 kg/ha)	HYVs (50-200 kg/ha)	Urea, DAP
Total P ₂ O ₅ applied (Kg/ha)	10-25 kg/ha (~11% farmers)	10-25 kg/ha (50% farmers)	10-25 kg/ha (~36% farmers)	DAP
Total K ₂ O applied (Kg/ha)	Nil	10 kg/ha (10% farmers)	15 kg/ha (~7% farmers)	
ZnSO ₄ applied (Kg/ha)	NA	10-20 kg/ha (50% farmers)	Nil	Zinc sulphate (either 21 or 33%)
Organic fertilizers applied	Very few (~11%) applied FYM or green manure	Very few (~10%) applied growth factors	About 29% farmers applied vermi-compost or GM	

B. Nursery and main field Management: Most of the farmers used 12-15 kg/ha of seed rate for nursery sowing but for direct seeding they used 15-20 kg seed per ha. On an average 37% farmers in different districts told that they adopted seed treatment. Seed treatment was mainly done with Bavistin (carbendazim). Application of organic manure in the nursery was very poor. About 5-36% of the farmers contacted told that they applied FYM in the nursery. However, majority (70-100%) of the farmers contacted in different districts told that they applied chemical fertilizers like urea and DAP in the nursery. Some farmers also applied MOP and zinc sulphate in the nursery. In the main field, rice crop was transplanted between second fortnight of June and first week of July. Basmati was transplanted during first week of July to 3rd week of July at farmer's field. Majority of the farmers followed random method of transplanting. Mostly farmers transplanted 30-40 days old nursery. In most of the cases, planting density was inadequate i.e. it varied from 18-27 plants/ m² as against recommended density of 33 plants/ m². Few farmers (~16%) followed line planting. During Kharif 2022, an area of about 2.0 lakh ha was under direct seeded rice (DSR), whereas rest was under puddled transplanted rice (PTR). Majority of farmers did direct seeding from last week of May 20 to first week of June. Farmers followed '**tar wattar**' technology of direct seeded rice and gave first irrigation to direct seeded rice at 21 days after sowing and they got good rice yields and had to manage low weed pressure. Some farmers even irrigated their DSR fields 28 days after sowing. Some farmers were still following dry seeded rice technology and managing high weed pressure with herbicides. Most of the surveyed farmers used over dose of nitrogen but many farmers skipped the application of P₂O₅ and K₂O in paddy crop, owing to higher status of these nutrients in their soils. Some farmers applied P₂O₅ in transplanted paddy fields. Application of Zinc sulphate (either 21 or 33%) is practiced by farmers.

Table 7: Weeds and weed management

Details	Districts			Remarks
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar	
Weed intensity	Low to medium	Medium	Low to medium	Few farmers did not use any weedicide in trans-planted crop but they adopted cultural method of weed control i.e. ponding of water for the first 15 days of crop cycle. About 12-19% farmers also practiced hand weeding along with herbicides
Names of the weeds	Predominant weeds observed during the survey were <i>Leptochloa chinensis</i> , <i>Cyperus</i> spp. and <i>Echinochloa crusgalli</i> , etc. in puddled transplanted rice. Weeds like <i>Eragrostis</i> sp. <i>Leptochloa chinensis</i> , <i>Echinochloa colona</i> , <i>Ammania</i> spp., <i>Cyperus</i> spp. were reported in case of direct seeded rice			
Weedicides used	In transplanted rice weedicides like pretilachlor, butachlor, anilofos and post emergence herbicides like bispyribac sodium, fenoxaprop were used. In DSR pendimethlin alone or pendimethalin+ pyrazosulfuron ethyl were most commonly used as pre-emergence herbicides. Other herbicides used were fenoxaprop-p-ethyl, chlorimuron ethyl + metsulfuron methyl, penoxasulam + cyhalofop, Council activ etc.			
%age of farmers applied herbicides	Yes (100%)	Yes (100%)	Yes (100%)	
Wild rice incidence	Nil	Nil	Nil	

Table 7 Contd..

Details	Districts			Remarks
	Rupnagar & Hoshiarpur	Faridkot, Moga& Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur	
Weed intensity	Medium	Low to Medium	Low to medium	Few farmers
Names of the weeds	Predominant weeds observed during the survey were <i>Leptochloa chinensis</i> , <i>Cyperus</i> spp. and <i>Echinochloa crusgalli</i> , etc. in puddled transplanted rice. Weeds like <i>Eragrostis</i> sp. <i>Leptochloa chinensis</i> , <i>Echinochloa colona</i> , <i>Ammania</i> spp., <i>Cyperus</i> spp. were reported in case of direct seeded rice			did not use any weedicide in trans-planted crop but they adopted
Weedicides used	In transplanted rice weedicides like pretilachlor, butachlor, anilofos and post emergence herbicides like bispyribac sodium, fenoxaprop were used. In DSR pendimethlin alone or pendimethalin+ pyrazosulfuron ethyl were most commonly used as pre-emergence herbicide. Other herbicides used were fenoxaprop-p-ethyl, chlorimuron ethyl + metsulfuron methyl, penoxasulam + cyhalofop, Council activ etc.			cultural method of weed control i.e. ponding of water for the first 15 days of crop cycle. About 20%
%age of farmers applied herbicides	Yes (100%)	Yes (100%)	Yes (100%)	farmers also practiced hand weeding along with herbicides
Wild rice incidence	Nil	Nil	Nil	

C. Weeds and their Management: Overall, intensity of weeds was low-medium throughout Punjab. Predominant weeds observed during the survey were *Leptochloa chinensis*, *Cyperus* spp. and *Echinochloa crusgalli*, etc. in puddled transplanted rice. Weeds like *Eragrostis* sp. *Leptochloa chinensis*, *Echinochloa colona*, *Ammania* spp., *Cyperus* spp. were reported in case of direct seeded rice. Most of farmers contacted used pretilachlor, butachlor and Anilofos and some farmers also used bispyribac sodium and fenoxaprop as a post emergence herbicide for weed control in transplanted rice crop. In DSR, pendimethlin alone or pendimethalin+ pyrazosulfuron ethyl were most commonly used as pre-emergence herbicides. Although bispyribac sodium was widely adopted post emergence herbicide but many other post emergence herbicides such as fenoxaprop-p-ethyl, chlorimuron ethyl + metsulfuron methyl, penoxasulam + cyhalofop, Council activ etc. were also used by some farmers. Even, a small fraction of farmers did not use any weedicide in transplanted crop but they adopted cultural method of weed control i.e. ponding of water for the first 15 days of crop cycle.

Table 8: Details of inputs used

Details	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar
Implements used	Tractor, disc harrow, cultivator, planker, combined harvester. Progressive farmers owned many implements. Many farmers used implements on custom hiring		
Seed replacement rate	Not available. However, majority of the farmers contacted told that they purchased part of their seed requirement		
Source of irrigation	Deep tube well (~72%), canal (~21%)	NA	Deep & shallow tube well (87.5%); Canal & canal (12.5%)
Scarcity of irrigation water	Yes (~7%)	NA	Yes (25%)
Availability of fertilizers/ pesticides	No (~69%)	NA	No (50%)
Quality of fertilizers/ pesticides	Not satisfied (~54%)	NA	Not satisfied (25%)
Advisors to the farmers	University and state government officials and private dealers	NA	University and state government officials

D. Input use: Implements like Tractor, disc harrow, cultivator, planker, combined harvester and others were used by the farmers. Progressive farmers owned many implements. Many farmers used implements on custom hiring. Majority of the farmers contacted told that they purchased part of their seed requirement. Deep tube wells were the main sources of irrigation followed by canal and shallow tube wells. However, many farmers from different districts expressed that fertilizers were not available in time and many of them were also not very satisfied with their quality. In addition to their own decisions, farmers received advices from officials of state department of agriculture, university and private dealers.

Table 8 Contd..

Details	Rupnagar & Hoshiarpur	Faridkot, Moga & Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur
Implements used	Tractor, disc harrow, cultivator, plunker, combined harvester. Progressive farmers owned many implements. Many farmers used implements on custom hiring		
Seed replacement rate	Not available. However, majority of the farmers contacted told that they purchased part of their seed requirement		
Source of irrigation	Deep tube well and canal	Deep & shallow tube wells, Canal	Deep & shallow tube well (78.5%); Canal & canal (21.5%)
Scarcity of irrigation water	Few expressed scarcity of water	Yes (40%)	Yes (~28%)
Availability of fertilizers/ pesticides	No (few)	No (50%)	No (21.5%)
Quality of fertilizers/ pesticides	Not satisfied (Few)	Not satisfied (~20%)	Not satisfied (~57%)
Advisors to the farmers	University and state government officials	University and state government officials	University and state government officials

E. Biotic stresses and their management: The overall incidence of rice diseases was low during the *Kharif*-2022. Low to moderate level of sheath blight was recorded on different rice and Basmati rice varieties viz., PR 121, PR 126, PR 128, PR 130, PR 131, Pusa 44, Pusa Basmati 1121, Sava 134 and Sava 127 in districts of Ludhiana, Samrala, Rupnagar, SAS Nagar, Fatehgarh Sahib, Hoshiarpur and Patiala. Low incidence of false smut was observed on Hybrid 6129, Sava 127, Pusa 44, PR126, and Pusa 44 in districts of SAS Nagar, Fatehgarh sahib, Sangrur and Ludhiana. Low to moderate incidence of the brown spot was recorded on varieties PR 131, PR 126, PR 128, Pusa 44, PR 127, PR 121 and Hybrid 6129 from districts of Patiala, SBS Nagar, Rupnagar, Ludhiana, Sangrur and SBS Nagar. Low to moderate incidence of bakanae was recorded from Patiala, SBS Nagar, Ludhiana, Gurdaspur, Muktsar, Sangrur, Bathinda, Tarantaran and Moga, districts on varieties Pusa Basmati 1121, Pusa Basmati 1509, Punjab Basmati 7 and Pusa Basmati 1637. Low to moderate incidence of leaf blight was recorded from districts Faridkot, Roopnagar, Fatehgarh Sahib, Bathinda, Mansa, Moga and Sangrur on basmati rice varieties Pusa Basmati 1401 and Pusa Basmati 1121. Low disease incidence was recorded from districts of Mansa, Bathinda, Sangrur and Muktsar districts on varieties Pusa Basmati 1401, PB-7, Pusa Basmati 1121, CSR-30 and Pusa Basmati 1509. Low incidence of sheath rot disease was observed on varieties PR 121, PR 126, PR 128, PR 129 and PR 131 in the districts of Rupnagar, SAS Nagar, Fatehgarh Sahib, Hoshiarpur and Patiala. Different intensities of SRBSDV (Southern Rice Black Streak Dwarf Virus) were observed in all the surveyed districts. Very high intensity of SRBSDV ((40-50%) was observed in Pusa 44 in Mandofal village in Fatehgarh Sahib district. Similarly, high intensity (25-30%) of SRBSDV was recorded in PR 128 rice variety in Kathana village in Hoshiarpur district. More incidence of SRBSDV was observed on early sown varieties.

In general, the infestation by stem borers as dead hearts, leaf damage by leaf folder and plant hoppers population was below economic threshold level both in non-Basmati and Basmati rice. Low to moderate population of brown plant hopper was observed from mid to late crop season. Most of the farmers applied chlorpyrifos 20 EC mixed with sand in standing water for the control of stunted disease. Some farmers applied Regent (fipronil), Virtako (thiamethoxam + chlorantraniliprole), Chess (pymetrozine), quinalphos, Coragen (chlorantraniliprole), Osheen (dinitopheron), Amistar (azoxystrobin), Ferterra (chlorantraniliprole) and Fame (flubendamide) for management of different biotic problems.

Table 9: Prevalence of different diseases and insect pests in surveyed districts of Punjab in 2022

Districts	Diseases							
	BI	NBI	ShBI	BS	ShR	FS	Bak	SRBSDV
Fatehgarh Sahib & Ludhiana	L (5-7%)		L-M (3-15%)	L (2-5%)	L-M (2-20%)	L (2-5%)		L-S (2-50%)
Patiala			L-M (3-13%)	L-M (2-8%)	T (<2%)			L-M (2-10%)
SAS Nagar			L-M (5-20%)	L (2-6%)	T	L-M (5-12%)		L-M (2-12%)
Rupnagar & Hoshiarpur	L (2-4%)		L-M (2-18%)	L-M (2-8%)	L-M (4-20%)		L (2-4%)	L-S (2-30%)
Faridkot, Moga & Firozpur	L (3-7%)	L (2-4%)	L-M (2-20%)	L (1-7%)			L-M (3-10%)	L-M (1-12%)
Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur	L-M (5-12%)	L-M (2-15%)	L-M (5-15%)	L-M (2-10%)	T	T	L (5-7%)	L (2-7%)

In Rupnagar & Hoshiarpur: Moderate incidence (10-15%) of rice tungro on PR 121, Low (2-3%) incidence of BLS and Low incidence (2-3%) of Erwinia rot were observed.

In Sangrur: Low to moderate incidence (5-20%) of BLB was observed

Districts	Insect pests				
	SB	LF	BPH	WBPH	GLH
Fatehgarh Sahib & Ludhiana	T (<2%)	T (<2%)	-	T-L (1-3%)	-
Patiala	T (<2%)	T (<2%)	T-L (1-4%)	L (2-4%)	T (<2%)
SAS Nagar	T (<2%)	L (2-3%)	L (3-4%)	L (2-3%)	
Rupnagar & Hoshiarpur	T (<2%)	T (<2%)	L (3-4%)	L (2-5%)	
Faridkot, Moga & Firozpur	-	-	-	-	-
Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur	-	-	-	-	-

Table 10: Researchable issues

Parameters/Issues	Districts		
	Fatehgarh Sahib & Ludhiana	Patiala	SAS Nagar
Rice ecology in your area	Irrigated	Irrigated	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif
Number of years of experience in rice farming	> 20 years	> 20 years	> 20 years
Main biotic constraints (diseases) in your area according to you	Sheath blight and false smut	Sheath blight and brown spot	Sheath blight and false smut
Extent of disease damage	<10%	<10%	<10%
Main biotic constraints (Insect pests) in your area according to you	BPH/WBPH, stem borer and leaf folder	BPH/WBPH and leaf folder	BPH/WBPH, stem borer and leaf folder
Extent of insect pest damage	<10%	<10%	<10%
Main abiotic constrains in your area according to you	-	Salinity	Acid sulphate soil
Production constraints in your area according to you	Scarcity of agricultural labours and micronutrient deficiency		
Irrigation facilities in your area	Yes (100%); Canal, Bore well	Yes (100%); Canal, Bore well	Yes (100%); Canal, Bore well
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address	-	-	-
What is urgently required in your area as far as rice varieties are concerned			
Duration	Varieties suitable for DSR, varieties with lodging resistance		
Biotic stress resistance	Varieties tolerant to BPH, sheath blight and false smut		
Abiotic stress resistance	Varieties resistant to salinity and high temperature		
Preferred grain quality	MS grain quality rice varieties and aromatic short grain and Basmati varieties and hybrids		
Nutritional quality	Rice varieties with high Zn and iron and low GI		

H. Researchable issues: Among the biotic stresses, major problems in the region are sheath blight, false smut, brown spot and blast among the diseases and BPH/WBPH, stem borer and leaf folder among insect pests. Among the abiotic problems, salinity was the main problem in certain areas. Major problems faced by the farmers were scarcity of agricultural labours and micronutrient deficiency. Farmers want varieties suitable for DSR, varieties having tolerance to sheath blight, brown spot, blast, false smut, BPH/WBPH and stem borer. Farmers also expressed the need of high yielding fine grain varieties and basmati varieties and varieties with high zinc and high iron.

Table 10 Contd..

Parameters/Issues	Districts		
	Rupnagar & Hoshiarpur	Faridkot, Moga & Firozpur	Sri Muktsar Sahib, Bathinda, Barnala, Mansa and Sangrur
Rice ecology in your area	Irrigated	Irrigated	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif
Number of years of experience in rice farming	> 20 years	> 20 years	> 20 years
Main biotic constraints (diseases) in your area according to you	Sheath blight, false smut and neck blast	Sheath blight and neck blast	Sheath blight and leaf and neck blast
Extent of disease damage	<10%	<10%	<10%
Main biotic constraints (Insect pests) in your area according to you	BPH/WBPH, stem borer and leaf folder	BPH/WBPH and stem borer	BPH/WBPH, stem borer and leaf folder
Extent of insect pest damage	<10%	<10%	<10%
Main abiotic constrains in your area according to you	Salinity	-	Drought/submergence
Production constraints in your area according to you	Scarcity of agricultural labours, micronutrient deficiency and in some places lack of irrigation facilities		
Irrigation facilities in your area	Yes (100%); Canal, Bore well	Yes (100%); Canal	Yes (~75%); Canal, Bore well
Normally how many years it takes to change the rice variety	5-20 years	5-10 years	5-20 years
Any other rice production issues in your area which the rice scientists need to address	-	-	-
What is urgently required in your area as far as rice varieties are concerned			
Duration	Varieties suitable for DSR, varieties with lodging resistance		
Biotic stress resistance	Varieties tolerant to BPH, sheath blight, blast and false smut		
Abiotic stress resistance	Varieties tolerant to submergence, salinity and high temperature		
Preferred grain quality	MS grain quality rice varieties and aromatic short grain and Basmati varieties		
Nutritional quality	Rice varieties with high Zn and iron and low GI		

Tamil Nadu-1-2022-2023 (Aduthurai)

Districts surveyed: Thanjavur, Thiruvarur, Nagappattinam, Mayiladuthurai, Tiruchirappalli, Ariyalur, Pudukkottai, Perambalur, Cuddalore, Villupuram, Vellore, Thiruvannamalai, Kancheepuram and Thiruvallur

Particulars of survey

District	Villages surveyed
Thanjavur	Thiruvidaimaruthur, Thugili, Vilangudi, Thiruvaikavur, Thiruvijayamangai, Thiruneelagudi, Pandanallur, Kalyanapuram, Sathurvedimangalam, Ammanpettai, Vannakudi and Thirukolambam
Thiruvarur	Konerirajapuram, Kalaparakaram, Karuvizhikottitai, Thiruanniyur, Vaduvur, Koradachery, Mannargudi, Andipanthai, Visalur, Keelpanankudi, Pulivalam, Thiruveezhimizhalai, Semmangudi, Valangaiman, Alangudi and Thippirajapuram
Nagappattinam	Vadakarai, Enangudi, Thirumarugal, Thittacherry, Nagore, Thirupugalur, Kilvelur, Sikkal, Aabaranathari, Eravadi, Kayattur, Narimanam and Pappakovil
Mayiladuthurai	Thirunandriyur, Aathugudi, Nayinarthoppu, Kulathinganallur, Umaiyalpathi, Pachaiperumalnallur, Kannukkiniyanarkoil, Madhanam, Semmangudi and Sirkazhi
Tiruchirappalli	Kuzhumani, Perur, Maruthandakurchi, Nangavaram, Sirugamani, Ettarai, Podhavur, Periyakaruppur, Kurichi, Mullikkarumbur, Agirimangalam, Mekkudi, Kumaravayalur and Neithalur
Ariyalur	Meikavalpudur, Muthuservaimadam, Kondasamudram, Vanamadevi, Kodangudi, Karaikurchi, Vazhaikurchi and Madhnathur
Pudukkottai	Vadakadu, Anavayal, Avanam, Alankudi, Seruvaviduthi, Karambakkudi, Tiruvonam, Kandavakkottai, Uranipuram, Keeramangalam, Merpanaikadu and Nagukudi
Perambalur	Veppankuzhi, Vetriyur, Thirumanoor, Sendurai, Annimangalam, Manjamedu, Ariyalur, Ammapalayam, Duraimangalam and Varanavasi
Cuddalore	Muttam, Govindanallur, Chozhatharam, Palaiyankottai, Pudupalayam, Savadikuppam, Nachiyarpettai, Kaliyankuppam, Venkidusamudram, Sriadhivaraganallur and Srimushnam
Villupuram	Adanur, Agaram Chittamur, Alathur, Aliyur, Echchanguppam, Kanai, Illangadu, Kodukkur, Mathur, Pagandai, Panamalai, Salavanur, Tennamadevi and Veliyandal
Vellore	Mulluvadi, Thakkankulam, Puduppadi, Virinjipuram, Cheyyaru, Arkadu, Arani, Kalavai, Kadappanthangal and Poondi
Thiruvannamalai	Kolakkudi, Indravanam, Perumkalathur, Chengapuram, Kuruvimalai, Vadakkumedu, Thirukkivilur, Polur, Andapattu, Devanandal, Kadambai and Mallavadi
Kancheepuram	Palamathoor, Thenpakkam, Keelathur, Panappakkam, Chengalpattu, Arasanthangal, Sivalingamedu, Kelappakkam, Maduranthagam and Chempampakkam
Thiruvallur	Periyapalayam, Tirur, Thiruthani, Chozhavaram, Anithanallur, Arikkarai, Pattabiramapuram and Narayanapuram

Widely prevalent rice varieties

District	Vaarieties
Thanjavur	HYVs: ADT 51, CR 1009 Sub 1, Savithiri, CO (R) 50, ADT 39, BPT 5204, Swarna Sub 1, ADT 42, ADT (R) 46, IR 20, CO 52 and others
Thiruvarur	HYVs: CR 1009 Sub1, ADT 51, ADT 38, Swarna Sub 1, IR 20, TRY 3, ADT 39, MTU 7029, CO (R) 50, ADT 46, NLR 34449 and others
Nagappattinam	HYVs: ADT 51, CR 1009 Sub 1, ADT (R) 45, Swarna Sub 1, CO (R) 51, CR 1009, ADT 39, ADT 46, TRY 3, IR 20, CO 50 and others
Mayiladuthurai	HYVs: CR 1009, ADT 51, Swarna Sub 1, CO 50, TRY 3, ADT 46, ADT 38, TKM 13 and others
Tiruchirappalli	HYVs: VGD 1, ADT 54, TRY 3, CO (R) 50, TKM 13, RNR, BPT 5204 and others
Ariyalur	HYVs: CR 1009 Sub 1, CO 50, CR 1009, ADT 51, CO 51, IR 20, ADT 39, BPT 5204, CO 43 and some varieties from private companies
Pudukkottai	HYVs: ADT 39, ADT 49, CO 51, Improved White Ponni, CR 1009, NLR 34449 and others
Perambalur	HYVs: ADT 39, ADT 49, CO 51, Improved White Ponni, CR 1009, NLR 34449 and others
Cuddalore	HYVs: BPT 5204, CR 1009 Sub 1, TKM 13, NLR 34449, CO 50, ADT 38 and others
Villupuram	HYVs: CR 1009 Sub 1, Improved White Ponni, ADT 39, BPT 5204, CO 51, Seeraga Samba and others
Vellore	HYVs: ADT 37, ADT 45, CO 51 and others
Thiruvannamalai	HYVs: Improved White Ponni, ADT 37, ADT(R)-45, CO 51, RNR 15048 Mahendra, BPT 5204 and others
Kancheepuram	HYVs: CO 51, MTU 1010, ADT 37, NLR, BPT 5204, CO 51, MDU 5 and others
Thiruvallur	HYVs: BPT 5204, CR 1009, TKM 13, MTU 1010, ADT 37, ADT 39, ADT 43, Improved White Ponni, MDU 1271 and others

Production oriented survey was conducted in fourteen districts of Cauvery delta zone in Tamil Nadu viz., Thanjavur, Thiruvarur, Nagappattinam, Mayiladuthurai, Tiruchirappalli, Ariyalur, Pudukkottai, Perambalur, Cuddalore, Villupuram, Vellore, Thiruvannamalai, Kancheepuram and Thiruvallur. Area under rice was marginally increased because of normal rains in the state. Commonly cultivated varieties were ADT 36, ADT 43, ADT (R) 45, TKM 13, CR 1009 Sub 1, ADT 38, ADT 39, ADT (R) 46, ADT (R) 49, CO 43, CO 51, NLR 34449, CO (R) 51, Improved White Ponni, CR 1009 and BPT 5204. Commonly followed cropping sequences in the region were Rice-rice-pulses/gingelly, rice-pulses, rice-rice-rice, rice-sugarcane-rice, rice-onion and others. Pest and disease incidences were noticed in all districts. Among the insects, leaf folder, stem borer, BPH, thrips, gall midge were recorded. Mild incidence of bacterial leaf blight, false smut, blast, sheath blight, sheath rot, bacterial leaf streak diseases were recorded. Labour scarcity was the major constraint to the farmers. Farmers from certain places reported that inputs were not available in time.

Particulars of rice area surveyed (Samba/Thaladi), 2022-23

District	Normal rice area (ha)	Area planted (ha)	%age of area covered as against normal area
Thanjavur	40000 (Kuruvai)	72816	182
	135000 (Samba)	138905	102
Thiruvavarur	147255	148319	100
Nagappattinam	65000	64808	99
Mayiladuthurai	72500	68565	94
Tiruchirappalli	6000 (Kuruvai)	10000	166
	45000 (Samba)	56000	124
	3000 (Thaladi)	3000	100
Ariyalur	20500	22259	108
Pudukkottai	78000	82059	105
Perambalur	5500	4257	77
Cuddalore	89000	19837	22
Villupuram	55900	70787	126
Vellore	2000	2431	121
Thiruvannamalai	70000	72943	104
Kancheepuram	8000 (Kuruvai)	10415	130
	15000 (Samba)	13800	92
	12000 (Navarai)	9000	75
Thiruvallur	51878	51687	99
Total	921533	921888	--

Districtwise details

Thanjavur: Production oriented survey was conducted in twelve villages in this district when the crops were in booting stage. Rice crop was grown in 72816 ha as against the normal area of 40000ha in *Kuruvaiseason* and 138905 ha as against 135000 ha in *Samba/Thalad iseason*. In general, the weather conditions were normal for rice cultivation. Rice-rice-pulses/gingelly, rice-pulses and rice-rice-rice were the major cropping systems followed by the farmers in the district. The fields surveyed were under irrigated ecosystem. Commonly cultivated varieties were HYVs like ADT 51, CR 1009 Sub 1, Savithiri, CO (R) 50, ADT 39, BPT 5204, Swarna Sub 1, ADT 42, ADT (R) 46, IR 20, CO 52 and others. Planting was done in the month of October. Most of the farmers contacted were in medium income group and per capita rice consumption was 15 kg rice/month. Farmers consumed only rice as the main food and they preferred boiled rice. Average seed rate was 75 kg/ha and seed treatment was not common among the farmers. In the nursery, farmers applied FYM. Nitrogenous fertilizers at recommended level (150 kg/ha), phosphorus and potash fertilizers at lower level (30 kg/ha) were applied by the farmers. Quality fertilizers and pesticides were available to the farmers. Combined harvesters were used by more than 90% of the farmers. Transplanters and conoweeder were used by many farmers. Intensity of common weeds like *Echinochloa frumentacea* (Kuthiraivali), *Cyperus rotundus* (Korai) and *Marisilia quadrifolia* (Alakodi) was low and farmers used butachlor @ 2.5 lit/ha at 3 DAT was used as pre-emergence herbicide for the control of common wetland weeds in addition to hand weeding. Insects like brown planthopper, gall midge and leaf folder incidence were noticed low to medium level. Diseases like bacterial blight, false smut and sheath blight were noticed across the district at low level. For the

management of BLB disease, fresh cow dung water extract @ 20% or copper hydroxide @ 1.25 kg/ha was sprayed for control by some farmers.

Thiruvarur: Production Oriented Survey was conducted in sixteen villages of this district when the crops were in heading stage. Normally rice crop was cultivated with Cauvery river irrigation and bore wells. This year both canal water and bore well water was available for irrigation. In general, weather conditions were normal for rice cultivation. Commonly cultivated varieties were CR 1009 Sub1, ADT 51, ADT 38, Swarna Sub 1, IR 20, TRY 3, ADT 39, MTU 7029, CO (R) 50, ADT 46 and NLR 34449 which were predominantly grown in *Samba/Thaladi* season. Crop rotations like rice-rice-pulses, rice-rice and rice-rice-rice were followed by the farmers. The average yield of the district in *Kharif* was about 4-6 t/ha. Planting was done in October. SRI method of cultivation was adopted by some farmers with components like young seedling (14 days old), one seedling/hill, wider spacing (22.5 x 22.5 cm) and conoweeder operation @ 2-3 times/crop season. Direct seeding was also practiced in some areas. Most of the farmers contacted were in medium income group and their average rice consumption was 15 kg/capita/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Average seed rate was 60 kg/ha and practice of seed treatment was not common among the farmers. In addition to FYM, farmers applied DAP in the nursery. Fertilizers were applied @ 80-100 kg N/ha, 40 kg P₂O₅/ha and 60 kg K₂O/ha. Fertilizers like urea, DAP, SSP and MOP were used by the farmers. Few farmers applied zinc sulphate 0.5% + urea 1.0% as foliar spray to correct zinc deficiency in *rabi* crop. Few farmers applied green manure. Intensity of common weeds like *Echinochloa frumentacea* (Kuthiraivali), *Cyperus rotundus* (Korai) and *Marisilia quadrifolia* (Alakodi) was low and farmers used weedicides like Nominee Gold in addition to hand weeding. Combined harvesters were widely used. Pest and disease like BLB, sheath blight, false smut, stem borer, leaf folder, and brown plant hopper were observed in some places below ETL. Some farmers used fungicides like propiconazole and insecticides like profenophos for managing the biotic problems. Major problems faced by the farmers were acute shortage of labour and shortage of machineries (on hire).

Nagappattinam: Production oriented survey was conducted in thirteen villages of this district when the crops were in heading stage. Rice crop was grown in 64808 ha in *Samba/Thaladi* season as against a normal area of 65000 ha. It is located in the tail end of Cauvery river basin. Because of non-availability of canal water, direct sowing was followed in some places where bore wells are not available. Most of the fields surveyed were under irrigated ecosystem. In general, the weather conditions were favourable for rice cultivation. Rice-pulses and rice-rice-pulses were the major cropping systems followed by the farmers. The varieties like ADT 51, CR 1009 Sub 1, ADT (R) 45, Swarna Sub, CO (R) 51, CR 1009, ADT 39, ADT 46, TRY 3, IR 20 and CO 50 are predominantly grown in this district. Planting was done mainly during 2nd to third week of October. Most of the farmers contacted were in medium income group and per capita rice consumption was 15-20 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Average seed rate was 75 kg/ha and most of the farmers did not adopt seed treatment. Most of the farmers applied FYM in the nursery in addition to DAP. Farmers consumed only rice as the main food and they preferred boiled rice. Most of the farmers purchased new seeds every year for cultivation. Sufficient quantity of fertilizers and pesticides were available on time both in co-operative societies and in private shops. Fertilizers were applied @ 90-100 kg N/ha, 30-35 kg

P₂O₅/ha and 60 kg K₂O/ha. Fertilizers like urea, DAP, SSP and MOP were used by the farmers. Intensity of common weeds like *Echinochloa frumentacea* (Kuthiraivali) and *Marisilia quadrifolia* (Alakodi) was low and farmers used weedicides like Nominee Gold or Adora (bisparybac sodium) in addition to hand weeding. Implements like tractors and combined harvesters were used by the farmers mostly on hire basis. In many cases, farmers were advised by private dealers. Insect pests like brown plant hopper, leaf folder, thrips, stem borer and diseases like sheath rot, BLB, sheath blight and false smut were observed at low level. Some of the farmers applied pesticides like carbendazim for diseases like sheath blight and chlorpyrifos for stem borer and leaf folder. Major problems faced by the farmers were acute shortage of labour, timely availability of fertilizers and shortage of machineries (on hire).

Mayiladuthurai: Production oriented survey was conducted in ten villages of this district. The crops were in tillering stage at the time of survey. The fields surveyed were under irrigated ecosystem and in general, the weather conditions were normal for rice cultivation. Rice crop was grown in 68565 ha in *Samba/Thaladi* season as against a normal area of 72500 ha. It is located in the tail end of Cauvery river basin. Because of non-availability of canal water, direct sowing was followed in some places where bore wells are not available. Rice-pulses and rice-rice-pulses were the major cropping systems followed. The varieties like CR 1009, ADT 51, Swarna Sub 1, CO 50, TRY 3, ADT 46, ADT 38 and TKM 13 are predominantly grown in this district. Planting was done in the month of October. Most of the farmers contacted were in medium income group and per capita rice consumption was 15-17 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Average seed rate was 70-75 kg/ha and majority of the farmers did not follow seed treatment. Most of the farmers applied FYM in the nursery. Fertilizers were applied @ 80-100 kg N/ha, 30-35 kg P₂O₅/ha and 55-60 kg K₂O/ha. Fertilizers like urea, DAP, SSP and MOP were used by the farmers. Weeds like *Echinochloa colona* and *Cynodon dactylon* were commonly observed in fields in low intensities. Most of the farmers followed hand weeding and some applied herbicides like bisparybac sodium. Implements like tractors, combined harvester and threshers were used by the farmers on hire basis. Most of the farmers purchased new seeds every year for cultivation. Sufficient quantity of fertilizers and pesticides were available on time both in co-operative societies and in private shops. Insect pests like Brown plant hopper, leaf folder, gall midge, whorl maggot and diseases like blast, sheath blight and false smut were observed at low level. Pesticides like tricyclazole and chlorpyrifos were used by some of the farmers. Some of the villages in Mayiladuthurai district (Mayiladuthurai, Manalmedu, Sirkazhi, Kollidum, Tharangambadi and Sembanarkoil) has received heavy down pour (16136 mm to 436.20 mm) in a single day (12.11.2022). Larger areas of the crop in the above villages have been submerged and the crop is completely lost.

Tiruchirappalli: The survey was conducted in fourteen villages of this district when the crops were in heading stage. Rice crop was grown in 10000 ha as against 6000 ha in *Kuruvai* season, 56000 ha in *Samba* season as against a normal area of 45000 ha and 2800 ha in *Thaladi* as against 3000 ha. Rice was under irrigated condition and weather conditions were favourable for rice cultivation. Rice-rice, rice-rice-pulses/gingelly and rice-pulses were the predominant cropping systems followed. Rice varieties like VGD 1, ADT 54, TRY 3, CO (R) 50, TKM 13, RNR and BPT 5204 were grown in larger areas. Most of the farmers contacted were in medium income group and average per capita rice consumption was 15 kg rice/month. Their main meal consisted of rice

only and mostly they preferred parboiled rice. Average seed rate was 75 kg/ha and practice of seed treatment was not common among the farmers. Farmers applied FYM and DAP in the nursery. Farmers applied higher level of nitrogenous fertilizer and lower level of phosphorus and potash fertilizers as against the blanket recommendation of 150:50:50 kg NPK/ha. Intensity of common weeds was low and farmers mostly practiced hand weeding. Implements like tractors, power tiller and combined harvesters were used by the farmers mostly on hire basis. Canal irrigation and bore wells were the major sources of irrigation. Two diseases viz., blast and bacterial leaf blight were noticed with low level of incidence. In case of insect pest, stem borer and leaf folder and also gall midge incidence were recorded to low level. Some of the farmers adopted plant protection measures. Farmers expressed the problems of non-availability of quality seeds and fertilizers and marketing problems.

Ariyalur: Eight villages were covered for production oriented survey in this district when the crops were in booting stage. Rice crop was grown in 22259 ha in *Samba/Thaladi* season as against a normal area of 20500 ha. The rice is cultivated under irrigated ecosystem. In general, the weather conditions were favourable for rice cultivation. Rice-pulses-gingelly/cotton cropping systems are being followed in this district. Rice varieties like CR 1009 Sub-1, CO 50, CR 1009, ADT 51, CO 51, IR 20, ADT 39, BPT 5204, CO 43 and some private varieties were prominently grown in *Rabi* season. Planting was done in the month of October. Most of the farmers contacted were poor and average per capita rice consumption was 15 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Farmers generally used higher seed rate of 90-100 kg/ha and practice of seed treatment was not common among the farmers. In the nursery, farmers applied DAP in addition to FYM. Few farmers only applied the recommended level of fertilizer application 150:60:60 kg NPK/ha for *Rabi* season. Canal, tanks and open wells were the major sources of irrigation. Direct sowing was practiced in the district due to less rainfall. The average yield was about 4.5-5 t/ha. Weeds like *Marsilia quadrifolia* (Alakodi) and *Asteracantha longifolia* were recorded in low intensity. Hand weeding was commonly followed. Inputs like water, power and seeds were not adequately available to the farmers. Proper facilities for drying and storage were not available in many villages. Generally, pest and disease was very low due to low rainfall. However, mild incidence of leaf folder, stem borer, gall midge, BPH, BLB, false smut and blast were recorded. Pesticides like propiconazole for false smut and thiamethoxam for insect pests were applied by some farmers.

Pudukkottai: The survey was conducted in thirteen villages of this district when the crops were in heading stage. The fields surveyed were under irrigated ecosystem and in general, weather conditions were favourable for rice cultivation. Rice crop was grown in a total area of 87400 ha in *Samba* season as against normal area of 82500 ha. Canal, tanks and open wells were the major sources of irrigation. ADT 39, ADT 49, CO 51, Improved White Ponni, CR 1009 and NLR 34449 were the prominent rice varieties grown by the farmers. Planting was done in the month of October. Most of the farmers contacted were poor and average per capita rice consumption was 15 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Farmers used a higher seed rate of 80-90 kg/ha and adopted random method of planting with 40-50 hills/sq. m. Farmers used new seeds every time for cultivation. Seed treatment was not practiced. Quality fertilizers and pesticides were available in private shops. Intensity of common weeds was low and most of the farmers adopted hand weeding for weed management. Implements

like Combined harvesters and threshers were widely used by the farmers. Low incidence of stem borer and leaf folder were noticed below economic threshold limit (ETL). In case of diseases, only bacterial leaf blight, bacterial leaf streak, blast, sheath rot and false smut was noticed below ETL. In case of insect BPH, leaf folder and stem borer were noticed below ETL. Few farmers adopted plant protection measures.

Perambalur: Ten villages in this district were covered for production oriented survey when the crops were in heading stage. Rice is cultivated under irrigated ecosystem in this district and in general, weather conditions were favourable for rice cultivation. Rice crop was grown in 4257 ha in samba season as against a normal area of 5500 ha. Rice-rice, rice-rice-pulses/gingelly, rice-sugarcane-rice and rice-onion were the cropping systems followed by the farmers. ADT 39, ADT 49, CO 51, Improved White Ponni, CR 1009 and NLR 34449 were largely grown in this district. Planting was done in October last week. Most of the farmers contacted were poor and average per capita rice consumption was 15 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Farmers used higher seed rate of 90-120 kg/ha. Government agencies contributed 20%, private agencies 20% and farmers used their own seeds to the extent of 60%. Farmers in general did not adopt seed treatment. Lower doses of NPK fertilizers were applied by the farmers. Average yield of the district in *Kuruvai* season was 5.0-5.5 t/ha. Direct seeding of rice was practiced in larger areas in Perambalur district. Intensity of common weeds was low and farmers primarily adopted hand weeding for weed management. Canals and borewells were the major sources of irrigation. Tanks were the supplemental source of irrigation. Resources like water, power, quality seeds and machineries were not adequately available. Insects like leaf folder, stem borer, BPH and gall midge were noticed to minor level. Diseases like BLB, sheath blight, sheath rot and false smut were noticed at low level. Few farmers applied pesticides like carbendazim and chlorpyrifos.

Cuddalore: Eleven villages were covered for production oriented survey in this district when the crops were in booting stage. The fields surveyed were under irrigated ecosystem and in general weather conditions were favourable for rice cultivation. Rice crop was grown in 19837 ha in *Samba/Thaladi* as against a normal area of 89000 ha. Direct seeding was practiced in the district due to less rainfall. In this district, 55% of rice area was cultivated with Cauvery river irrigation and the remaining area was grown with bore wells. Rice-rice-rice, rice-rice-pulses, rice-sugarcane and rice-rice-groundnut is the normal cropping systems being followed in this district. Commonly cultivated rice varieties like BPT 5204, CR 1009 Sub-1, TKM 13, NLR 34449, CO 50, ADT 38 and others were prominently grown in *Rabi* season. The average yield was about 5.0-5.5 t/ha and 4.5-5.0 t/ha in *Kharif* and *Rabi* seasons, respectively. Planting was done in the month of October. Average per capita rice consumption was 15 kg rice/month. Their main meal consisted of rice only and mostly they preferred parboiled rice. Farmers generally used higher seed rate of 90-100 kg/ha. Few farmers only applied the recommended level of fertilizer application 150:60:60 kg NPK/ha for *Rabi* season. Common weeds like *Echinochloa colona*, *Cynodon dactylon* and others were observed in low intensity. Some farmers used herbicide like pretilachlor in addition to hand weeding. Inputs like water, power and seeds were not adequately available to the farmers. Proper facilities for drying and storage were not available in many villages. The insect pest like BPH was noticed below ETL. Few farmers adopted plant protection measures.

Villupuram: Production oriented survey was conducted in thirteen villages of this district when the crops were in heading stage. Rice crop was grown in 70787 ha as against a normal area of 55900 ha in *Samba*. The rice fields surveyed were under irrigated ecosystem and in general, the weather conditions were favourable for rice cultivation. Rice-pulses/onion/ Maize was the major cropping system adopted by the farmers. The varieties like CR 1009 Sub-1, Improved White Ponni, ADT 39, BPT 5204, CO 51, Seeraga Samba were predominantly grown. Planting was done in the month of October. Most of the farmers contacted were from medium income group and their average monthly rice consumption was 15 kg/capita. The farmers mostly consumed only rice as their main meal and in general, they preferred parboiled rice. Seed treatment practices were not common among the farmers. Most of the farmers contacted applied DAP in addition to FYM in the nursery. Tanks and open wells were the major sources of irrigation. Direct sowing was practiced by the farmers. Conventional method of cultivation with random planting was followed in many places. Hand weeding was commonly done by the farmers. The pests like stem borer and neck blast were noticed in 42.77 ha in Seeraga samba. Few farmers adopted plant protection measures.

Vellore: Production oriented survey was conducted in ten villages of this district when the crops were in heading stage. Rice crop was grown in 2431 ha as against normal area of 2000 ha in *samba*. The rice fields surveyed were under irrigated ecosystem and in general, the weather conditions were favourable for rice cultivation. Varieties like ADT 37, ADT 45, CO 51 were commonly grown in the district. Planting was mostly done in the month of October. Most of the farmers contacted were from medium income group and their average monthly rice consumption was 15 kg/capita. The farmers mostly consumed only rice as their main meal and in general, they preferred parboiled rice. Seed treatment practices were not common among the farmers. Most of the farmers contacted applied DAP in addition to FYM in the nursery. Zinc sulphate was applied as basal application at the rate of 25 kg/ha or 0.5% foliar spray in many villages. Few farmers used bio fertilizers like *Azospirillum* and *Phosphobacteria* for rice cultivation as seed treatment and soil application. Water, electricity and quality seeds were inadequate. Tanks and open wells were the major sources of irrigation. No pest and disease incidence was observed.

Thiruvannamalai: During *Rabi* season, the survey was conducted in twelve villages of this district. The crops were in heading stage at the time of survey. Rice crop was grown in 72943 ha as against normal area of 70000 ha in *samba*. The rice fields surveyed were under irrigated ecosystem and in general, the weather conditions were favourable for rice cultivation. Rice-rice-rice, rice-rice and rice-rice-groundnut were the major cropping sequences followed by the farmers. Rice varieties like Improved White Ponni, ADT 37, ADT (R) 45, CO 51, RNR, Mahendra, BPT 5204 were prominently grown in *Rabi* season. The average rice yield was 5.0-5.5 t/ha in *Kharif* and 4.5 - 5.0 t/ha in *Rabi* season. Planting was done in the month of October. Most of the farmers did not apply any fertilizers for nursery. The intensity of common weeds like *Echinochloa crusgalli*, *Cyperus rotandus* and *Marsilia quadrifolia* was medium. Combine harvesters were used by 80 - 90% of farmers of this district. Inputs such as power, water and seeds were inadequate to the farmers. Power sprayers were widely used for spraying of insecticides and fungicides. Occurrence of stem borer and leaf folder were noticed. Low incidence of blast was also noticed. Few farmers adopted plant protection measures with pesticides like tricyclazole and profenophos.

Kancheepuram: The survey was conducted in ten villages of this district when the crops were in heading stage. Rice crop was grown in a total area of 10415 ha in *Kuruvai* season as against normal area of 8000 ha. In *Samba* season paddy was grown in an area of 13800 ha as against normal area of 15000 ha. In *Navarai* season rice crop was grown in an area of 9000 ha as against a normal area of 12000 ha. The rice fields surveyed were under irrigated ecosystem and in general, the weather conditions were favourable for rice cultivation. Varieties like CO 51, MTU 1010, ADT 37, NLR, BPT 5204, CO 51 and MDU 5 were prominently grown by the farmers. Planting was done in the month of October. Most of the farmers contacted were from medium income group and their average monthly rice consumption was 15 kg/capita. The farmers mostly consumed only rice as their main meal and in general, they preferred parboiled rice. Seed treatment practices were not common among the farmers. Farmers used a higher seed rate of 80-90 kg/ha and adopted random method of planting with 40-50 hills/sq. m. Farmers used new seeds every time for cultivation. Canal, tanks and open wells were the major sources of irrigation. Quality fertilizers and pesticides were available in private shops. Combined harvesters and threshers were widely used. Low incidence of false smut was recorded. The insect pest like leaf folder and stem borer was recorded below ETL.

Thiruvallur: Production oriented survey was conducted in eight villages of this district when the crops were in heading stage. Rice crop was grown in 51687 ha as against a normal area of 51878 ha in *Samba/Thaladi*. The rice fields surveyed were under irrigated ecosystem and in general, the weather conditions were favourable for rice cultivation. Rice-rice and rice-rice-rice were the important cropping sequences followed. Varieties like BPT 5204, CR 1009, TKM 13, MTU 1010, ADT 37, ADT 39, ADT 43, Improved White Ponni and MDU 1271 were mostly grown by the farmers. Planting was done mostly in the month of October. Optimum population of 40-50 hills/sq. m. was maintained. Intensity of common weeds like *Echinochloa colona* and *Cynodon dactylon* were observed in low intensity. Bore wells and tanks were the main sources of irrigation. Harvester cum Thresher was widely used by farmers on hire basis. Water, electricity, seeds, storage and drying facilities were inadequate. Blast, leaf folder and brown plant hopper were recorded in all varieties and their incidence was found to be under ETL. Few farmers adopted plant protection measures.

Prevalence of diseases and insect pests in Tamil Nadu (Aduthurai), 2022-2023

Districts	Diseases					
	Bl	ShBl	FS	ShR	BLB	BLS
Thanjavur	-	L	L	-	L	-
Thiruvarur	-	L	L	-	L	-
Nagappattinam	-	L	L	L	L	-
Mayiladuthurai	L	L	L	-	-	-
Tiruchirappalli	L	-	-	-	L	-
Ariyalur	L	-	L	-	L	-
Pudukkottai	L	-	L	L	L	L
Perambalur	-	-	-	-	-	-
Cuddalore	-	-	-	-	-	-
Villupuram	L	-	-	-	-	-
Vellore	-	-	-	-	-	-
Thiruvannamalai	L	-	-	-	-	-
Kancheepuram	-	-	L	-	-	-
Thiruvallur	L	-	-	-	-	-

Districts	Insect pests				
	SB	LF	BPH	Th	GM
Thanjavur	-	M	L	-	L
Thiruvarur	L	L	L	-	-
Nagappattinam	L	L	L	L	-
Mayiladuthurai	-	L	L	-	L
Tiruchirappalli	L	L	-	-	L
Ariyalur	L	L	L	-	L
Pudukkottai	L	L	L	-	-
Perambalur	-	L	-	-	-
Cuddalore	-	-	L	-	-
Villupuram	L	-	-	-	-
Vellore	-	-	-	-	-
Thiruvannamalai	L	L	-	-	-
Kancheepuram	L	L	-	-	-
Thiruvallur	-	L	L	-	-

Tamil Nadu-2-2022-2023 (Coimbatore)

Districts surveyed: Erode, Coimbatore, Dharmapuri, Thiruvannamalai, Karur, Dindigul, Tenkasi and Kallakurichi

Particulars of survey

Districts	Villages
Erode	Kallipatti, Arakkankottai, Kodiveri, Athani, Sakthinagar, Ammapettai, Arachalur and Nasiayanur
Coimbatore	Narasipuram, Thannerpalayam, Anaimalai, Thondamuthur and Pannimadai
Dharmapuri	Palacode, Arathanapatti, Periyapanamuttu and Pannaiyarpatti
Thiruvannamalai	Vembanur, Perumselvavilai, Puthalam and Pandavathoppu
Karur	Pettavaithalai, Vangal, Mayanoor, Ayyampettai and Nadupatti
Dindigul	Attur, Nillakottai, Shanarpatti and Vilampatti
Tenkasi	Thattanmangalam, Melur, Vadipatti, Allanganallur and Palamedu
Salem	Thevoor, Poolampatti, Mettur and Edappadi

Widely prevalent rice varieties

Districts	Varieties
Erode	CO 51, BPT5204, White ponni, ASD 16, Archana
Coimbatore	ASD 16, NLR, Anna 4 and BPT 5204
Dharmapuri	ADT 37, Paiyur 1, Akshaya, ADT 39, Ponni, Archana, Amman, Sowbackya and Dhanista
Thiruvannamalai	CO 51, ADT 37, ADT 43, NLR 3449, ASD 16, BPT5204, Sadana
Karur	ADT 49, ADT 53, CO(R) 51, BPT 5204, Vasundra, Dhanuska
Dindigul	CO 51, BPT 5204, BPT 5204
Tenkasi	ADT 43, CO 51, BPT 5204, Sadana, Dhanista
Kallakurichi	Amman, NLR, ASD 16, CO 51, Akshaya, Tirupthi

Particulars of rice area and coverage in different districts of Tamil Nadu

Districts	Total geographical area in (ha)	Area under Rice(ha)
Erode	417594	65792
Coimbatore	214300	11674
Dharmapuri	169089	8365
Thiruvannamalai	194600	22780
Karur	266543	13154
Dindigul	251076	18329
Tenkasi	178454	12739
Kallakurichi	163500	16383

In the Production Oriented Survey (POS) programme during the year 2022-23, eight districts viz., Erode, Coimbatore, Dharmapuri, Thiruvannamalai, Karur, Dindigul, Tenkasi and Salem were surveyed. Good monsoon from both South West and North East monsoon after long gap ensured very good coverage in Kuruva and Samba seasons. Farmers solely depended on canal irrigation

were able to cultivate rice during Kuruvai season. Delayed Thaladi cultivation was done in few districts due to delayed release of water from dams. Varieties chosen by the farmers in each district were mentioned above. Most of the areas surveyed were cultivated with two season rice crop in the current year unlike previous years. During 2022-23, short and medium duration varieties were generally chosen by the farmers for cultivation. Seed rate used by the farmers were varied from 50 to 70 kg per hectare and the seeds were purchased by the farmers every year from the local retailers and Agricultural Department. Seed rate of 10 kg/ha was adopted by farmers wherever the SRI method of cultivation was practiced. In the surveyed districts major sources of irrigation were from canals and deep tube well. Herbicides butachlor (pre-emergence) and bispyribac sodium (early post-emergence) were used along with one or two hand weeding for the control of weeds. Cono weeder was used by the farmers who adopted SRI method of rice cultivation. Complex fertilizers containing 17:17:17 (NPK) was applied by the farmers along with DAP as basal fertilizers. Urea and potash along with neem cake 50 kg/ha was also applied as top dressing in some of the rice growing areas. Micro nutrients, ZnSO₄ were also applied as basal fertilizer by many farmers. Zinc deficiency was noticed in some pockets. Farmers are facing insufficient labour for rice cultivation. Random transplanting, line transplanting and direct sowing were adopted by the farmers. Machine planting method of cultivation was also observed in few places in the surveyed district. In the mechanized cultivation farmers are using the agricultural implements viz., power tiller, tractor and machine harvester. In most of the places, farmers are advised by the pesticide dealers for the usage of fertilizers, pesticides and seed. Mechanical planter was used in some pockets where labour shortage was acute particularly in Delta districts. Harvesting is done by combine harvester and the use of combine harvester is gaining momentum among the various categories of farmers and getting an average yield of 5000-7000kg/ha.

Stem borer, Blast and bacterial blight emerged as major biotic problems during this year. Insecticides viz., imidachloprid, thiomethaxim, acephate, profenophos, melathion, chlorpyriphos and monocrotophos were used for the control of gall midge, BPH, leaf folder and stem borer. In gall midge affected areas, farmers have used up to 3 sprays. Higher doses of chemicals were used for the control of gall midge, stem borer and leaf folder. Many farmers have not carried out even single spray of plant protection chemicals. Farmers used prophylactic sprays by mixing the insecticides with fungicides before application. Fungicides like tricyclazole, tebuconazole, propiconazole, azoxystrobin and carbendazim were used by the farmers for disease control. Seed treatment with *Bacillus subtilis* @ 10 gm/kg was practiced by several farmers across the state. Most of the farmers were not aware about the name of pesticides they are using and also not able to distinguish the pest and disease incidence in the field. Inadequate price, delayed water supply in tail end areas due to poor canal maintenance and labour shortage are the common constraints faced by many farmers. Farmers are in need of premium varieties with short duration which can fetch higher prices in the market and non lodging type suitable for machine harvest.

District wise observations

Erode: In this district, eight villages were surveyed when the crops were in different stages of growth (just planted to panicle initiation stage). In Erode district ADT 43, ASD 16, CO 51, BPT 5204, IR 20 and white ponni were most commonly cultivated varieties of rice among the farmers. NPK fertilizers were applied in terms of Urea, SSP and MOP. Majority of the farmers purchased

seeds from private seed companies. Generally pest and disease incidence was low during the survey. During the survey crops with tillering stage were sprayed with combination fungicides (carbendazim 12% + mancozeb 60%WP) or tricyclazole as a prophylactic measures against blast and brown leaf spot diseases.

Coimbatore: Five villages viz., Narasipuram, Thannerpalayam, Anaimalai, Thondamuthur, and Pannimadai in Coimbatore district were covered for production oriented survey when the crops were in different stage of growth (just planted to panicle initiation stage). Commonly cultivated rice varieties in the district were CO 51, CO 52, ADT 45 Ponni and BPT 5204. Crop rotation with either sugarcane or banana was followed by the farmers. Application of NPK fertilizers (Urea, SSP and MOP) along with 20 kg/acre of ZnSO₄ was used. Other amendments like FYM @ 12.5 tonnes/ha were used by some farmers. Intensity of weeds in the field was medium which was controlled by application of herbicides like butachlor (1.25 a.i kg/ha) in some areas. Pest and disease incidence were less in this district. Leaf blast and brown spot was most common in the field where minor occurrence of false smut was also observed. Stem borer and brown plant hopper infestation were the most frequent in the fields. Application of monocrotophos was followed by some of the farmers to protect the crop from insect attack.

Dharmapuri: Production oriented survey was conducted in 6 villages in Dharmapuri district viz., Karimangalam, Konarpatti, Arasur, Nadappanahalli, Morappur and Cinahanahalli when the crops were in different stages of growth (tillering and harvesting). Rice varieties ADT 43, White Ponni, Archana, Sowbackya, BPT 5204 and Dhanista were the most commonly used varieties of rice among the farmers. Crop rotation with varied crops like, green gram, fodder crops, sugarcane, ragi, brinjal and tomato were practiced by the farmers. Along with NPK fertilizers (Urea, SSP and MOP), ZnSO₄ was also used. Intensity of weeds in the field was low; hence, application of herbicide was not followed. Average yield obtained during Kharif season was around 2000 Kg/acre whereas it was around 3000 kg/acre during Rabi season. Majority of the farmers using seeds of previous year therefore no dependency over private seed companies. Brown spot and blast infection followed by stem borer and leaf folder infestation were the most common. Application of pesticides like acephate, quinalphos, carbendazim and azoxystrobin was followed by some of the farmers to protect the crop.

Thiruvannamalai: In Thiruvannamalai district, survey was conducted in Peranampet, Chengam, Melsiruvalur, Moongilthurai pattu and Thandarampet villages when the crops were in different stages of growth starting from early planting to harvesting stage. Rice varieties like BPT5204, ADT 43 and Amman BT were the preferred varieties by the rice growers of this district. N, P and K fertilizers were applied at the rate of 90-100 kg/ha, 20-30 kg/ha, 20-40 kg/ha, respectively through Urea, DAP, MOP. Complex fertilizers were also used in some places. Yield ranged from 3000 to 5000 kg/ha was recorded. Average yield obtained during the season was around 4300 Kg/ha. Machineries, power tiller, tractor, tractor tiller and machine harvesters used were used by the farmers. Majority of the farmers were using seeds from private seed companies. Intensity of weeds in the field was medium. Leaf blast and false smut infection among the diseases and stem borer infestation was the most common. Application of pesticides like monocrotophos, azoxystrobin and profenofos was widely practiced by the farmers.

Karur: Production oriented survey was conducted in four villages viz., Vangal, Mayanoor, Pettavaithalai and Ayyampettai in this district when the crops were in maturity and harvesting stage. Rice varieties viz., Amman, NLR, BPT 5204 and ASD 16 were the most commonly used rice varieties among the farmers. Complex fertilizers, Urea, SSP, DAP, MOP were used. Intensity of weeds in the field was medium. Average yield obtained by the farmers during the season was around 6500 kg/ha. Among different biotic stresses, leaf blast and false smut infection and stem borer infestation was most common. Farmers applied different pesticides like imidacloprid and monocrotophos to protect the crop from pest. Fungicides like carbendazim, propiconazole and copper hydroxide were used by some of the farmers to manage diseases.

Dindigul: Production oriented survey was conducted in four villages in Attur, Nillakottai and Shanarpatti blocks in this district when the crops were in various stages of growth starting from just transplanted to harvesting stage. Commonly cultivated rice varieties were NLR, ADT 43, CO 51 and BPT 5204. Majority of the farmers are dependent on the private seed companies for seeds. Average yield of these varieties were 5000 kg/ha. NPK fertilizers were applied through urea, DAP and MOP, which were applied at the rate of 100:60:40 along with ZnSO_4 @ 20 kg/ha. Intensity of weeds (*Echinochloa* spp. and others) in the field was medium. Pest and disease incidence were less.

Tenkasi: Survey was conducted in rice fields of 5 villages of Periyakulam, Theni, Bodinayakanur and Uttamapalayam blocks when the crops were in tillering stage. Rice varieties CO 51, BPT5204, ADT 45, White ponni and ASD16 were the most commonly used varieties of rice among the farmers during the crop season. The average seed rate used was 80-100 kg/ha. Fertilizers were applied @ 60-80 kg N/ha, 20-32 kg P_2O_5 /ha and 25 kg K_2O /ha nutrients were applied through urea, DAP and complex fertilizers. Farmers applied the growth hormones which is actually recommended for vegetable and fruit crops. Farmers used hired tractor, power tiller and machine harvester for field operations. The source of irrigation is deep tube well and canal. Pest and disease incidence was minimum during the crop season.

Kallakurichi: Villages viz., Melaperungarai, Keelapperungarai, Illanthaikulam, Keelakkottai and Achunthavayal were covered during the production oriented survey. In most of the villages rice crop was at harvesting stage at the time of survey. Commonly cultivated rice varieties by the farmers during Kharif/Rabi season were ADT 39, Anna 4, ADT 49, CO(R) 51, TKM 13, Improved white ponni, BPT 5204 and Dhanuska. Majority of the farmers were using seed from private seed companies. NPK fertilizers (urea, SSP and MOP) were used. Weeds were found to be negligible during cropping season. Average yield obtained during the year was around 2300 kg/acre. Leaf blast infection and stem borer damage were observed. To control these damages farmers applied fungicides like carbendazim and insecticides like monocrotophos to protect the crop.

Prevalence of diseases and insect pests in Tamil Nadu during 2022-2023

Districts	Diseases						
	BI	NBI	BS	ShBI	ShR	FS	BB
Erode	M	L	-	-	L	L	M
Coimbatore	L	-	M	L	L	L	L
Thiruvanamalai	L	M	L	-	L	-	L
Dharmapuri	M	M	L	L	-	L	L
Karur	L	L	-	-	L	L	L
Dindigul	L	L	M	-	L	L	L
Tenkasi	L	L	-	-	-	L	L
Kallakurichi	L	M	-	L	-	L	M

Districts	Insect pests					
	SB	LF	BPH	CW	GM	Th
Erode	M	M	L	-	L	-
Coimbatore	L	L	-	-	-	L
Thiruvanamalai	M	L	L	-	-	L
Dharmapuri	M	L	-	-	L	-
Karur	L	M	-	L	-	L
Dindigul	L	M	-	-	L	-
Tenkasi	L	L	-	-	L	-
Kallakurichi	L	L	-	L	-	-

Telangana-2022-2023 (Rajendranagar)

Districts surveyed: Nizamabad, Kamareddy, Karimnagar, Siddipet, Khammam, Yadadri Bhuvanagiri, Rangareddy, Mahabubnagar, Wanaparthy Nagarkurnool and Nalgonda

Details of survey

District	Mandals	Villages
Nizamabad	Velpur, Argul, Dichpally, Makloor, Nizamabad	Velpoor Cross, Velpoor, Ethonda, Dharamaram, Kalur Camp, Siripur, Borgaon, RS & RRS-Rudrur
Kamareddy	SS Nagar, Bikanoor, Domakonda, Kamareddy	Kupriyal, Bikanoor, Linguapally, Kamareddy,
Karimnagar	Chigurumamidi, Venkepally,	Bommanapally, Saidapur, Sundaragiri
Siddipet	Narayanraopet, Siddipet Rural, Chinnakodur, Nangunoor	Narayanraopet, Raghavapur, Gangapur, Ramancha, Kasturipally, Narmetta, Khanapour
Khammam	Chintakarni, Thallada, Wyr	Lacchagudem, Chintakani, Nagiligonda, KVK, Wyr, Reddygudem, Kotha Venkatagiri
Yadadri Bhuvanagiri	Ramannapet, Voligonda, Atmakur, Bhuvanagiri	Bhogaram, Veluvathi, Kerchupally, Parupally, Rayagiri
Ranga Reddy	Shamshabad	Pedda Shapur, Shamshabad, SB Pally
Mahabubnagar	Jadcherla	Burugupally, Valur
Wanaparthy	Ghanpur	Mulkmanipally, Allamyanipalli, Venkatampalli, Khillaghanpur, Ghanpur
Nagarkurnool	Bhootpur, Bijenepally	Maddigatla, Yelchicharla, Palem, KVK-Palem
Nalgonda	Kethapally, Thipparthi, Madgulapally, Choutippal, Narketpally,	Kasanguda, Indugala, Gurrappagudem, Madgulapally, ARS-Kampasagar, Lakkaram, Nemmani

Rice is the important food crop in the world for more than one billion population. India is the world's second-largest producer of rice with approximately 45.7 million ha area, with production of 124.36 million tonnes accounting for 22 per cent of world rice production (INDIASTAT, 2021). Paddy is grown in almost all the districts of Telangana State and area has doubled in 2022-23 as against 2014-15 due to enhanced irrigation facilities created by the Govt. of Telangana, pro-farmer government policies, large scale adoption of newly released varieties and development of cost-effective agro-technologies for addressing the major problems encountered by the farmers. In Telangana, In Telangana, rice is mostly cultivated under wells, tanks and canals in an area of around 61.75 lakh acres against normal area of 34.01 lakh acres with 181.6% sown to season normal during *kharif*, 2022, whereas 56.44 lakh acres against normal area of 33.53 lakh acres with 168% sown to season normal during *rabi*, 2022-23 (www.agri.telangana.gov.in).

The Production Oriented Survey, 2022-23 (POS) of rice growing areas was conducted in 11 districts viz., Nizamabad, Kamareddy, Karimnagar of Northern Telangana Zone, Siddipet and Khammam of Central Telangana Zone, Yadadri Bhuvanagiri, Rangareddy, Mahabubnagar, Wanaparthy Nagarkurnool and Nalgonda of Southern Telangana Zone covering 53 villages during *vanakalam*, 2022 and *yasangi*, 2022-23. The details of the POS visits containing the names of the districts, mandals and villages covered during survey along with the list of the team members

participated in respective district visit are furnished in Table (1). Further, the department officials were also participated in POS visit in their respective districts. The information on various aspects of rice cultivation viz., seasonal conditions, crop area coverage and item wise package of practices, abiotic/ biotic constraints and their management are discussed in the following headings. The information on the aforesaid aspects were collected from the progressive farmers, seed producers, AEOs, MAOs, ADAs, DAOs and Input dealers of the respective villages / mandal / district through interaction and participatory approach.

A. General information

A.1. Seasonal Conditions

The rainfall received from South West monsoon and North East monsoon during the period from June, 2022 to February, 2023 along with district wise rainfall situation.

South West Monsoon-2022:

During the South-west monsoon period, a total of 1075.9 mm rainfall received in Telangana as against normal rainfall of 712.5 mm showing deviation +51% with over all status is being excess.

North-East Monsoon:

Normally, in Telangana State, the average normal rainfall of North-East Monsoon is 124.9 mm and actual rainfall received is 125.8 mm showing the deviation of 0.72 % with over all status is being normal during NE monsoon. Overall, the average rainfall received in Telangana state from 01.06.2022 to 22.02.2023 is 1225.4 mm as against the normal rainfall of 857.6 mm with deviation of +43 per cent with over all status being excess. Among the districts, newly formed district Mulugu received the highest rainfall of 1914.0 mm with a deviation of +57% while, Jogulamba District received the lowest rainfall of 700.7 mm. Overall, the weather conditions are highly favorable for growth of paddy crop. However, excess rainfall in September and October months posed the several biotic constraints in paddy.

Month wise rainfall received in Telangana from 01.6.2022 up to 22.02.2023

Month	Normal (mm)	Actual rainfall (mm)		% deviation to normal	Status
		2021-22	2022-23		
June, 2022	129.3	194.5	150.6	16	Normal
July, 2022	244.4	353.0	539.9	121	Excess
August, 2022	219.6	185.7	186.2	-15	Normal
September, 2022	127.9	276.2	222.1	73	Excess
S W Monsoon	721.2	1009.5	1098.8	51	Excess
October, 2022	95.5	66.0	117.8	23	Excess
November, 2022	23.9	26.6	0.90	-96	Scanty
December, 2022	5.5	0.0	7.10	29.09	Excess
N E Monsoon	124.9	128.8	125.8	0.72	Normal
January, 2023	6.8	0.0	0.60	-91	Scanty
February, 2023	4.7	0.0	0.20	-96	Scanty
Cumulative Total (01.06.2022 to 22.02.2023)	857.6	1138.4	1125.4	43	Excess

Production Oriented Survey-2022

District wise average rainfall for the period from 01.06.2022 to 22.02.2023

Sl. No.	District	Annual Normal Rainfall	SOUTHWEST MONSOON (June to Sept.)			NORTHEAST MONSOON (Oct to Dec)			Cumulative Total From 01-06-2022 to 22.02.2023(inMM)			Corr .Period of Previous year		% Dev. Of current actual over previous actual	Status
			Normal	Actual	% Dev.	Normal	Actual	% Dev.	Normal	Actual	% Dev.	Actual	% Dev.		
1	Adilabad	1199.0	1005.0	1481.3	47	127.8	107.1	-16	1149.9	1588.4	38	1519.5	32	5	Excess
2	Komarambheem	1195.5	1020.5	1740.3	71	113.5	90.3	-20	1152.5	1830.8	59	1526.3	32	20	Excess
3	Mancherial	1145.3	986.8	1564.3	59	108.0	64.1	-41	1110.5	1628.4	47	1111.7	0	46	Excess
4	Nirmal	1127.6	953.4	1677.3	76	121.2	78.0	-36	1092.2	1755.3	61	1507.5	38	16	Excess
5	Nizambad	1042.4	860.0	1539.0	79	127.8	71.5	-44	1006.5	1610.7	60	1489.4	48	8	Excess
6	Jagtial	1034.6	854.7	1569.5	84	113.2	53.6	-53	989.4	1623.3	64	1374.4	39	18	Excess
7	Peddapally	1055.4	889.1	1423.9	60	109.0	81.2	-26	1016.9	1507.0	48	1118.7	10	35	Excess
8	Jayashanker	1088.0	931.3	1619.5	74	100.8	88.7	-12	1043.6	1708.2	64	1310.2	26	30	Excess
9	Bhadradi	1132.6	904.0	1323.5	46	116.3	121.6	5	1039.7	1445.1	39	1330.0	28	9	Excess
10	Mahabubabad	1007.7	793.3	1140.5	44	128.4	110.4	-14	936.8	1255.1	34	1290.9	38	-3	Excess
11	Warangal(R)	1039.5	814.9	1117.1	40	120.5	147.7	23	947.6	1266.2	34	1377.4	45	-8	Excess
12	Warangal(U)	889.5	765.4	1072.2	37	113.8	153.8	35	891.5	1226.1	38	1497.5	68	-18	Excess
13	Karimnagar	898.3	717.0	1253.1	75	116.3	113.6	-2	848.2	1366.7	61	1360.9	60	0	Excess
14	Rajanna	915.3	718.2	1160.3	62	133.3	120.6	-10	866.0	1281.0	48	1529.6	77	-16	Excess
15	Kamareddy	1029.0	834.1	1160.0	39	142.8	120.4	-16	988.1	1280.4	30	1334.1	35	-4	Excess
16	Sangareddy	895.4	691.6	900.5	30	139.6	140.1	0	840.4	1041.5	24	947.5	13	10	Excess
17	Medak	916.9	733.8	1030.3	40	130.2	113.2	-13	873.9	1143.7	31	1071.1	23	7	Excess
18	Siddipet	785.1	599.6	961.1	60	121.8	144.1	18	732.0	1105.2	51	1263.6	73	-13	Excess
19	Jangoan	874.3	677.8	1055.7	56	122.5	129.0	5	812.6	1186.8	46	1166.3	44	2	Excess
20	Yadadri	743.7	552.1	803.8	46	144.8	100.0	-31	703.7	908.8	29	960.2	36	-5	Excess
21	Medchal	763.2	565.3	868.7	54	137.3	150.8	10	713.8	1020.6	43	911.7	28	12	Excess
22	Hyderabad	779.1	562.1	742.9	32	151.9	148.4	-2	722.4	891.4	23	897.9	24	-1	Excess
23	Rangareddy	694.6	506.6	794.5	57	133.7	176.2	32	646.4	971.4	50	907.1	40	7	Excess
24	Vikarabad	814.3	629.0	873.3	39	121.8	166.2	36	756.6	1039.6	37	935.7	24	11	Excess
25	Mahabubnagar	626.9	480.0	765.2	59	113.7	181.7	60	597.1	947.0	59	810.0	36	17	Excess
26	Jogulamba	533.0	385.3	559.9	45	114.9	140.8	23	503.5	700.7	39	571.9	14	23	Excess
27	Wanaparthi	579.6	434.0	625.0	44	110.1	183.2	66	547.1	808.2	48	680.8	24	19	Excess
28	Nagarkurnool	642.3	460.9	661.4	44	142.4	181.7	28	605.9	843.2	39	628.7	4	34	Excess
29	Nalgonda	704.2	513.4	608.1	18	141.3	166.7	18	662.1	776.2	17	901.7	36	-14	Normal
30	Suryapet	836.8	646.2	772.7	20	134.5	126.4	-6	788.4	900.7	14	895.7	14	1	Normal
31	Khammam	1036.0	719.2	868.7	10	222.0	126.3	-43	954.3	995.2	4	1156.1	21	-14	Normal
32	Mulugu	1292.7	1099.8	1807.8	64	112.1	103.9	-7	1222.6	1914.0	57	1354.1	11	41	Excess
33	Narayanpet	561.8	424.5	718.6	69	108.2	152.1	41	537.4	870.7	62	828.2	54	5	Excess
Total Average		905.4	721.2	1098.8	52	127.1	125.9	-1.0	857.6	1225.4	43	1138.4	33	8	Excess

Source: Directorate of Economics & Statistics, Govt. of Telangana, Hyderabad

Date is provisional & Limits for deviation from Normal; Excess = (+20% & above), Normal= (+19% to -19%), Deficit= (-20% to -59%), Scanty== (-60% to -99%), No rain= (-100%)

A.2. Crop coverage

In Telangana, rice is mostly cultivated under wells, tanks and canals in an area of around 61.75 lakh acres against normal area of 34.01 lakh acres with 181.6% sown to season normal during *kharif*, 2022, whereas 56.44 lakh acres against normal area of 33.53 lakh acres with 168% sown to season normal during *rabi*, 2022-23 (www.agri.telangana.gov.in).

District wise normal and actual rice area covered during *kharif*, 2022 and *rabi*, 2022-23 (Area in acres)

		<i>Kharif, 2022</i>			<i>Rabi, 2022-23</i>		
		Normal Area	Actual Area	% Cov. over NA	Normal Area	Actual Area	% Cov. over NA
	Rangareddy	449980	378927	84.21	66076	71938	108.87
	Medchal-Malkajgiri	25030	21212	84.75	11467	14936	130.25
	Vikarabad	523649	608819	116.26	68969	128556	186.40
	Mahabubnagar	325444	380282	116.85	73338	142794	194.71
	Nagarkurnool	572973	518852	90.55	222451	284454	127.87
	Wanaparthi	234162	240134	102.55	145878	198532	136.09
	Gadwal (Jogulamba)	343738	343688	99.99	100746	142587	141.53
	Narayanpet	409397	451217	110.22	75830	136306	179.75
	Nalgonda	1034442	1186932	114.74	362845	567768	156.48
	Suryapet	513209	596422	116.21	342783	477475	139.29
	Yadadri Bhuvanagiri	393740	431172	109.51	165411	287399	173.75
	Total	4825764	5157657	104.17	1635794	2452745	152.27
	Nizamabad	456791	513180	112.34	403705	487526	120.76
	Kamareddy	455324	512052	112.46	275710	412692	149.68
	Karimnagar	314719	328116	104.26	220286	291717	132.43
	Jagtiyal	335370	385207	114.86	248433	335162	134.91
	Peddapalli	265375	278898	105.10	162004	210544	129.96
	RajannaSiricilla	226857	268993	118.57	108936	171362	157.31
	Adilabad	523844	561666	107.22	103706	161082	155.33
	Mancherial	321126	308120	95.95	77419	96679	124.88
	Nirmal	378643	423303	111.79	199829	270024	135.13
	Asifabad (K. Bheem)	366128	434802	118.76	25141	38419	152.81
	Total	3644177	4014337	110.13	1825169	2475207	139.32
	Medak	255521	354695	138.81	122429	235486	192.34
	Sangareddy	660731	759155	114.90	86936	169471	194.94
	Siddipet	510070	573399	112.42	207819	360116	173.28
	Warangal (Rural)	274689	292120	106.35	133540	182409	136.60
	Warangal (Urban)	239952	247395	103.10	134400	177257	131.89
	JayashankarBhupalpalli	207544	233573	112.54	64727	73118	112.96
	Janagoan	319054	403936	126.60	118256	186723	157.90
	Mehabubabad	305249	425067	139.25	134297	189256	140.92
	Mulugu	130161	127311	97.81	45356	51400	113.33
	Khammam	590267	590834	100.10	226582	296566	130.89
	BhadradiKothagudem	371227	424319	114.30	50208	73919	147.23
	Total	3864465	4431804	115.11	1324550	1995721	148.39

Source: www.tg.agrisinet.com, Directorate of Agriculture, Telangana state.

A.3. Crop stage at the time of survey

The roving survey was conducted in 11 major rice growing districts of Telangana State, when the crop was between maximum tillering to maturity stage during *kharif*, 2022 whereas tillering stage during *rabi*, 2022-23.

A.4. Crop rotation practiced

Rice-rice was the predominant cropping system in all the surveyed districts varying from 80-90%. The other systems were green manure-rice-rice, rice-fallow, rice-pulses, rice-sesame, rice-zero tillage sunflower, rice-rice-vegetables depending on the water availability and other factors. In Telangana state, majority of the farmers are being cultivating the paddy crop during *kharif*, 2022 and *rabi*, 2022-23 due to continuous availability of irrigated water.

A.5. Varietal Scenario during *Kharif*, 2022 and *Rabi*, 2022-23

The major fine varieties grown in the surveyed districts during *kharif*, 2022 were Samba Mahsuri (BPT 5204), Telangana Sona (RNR 15048), Jai Sreeram type (Cintoo, Pooja, Sriram gold, Ankur Sona, Super Aman, Sowbhaya, Aman gold), HMT Sona, MTU 1061, MTU 1262, MTU 1224, MTU 1064, RNR 21278, MTU 1271 and other fine varieties, whereas coarse varieties are Kunaram Sannalu, MTU 1010, IR 64, Jagtial Rice-1, Tellahamsa, Bathukamma, MTU 1061, MTU 1153, MTU 1156, 7029 and MTU 1001 *etc.*, whereas the private hybrids grown particularly in Yadadri Bhuvanagiri, Musi belt of Ranga Reddy and Nalgonda districts were Kaveri 272, Kaveri 175, VNR 22258, Rasi 113, Mahindra 303, Kaveri 468, 27P31, RX 100 and Bio 799 during *rabi* season. At Kerchupally village, majority of the farmers growing the coarse grain private hybrids during *rabi* season and it is regular practice every year and hybrid sowings will be taken up during after 15th November. It was observed that, local variety Ganga Kaveri (fine and coarse) is very popular in Nizamabad and Kamareddy districts during *kharif* and *rabi* seasons. The information on area particulars of coarse and fine grain varieties (public and private sector) is presented in the below table.

The varietal spectrum data revealed that, the paddy variety *i.e.* BPT 5204 was covered highest area (847363 acres) during *kharif*, 2022 in Telangana state followed by another fine grain variety RNR 15048 (444052 acres) and MTU 1061 (186725 acres). The super fine grain varieties *i.e.* Jaisreeram type and HMT Sona from private companies were occupied the maximum area in Khammam, Nalgonda and Suryapet districts during *kharif*, 2022. It was also observed that, the paddy variety BPT 5204 is popular in the surveyed districts in Nizamabad and Kamareddy districts. Majority of the farmers in Nizamabad and Kamareddy district still prefer the long duration variety such as BPT 5204 due to cooking quality and exclusive market as well as preference of the millers.

Among the coarse grain varieties, MTU 1010 (3032974 acres), MTU 1001 (365804 acres), KNM 118 (204091 acres), IR 64 (141295 acres) and JGL 24423 (130349 acres) are the major varieties grown by the farmers during *vanakalam*, 2022. A total of 224 varieties from public and private sector were grown by the farmers during *kharif*, 2022. The coarse grain varieties occupied 63.72% to the total area, whereas fine grain varieties occupied 36.28% to the total area during *kharif*, 2022. The POS team observed that, majority of the farmers were growing the newly released coarse grain varieties of PJTSAU such as JGL 24423 and KNM 118, but farmers claiming as MTU 1010 due to marketing issue at IKP centers. The same was witnessed by the POS team at Kethepally village

of Nalgonda district. The coarse grain varieties were occupied the major area in Kasanguda village of Kethepally (m) of Nalgonda district during *kharif*, 2022 compared with fine grain varieties. The farmers preferred the coarse grain varieties at Kasanguda village due to musli belt (soil and water salinity), higher yield, duration and ease in marketing at IKP centers. Further, the difference between the coarse and fine grain varieties is less in Govt. procurement centers.

The coarse grain varieties (MTU 1010, KNM 118, JGL 24423 and other varieties) are occupying the major area in Telangana state during *rabi*, 2022-23, whereas fine grain varieties especially RNR 15048, Jai sreeram type and HMT Sona and other private varieties are popular during *yasangi* season also. But the area under fine grain varieties is less during *rabi* season when compared *vanakalam* (*kharif*) season. The coarse grain variety (JGL 24423) is having the issue in threshing of grains if the crop is not dried properly. The farmer claiming that, some of the grains were left in the panicles in the machine harvested crop. Telangana Sona, a short duration (125 days) fine grain variety has become popular during *kharif* and *rabi* seasons in Wanaparthy, Mahbubnagar, Nagarkurnool, Vikarabad, Rangareddy dsitricts. Majority of the farmers preferred the Telangana Sona because of its short duration, super fine grain and blast resistance and suitability to late planted situations and relatively requires less water.

Area sown of fine and coarse varieties of paddy during *vanakalam*, 2022 in Telangana state

S. No.	Category	No. of varieties	Area (Acres)	Percentage to total area
1.	Private coarse research varieties	42	85340	1.31
2.	Public coarse varieties	23	4056371	62.41
	Sub-Total	65	4141711	63.72
3.	Private fine research varieties	133	604762	9.30
4.	Private fine research varieties	26	1753382	26.98
	Sub-Total	159	2358144	36.28
	Total	224	6499855	

Source:www.ts.agrisinet.com, Directorate of Agriculture, Telangana state.

B. Crop Management

B.1. Seed rate and source of seed:

The farmers are adopting the seed rate of 50-60 kg/ha for fine grain varieties, whereas 75 kg/ha for coarse grain varieties in transplanting method. The seed rate for dry converted wet rice was ranged from 10-18 kg per acre for fine grain varieties, whereas, 12-25 kg of seed per acre for coarse grain varieties during *yasangi* season. Initially, DSR is popular in Khammam district, but now it is becoming popular in entire state. The seed rate used for dry direct sowing is 15 kg for fine and 18-20 kg for coarse grain varieties. As per the farmers feedback, less seed rate in DSR will have more weed population and they are not realizing the potential yield. The majority of the farmers were purchased the seed from TSSDC, NSC, Research Stations of PJTSAU, DCMS or private input dealers. The farmers are using the seed rate of 3-10 kg/acre for research paddy seed purchased from private companies.

B.2. Seed treatment

The farmers are adopting wet seed treatment to an extent of 8-12% across the surveyed villages by using Carbendazim @ 1.0 g or Mancozeb + Carbendazim @ 2.5 g per kg of seed per liter of water

by soaking for 24 hours. However, the farmers are aware of seed treatment in paddy and its advantages.

B.3. Sowing and Planting

In Telangana State, the sowing and planting time varied from district to district depending on variety, monsoons and release of canal water. The long duration varieties were sown during May last week to June and plantings were completed by second fortnight of July, 2021 in Nizamabad, Kamareddy and Rajanna Siricilla districts, except Khammam and part of Nalgonda district where the sowing and plantings were delayed for long duration varieties due to late receipt of canal water. Overall, the sowings were taken up by the end of July, 2022 and plantings were completed by the end of August, 2022. During *rabi*, 2022-23, the sowings were taken up from 1st FN of November, 2022 to December, 2022 and planting were continued up to the end of January, 2023. Majority of the farmers (30-50%) are growing the green manure crops *viz.*, *Crotalaria* and Sun hemp preceding to rice in the surveyed villages. The paddy transplantings were delayed during *rabi*, 2022-23 due to cold injury, zinc deficiency at nursery stage. Further, severe incidence of dead hearts during nursery stage is also one of the reason for delayed transplanting during *rabi* season.

B.4. Organic manures and inorganic fertilizers applied

The majority of the farmers were applied inorganic fertilizers @ 2-10 kg of N, 1-6 kg P and 2.0-3.0 kg K₂O in the form of DAP or 20-20-0-13 or other complex fertilizers. It was observed that, application of sheep manure or poultry manure @ 600-850 kg per 3-4 cents of nursery area especially during *rabi* season. Further, application of zinc sulphate (20 kgs per acre) during *rabi* season is also a common practice adopted by the majority of the farmers in the surveyed districts. However, awareness is lacking on time of application of zinc sulphate and also farmers mixing with other complex fertilizers. The growth of nurseries was affected during *rabi* season due to cold injury, sulphide injury and salinity.

B.5. Fertilizer application

The majority of the farmers are applying NPK in the form of complex fertilizers *viz.*, 12-32-16, 20-20-0-13, DAP, 10-26-26, 16-20-0-13, 17-17-17, 19-19-19, 28-28-0 ranging from 1-2.5 bags per acre as a basal dose. It was observed that, the farmers from Velpoor village of Nizamabad district has sprayed the Nano-Urea @ 500 ml per acre and the farmer has not given any clear cut opinion on application of Nano-Urea in Rice. They have applied the Nano-urea due to scarcity of urea fertilizers during peak period of crop growth. Few farmers opined that, dosage of Nano-urea recommended by the IFCCO is not sufficient in rice. There is clear need to increase the dosage of Nano-urea in rice as expressed by the farmers in Nizamabad district. Majority of the farmers are applying the complex fertilizers (50-150 kg/acre) as basal followed by top dressing of Urea (150-200 kg/acre) in 2-3 split doses at tillering stage, booting and just before panicle initiation depending on duration of the varieties, while potash is applying in the form of MOP (15-50 kg/acre). The use of DAP was drastically reduced in the surveyed villages due to cost of the fertilizer or non-availability. The cost of fertilizer is the major concern by the farmers in the surveyed villages and also availability of potash fertilizers.

B.6. Methods of planting

In all the surveyed districts, majority of the farmers adopted random or zig-zag planting method, which was found to be the common practice except few districts where the farmers are adopting the DSR. Moreover, the laborers from UP and Bihar are available during the peak transplanting

season (Bengal planting) in the surveyed districts. The transplanting cost is varied from district to districts and it is ranging from Rs. 4000-6000/- per acre. In Telangana state, direct seeding with drum seeder and wet-DSR under puddled conditions are gaining popularity among farming community during both *kharif* and *rabi* seasons, whereas direct seeding using seed cum ferti-drill is common practice in Sattupally division of Khammam district during *kharif* season. The plant population of 15-24 hills/m² was observed in majority of the farmer fields, irrespective of the variety and planting time. The plant population is more (30-60 hills/m²) in dry converted wet rice.

The ranking of methods of planting as follows:

1. Normal transplanting is still hold goods where sufficient labour force is available.
2. Dry converted wet rice – Broadcasting of sprouted seed
3. Drum seeding
4. Machine planting
5. DSR using seed cum ferti drill.

In Argul village of Nizamabad district, the farmers have adopted the machine transplanting during *kharif*, 2021 and not able to continue during *kharif*, 2022 due to non-availability of machines for transplanting. Further, very feedback was recorded on machine planting at Kethepally village of Nalgonda district, but they not adopting the machine planting is due to non-availability machines. Among the districts surveyed, the large area under drum seeding was observed in Nalgonda district. In Nizamabad district, the majority of the farmers were not showing interest for DSR method due to lack of awareness, weed problem as well as availability of labors from Bihar and UP. At Kupriyal village of SS Nagar mandal, Bengal method of planting is being adopted by the farmers.

B.7. Intensity of weeds

The weed intensity was in the range of low to medium in transplanted rice, whereas the high in DSR and Drum Seeding. Majority of the farmers were applied the pre and post-emergence herbicides during *kharif* and *rabi* seasons. The predominant weed flora includes *Echinochloa colanum*, *E. crusgalli*, *Cyandon dactylon*, *Cyprus rotundus*, *Leersia hexandra*, *Panicum ripens*, *Euphorbia spp.* and *Parthenium spp.* As per the farmers feedback, the change of weed flora was noticed in DSR methods especially in Khammam and Nalgonda (Kethepally village) districts where, the farmers are cultivating the DSR from the last 5-6 years. In DSR either in drum seeding or wet direct seeding, the weeds *Ischaemum regosum* (Tonagi in local language) and Jungle rice are the major weeds observed in the farmer fields. At SB Pally village of Ranga Reddy district, full of weeds in the crop was observed and that particular farmer has neglected the crop at tillering stage of the crop and not applied the pre-emergence weedicide. Severe weed problem was noticed at Kethepally village of Nalgonda district due to non-availability new combination molecules as well as awareness is less on new herbicides.

B.8. Weed management

The farmers in the surveyed districts are using various pre and post-emergence herbicide molecules depending upon the availability in the districts. Non-availability of labourer's for manual weeding enforced the farmers to use herbicide molecules for control of weeds in rice. In few districts, farmers are taking up manual weeding at 25-35 DAT depending on the weed intensity (No. of labourers: 6-8 Nos. per acre @ Rs. 250-300). Mixing of herbicides (2 minimum) especially for

post-emergence application was observed in farmer fields for control of weeds in DSR. The most commonly used herbicide molecule for mixing with other weedicide is Bispyribac sodium 10% SC (Nomnee gold) @ 100 ml/acre as post emergence herbicide. Majority of the farmers mixing the herbicide i.e. nominee gold with other herbicides such as Bispyribac sodium @ 100 ml/acre vivaya or assert or council act.

The most commonly used herbicides in nursery and main field are listed below:

Pre / Post Emergence	Herbicides used by the farmers
Pre-emergence	Benthiocarb@ 75 ml or Pretilachlor + safener@ 40 ml or Butachlor @ 50 ml or Pyrazosulfuron ethyl @ 5 g in 10 liters of water for five cents nursery Butachlor @ 1.25 litres /acre (or) Anilophos @ 500 ml/acre (or) Pretilachlor @ 600 ml /acre (or) Oxadiargyl @ 35 g (mixed with 500 ml of water) within 3 to 5 days of transplanting. Dry converted wet rice: Pendimethalin @ 1.0 lit/acre or Pyrazosulfuron ethyl 10% WP @ 60-80 g per acre after sowing.
Post-Emergence	Transplanted crop: Pyrazosulfuran ethyl @ 80-100 g/ acre at 8-12 DAT or Bensulfuron methyl + Pretilachlor @ 4 kg /acre at 3-5 DAT. 2,4- D SS@ 400 g / acre at 20-25 DAT to control broad leaved weeds Triafamone 20% + Ethoxysulfuron 10% WG @ 90 g per acre (Council Act) or Bispyribac sodium @ 100 ml/acre at 20 DAT to control both grassy and broad-leaved weeds. Dry converted wet rice: Bispyribac sodium @ 100-120 ml/acre, Penoxsulam 2.7% @ 400 ml per acre (Assert) or Penoxsulam 1.02% + Cyhalofop-butyl 5.1 w/w OD (Repivox / Vivaya) @ 1000 ml + Almix @ 8 g or Bentazone 480 G/L (Basagran) @ 800 per acre at 18-25 DAT or Triafamone 20% + Ethoxysulfuron 10% WG @ 90 g per acre (Council Activ).

B.9. Inputs (Seed, fertilizers and farm implements)

In the surveyed districts, the farmers (90-95%) purchasing the seed from local dealers, private companies, TSSDC, HACA, PACs, Department of Agriculture and Research Stations. Very few farmers (5-10%) are using their own seed especially minikits cultivated farmers. The societies were strengthened in terms of financial capability and human resources and playing critical role in timely arranging the fertilizers, green manure seeds and purchasing the produce. During the visit, the team also visited the paddy minikits (WGL 1246, WGL 1119, JGL 27356, JGL 33124, JGL 28639, RNR 29325, RNR 28361 and RDR 1200) grown by Sri. M. Yadagiri, Velpoor (v and m), Nizamabad district. The minikit demonstrations were organized by KVK, Rudrur. The uniformity issue in seed was observed in WGL 1119. The variation in height of plant was noticed in JGL 27356. All the minikits were sown on 05.07.2022 and transplanted on 31.07.2022. The POS team also visited the paddy minikit fields (JGL 27356, KPS 6251, RDR 1200, RNR 37456, RNR 29325 and RNR 28361) at Nalgonda and Yadadri Bhuvanagiri districts on 27.10.2022

C. Biotic stresses (insect pests and diseases)

The pest scenario in rice cultivation has been assessed during *kharif*, 2022 and *rabi*, 2022-23 in response to adoption of new varieties, cultivation practices and pest control methods being followed by the farmers in the surveyed districts. The following conclusions emerged out with interaction with farmers, observations during POS visits and discussions with officials from department of agriculture, Govt. of Telangana,

- The insect-pests scenario across the surveyed districts revealed that, incidence of insect-pests is less during *kharif*, 2022 except gall midge incidence at RS&RRS, Rudrur and yellow stem borer (white ears) at Choutappal, Narketpally mandals of Nalgonda district and Voligonda, Rammannapet and Atmakur mandal of Yadadri Bhuvanagiri district. The severe incidence of gall midge was noticed at RS&RRS, Rudrur, Nizamabad district. Overall, the incidence of insect-pests less during *kharif*, 2022 except sporadic incidence of gall midge was noticed in late planted crop in the surveyed districts.
- Perusal of the data on the incidence of various diseases revealed that the incidence of BLB was severe in Thallada mandal of Khammam district, moderate to low incidence was noticed in Nizamabad and Nalgonda districts. The severe incidence of leaf and neck blast was observed in farmer field at Maddigatla village of Boothpur mandal of Mahabubnagar district. The incidence of false smut very low during 2022 compared to previous years and noticed at RS&RRS, Rudrur.
- Among the abiotic stresses, salinity, cold injury and sulphide injury was observed during *rabi*, 2022-23 in Venkepally, Chigurumamidi mandals of Karimnagar districts and Siddipet districts. In few places, the crop was completely dried due to accumulation salts during *rabi* season at Karimnagar and Siddipet districts. The reason for severe occurrence of salinity is due to continuous paddy cultivation, ill drained conditions, not sufficient time or very less time for incorporation of *kharif* crop stubbles or puddling and majority of the farmers not growing the green manure crops during preceding *kharif* season. The crop was severely affected by stem borer (dead hearts), algal growth, sulphide injury, salinity and ill drained conditions at Biknoor (v & m), Lingupally of Kamareddy district.
- The severe incidence of stem borer (dead hearts) was observed during *rabi*, 2022-23 in all the rice growing districts of Telangana state. Among the districts, outbreak of stem borer (dead heart stage) was noticed in Siddipet district. The main reason for outbreak of yellow stem borer (DH) in rice is due to lack of awareness among the farming community, spraying of bios and indiscriminate application of chlorpyrifos (10G) granules during *rabi* season.
- In *rabi*, 2022-23, it was observed that, the farmers drying the paddy fields under saline conditions, which in turn affecting the crop.
- A total of **6 alert messages** and **6 YouTube Modules** were communicated to the DAATTC, KVK and departmental officers besides covering through print and electronic media from time to time.

Occurrence of insect-pests in the surveyed districts during *Kharif*, 2022 and *Rabi*, 2022-23

District	Per cent Incidence (%)							
	BP H	YSB (DH)	YSB (WE)	GM	PM	LF	WM	RH
Nizamabad	-	1-10	1-5	1-60	5-10	1-15	-	1-10
Kamareddy	-	5-20	1-5	1-5	-	5-10	1-5	-
Karimnagar	-	10-25	-	-	-	-	-	-
Siddipet	-	5-30	-	1-5	-	-	-	-
Khammam	-	-	-	-	-	1-8	-	-
Yadadri Bhuvanagiri	1-5	-	5-20	10-15	-	-	-	-
Rangareddy	-	<5	-	-	-	-	-	<5
Mahabubnagar	-	1-5	-	1-5	-	1-5	-	-
Nagarkurnool	-	-	-	-	-	1-5	-	-
Wanaparthy	-	5-30	-	-	-	-	-	-
Nalgonda	-	-	1-25	-	-	1-5	-	-

Source: The data presented in the table is incidence of insect-pests and diseases in the surveyed farmer fields. The incidence of pests and diseases may vary from village to village in the respective districts. The information also collected from concerned district ADAs, MAOs, AEOs and farmers interaction.

Incidence of rice diseases in the surveyed districts during Kharif, 2022 and Rabi, 2022-23

Districts	Diseases						
	BLB	BI	NBI	ShBI	FS	GD	BS
Nizamabad	1-10	-	-	5-10	1-5	1-5	-
Kamareddy	-	-	-	-	<2	-	-
Karimnagar	-	5-15	-	-	-	-	-
Siddipet	-	-	-	-	-	-	-
Khammam	15-25	-	-	-	-	-	-
Y. Bhuvanagiri	-	-	5-10	-	1-5	1-10	1-5
Rangareddy	-	-	-	-	1-5	1-5	1-5
Mahabubnagar	-	1-20	5-40	-	-	-	-
Nagarkurnool	-	-	-	-	-	-	-
Wanaparthy	-	-	-	-	-	-	-
Nalgonda	-	-	5-10	-	-	-	1-5

Note: BLB: Bacterial Leaf Blight; LB: Leaf Blast; NB: Neck Blast; ShB: Sheath Blight; FS: False smut; GD: Grain discolouration.

Field visits, training cum awareness programmes on the management of stem borer and other problems in yasangi rice in Siddipet District

In Siddipet district, the paddy crop is grown in an area of 2.85 lakh acres during yasangi, 2022-23. The majority plantings were done during II FN of December, 2022 to 1st FN of January, 2023. The major varieties grown by the farmers during yasangi, 2022-23 in siddipet districts are coarse grain types (MTU 1010, KNM 118, JGL 24423, IR 64 and other private varieties). During this season, the stem borer (dead heart) incidence varied from moderate to high incidence (5-20%) across the district. The team of scientists from PJTSAU, officials from Department of Agriculture, Siddipet along with public representatives and progressive farmers extensively visited the farmer fields covering different villages and mandals of Siddipet district. The team observed that, the crop was severely affected due to salinity and Zinc deficiency in majority of patches. Further, at early stage of the crop (10-30 DAT), growth was stunted due to algal growth forming encrustation and Sulphide injury coupled with cold.

Proceeding the field visit on 24.01.2023, an YouTube module on rice stem borer management was prepared by scientists of PJTSAU for wide publicity. Further, YouTube Live programme on rice stem borer was conducted by PJTSAU on 27.01.2023 under the chairmanship of Director of Extension, PJTSAU to create awareness on management of rice stem borer and other issue noticed during the visit along with the extension scientists and farmers. The following activities were conducted by PJTSAU in collaboration with Department of Agriculture, Siddipet from 20.01.2023 to till date are as follows:

S. No.	Date	Activity taken up by PJTSAU in association with Department of Agriculture, Siddipet
1.	24-01-2023	Nutrient and Pest Management in Paddy a Training Programme cum Diagnostic Field visits organized by ARS, Tornala and IRR, Rajendranagar in Narayanraopet and ChinnaKoduru mandals of Siddipet on 24-01-2023 <u>Villages Covered</u> Narayanraopet, and Pedhalingareddypalli, in Narayanraopet Manadal Raghavapur – Siddipet rural Ramancha and Gangapur Chinna Koduru Mandal
2.	27.01.2023	YouTube Live Interaction Meeting with Extension Scientists and Farmers
3.	01.02.2023	Training cum diagnostic field visit to paddy fields at Chinna Koduru and Nangunoor mandals of Siddipet district <u>Villages covered:</u> Kasturipalli of Chinnakoduru Narmetta and Khanapur villages of Nangunoor mandal

Important Measures Recommended

- Problem:** Farmers excessively dried the Paddy fields, leading to formation of hard encrustation of algal growth which resulted in blackening, decay and death of roots due to excess algal growth in rice fields.

Recommendation: Manual intercultural operation need to be performed to aerate the soil and root zone, remove algal growth to the extent possible by irrigating flooding and draining of the field.

- Problem:** Salinity coupled with Zinc deficiency leading to poor take of nutrients, because of which farmers resorted to use of humic acid based formulations, organic or bio formulations or sea weed extracts etc., which are not recommended in paddy.

Recommendation: To reduce the salinity levels/concentrations, farmers need to irrigate and drain the field at frequent intervals. To rectify Zinc deficiency, foliar spray with Zinc Sulphate (21.33%)@ 2 g/l of water twice at 5days interval. Three days after 1st spray of zinc, apply urea @30kg/acre along with combination of Carbendazim 25% + Mancozeb 50% @ 100 g/acre.

- Problem:** Dead heart incidence due to stem borer damaging young seedlings. Farmers resorted to application of Chloropyriphos mixed with urea or chloropyriphos 10G granules or organic granules or biostimulants or foliar sprays of chloropyriphos or Lambda cyahalothrin or cypermethrin or emamectin benzoate which are not recommended for stem borer management by PJTSAU. This has aggravated the stem borer problem rather than the controlling the stem borer.

Recommendation:

- ❖ **For crop at nursery stage and to be transplanted in another one week to 10 days:** Apply Carbofuran 3G@800g or Fipronil 0.3G @ 600 g or Fipronil 0.6G @ 400 g for 200 sq.m nursery, sufficient for one acre of main field.

- ❖ **For crop at 15-40 DAT:** Apply carbofuran 3G @ 10 kg or cartap hydrochloride 4G@8kg or Chlorantraniliprole 0.4G @ 4 kg or Fipronil 0.3G @ 8 kg or Fipronil 0.6G @ 4 Kg/acre along with 20-25Kg sand.
- ❖ **For Crop above 50 DAT:** Foliar spray with Cartap hydrochloride 50 SP @ 2 g/L (400g/acre) or Chlorantraniliprole 18.5 SC @ 0.3 ml/l (60 ml/acre).
- ❖ **For crops at P.I to booting:** Foliar spray with Chlorantraniliprole 18.5 SC @ 0.3 ml/l (60 ml/acre) or Tetraniliprole 0.5 ml/l (100 ml/acre) to avoid white ears due to stem borer during reproductive stage of the crop.

4. **Problem:** Sporadic Incidence of cut worm (*Mythimna*) in some paddy fields.

Recommendation: Spray Chloropyrphos 50% @ 2 ml or Profenphos 2 ml/l (@400 ml/acre) after irrigating followed by flooding the field.

5. **Problem:** Drying of paddy fields due to application of diesel by the farmers for stem borer management based on Youtube videos circulating in social media.

Recommendation: It is not a recommended practice and advised the farmers not to resort to such wrong practices.

6. **Problem:** Some minor problems like leaf folder, whorl maggot, brown spot etc.,

Recommendation: Monitor the population or disease incidence and consult the scientists or department officials for recommendation if needed.

Future problems expected:

7. **Problem:** Crop may be affected by neck blast.

Recommendation: Spray with Isoprothictane @ 1.5 ml/l (300 ml/acre) or (Tebuconazole+ Trifloxystrobin) @0.4 g/l (80 g/acre) or (Picoxystrobin + Tricyclazole) @ 2 ml/l (400 ml/acre).

Other recommendations:

Saline Patches: Advised to grow green manure crops and incorporate, grow saline tolerant like RNR 11718, KPS 2874 or RNR 29325 or JGL 24423 etc., in future.

Do's:

1. Grow saline tolerant rice varieties, grow green manure crop, frequently irrigate and drain out the fields.
2. Apply recommended granular pesticides formulations only with 20-25Kgs and along with thin film of water.
3. Use only recommended fertilizers at optimum doses as per crop stage.
4. Use Zinc formulations (21-33%) while applying as foliar sprays, twice at 5 days intervals.
5. Frequently perform intercultural operations/ do hand weeding operations to avoid encrustation due to algal growth and ensure proper aeration of roots.
6. Consult your AEO/Agri Department Officers/Scientists for proper recommendation or visit PJTSAU Youtube channel for suitable recommendations.

Don'ts:

1. Never completely dry the fields which are saline.

2. Don't mix any pesticides/ granular formulations along with urea and apply in the field, unless recommended.
3. Do not use humic acid, organic or bioformulations or biostimulants or Sea Weed extracts or diesel in paddy crop.
4. Do not use Zinc formulations at low concentrations (4-6%) or apply zinc mixed with DAP.
5. Avoid use of Chlorpyrifos or Lambda cyhalothrin or cypermethrin or emamectin benzoate or other synthetic pyrethroid combinations in rice, particularly at tillering stage.

C.1. Pesticide application equipment

The most commonly used plant protection equipment's are Tractor mounted sprayer, Taiwan / Power sprayer, hand and battery-operated knapsack sprayer in all the surveyed districts. Among the plant protection equipment, tractor mounted sprayers were replacing the Taiwan sprayer in Nalgonda, Nizamabad and Kamareddy districts. It was observed that, spraying of pesticides using drones were also practicing by farmers in Nalgonda, Khammam, Nagarkurnool, Nizamabad, and Kamareddy districts on outsourcing basis due to labour scarcity for spraying of pesticides. However, the farmers were spraying the pesticides at 0.75X dose of recommendation and reducing the 25% pesticide dosage. The cost for spraying of pesticides using drones per acre was ranging from Rs. 500-600 per acre and spray fluid used per acre was 10-20 liter per acre. As per the information from farmers and department officers, a total of 25 drone operators are available in Khammam district for spraying of pesticides and none of them have pilot license certificate. The POS team interacted with drone operator at Argul (v) of Nizamabad district (Mr. Vijay Kumar: 9010026671) and at KVK, Palem (A. Anand: 720731185; 8330922500 and S. Mannem: 9603249383).

C.2. Total no. of pesticides sprayed in the crop season

Majority of the farmers (80-85%) in the surveyed villages are not taken up the single spraying of pesticides during *kharif*, 2022 due to continuous rainfall from II FN of August to October, 2022. Overall, the pesticides sprayings are very less during *kharif*, 2022 in the surveyed districts except Nizamabad district. This is clearly reflected on cost of cultivation during *kharif*, 2022, whereas, majority of the farmers were sprayed pesticides (2-5 times) due to severe incidence of stem borer (Dead hearts and white ears stage), cold injury, zinc deficiency and salinity in the surveyed districts. The application of granules (3G or 4 G or 0.4G) at tillering stage (15-25 DAP) is the common practice is being adopted by the farmers in majority of the surveyed districts. As per the farmers feedback, the stem borer was not controlled at Rammanapet, Voligonda and Atmakur mandals of Bhuvanagiri district although, the farmers applied the granules at tillering stage followed by spraying at PI to booting stage. It may be concluded that, the stage of application of insecticide is playing major role in control of stem borer in rice. It was observed that, the farmers sprayed the insecticides after appearance of white ears at Bhuvanagiri district.

The application of chlorpyrifos @ 500 ml mixed with urea @ 25-30 kg at maximum tillering stage was observed at Kupriyal village of SS Nagar (m) of Kamareddy district. The application of granules (3G or 4G or 0.4 G) mixed with Carbendazim + Mancozeb (saff) @ 500 g per acre at maximum tillering stage was observed Saidapur village of Venkappally mandal of Karimnagar district and Gurrappagudem village of Nalgonda district during *kharif*, 2022. During the POS visit to Narmetta

village of Siddipet district, it was observed that, the private companies are door delivering the pesticides to farmers in their villages.

List of insecticides and fungicides used by the farmers

S. No.	Insect-pests /diseases	Chemicals used
1.	Gall midge	Fipronil 0.3 G and 0.6G, Carbofuran 3G, Carbosulfan 25% EC
2.	Stem borer, Hispa, whorl maggot and leaf folder	Nursery to Tillering stage: Carbofuran 3G, Cartap Hydro Chloride 4G, Chlorantraniliprole 0.4G, Fipronil 0.3%G, Flubendiamide 0.7%G Chlorpyrifos 50%EC + Sand PI to Booting stage: Chloranthraniliprole 18.5 SC (Coragen), Cartap Hydrochloride 50% WP, Chlorantraniliprole 9.6% + Lambda cyhalothrin 4.6% (Ampligo), Flubendiamide 39.35 SC, Acephate 75 SP. Chlorpyrifos 50%EC and 20%EC, Thiamethoxam + Chlorantraniliprole (Virtako), Tetraniliprole (Vayego)
3.	Leaf/panicle mite	Dicofol, Propargite and Spiromesfin
4.	Blast (Leaf and Neck blast)	Tricyclazole 18% + Mancozeb 64%WP (Merger/Trozole), Isoprothiolane 40%EC, Kasugamycin 3%L, Kresoxim methyl 44.3%SC, Picoxystrobin 6.78% + Tricyclozole 20.33% SC (Galileo Sensa/Salsa/Fanton/Kronos), Propiconazole 10.7% + Tricyclazole 34.2% SE (Filia/Slogan), Pyraclostrobin 100 g/L (Seltima), Azoxystrobin 12.5 + Difenoconazole 11.4% SC, Azoxystrobin 16.7% + Tricyclazole 33.3% SC (Azotrix).
5.	Sheath Blight	Hexaconazole 5%EC, Propiconazole 25%EC, Validamycin 3%L, Tebuconazole + Trifloxystrobin (Nativo). Azoxystrobin + Tebuconazole (Custodia), Picoxystrobin 7% + Propiconazole 12%SC (Galileo Way), Thifluzamide 24%SC (Pulsor), Propiconazole 10.7% + Tricyclozole 34.2% SE (Filia), Captan 70%+Hexaconazole 5% WP (Taqat), Carbendazim, 25% + Flusilazole 12.5% (Lusture), Flupyroxad 62.5 g/L + Epoxiconazole 62.5 g/L EC
6.	BLB	Copper oxy chloride + Plantamycin or Paushamycin or Crocin or Agrimycin; Kasugamycin 5% + Copper Oxychloride 45% (Conika) Copper Sulphate 47.15% + Mancozeb 30% WDG (Devona)
7.	Stem rot	Validamycin 3%L, Propiconazole 25%EC, Hexaconazole 5%EC, Iprobenphos 48%EC, Carbendazim 25% + Mancozeb 50% WS (Sprint), Copper Sulphate 47.15% + Mancozeb 30% WDG (Cuprofix).
8.	Sheath rot and GD	Propiconazole 25%EC, Carbendazim 12% + Mancozeb 63% WP (Saaf),

Source: Interaction with farmers during POS visits, ADAs and MAOs

New combination molecules used by the farmers:

- Fenoxanil 5% + Isoprothiolane 30% EC @ 400 ml per acre (Capstone – M/s. Tata Rallis) against leaf and neck blast of rice.
- Hexaconazole 0.5% GR @ 4 kg per acre (Zaafu – M/s. Tata Rallis) against sheath blight, sheath rot and stem rot of rice.
- Azoxystrobin 4.7% + Mancozeb 59.7% + Tebuconazole 5.6% WG @ 800 g per acre (Arruyn of M/s. Swal and Tridium – M/s. UPL). The label claim was there in cucumber, but farmers were spraying this molecule against diseases of rice.

C.3. Mixing of different pesticides and spraying of Bio's for management of pests and diseases

Majority of the farmers in surveyed districts were mixing at least one insecticide and fungicide compulsorily while others are using cock-tail mixtures of various molecules in different proportions without knowing the compatibility of the molecules. In Khammam, Warangal, Mahbubabad, Badradri-Kothagudem, the use of bios for control of insect-pests and diseases were observed.

The following are the common cocktail mixtures of insecticides and fungicides being used by the farmers:

1. Dinotefuran + (Carbendazim + Mancozeb)
2. Dinotefuran + (Trifloxystrobin + Tebuconazole)
3. Pymetrozine + (Trifloxystrobin + Tebuconazole)
4. Pymetrozine + Isoprothiolane
5. Chlorantraniliprole + Propiconazole
6. Pymetrozine + Propiconazole
7. Isoprothiolane + Chlorantraniliprole + Acephate
8. Chlorantraniliprole + Acephate + Propineb
9. Chlorpyrifos + Acephate + Saff (Carbendazim + Mancozeb)
10. Buprofezin + Acephate + Tricyclazole
11. Cartap hydrochloride + Tricyclazole
12. Cartap hydrochloride + Spiromesfin
13. Profenophos + Acephate + Saff
14. Lambda Cyhalothrin + Acephate
15. Propiconazole + Chlorantraniliprole
16. Cartap Hydrochloride + Isoprothiolane

D. COST OF CULTIVATION

The information on cost of cultivation of paddy / acre was collected from the farmers in the surveyed districts were ranging from Rs. 18,000 to 30,000/-. During *kharif*, 2022, the maximum expenditure was incurred by the farmers on cost of transplanting ranging from 3500 to 6500 per acre followed by the cost on harvesting, whereas pesticides and its spraying cost was drastically reduced due to less incidence of insect-pests and diseases in rice. Further, more expenditure was incurred on a long duration varieties like BPT 5204, MTU 1061 and MTU 1072 in Nizamabad, Kamareddy and Khammam districts. The chain harvester price was increased to Rs. 3000-3500 per hour (Rs. 2000 to 2500 for normal field). As per the farmer's feedback from Khammam district, the cost of cultivation was reduced to Rs. 5000-6000 per acre in DSR.

Cost of cultivation of paddy in different districts of Telangana state (Transplanted crop)

S. No.	Name of the district	Cost of cultivation (per acre)
	Nizamabad and Kamareddy	25,000 – 30,000
	Siddipet	24,000 – 28,000
	Karimnagar	20,000 – 28,000
	Khammam	23,000 – 28,000
	Yadadri Bhuvanagiri	20,000 – 25,000
	Mahbubnagar and Nagarkurnool	18,000 – 25,000
	Wanaparthy	20,000 – 27,000
	Ranga Reddy	22,000 – 25,000
	Nalgonda	25,000 – 30,000

E. Harvesting

The cost of harvesting per acre was ranging from 3000 to 3500 per acre depending on the crop condition and area / location. The cost of bale for paddy straw bale is Rs. 30/-. Overall, it was observed that, very good paddy yields were realized during *kharif*, 2022. Majority of the farmers in the surveyed districts were satisfied with yields obtained during *kharif*, 2022.

F. Farmers Outreach Programmes

In order to forecast the incidence of pests and diseases in rice, Principal Scientist (Rice), PJTSAU, Rice Research Centre, Rajendranagar, has given **6 alert messages and 5 YouTube modules (PJTSAU YouTube channel)** to farmers, Commissionerate, Dept. of Agriculture, DAATTCs, KVKs, NGOs and wide publicity was given through print and electronic media. During the POS team visit to different districts, PS (Rice) & Head, RRC, ARI, Rajendranagar addressed the print and electronic media, to alert the farmers encountering similar problems in the respective districts. The farmers were receiving advices on fertilizer and pesticide recommendations through concerned AEOs, MAOs, Scientists of DAATTCs, KVKs and Research Scientists and input dealers. However, the progressive farmers are managing the crop based on self-experience by timely application of fertilizers / pesticides or following the recommendations of university vyavasaya panchangam / Annadata and other publications. Now a days, farmers are uploading the photographs of pest or disease infected field / plants to the scientists / MAOs through WhatsApp for suitable control measures and remedial measures are being suggested by scientists.

G. Interaction with RAWEP students during the POS visit

During the POS visit to Nizamabad district on 14.09.2022, the POS team interacted with RAWEP students at Argul village of Jakranpally mandal, Nizamabad district and Parupally (v), Atmakur (m) of Yadadri Bhuvanagiri district on crop condition and occurrence pests and diseases in rice.

H. RESEARCHABLE ISSUES:

- Development of package for weed management in DSR
- Development of package of practices for management of algal growth during *rabi* season.
- Characterization gall midge biotypes of Telangana State
- Identification new insecticide molecules for management of rice gall midge.
- Evaluation and development of organic based pesticide products for management of insect pests and diseases of rice.
- Fine-tuning cold management techniques in *rabi* nurseries.
- Development of export quality and short slender grain varieties of rice.
- Diversification from *yasangi* rice to profitable alternative crops.
- BLB, gall midge, stem borer and blast were common problems in Telangana state causing substantial yield losses in paddy every year. Majority of the farmers are asking for development of BLB, blast and gall midge tolerant fine grain varieties with Jai Sreeram grain type.
- Farmers seeking information on different methods of crop establishment in rice (Dry-DSR, Wet DSR, Dry converted wet rice, Drum seeder and MSRI).

Significant Highlights of Rice Production Oriented Survey, 2022-23

- The Production Oriented Survey (POS), 2022-23 of rice growing areas was conducted in 11 districts viz., Nizamabad, Kamareddy, Karimnagar of Northern Telangana Zone, Siddipet and Khammam of Central Telangana Zone, Yadadri Bhuvanagiri, Rangareddy, Mahabubnagar, Wanaparthy Nagarkurnool and Nalgonda of Southern Telangana Zone covering 56 villages during *kharif*, 2022 and *rabi*, 2022-23. In Telangana state, the coarse grain varieties occupied 63.72% of total area during *kharif*, 2022, whereas fine grain varieties occupied only 36.28% of the total area.
- The insect-pests scenario across the surveyed districts revealed that, incidence of insect-pests is comparatively less during *kharif*, 2022 except gall midge incidence at RS&RRS, Rudrur and yellow stem borer (white ears) at Choutappal, Narketpally mandals of Nalgonda district and Voligonda, Rammannapet and Atmakur mandal of Yadadri Bhuvanagiri district. The severe incidence of gall midge was noticed at RS&RRS, Rudrur, Nizamabad district. Overall, the incidence of insect-pests comparatively less during *kharif*, 2022 except in isolated patches..
- Perusal of the data on the incidence of various diseases revealed that the incidence of BLB was severe in Thallada mandal of Khammam district, moderate to low incidence was noticed in Nizamabad and Nalgonda districts. The severe incidence of leaf and neck blast was observed in farmer field at Maddigatla village of Boothpur mandal of Mahabubnagar district. The incidence of false smut very low during 2022 compared to previous years and traces of incidence was noticed at RS&RRS, Rudrur.
- Among the abiotic stresses, salinity, cold injury and sulphide injury was observed during *rabi*, 2022-23 in Venkepally, Chigurumamidi mandals of Karimnagar districts and Siddipet districts. In few places, the crop was completely dried due to accumulation salts during *rabi* season at Karimnagar and Siddipet districts. The reason for severe occurrence of salinity is due to continuous paddy cultivation, ill drained conditions, not sufficient time or very less time for incorporation of *kharif* crop stubbles or puddling and majority of the farmers not growing the green manure crops during preceding *kharif* season. The crop was severely affected by stem borer (dead hearts), algal growth, sulphide injury, salinity and ill drained conditions at Biknoor (v & m), Lingupally of Kamareddy district.
- The severe incidence of stem borer (dead hearts) was observed during *rabi*, 2022-23 in all the rice growing districts of Telangana state. Among the districts, outbreak of stem borer (dead heart stage) was noticed in Siddipet district. The main reason for outbreak of yellow stem borer (DH) in rice is due to lack of awareness among the farming community, spraying of bios and indiscriminate application of chlorpyrifos (10G) granules during *rabi* season.
- A total of **6 alert messages** and **6 YouTube Modules** were communicated to the DAATTC, KVK and departmental officers besides covering through print and electronic media from time to time.

Conclusion, the crop condition is very good across the surveyed districts except few isolated patches during *kharif*, 2022, whereas the severe incidence yellow stem borer (dead hearts), leaf and neck blast, zinc deficiency, algal growth and salinity affected the crop growth in majority of rice growing districts of Telangana state during *rabi*, 2022-23.

Uttar Pradesh-2022-2023 (Faizabad)

Districts surveyed: Ayodhya, Sultanpur, Ambedkar Nagar, Barabanki, Basti, Sant Kabir Nagar and Siddharth Nagar

Table 1: Particulars of survey

Districts	Block/Taluka	Villages
Ayodhya	Masodha, Bikapur, Pura, Maya, Milkipur and Harringtonganj	Palia Lohani, Porakhan, Sarai Sagar, Hisamuddinpur, Ruskhas, Madhupur and Ghandipur
Sultanpur	Kurebhar, Dhanpatganj and Baldirai	Bhagwanpur, Pipergaon, Bisawa, Saraiya and Pandeypur Saraiya
Ambedkar Nagar	Akbarpur, Katehari, Tanda and Jalalpur	Dhanwari, Pura Bishram, Hanumanpur, Golpur, Kagri, Burganna and Ausanpur
Barabanki	Pure Dalai, Banki and Sirauli	Sukhipur, Mohdipur, Balubarta and Markampur
Basti	Vikramjot, Harriya, Kaptanganj and Chawani	Tenuwa, Pachwas, Shankarpur, Garha Jantan and Ramhadia
SantKabir Nagar	Khalilabad and Dhanghata	Ghanichera, Bisrapur, Sirauli, Paraspur, Ranipur and Barani
Siddharth Nagar	Sohratgarh, Methwal and Lotan	Parsanna, Berwa, Asnar, Manikpur and Chorar

Table 2: Widely prevalent rice varieties

Districts	Varieties
Ayodhya	HYVs: NDR 97, NDR359, NDR2064, NDR2065, Swarna, Narendra Lalmati, Sarjoo 52, Pusa Basmati 1, Damini, Sambha Mahsuri and Samba Mahsuri-Sub 1; Hybbrids: Gorakhnath 509, Arize 6444 Gold, Kaveri 9090, VNR 2377, 27P63, 27P65, 27P67 and others
Sultanpur	HYVs: NDR 359, NDR 3112-1, NDR2065, Narendra Lalmati, Sonam, Samba Mahsuri, Swarna Sub-1, Pusa Basmati 1, Damini, NDR 97, NDR 2064, Sarjoo 52 and Moti Gold; Hybbrids: Gorakhnath 509, Arize 6444 Gold, Ganga Kaveri, 27 P 31, 27P63, Nandi 333 and others
Ambedkar Nagar	HYVs: Samba Mahsuri, Swarna, Narendra Lalmati, Sambha Mahsuri-Sub 1 Swarna Sub-1, NDR-97, NDR 2064, NDR 2065, NDR 359, Sarjoo 52, Dhanrekha, Chintu, Damini, and Jamuna; Hybbrids: 27P31, 27P63, Kaveri 9090, US 305, Arize 6444 Gold, Gorakhnath 510 and others
Barabanki	HYVs: NDR-97, NDR 359, NDR 2064, NDR 2065, Samba Mahsuri, Swarna, Sarjoo 52, Narendra Lalmati and Sampoorana; Hybbrids: Arize 6444 Gold, US-305, 27 P 31, 27P63, Kaveri, 27P65 and others
Basti	HYVs: NDR 97, Samba Mahsuri Sub 1, Purva, Khusi 27, BPT 5204, NDR 359, NDR 2064, NDR 2065, Swarna, Pusa Basmati, Damini, KN-3, Chintu, Sampoorana and Moti; Hybbrids: Gorakhnath 509, 27P31, Arize 6444 Gold, 27P63, Dhanya 8666, Bayer 6633, and Syngenta 6302; Locals: Kalanamak
SantKabir Nagar	HYVs: BPT 5204, NDR 97, Samba Mahsuri Sub 1, Purva, Khusi 27, NDR 359, NDR 2064, NDR 2065, Swarna, Pusa Basmati 1, Damini, KN-3, Chintu, KN3,

	Sampoorna, and Moti; Hybrids: Gorakhnath 509, 27P31, Arize 6444 Gold, 27P63, Dhanya 8666, Bayer 6633 and Syngenta 6302; Locals: Kalanamak
Siddharth Nagar	HYVs: NDR 359, NDR 2064, NDR 2065, Swarna, Pusa Basmati 1, Damini, KN-3, Kalanamak Kiran, Chintu, Sampoorna, Moti, BPT 5204, NDR 97, Samba Mahsuri Sub 1, Purva and Khusi 27; Hybrids: Arize 6444 Gold, 27P63, Dhanya 8666, Bayer 6633, Syngenta 6302, Gorakhnath-509, 27P31 and others; Locals: Kalanamak

Table 3: Area under rice cultivation in the surveyed districts during Kharif 2022

Districts	Area (ha) under rice cultivation			
	Scented/ Basmati	Hybrid	Other	Total
Ayodhya	2300	41000	55790	99090
Sultanpur	1650	51005	42266	92921
Ambedkar Nagar	1425	52987	61961	116373
Barabanki	2502	58000	188544	179046
Basti	3500	43000	84426	130926
Sant Kabir Nagar	3110	30490	56205	90005
Siddharth Nagar	3500	74500	93463	171463

Table 4: Rainfall distribution in surveyed districts during Khari, 2022

Districts	Rainfall (mm)							
	June		July		August		September	
	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual
Ayodhya	106.5	44.1	306.1	178.8	282.0	113.5	196.7	27.3
Ambedkar Nagar	106.5	40.1	306.1	251.5	282.0	96.3	196.7	2.8
Sultanpur	87.3	49.3	307.1	120.5	289.5	154.3	202.8	0.10
Barabanki	98.4	33.2	299.7	159.0	281.6	216.0	203.6	18.0
Basti	126.3	39.8	279.4	108.1	368.0	146.6	141.2	221.5
Sant Kabir Nagar	163.0	86.0	380.1	85.7	314.1	103.3	231.3	227.5
Siddharth Nagar	163.4	62.7	380.1	139.8	325.3	84.5	231.3	202.2

The production-oriented survey of rice growing areas was conducted in the Ayodhya, Sultanpur, Ambedkar Nagar, Barabanki, Basti, Sant Kabir Nagar and Siddharthnagar districts of eastern Uttar Pradesh from tillering to maturity stage during *Kharif* '2022. The details of survey are presented in Table 1. In 2022, rice crop suffered with drought like condition from sowing of nursery to tillering stage. Initially rainfall was very less up to the month of August and as a result, some resource poor farmers could not save their crop from drought. The details of rainfall pattern are presented in Table 4. Commonly cultivated varieties were HYVs like Sarjoo 52, BPT 5204, NDR 97, Samba Mahsuri Sub 1, Purva, Khusi 27, NDR 359, NDR 2064, NDR 2065, Swarna, Pusa Basmati 1, Damini, KN-3, Chintu, KN3, Kalanamak Kiran, Sampoorna, and Moti and hybrids like Arize 6444 Gold, 27P63, Kaveri 9090, 27P65, 27P67, Dhanya 8666, Bayer 6633, Syngenta 6302, Gorakhnath-509, 27P31. The details of different varieties and hybrids cultivated in different surveyed districts are presented in Table 2.

Table 5: General question on rice cultivation in district (to be filled by the cooperator in consultation with the officials from state department of agriculture)

Parameters	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Total area under HYVs (ha)	55790 hac	42266 hac	61961 hac	188544 hac
Most prevalent HYVs in the district	NDR 2065, NDR359, NDR 97 Sabha Mahsuri.	NDR359, NDR 2065, Sabha, Swarna.	NDR 2065, Sabha, Swarna, NDR 97.	NDR 2065, NDR359, Sabha, Swarna.
Total area under rice hybrids	41000 hac	51005 hac	52987 hac	58000 hac
Most prevalent rice hybrids in the district	27P63, Ariz 6444 Gold, GorakhNath 509.	27P63, Ariz 6444 Gold, GorakhNath 509.	27P63, Damini, GorakhNath 509, Ariz 6444 Gold.	27P63, Ariz 6444 Gold.
Total area under basmati in the district	2300 hac	1650 hac	1425 hac	2502 hac
Most prevalent basmati	PB-1, N.Lalmati.	PB-1, Lalmati, Sonam.	PB-1, Sonam, N.Lalmati.	Lalmati.
Seed replacement rate	70%	75%	80%	80%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Yes, Combine harvester, Rotavator.	Yes, Combine machine.	Yes, Combine harvester, Rotavator.	Combine machine, Rotavator.
Mention water saving technologies like SRI/laser leveling/ DSR being used by the farmers	Yes, only by few farmers.	Yes, DSR	only by few	Yes, only by few.
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Yes, use of plant protection measurements.	Yes, use of plant protection measurements.	Yes	Yes, use of balance fertilizers and plant protection measurements.
What are the general problems in rice cultivation in the district?	High wages of labour.	Cost of labour wages.	Higher cost of labour wages.	Few
Please provide any farmers association in the district	Yes, FPO and kisan club.	Yes	Yes, farmers club and FPO.	Yes, FPO
Whether availability of agricultural labours is sufficient?	Yes	No	No	No
Whether there is any marketing problem of the produce?	No	No	No	No
Any major irrigation/power generation project in the district	Yes, SardhaSahayak Canal project.	Yes, SardhaSahayak Canal.	NTPC Canals	SardhaSahayak Canal.
Any soil testing program undertaken?	Yes	Yes, to know your soil.	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	Yes, Regular training program by Dept of Ag and KVK of Ag University.	Yes, by Dept of Agriculture and KVK of Ag University.	Yes, by Dept of Agriculture and KVK of Ag University.	Yes, by Dept of Agriculture and KVK of Ag University.

Table 5 Contd..

Parameters	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Total area under HYVs (ha)	84426 hac	56205 hac	93463 hac
Most prevalent HYVs in the district	NDR 2065, Sabha, Swarna, NDR 359.	BPT 5204, NDR97,NDR 2065, Swarna.	Sabha, Swarna, NDR 2065.
Total area under rice hybrids	43000 hac	30490 hac	74500 hac
Most prevalent rice hybrids in the district	27P63, Ariz 6444 Gold, GorakhNath 509.	27P63, Ariz 6444 Gold, GorakhNath 509.	27P63, Ariz 6444 Gold.
Total area under basmati in the district	3500 hac	3110 hac	3500 hac
Most prevalent basmati	Kalanamak, Basmati.	Kalanamak, Pusa Basmati.	Kalanamak, Kalanamak-3, Kalanamakkiran.
Seed replacement rate	70%	70%	80%
Whether farmers are using any heavy equipments like transplanter/combine harvester	Yes , Combine machine.	Yes , Combine machine.	Combine machine, Rotavator
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	Yes, DSR	No	Yes, DSR by only few farmers.
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Yes, use of balance fertilizers and plant protection measurements.	Yes, use of plant protection measurements.	Plant protection measurements.
What are the general problems in rice cultivation in the district?	Shortage of labours.	Higher cost of labour wages.	Seed of quality rice.
Please provide any farmers association in the district	Yes	Yes, FPO	Yes, FPO
Whether availability of agricultural labours is sufficient?	No	No	No
Whether there is any marketing problem of the produce?	No	No	No
Any major irrigation/power generation project in the district	No	No	No
Any soil testing program undertaken?	Yes	Yes	Yes
Any farmers' training program was organized by the state department of Agriculture/University	Yes, by Dept of Agriculture and KVK of Ag University.	Yes, by Dept of Agriculture and KVK of Ag University.	Yes, by Dept of Agriculture and KVK of Ag University.

A. General information, cropping system and rice yield: The details of number of villages surveyed are presented in Table 6. A total of 56 farmers were contacted during the survey. Majority (>75%) of the rice fields surveyed were under irrigated ecosystem. Some fields were under rainfed upland and rainfed lowland ecosystem. Major crop rotations followed by the farmers were rice-wheat, rice-sugarcane rice-mustard, rice-pulses, rice-potato and rice-vegetables. Average rice yield among different HYVs and hybrids ranged from 3000-5600 kg/ha while in case of aromatic short grains the yield was 1900-3000 kg/ha (Table 7).

Table 6: General information

Parameters	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
# of talukas/blocks covered	6	3	4	3
# of villages surveyed	7	5	7	4
# of farmers interviewed	8	8	8	8
Field ecosystem	Irrigated (100%)	Irrigated (75%); RL (12.5%); UL (12.5%)	Irrigated (87.5%); RL (12.5%)	Irrigated (75%); RL (12.5%); UL (12.5%)
Weather conditions during cropping season	Normal (75%); DLC (25%)	Normal (100%)	Normal (100%)	Normal (75%); DLC (25%)
Crop stage when survey was made	Milk to maturity	Booting (mainly); maturity	Heading to maturity	Milk to Heading
Crop rotations	Rice-wheat, rice-sugarcane rice-mustard, rice-pulses, rice-potato, rice-vegetables			

DLS: Drought like condition; RL :Rainfed lowland; UL: Upland

Table 6 Contd..

Parameters	Basti	St Kabir Nagar	Siddharthnagar
# of talukas/blocks covered	4	2	3
# of villages surveyed	5	6	5
# of farmers interviewed	8	8	8
Field ecosystem	Irrigated (87.5%); RL (12.5%)	Irrigated (75%); RL (12.5%); UL (12.5%)	Irrigated (87.5%); UL (12.5%)
Weather conditions during cropping season	Normal (100%)	Normal (25%); DLC (75%)	Normal (75%); DLC (25%)
Crop stage when survey was made	Tillering to heading	Booting to maturity	
Crop rotations	Rice-wheat, rice-pulse, rice-mustard, rice-sugarcane, rice-potato and others		

Table 7: Average yields of different rice varieties as reported by the cooperators/farmers

Variety/hybrids	Yield (kg/ha)			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
HYVs				
NDR 97	3800		3000-3500	
BPT 5204	3880-4080	4000-4080		
Sarjoo 52	4000-4200	4500	3800-4000	3500-4200
NDR 2064		4500-5000		
Moti Gold		4200		
Swarna			5500	
N. Lalmati			3000	
NDR 2065				4500
NDR 359				4000
Arize 6444		5200	5500-5600	

Table 7 Contd..

Variety/hybrids	Yield (kg/ha)		
	Basti	St Kabir Nagar	Siddharthnagar
HYVs			
NDR 97	3200-3300		
BPT 5204	3800-4000	4500	
Pusa Basmati 1	3500		
Swarna	5500		
Purna	4000	4500	
Moti Gold		4800-5000	
Sarjoo 52		4300	
Damini		4800	
NDR 2064		4400	
KN-3			2500-3000
Sampoorna			5200
NDR 359			3800
Kalanamak			1900-2300
Arize 6444		5500	

Table 8: Details of rice consumption pattern in different districts of Haryana

Parameters	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Status of farmers	Medium Income (100%)	Medium Income (100%)	Medium Income (62.5%), Poor (37.5%)	Medium Income (100%)
Per capita monthly rice consumption (kg)	3.5-5 kg	3.5-5 kg	3.5-5 kg	3.5-4.5 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (100%)	Polished rice (100%); Parboiled (12.5%)	Polished rice (100%); Parboiled (25%)	Polished rice (62.5%), Parboiled (37.5%)
Rice grain type preference	Fine grain (87.5%), coarse grain (62.5%)	Fine grain (100%), coarse grain (75%)	Fine grain (87.5%), coarse grain (75%)	Fine grain (87.5%), coarse grain (100%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (100%)	No (100%)

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different surveyed districts of this part of eastern Uttar Pradesh. Majority (>85%) of the farmers contacted were in the medium income group except Ambedkarnagar where about 37% farmers were in poor category. Average per capita consumption of rice per month was 3.5-5.5 kg rice and 100% of the farmers contacted told that their main meal consisted of both rice and wheat. Majority of the farmers preferred polished rice over parboiled rice. Farmers consumed both fine grain and coarse grain rice. In general, there was no change in the food habit.

Table 8 Contd..

Parameters	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Status of farmers	Medium Income (100%)	Medium Income (87.5%), Poor (12.5%)	Medium Income (100%)
Per capita monthly rice consumption (kg)	3.5-5 kg	3.5-5 kg	3.8-5.5 kg
Composition of main meal	Rice + Wheat (100%)	Rice + Wheat (100%)	Rice + Wheat (100%)
Preferred rice types	Polished rice (100%)	Polished rice (87.5%), Parboiled (12.5%)	Polished rice (87.5%), Parboiled (37.5%)
Rice grain type preference	Fine grain (62.5%), coarse grain (75%); Basmati (12.5%)	Fine grain (87.5%), coarse grain (100%), Basmati (12.5%)	Fine grain (100%), coarse grain (87.5%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (100%)

Table 9: Details of nursery management

Parameters	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Planting time	1 st week to last week of June	1 st week to last week of June	1 st week of June to 1 st week of July	End of May to end of June
Seed rate	30-35 kg/ha (HYVs); 15 kg/ha (hybrids)	28-33 kg/ha (HYVs)	30-35 kg/ha (HYVs); 15 kg/ha (hybrids)	28-30 kg/ha (HYVs); 15 kg/ha (hybrids)
Seed treatment (% farmers adopted)	Yes (12.5%)	Yes (12.5%)	Nil (100%)	Nil (100%)
Chemicals used for seed treatment	Carbendazim (2 g/kg)			
Organic manure in nursery (% farmers adopted)	Yes (87.5%) FYM, GM	Yes (75%) FYM, GM, vermicompost	Yes (75%) FYM, vermicompost	Yes (100%) FYM, GM, vermicompost
Inorganic manure in nursery (% farmers adopted)	Yes (37.5%); Urea (80 kg/ha) and/or DAP (60-80 kg/ha)	No (100%)	Yes (12.5%) Urea (80 kg/ha)	No (100%)

Table 9 Contd..

Parameters	Basti	St Kabir Nagar	Siddharthnagar
Planting time	End of May to end of June	End of May to end of June	End of May to end of June
Seed rate	30-32 kg/ha (HYVs); 15 kg/ha (hybrids)	25-32 kg/ha (HYVs); 15 kg/ha (hybrids)	30-35 kg/ha (HYVs); 15 kg/ha (hybrids)
Seed treatment (% farmers adopted)	Yes (25%)	Yes (12.5%)	Yes (12.5%)
Chemicals used for seed treatment	Carbendazim (2 g/kg)		
Organic manure in nursery (% farmers adopted)	Yes (100%) FYM, vermicompost	Yes (87.5%) FYM, GM, vermicompost	Yes (87.5%) FYM, vermicompost
Inorganic manure in nursery (% farmers adopted)	Yes (25%) DAP (80 kg/ha)	No (100%)	No (100%)

C. Nursery and main field Management: Average seed rate used by the farmers ranged from 28-35 kg/ha for HYVs while in case of hybrids it was 15kg/ha. About 12.5-25% of the farmers contacted from Ayodhya, Sultanpur, Basti, Sant Kabir Nagar and Siddharth Nagar told that they adopted seed treatment with carbendazim (2 g/kg seeds). About 75-100% of the farmers contacted from different districts told that they applied organic manure like FYM, green manure or vermicompost in the nursery (Table 9). About 12.5-37.5% of the farmers Ayodhya, Ambedkar nagar and Basti applied chemical fertilizers like urea and DAP in the nursery. Planting was done from end of May to end of June. In the main fields, fertilizers were applied @ 100-130 kg N/ha, 40-65 kg P₂O₅/ha and 40-65 kg K₂O/ha (Table 10). Majority of the farmers contacted applied patash and phosphorus. Zinc and Sulphur deficiency were observed in surveyed districts. All the farmers contacted also applied zinc sulphate to correct the zinc deficiency symptoms. Majority (>75%) of the farmers contacted applied FYM, green manure (Dhaincha, Urd bean, Moong bean) and vermicompost in the fields. To supply essential nutrient to the crop farmers were using inorganic fertilizers viz. Urea, NPK, DAP, SSP, MOP, and Zinc sulphate. Plant growth regulators/promoters viz. Biozyme and Microzyme are being used by progressive farmers to obtain good harvest.

Table 10: Details of main field management

Details	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Planting method	Majority (62.5-100%) of the farmers adopted random planting where plant population per unit area was not maintained. Very few in Ayodhya adopted line planting. Some farmers (37.5% in Sultanpur) and (12.5% in Ambedkar Nagar) adopted direct sowing.			
Total N applied	115-130 kg/ha	100-125 kg/ha	100-125 kg/ha	100-125 kg/ha
Total P ₂ O ₅ applied	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 40-65 kg/ha	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 45-65 kg/ha
Total K ₂ O applied	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 40-65 kg/ha	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 45-65 kg/ha
ZnSO ₄ applied (21% or 33%)	Yes (100%) @ 15-20 kg/ha	Yes (100%) @ 10-25 kg/ha	Yes (100%) @ 10-25 kg/ha	Yes (100%) @ 15-30 kg/ha
Organic fertilizers applied	Yes (100%); FYM (20-22 t/ha), GM	Yes (100%); FYM (16-20 t/ha), GM	Yes (87.5%); FYM (21-22 t/ha), vermicompost, GM	Yes (100%); FYM, GM & vermicompost
Remarks	Nutrients were applied in the form of urea, DAP, SSP, MOP and zinc sulphate.			

D. Weeds and their Management: Overall intensity of weeds was low to medium. Commonly recorded weeds were *Echinochloa colona*, *E. crusgalli*, *Eclipta alba*, *Cyperus iria*, *C. rotundus*, *Cloeme viscosa*, *Digitaria sanguinalis*, *Dactyloctenium aegyptium*, *Chloris barbata*, *Fimbristylis dichotoma* and *Paspalum distichum*. About 87.5- 100% farmers contacted adopted herbicide application. Commonly used herbicides were butachlor, pendimethalin, pretilachlor, Nominee Gold and others. All of them also adopted hand weeding for the management of weeds (Table 11).

E. Common needs of the farmers: Some of the common needs of the farmers were timely availability of seeds HYVs, timely availability of fertilizers and other inputs, medium duration HYVs, marketing facility, technical assistance

Table 10 Contd..

Details	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Planting method	Majority (62.5-100%) of the farmers adopted random planting where plant population per unit area was not maintained. Some farmers in Basti adopted line planting. Some farmers (12.5% in Basti and 25% in Siddharthnagar) adopted direct sowing.		
Total N applied	100-120 kg/ha	110-120 kg/ha	110-120 kg/ha
Total P ₂ O ₅ applied	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 50-60 kg/ha	Yes (100%) @ 40-60 kg/ha
Total K ₂ O applied	Yes (100%) @ 40-60 kg/ha	Yes (100%) @ 50-60 kg/ha	Yes (100%) @ 40-60 kg/ha
ZnSO ₄ applied (21% or 33%)	Yes (100%) @ 10-20 kg/ha	Yes (100%) @ 15-30 kg/ha	Yes (100%) @ 10-30 kg/ha
Organic fertilizers applied	Yes (75%); FYM (15-25 t/ha)	Yes (100%); FYM, GM, vermicompost	Yes (100%); FYM, GM,
Remarks	Nutrients were applied in the form of urea, DAP, SSP, MOP and zinc sulphate.		

Table 11: Weeds and weed management

Details	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Weed intensity	Low to medium	Low to medium	Low to medium	Low to medium
Names of the weeds	Commonly recorded weeds were <i>Echinochloa colona</i> , <i>E. crusgalli</i> , <i>Eclipta alba</i> , <i>Cyperus iria</i> , <i>C. rotundus</i> , <i>Cloeme viscosa</i> , <i>Digitaria sanguinalis</i> , <i>Dactyloctenium aegyptium</i> , <i>Chloris barbata</i> , <i>Fimbristylis dichotoma</i> and <i>Paspalum distichum</i>			
Weedicides used	Butachlor (2.5 l/ha), pendimethalin (2.4 l/ha), pretilachlor (3 l/ha), Nominee Gold (200 ml/ha) and others			
%age of farmers applied herbicides	Almost all the farmers applied weedicides. All the farmers contacted also practiced hand weeding along with herbicide application			
Wild/weedy rice incidence	Nil	Nil	Nil	Nil

Table 11 Contd..

Details	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Weed intensity	Low to medium	Low to medium	Low to medium
Names of the weeds	Commonly recorded weeds were <i>Echinochloa colona</i> , <i>E. crusgalli</i> , <i>Eclipta alba</i> , <i>Cyperus iria</i> , <i>C. rotundus</i> , <i>Cloeme viscosa</i> , <i>Digitaria sanguinalis</i> and <i>Fimbristylis dichotoma</i>		
Weedicides used	Butachlor (2.5 l/ha), pendimethalin (2.4 l/ha), pretilachlor (3 l/ha), Nominee Gold (200 ml/ha) and others		
%age of farmers applied herbicides	About 87.5- 100% farmers adopted herbicide application. All of them also adopted hand weeding for the management of weeds		
Wild/weedy rice incidence	Nil	Nil	Nil

Table 12: Details of inputs used

Details	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Implements used	Implements like sprayer, cultivator, tractor, rotavator, leveler, combine harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers hired the implements			
Source of seeds	About 25-50% of the farmers in different districts told that they purchased part of their seed requirement.			
Source of irrigation	Deep tube well (87.5%); Canal (12.5%)	Deep tube well (100%)	Deep tube well (62.5%), Shallow tube well (37.5%), Canal (12.5%)	Deep tube well (100%); canal (87.5%)
Scarcity of irrigation water	No (87.5%)	No (100%)	No (100%)	No (100%)
Availability of fertilizers/pesticides	No (62.5%)	No (12.5%)	No (37.5%)	Yes (100%)
Quality of fertilizers/pesticides	Not Satisfied (50%)	Not Satisfied (12.5%)	Not Satisfied (37.5%)	Satisfied (100%)
Advisors to the farmers	Own decisions (100%)	Own decisions (100%); Dealers (12.5%)	Own decisions (100%); Dealers (12.5%); Univ (12.5%)	Own decisions (100%)

Table 12 Contd..

Details	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Implements used	Implements like sprayer, cultivator, tractor, rotavator and combine harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers hired the implements		
Source of seeds	About 50-62.5% of the farmers in different districts told that they purchased part of their seed requirement.		
Source of irrigation	Deep tube well (62.5%); Canal (25%); shallow tube well (25%)	Deep tube well (100%); Canal (100%)	Deep tube well (100%); Canal (50%)
Scarcity of irrigation water	No (100%)	No (100%)	No (100%)
Availability of fertilizers/pesticides	No (25%)	No (12.5%)	Yes (100%)
Quality of fertilizers/pesticides	Not Satisfied (25%)	Satisfied (100%)	Satisfied (100%)
Advisors to the farmers	Own decisions (87.5%); State dept (25%); Dealers (12.5%)	Own decisions (100%)	Own decisions (100%)

F. Input use: Implements like sprayer, cultivator, tractor, rotavator, leveler, combine harvester were used by the farmers. Progressive farmers had some of their own equipments and other farmers

hired the implements. Use of Rotavator, combine harvester and paddy thresher was common practice among the rice farming community of the eastern Uttar Pradesh. About 25-62.5% of the farmers in different districts told that they purchased part of their seed requirement. Govt. agencies are providing subsidized seeds, agro-chemicals, plant protection inputs and farm machineries including solar pumps to the farmers. Deep tube wells, canal and shallow tube wells were the main sources of irrigation (Table 12). About 12.5-50% of the farmers contacted from Ayodhya, Sultanpur, Ambedkar Nagar and Basti expressed concern about the quality of pesticides and fertilizers. Soil testing program is promoting by the govt. agencies and providing Soil Health Card to farmers. Few farmers are doing organic rice cultivations in small areas. Kisan Mela, Kisan Gosthies and training programmes were regularly organized by Agriculture universities and Department of Agriculture, Govt. of U.P. to promote new varieties/technologies to minimize the cost of cultivation and enhancing the income of the rice growing farmers. The main sources of farmers finance are own resources, cooperative societies, Kisan credit card and P.M. Kisan Sammannidhi. In addition to their own decisions, farmers received advices from officials of state department of agriculture and private dealers.

Table 13: Prevalence of diseases and Insects in Eastern Uttar Pradesh during Kharif2022

Districts	Diseases			
	BS	ShB	BLB	FS
Ayodhya	L-M	L-M (10-20%)	L-M (5-10%)	L
Sultanpur	L-M	L-M (5-15%)	L	L (3-5%)
Ambedkar Nagar	L-M (5-10%)	L-M (5-15%)	L-M	L-M
Barabanki	L (5%)	L-M (5-10%)	L	L
Basti	L-M	L-M (5-15%)	L-M (5-15%)	L-M
SantKabir Nagar	L-M (5-10%)	L-M (5-15%)	L-M (5-10%)	L-M
Siddharth Nagar	L-M	L-M (5-15%)	L (5%)	L-M

Districts	Insects			
	SB	LF	GB	GLH
Ayodhya	L-M	L-M	M	L-M
Sultanpur	L-M	L	L-M	L
Ambedkar Nagar	L-M	L-M	M	L
Barabanki	L-M	L-M	M	L-M
Basti	L-M	L	L-M	L
SantKabir Nagar	L-M	L	L	L
Siddharth Nagar	L	L	L-M	L

G. Biotic stresses and their management: The details of occurrence of different diseases and insect pests are presented in Table 13. Overall, the incidences of different diseases like brown spot, sheath blight, false smut and bacterial blight were low to moderate. Among the insect pests, stem borer, leaf folder, gundhi bug and green leaf hoppers were observed in low to moderate intensities. On an average 50% of the farmers contacted adopted plant protection measures. The details of different insecticides and fungicides used by the farmers are presented in Table 14. In most cases, farmers adopted one spraying and none of the farmers contacted mixed 2 or more pesticides before

spraying. In many places, deficiency symptoms of zinc and sulphur were observed. Some of the common problems were shortage of labours and their high wages, damage by stray animals, poor electricity supply, unavailability of fertilizers and quality seeds in time and micronutrient deficiency

Table 14: Details of pest management

Details	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
% age farmers adopting plant protection	87.5%	50%	25%	25%
Names of pesticides	Insecticides: cartap hydrochloride, folidol, imidacloprid, Coragen, acephate and chlorpyrifos (1 l/ha) for different insect pests Fungicides: hexaconazole (1 l/ha), propiconazole (500 ml/ha), carbendazim (500 g/ha), thiophenate methyl (1.5 kg/ha) for sheath blight and false smut and copper oxychloride + streptomycin (500 g + 15 g/acre) for bacterial blight			
# of pesticide sprays	1	1	1	1
Mixing of pesticides before application	No (100%)	No (100%)	No (100%)	No (100%)

Table 14 Contd..

Details	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
% age farmers adopting plant protection	75%	50%	37.5%
Names of pesticides	Insecticides: cartap hydrochloride, folidol, Coragen, acephate and chlorpyrifos (1 l/ha) for different insect pests Fungicides: hexaconazole (1 l/ha), propiconazole (500 ml/ha), thiophenate methyl (1.5 kg/ha) for sheath blight and false smut; mancozeb (2 kg/ha) for brown spot and copper oxychloride + streptomycin (500 g + 15 g/acre) for bacterial blight		
# of pesticide sprays	1	1	1
Mixing of pesticides before application	No (100%)	No (100%)	No (100%)

H. Researchable issues: Among the biotic stresses, major problems in the region are sheath blight, bacterial blight and false smut among the diseases and stem borer, leaf folder and BPH among the insect pests. Among the abiotic problems, Submergence/ drought/flash flood, salinity and alkalinity were the main problem. Some of the major problems faced by the farmers were scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs, micronutrient deficiency and lack of mechanization. Farmers expressed the need for varieties suitable for DSR, varieties having resistance to sheath blight, false smut, bacterial blight, stem borer, BPH and leaf folder. Farmers also expressed the need for varieties having tolerance to submergence and drought, salinity, alkalinity and varieties with MS grain quality and with high zinc, iron and protein.

Table 15: Researchable issues

Parameters/Issues	Districts			
	Ayodhya	Sultanpur	Ambedkar Nagar	Barabanki
Rice ecology in your area	Irrigated	Irrigated	Irrigated	Irrigated
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif	Kharif
Number of years of experience in rice farming	10- 20 years	10-20 years	10-20 years	5-20 years
Main biotic constraints (diseases) in your area according to you	Sheath blight, bacterial blight and false smut	Sheath blight and false smut	Sheath blight, bacterial blight and false smut	Sheath blight, bacterial blight and false smut
Extent of disease damage	10-25%	Below 10%	10-25%	10-25%
Main biotic constraints (Insect pests) in your area according to you	Stem borer, leaf folder and BPH	Stem borer	Stem borer, leaf folder	Stem borer and leaf folder
Extent of insect pest damage	10-25%	Below 10%	Below 10%	10-25%
Main abiotic constraints in your area according to you	Submergence/ drought, salinity and alkalinity	Submergence/ drought and high temperature	Submergence/ drought, salinity and alkalinity	Submergence/ drought salinity and alkalinity
Production constraints in your area according to you	Scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs, micronutrient deficiency and lack of mechanization			
Irrigation facilities in your area	Available; Bore well, canal	Available; Bore well	Available; Bore well and open well	Available; Bore well and Canal
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 Years	5-10 Years
Any other rice production issues in your area which the rice scientists need to address				
What is urgently required in your area as far as rice varieties are concerned				
Duration	Varieties suitable for DSR			
Biotic stress resistance	Varieties tolerant to sheath blight, false smut, stem borer; Some farmers expressed the need of BPH and blast resistant rice varieties			
Abiotic stress resistance	Varieties with resistance to submergence, drought, high temperature and salinity			
Preferred grain quality	MS grain rice varieties and aromatic short grain			
Nutritional quality	Varieties with high iron, zinc and high protein			

Table 15 Contd..

Parameters/Issues	Districts		
	Basti	St Kabir Nagar	Siddharthnagar
Rice ecology in your area	Irrigated	Irrigated; Upland	Irrigated; Upland
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif
Number of years of experience in rice farming	10-20 years	5-10 years	5-20 years
Main biotic constraints (diseases) in your area according to you	Sheath blight, bacterial blight and leaf blast	Sheath blight, bacterial blight and leaf blast	Sheath blight and leaf blast
Extent of disease damage	>10%	10-25%	10-25%
Main biotic constraints (Insect pests) in your area according to you	Stem borer	Stem borer and leaf folder	Stem borer and leaf folder
Extent of insect pest damage	>10%	10-25%	10-25%
Main abiotic constraints in your area according to you	Submergence/ drought, flash flood, salinity and alkalinity	Submergence/ drought, flash flood, salinity and alkalinity	Submergence/ drought, flash flood, salinity and alkalinity
Production constraints in your area according to you	Scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs, micronutrient deficiency and lack of mechanization		
Irrigation facilities in your area	Available; Bore well, open well	Available; Bore well, canal	Available; Bore well, canal
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address			
What is urgently required in your area as far as rice varieties are concerned			
Duration	Varieties suitable for DSR and varieties with lodging resistance		
Biotic stress resistance	Varieties tolerant to sheath blight, false smut, stem borer; Some farmers expressed the need of BLB, BPH and blast resistant rice varieties		
Abiotic stress resistance	Varieties with resistance to submergence, drought, high temperature and salinity		
Preferred grain quality	MS grain rice varieties and aromatic short grain		
Nutritional quality	Varieties with high iron, zinc and high protein		

Uttarakhand-2022-2023 (Pantnagar)

Districts surveyed: Udham Singh Nagar and Nainital

Details of survey

District	Blocks surveyed
Udham Singh Nagar	Khatima, Sitarganj Rudrapur, Gadarpur, Bazpur, Kashipur and Jaspur
Nainital	Ramnagar, Kotabagh, Haldwani

Widely prevalent rice varieties

District	Prevalent varieties
Udham Singh Nagar	HYVs: PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130, NDR 359 and Pant Dhan 23; Basmati/Scented: Pusa Basmati 1509, Pusa Basmati 1121 and Pant Sugandh Dhan 27.
Nainital	Bhabar area: HYVs: Pant Dhan 11, Govind, Pant Dhan 18 and PR 113 Hilly area: HYVs: Govind, VL Dhan 210 and VL Dhan 211

Particulars of rice area

District	Area (ha)	Production (tonnes)	Productivity (q/ha)
Udham Singh Nagar	108099	389315	36.01
Nainital	10896	36959	33.92

General questions on rice cultivation in district (to be filled by the co-operator in consultation with the officials from state department of Agriculture)

Parameters	Districts	
	Udham Singh Nagar	Nainital
Total area under HYVs in the district	50-55%	25-30%
Most prevalent HYVs in the district	PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130 and NDR 359	Bhabar area: Pant Dhan 11, Govind, Pant Dhan 18 PR 113, HKR 47 and PR 121; Hilly area: Govind, VL Dhan 210, VL Dhan 211
Total area under rice hybrids in the district	NA	NA
Most prevalent rice hybrids in the district	NA	NA
Total area under basmati in the district	Less than 1%	Less than 1%
Most prevalent basmati varieties in the district	Pusa Basmati 1509, Pusa Sugandh 4, Pusa Sugandh 5, Pant Sugandh Dhan 27.	NA
Whether farmers are using any heavy equipments like transplanter /combine harvester	Yes	No

Production Oriented Survey-2022

Mention water saving technologies like SRI/laser levelling/DSR being used by the farmers	Yes (DSR on small scale)	Yes (DSR in hilly upland areas)
Whether survey team gave any advice to the farmers during survey? If yes, then what are those?	Not to cultivate rice during summer. Apply only recommended doses of pesticides in consultation with the experts/scientists.	Use quality seeds of latest and recommended varieties, apply only the need based and recommended doses of fertilizers and pesticides.
What are the general problems in rice cultivation in the district?	Higher wages of labour, Insufficient rice counters where farmers can sell their produce	Non availability of agriculture labour and Insufficient rice counters where farmers can sell their produce
Please provide any farmers association in the district	Not known	Not known
Whether availability of agricultural labours is sufficient?	No	No
Whether there is any marketing problem of the produce?	Insufficient rice counters where farmers can sell their produce	Insufficient rice counters where farmers can sell their produce
Any major irrigation/power generation project in the district	Khatima hydro power Station, Lohiahead, Khatima	No
Any soil testing program undertaken	Yes	Yes
Any farmers training program was organized by the state department of agriculture/university	Trainings by State Agriculture department and university KVKs	Trainings by State Agriculture department and university KVKs

Weather conditions during Kharif 2022 at Pantnagar (Udham Singh Nagar)

Weather Data	Months							
	May	June	July	Aug	Sep	Oct	Nov	Dec
Rainy Days (No.)	5	4	9	10	11	6	0	0
Total Rain Fall (mm)	45.5	104.8	174.8	182.1	401.9	294.3	0	0
Maximum Temperature (°C)	35.7	37.8	33.5	33.5	31.6	29.8	27.3	22.7
Minimum Temperature (°C)	23.8	26.1	27.1	26	24.2	18.3	12.1	7.1
RH% (Morning)	66	71	82	87	89	88	90	93
RH% (Evening)	40	41	66	67	69	55	46	52

Production oriented survey was conducted in two rice growing districts of Uttarakhand viz., Udham Singh Nagar and Nainital at crop maturity. In Nainital, survey was mainly conducted in Bhabar plain including foot hills, and lower hills (rainfed and irrigated) at crop maturity. Major rice varieties cultivated by the farmers in plains were HYVs like PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130, NDR 359 and Pant Dhan 23 and basmati or scented rice

varieties like Pusa Basmati 1509, Pusa Basmati 1121 and Pant Sugandh Dhan 27. While in lower hills, varieties like Govind, VL Dhan 210 and VL Dhan 211 were cultivated by the farmers. Common crop rotations followed by the farmers in the plains were adopted rice-wheat, rice-sugarcane, Sugarcane-toria/lentil-sugarcane and maize-wheat-rice-vegetable pea. In plains, farmers applied recommended dose of fertilizers (120 kg N/ha, 60 kg P₂O₅/ha and 40 kg K₂O/ha). In general, crop conditions were good in irrigated areas of plain. Expected rice yield was 4.5-5 t/ha. Most of the farmers applied zinc sulphate (either as basal or foliar). Majority of the farmers in plains applied weedicides like pretilachlor (pre-emergence) and bispyribac sodium (post-emergence) at most of the places. Diseases like blast, sheath blight, brown spot, false smut, sheath rot and bacterial blight were observed in low to moderate intensity while insect pests like stem borer, leaf folder, BPH and WBPH were observed in low to moderate intensities. Mysterious rice dwarfing problem with less than 1% incidence was also noticed at few places in US Nagar. Most of the farmers used cartap hydrochloride, Fipronil and chlorantraniliprole to control stem borer and thiamethoxam or acephate to manage hoppers. Fungicides like hexaconazole, propiconazole, validamycin, azoxystrobin + difenoconazole were used by some of the farmers to manage different rice diseases.

District wise details

Udham Singh Nagar: Production oriented survey was conducted in 40 villages of 7 blocks (Jaspur, Kashipur, Bazpur, Gadarpur, Rudrapur, Sitarganj and Khatima) of district Udham Singh Nagar during crop maturity. The general weather conditions for rice cultivation were normal. Most of the farmers were marginal or sub-marginal. Since, rice is the major crop in the Kharif season, most of the fields (50-55%) were occupied with rice. Due to favourable weather conditions, there was good crop stand in almost all areas surveyed. The major varieties predominantly grown by the farmers in the district were HYVs like PR 113, HKR 47, PR 121, PR 126, PR 127, PR 128, PR 129, PR 130 and NDR 359 basmati or scented varieties like Pusa Basmati 1121, Pusa Basmati 1509, Pusa Basmati 1121 and Pant Sugandh Dhan 27. Some farmers cultivated local varieties like Nuri and Tilakchandani. Farmers adopted rice-wheat, rice-sugarcane, Sugarcane-toria/lentil-sugarcane and maize-wheat-rice-vegetable pea cropping systems. The district falls under *tarai* belt of the state. Entire area under the district is irrigated and most of the farmers followed recommended agronomic package of practices. In the main fields farmers used about 120 Kg nitrogen, 60 Kg phosphorus and 40 Kg potassium. Farmers in the district unanimously applied zinc sulphate @ 25 Kg/ha as basal application or sprayed the crop with 5 Kg zinc sulphate and 20 Kg urea/ha to manage Khaira disease in rice. Different equipments like; tractor, power tiller, rotavator and combine harvester were used by the farmers. Shallow wells are the main sources of irrigation in the district.

Yield of rice was expected to be 45-50 q/ha in case of bold and medium grain varieties and 20-25q/ha in case of basmati/scented rice varieties. During survey for diseases and insect-pests, low to moderate incidence of different diseases like sheath blight, BLB, false smut, brown spot, grain discoloration and sheath rot and insect pests like BPH, WBPH, leaf folder, stem borer, rice hispa and gundhi bug were observed. Besides, mysterious rice dwarfing problem with less than 1% incidence was also noticed at few places in the district. Most of the farmers used cartap hydrochloride, Regent (Fipronil 5 SC) and chlorantraniliprole (Coragen) to control stem borer and

thiamethoxam or acephate to manage hoppers. While, carbendazim, hexaconazole, propiconazole, validamycin, azoxystrobin + difenoconazole are some of the fungicides used by the farmers for the management of major diseases of rice. Crop was free from weeds as most of the farmers used pretilachlor (pre-emergence) and bispyribac sodium (Nominee Gold) (post-emergence) at most of the places.

Nainital: The farming system of Nainital district is an integration of food grains, vegetables, fruits and livestock production system. The district is comprised of 4 farming situations namely, Bhabar plain including foot hills, lower hills (rainfed and irrigated), mid hills (rainfed and irrigated) and high hills (rainfed). Crops like rice, wheat, maize, soybean, ragi, grain amaranth, ginger, lentil, pea, tomato, Cole crops, brinjal, bhindi, guava, jackfruit etc. are mainly grown in bhabar and foot hills, while rice, wheat, soybean, maize, tomato, potato, cauliflower, French bean, mango, lime, peach and pear are mainly cultivated in lower hills. In Nainital, production oriented survey was conducted in 10 villages of 3 blocks of two farming situations namely Bhabar plain including foot hills, and lower hills (rainfed and irrigated) at crop maturity. The general weather conditions for rice cultivation were normal. Most of the farmers were sub-marginal. The area under rice cultivation was more in Bhabar as compared to hills. Good crop stand was noticed in Bhabar compared to hilly areas. High yielding varieties like Govind, Pant Dhan 11, PR 113 and HKR 47 were grown by the farmers in Bhabar region, whereas, Govind, VL Dhan 210 and VL Dhan 211 were mainly grown in foot and lower hills in Kotabagh and Ramnagar blocks of Nainital district. Only Bhabar area is irrigated and farmers followed recommended agronomic package of practices. Farmers used about 120 Kg nitrogen, 60 Kg phosphorus and 40 Kg potassium in the main fields. They also applied zinc sulphate @ 25 Kg/ha as basal dose to avoid khaira disease. The average productivity was expected to be around 40-45 q/ha. During survey for diseases, leaf blast was noticed during vegetative phase of the crop while sheath blight in late tillering stage. Neck blast, false smut and brown spot were observed after panicle emergence. Bacterial blight was observed in Bhawar region of the district. The incidence of brown spot was more in rainfed conditions compared to plains. Low to moderate incidence of stem borer and BPH were also observed during the crop season. Farmers in the Bhabar region used cartap hydrochloride, Regent (Fipronil 5 SC) and chlorantraniliprole (Coragen) to control stem borer and bis-pyribac sodium (Nominee Gold) for weed control. However, hilly farmers still continue to grow rice in traditional way.

Prevalence of major diseases and insect pests in Uttarakhand in Kharif 2022

Districts	Diseases								
	BI	NBI	ShBI	BS	FS	ShR	GD	BLB	RD
US Nagar	-	-	L-M	L	L-M	L	L	L-M	L
Nainital	L	L	L-M	M	L-M			L-M	

RD: Rice Dwarfing

Districts	Insect pests					
	SB	LF	BPH	WBPH	GB	RH
US Nagar	L-M	L	L-M	L	L	L
Nainital	L	L	L	L		

West Bengal-1-2022-2023 (Bankura)**Districts surveyed:** Bankura, Purulia and Purba Medinipur**Table 1: Particulars of survey**

Districts	Blocks	Villages
Bankura	Bankura-I and Bankura-II	Belia and Pratappur
Purulia	Purulia II	Kanchanpur
Purba Medinipur	Nandakumar, Mahisadal and Tamruk	Jalpai, Namal, Bhabanipur, Basudevpur, Sarberia and Radhamoni

Table 2: Widely cultivated rice varieties

Districts	Varieties
Bankura	HYVs: Swarna (MTU 7029), BB-11, Lalat, MTU 1017 and others; Scented: Badshabhog; Few are cultivating private hybrids
Purulia	HYVs: Swarna (MTU 7029), GB-1, MTU 1010, Lalat, Super Shyamali, MTU 1001, MTU 1017, Sampriti, BB-11, Sahabhazi Dhan, IR 64, Parijat Ananda and others
Purba Medinipur	HYVs (Kharif): Swarna (MTU 7029), IR 36, BB-11, GS-4, Pratik, Super Shyamali, CR 1009, SS-1, Mali-4, Banstara, Varsha, Gitanjali, Lalat, MTU 1010, MTU 1075, CR-1018, IET 4756, IET 1064, MTU 1017, Rajendra Bhagawati, Santoshi, IET 23467, MTU 1001, Sabita, IET 4786 and MTU 1153, Boro: Lalat, MTU 1010, Super Sankar, IET 4786, GMS-386, Super Lalat, IR 64, WGL-20471, MTU 1156 and some hybrids; Local: Palui, Dudheswar and Raniakundi

Table 3: Particulars of rice areas in the surveyed districts of West Bengal in 2022

District	Total geographic area (ha)	Total cultivable area (ha)	Total cultivated area (ha)	Total irrigated area (ha)	Area under paddy (ha)
Bankura	688100	407850	391110	232074	293060
Purulia	625646	379150	-	87816	346250
Purba Medinipur	430140	340033	304800	190322	250000 (K) 135000 (R)

K= Kharif; R= Rabi

Table 4: Details of weather data in the surveyed districts in 2022

Weather parameters	Months							
	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan
Bankura								
Total rainfall (mm)	158	152	334	199.4	114.5	0	0	0
Purba Medinipur								
Rainy days	19	19	19	20	10	1	5	0
Total rainfall (mm)	389.5	533.9	360.6	812.4	242.9	3.2	48.4	0
Monthly Mean Temp (°C)	30.2	29.7	29.25	29.7	27.7	22.95	20.65	14.9
Maximum temp (°C)	33.2	32.3	31.9	32.7	31.7	29.4	27.5	19.5
Minimum temp (°C)	27.2	27.1	26.2	26.7	23.7	16.5	13.8	10.3

Table 5: General Question of Rice Cultivation In District (To Be Filled By The Cooperator In With The Officials From State Department of Agriculture)

Parameters	Districts		
	Bankura	Purulia	Purba Medinipur
Total Area under HYVs in the district (ha)	254400 ha	346000 ha	230000 ha (Kh) 130000 ha (Rabi)
Most prevalent HYVs in the District	Swarna (MTU 7029)	MTU 7029, GB-1, MTU 1010	MTU 7029, Lalat, MTU 1010, MTU 1075, IET 1064, 4786, IR 64
Total area under rice hybrids in the district (ha)	100 ha	3100 ha	5000 ha
Most prevalent rice hybrids in the district	-	-	PAN Hybrid 102, GMS 2264, Arize 6444
Total area under basmati/scented in the district	-	-	-
Most prevalent basmati varieties in the district	-	-	-
Seed replacement rate	~ 41%	~ 30%	~ 20%
Whether farmers are using any heavy equipments like transplanted/combine harvester	Yes	Very few	Yes; mostly using combine harvester
Mention water saving technologies like SRI/laser leveling/DSR being used by the farmers	SRI	DSR	SRI, DSR in limited area
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	SRI and DSR	Use of Cono weeder	-
What are the general problems in rice cultivation in the district?	Uneven distribution of rainfall	Low yield, drought	Irrigation, drainage and marketing problems
Please provide any farmers association in the district	FPCs	FPC	-
Whether availability of labors is sufficient?	Yes	Yes	Yes
Whether there is any marketing problem of the produce?	Paddy procurement through CPC is not sufficient	Yes	Marketing is a main problem
Any major irrigation/power generation project in the district	Kangshavati and DVC project	Ayodhya Hill hydal project	-
Any soil testing program undertaken?	Unified soil health card	Yes; NMSA	Soil testing program (last 2 years back)
Any farmers' training program was organized by the state department of Ag/ University	Yes	Yes	Yes; By Dept of Agriculture

NMSA: National Mission for Sustainable Agriculture

Production oriented survey was conducted in three rice growing districts of this part of West Bengal viz., Bankura, Purulia and Purba Medinipur when the crops were in dough to maturity stage. Nine villages in 6 blocks were covered during the survey. A total of 49 farmers were contacted during the survey. The details of the survey are presented in Table 1. Most of the fields surveyed were under rainfed (upland or lowland) ecosystem. In general, weather conditions were favourable for rice cultivation. The details of weather parameters in the surveyed area are presented in Table 4. The details of different rice varieties cultivated in different surveyed districts are

presented in Table 2. Predominant rice varieties were Swarna, Lalat, MTU-1017, MTU-1010, GB-1, Super Shyamali, MTU 1001 and Sahabhagi Dhan. Some other varieties primarily found in Purba Medinipur district were IR 36, BB-11, GS-4, Pratik, CR 1009, SS-1, Mali-4, MTU 1075, CR 1018, IET 4756, IET 1064, Rajendra Bhagwat, IET 23467, Sabita, CR 1017, IET 4786 and MTU 1153. Varieties like Lalat, MTU 1010, Super Sankar, IET 4786, GMS 386, Super Lalat, IR 64, WGL 20471 and MTU 1156 were cultivated during boro season. Common crop rotations followed by the farmers were rice-mustard, rice-mustard-fallow, rice-lathyrus, rice-pulse, rice-rice, rice-vegetables, rice-fallow and rice-flowers. The particulars of rice area are presented in Table 3. The details of district wise area of predominant rice varieties are presented in Table 6. The details of rice yield of different varieties in different rice growing districts of West Bengal are presented in Table 8. Average rice in farmers' field ranged from 3500-6000 kg/ha in case of HYVs,

Table 6: Variety wise area coverage (ha) in surveyed districts of West Bengal, Kh 22

Variety/hybrid	Districts		
	Bankura	Purulia	Purba Medinipur
Swarna	225000	96950	20000
Lalat	6000	20770	18000
MTU-1017	23400		17000
MTU-1010		20775	25000
GB-1		41550	
Super Shyamali		6925	12500
MTU 1001		17310	
Sahabhagi Dhan		2770	
IR 64		20670	
Parijat Ananda		10380	
IR 36			8000
BB-11			5000
GS-4			1500
Pratik			2000
CR 1009			10000
SS-1			2500
Mali-4			3500
MTU 1075			15000
CR 1018			3500
IET 4756			8500
IET 1064			13000
Rajendra Bhagwat			5000
IET 23467			10000
Sabita			15000
CR 1017			10000
IET 4786			10000
MTU 1153			5000
Lalat (Boro)			20000
MTU 1010 (Boro)			20000
Super Sankar (Boro)			15000
IET 4786 (Boro)			19000
GMS 386 (Boro)			10000
Super Lalat (Boro)			12000
IR 64 (Boro)			18000

Variety/hybrid	Districts		
	Bankura	Purulia	Purba Medinipur
WGL 20471 (Boro)			8000
MTU 1156 (Boro)			8000
Others		83110	
Hybrids	100	3100	5000
Badsabhog	38478		

Table 7: General informations

Parameters	Districts		
	Bankura	Purulia	Purba Medinipur
# of talukas/blocks covered	2	1	3
# of villages surveyed	2	1	6
# of farmers interviewed	22	10	17
Field ecosystem	Upland (50%); RL (50%)	Upland (30%); RL (70%)	IR (6%), Upland (17%); RL (77%)
Weather conditions during cropping season	Normal; in general favourable for rice cultivation		
Crop stage when survey was made	Maturity (100%)	Maturity (100%)	Maturity (94%); Dough (6%)
Crop rotations	Rice-mustard, rice-mustard-fallow, rice-lathyrus, rice-pulse, rice-rice, rice-vegetables, rice-fallow and rice-flowers		

IR: Irrigated; RL: Rainfed lowland

Table 8: Average yields of different rice varieties as reported by the cooperators/ farmers

Varieties	Yield (kg/ha)			Remarks
	Bankura	Purulia	Purba Medinipur	
Swarna	4500-5250	4500-5250		In some places, good yields were obtained because of proper fertilizer management, good quality seeds and timely planting and low pest and disease incidence
BB-11	4500-5250	4000		
Lalat	4500-4875	3750-4500	5200	
MTU-1017	4500	4500	5400	
Sampriti		5500-5800		
Santoshi			5200-6000	
Palui			3700	
Mali-4			5000-6200	
Banstar			5100	
Varsha			5300-5800	
Gitanjali			4800-5700	
Dudheswar			3500-3900	
Sabita			4900-5600	
G-4			5000-5300	
Raniakundi			3500-3700	

A. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different districts of West Bengal. Majority of the farmers contacted were in the medium income to poor group. Average per capita consumption of rice per month was 6-12 kg rice (Table 9). About 54-80% of the farmers contacted told that their main meal consisted of both rice and wheat (chapatti). All the farmers contacted in Bankura and Purulia told that they preferred parboiled and coarse grain rice while about 80% of the farmers contacted in Purba Medinipur told that they preferred polished rice. In general, there was no change in the food habit except about 40% farmers from Purba Medinipur told that they have included wheat in their diet.

Table 9: Details of rice consumption pattern

Parameters	Districts		
	Bankura	Purulia	Purba Medinipur
Status of farmers	Medium income (45.5%); Poor (54.5%)	Medium income (30%); Poor (70%)	Medium income (64.7%); Poor (35.3%)
Per capita monthly rice consumption (kg)	7-12 kg	6-12 kg	10-12 kg
Composition of main meal	Only rice (45.5%); Rice + Wheat (54.5%)	Only rice (20%); Rice + Wheat (80%)	Only rice (23.6%); Rice + Wheat (76.4%)
Preferred rice types	Parboiled rice (100%)	Parboiled rice (100%)	Polished rice (82.4%); Parboiled rice (6%); Both (11.6%)
Rice grain type preference	Coarse/bold grain (100%)	Coarse/bold grain (100%)	Fine (35.3%); Coarse + fine (64.7%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	Yes (~41%); Wheat is included in diet

Table 10: Details of nursery management

Parameters	Districts		
	Bankura	Purulia	Purba Medinipur
Planting time	Last week July to 2 nd week of August	1 st to 2 nd week of August	2 nd week of July to 1 st week of August
Seed rate	38-45 kg/ha	45 kg/ha	HYVs: 30-45 kg /ha; Locals: 30-60 kg/ha
Seed treatment (% farmers adopted)	No (100% only)	No (100% only)	Yes (29.4%)
Chemicals used for seed treatment	-	-	Carbendazim (2 g/kg); mancozeb (3 g/kg)-dry seed treatment
Organic manure in nursery (% farmers adopted)	Yes (100%) FYM	Yes (100%) FYM	Yes (~12%) FYM
Inorganic manure in nursery (% farmers adopted)	100% adopted Urea (39-45/acre) and 10:26:226 (48 kg/acre) or urea + DAP (24 kg/acre) + MOP (21-24 kg/acre)	100% adopted Urea (39-45/acre) and 10:26:226 (48 kg/acre)	Yes (65%) DAP (24-30 kg/acre) or urea (24-30 kg/acre)

B. Nursery and main field Management: In general, planting was done from middle of July to middle of August. Average seed rate ranged from 30-45 kg/ha. Practice of seed treatment was not very common among the farmers and about 29% of the farmers from Purba Medinipur told that they treated the seeds with carbendazim (2 g/kg) or mancozeb (3 g/kg). All the farmers contacted from Bankura and Purulia applied FYM in the nursery while about 12% farmers from Purba Medinipur applied FYM in the nursery. About 65-100% farmers from different districts applied chemical fertilizers like urea and 10:26:26. Some farmers applied urea, DAP and MOP. Planting was random where proper plant population per unit area was not maintained. Fertilizers were applied @ 20-110 kg N/ha, 12-55 kg P₂O₅/ha and 12-45 kg K₂O/ha. Very few from Purba Medinipur applied zinc sulphate as foliar application (Table 11). All the farmers contacted from Bankura and Purulia applied FYM (1.5-2.1 t/acre). However, comparatively less number of farmers from Purba medinipur applied FYM in the main fields.

Table 11: Details of main field management

Details	Districts			Remarks
	Bankura	Purulia	Purba Medinipur	
Planting method	Random Transplanting (100%)	Random Transplanting (100%)	Transplanting (100%)	Very few adopted line planting in P. Medinipur
Total N applied	60 kg/ha	60 kg/ha	20-110 kg/ha	Urea, DAP, 10:26:26, SSP, MOP
Total P ₂ O ₅ applied	30 kg/ha	30 kg/ha	12-55 kg/ha	
Total K ₂ O applied	30 kg/ha	30 kg/ha	12-45 kg/ha	
ZnSO ₄ applied	-	-	Some (~ 12%) sprayed ZnSO ₄ @ 2-2.5 g/l at tillering stage	Very few applied
Organic fertilizers applied	Yes (100%); FYM (1.5-2.1 t/acre)	Yes (100%); FYM (1.5-1.8 t/acre)	Yes (41%); FYM (1-3 t/acre)	

Table 12: Weeds and weed management

Details	Districts			Remarks
	Bankura	Purulia	Purba Medinipur	
Weed intensity	Low to medium	Low	Low	Hand weeding (1-2) was the main method of weed management
Names of the weeds	Cyperus rotundus (Mutha), Marsilea quadrifolia (Shooshni), Echinochloa colona, some broad leaved weeds			
Weedicides used	None of the farmers contacted applied herbicides.			
Percentage of farmers applied herbicides	Nil	Nil	Nil	
Wild rice incidence	Nil	Nil	Nil	

C. Weeds and their Management: Overall, intensity of weeds was low to medium. The details of different weeds recorded in different districts are presented in Table 12. Weeds were common in most of the fields surveyed. None of the farmers contacted used any herbicide. Most of the farmers practiced one to two hand weeding for managing weeds.

D. Needs of the farmers: Some of the common needs of the farmers were

- Market facility for selling the produce
- Improvement in irrigation and drainage facilities
- Availability of good quality seeds, fertilizers and other inputs
- Availability of agricultural labours during peak agricultural operations
- Drought/submergence tolerant rice varieties
- Short duration rice varieties
- Lodging resistant rice varieties
- Training or technical knowledge on improved rice production technology

E. Input use: Farmers used different equipments like tractor, power tiller, combine harvester, thresher and sprayers (either own or on hire basis) (Table 13). Majority (~ 70%) of the farmers contacted purchased a part of their seed requirement in addition to use of their own seeds. Seed replacement rate in surveyed districts ranged from 20-41%. All the farmers contacted expressed that fertilizers and pesticides were available and they were happy with their quality. In addition to their own decisions, farmers took advices from officials of state department of agriculture and private dealers.

Table 13: Details of inputs used

Details	Districts		
	Bankura	Purulia	Purba Medinipur
Implements used	Power tiller (own or hired), tractor (own or hired), combine harvester (hired), pump set (own or on rent), thresher and sprayers		
Source of seeds	Majority (~ 70%) of the farmers contacted purchased a part of their seed requirement in addition to use of their own seeds		
Source of irrigation	Irrigation source not available; About 72.7% farmers in Bankura and 100 farmers in Purulia expressed scarcity of irrigation water		Canal, shallow and deep tube wells; No scarcity of irrigation water
Availability of fertilizers/pesticides	Available (63.6%)	Available (100%)	Available (100%)
Quality of fertilizers/pesticides	Satisfied (100%)	Satisfied (100%)	Satisfied (100%)
Advisors to the farmers	Own decisions (31.8%); State dept (72.7%); Dealers (13.6%)	Own decisions (10%); State dept (90%); Dealers (13.6%)	Own decisions (82.4%); State dept (94.1%); Dealers (58.8%)

Table 14: Prevalence of diseases and insect pests in West Bengal during *Kharif* 2022

Districts	Diseases								Insects
	BI	NBI	BS	ShBI	ShR	FS	GD	BB	SB
Bankura	L-M (10-25%)	-	L-M (10-20%)	M (20%)	-	-	-	M (15%)	L-M (10-20%)
Purulia	M (15%)	-	M (15-25%)	M (15%)	-	-	-	L-M (5-10%)	L-M (8-20%)
Purba Medinipur	L-M (5-15%)	L (1-5%)	L-S (2-50%)	-	L-M (5-12%)	L (1-5%)	L-M (5-15%)	L-S (5-35%)	L-M (2-15%)

F. Biotic stress and their management: District wise prevalence of different diseases and insect pests are presented in Table 14. Diseases like blast, neck blast, sheath blight, false smut, grain discoloration and insect pests like stem borer were recorded in low to moderate intensities (Table 14). High intensity of brown spot (up to 50% intensity) was recorded on rice varieties like Santoshi, MTU 1017, Gitanjali, Sabita, G-4, Raniakundi, Mali 4 and Dudheswar in different villages in Purba Medinipur. Similarly, high intensity of bacterial blight (30-35%) was recorded in varieties like NTU 10017, Santoshi and Banstara in Namal village in Purba Medinipur. About 47-90% of the farmers contacted in different districts adopted plant protection measures. The details of different pesticides used are presented in Table 15. The number of pesticide application ranged from 1-4 and none of the farmers contacted mixed different pesticides before application.

Table 15: Details of pest Management

Details	Districts		
	Bankura	Purulia	Purba Medinipur
% age farmers adopting plant protection	90.9%	60%	47.1%
Names of pesticides	Insecticides: cartap hydrochloride (9 kg/acre), Hamla (chlorpyrifos 50% + cypermethrin 5% EC) @ 1 ml/l, Ferterra (chlorantraniliprole) @ 3 kg/acre and Regent (fipronil) 2 ml/l for stem borer and other insects Fungicides: Tricyclazole (0.6 g/l) for leaf blast; validamycin (2 g/l) and propiconazole (1 ml/l) for sheath blight; carbendazim + mancozeb (2 g/l) and mancozeb (3 g/l) for brown spot; copper oxychloride (3 g/l) for bacterial blight and Score (difenconazole) @1 ml/l, carbendazim (1 g/l) and Nativo (Tebuconazole + trifloxystrobin) @ 0.4 g/l for different diseases		
# of pesticide sprays	2-4	2	1-2
Mixing of pesticides before application	Nil	Nil	Nil

G. Abiotic and other general problems: There were no zinc or iron deficiency symptoms observed in the surveyed fields. Common problems expressed by the farmers were scarcity of agricultural labours, lack of irrigation facilities, poor market price (selling price is less than cost of cultivation), unavailability of good quality seeds, fertilizers and other inputs, lack of irrigation facilities, high cost of fertilizers and other inputs, lack of technical knowledge, requirement of training and more demonstrations and requirement of drought and submergence tolerant rice varieties

H. Researchable issues: Among the biotic stresses, major problems are brown spot, bacterial blight, sheath blight, leaf blast and stem borer and among abiotic stresses, drought and submergence are the major problems. Farmers want varieties suitable for DSR, short duration varieties, varieties resistant to lodging, varieties resistant/tolerant to above mentioned biotic constraints and biofortified varieties.

Table 15: Researchable issues

Parameters/Issues	Bankura	Purulia	Purba Medinipur
Rice ecology in your area	Rainfed lowland and upland	Rainfed lowland and upland	Rainfed lowland and upland
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif	Kharif	Kharif and Rabi
Number of years of experience in rice farming	10-20 years	10-20 years	>20 years
Main biotic constraints (diseases) in your area according to you	Brown spot, sheath blight	Brown spot, sheath blight and bacterial blight	Brown spot, bacterial blight, leaf blast and grain discoloration
Extent of disease damage	10-25%	10-25%	10-25%; >25%
Main biotic constraints (Insect pests) in your area according to you	Stem borer	Stem borer	Stem borer, BPH
Extent of insect pest damage	10-25%	Below 10%	10-25%; >25%
Main abiotic constrains in your area according to you	Submergence/ drought	Submergence/ drought	Submergence/ drought/flash floods
Production constraints in your area according to you	Lack of irrigation facilities, scarcity of agricultural labours, unavailability of good quality seeds, fertilizers and facilities, poor drainage facilities and poor market price		
Irrigation facilities in your area	No (100%)	No (100%)	Yes (88%); Canal, bore well
Normally how many years it takes to change the rice variety	5-10 years	5-10 years	5-10 years
Any other rice production issues in your area which the rice scientists need to address	-	-	As mentioned in text
What is urgently required in your area as far as rice varieties are concerned			
Duration	Short duration HYVs, long duration varieties with lodging resistance	Varieties suitable for DSR, long duration varieties with lodging resistance	Short duration rice varieties and varieties with lodging resistance
Biotic stress resistance	Varieties with stem borer tolerance and tolerance to brown spot and sheath blight	Varieties with stem borer tolerance and tolerance to brown spot and sheath blight	Varieties with stem borer tolerance and tolerance to leaf blast and bacterial blight
Abiotic stress resistance	Varieties resistant to drought and submergence		
Preferred grain quality	MS grain quality rice varieties	MS grain quality rice varieties	MS grain quality rice varieties
Nutritional quality	Rice varieties with high Zn and iron and low GI		

West Bengal-2-2022-2023 (Chinsurah)**Districts surveyed:** *Nadia, Howrah, Hooghly and Purba Bardhaman***Particulars of survey**

Districts	Blocks	Villages
Nadia	Krishnaganj and Hanskhali	Bhagabanpur, Kalamari, Birnagar, Mahish Nangra and Joypur
Howrah	Uluberia-I	Chikunberia
Hooghly	Polba Dadpur	Pawnan, Unchai, Polba, Belgaria and Kasundipara
Purba Bardhaman	Kalna-I	Mirzapur, Kaikhali, Rampur, Manikhar and Gram Kalna

Widely prevalent rice varieties

Districts	Varieties
Nadia	HYVs: Pratikshya, Lalat, Swarna, Swarna Sub-1, Shatabdi, Kanak, Lal Swarna, MTU 1010 and others; Local: Madhuri and Nayanmani
Howrah	HYVs: GS-4, Santoshi, Swarna, Mali-4, Shatabdi and others; Hybrids: Arize 6444 Gold, Arize 6129 Gold, Bio 453 and PAC 8744; Local: Patnai
Hooghly	HYVs: Poushali, Swarna Mahsuri, Bullet, Ratna, Jamuna, MTU 1017, CR 1017, Shatabdi, Swarna Sub-1, Pratiksha, CR Dhan 800, Rajendra Mahsuri, IET 4096, MTU 1001, MTU 1010 and others; Hybrids: Arize 6201, KRH 2 and others; Local: Gobindobhog
Purba Bardhaman	HYVs: Swarna, Shatabdi (IET 4786), Ratna, Khitish, IR 64, MTU 1010, GB-1, GB-2 and others; Local: Gobindobhog

Table 3: Particulars of rice areas in the surveyed districts of West Bengal during 2022

District	Total geographic area (ha)	Total cultivable area (ha)	Total cultivated area (ha)	Total irrigated area (ha)	Area under paddy (ha)
Nadia	389920.35	272137	775591	682520	173499
Howrah	138676	83176	80200	56748	98200
Hooghly	314300	224506	219826	169261	237946
Purba Bardhaman	542100	400610	391080	360400	374155

Production oriented survey was conducted in four districts of this part of West Bengal viz. Nadia, Howrah, Hooghly and Purba Bardhaman when the crops were in heading to maturity stage. The details of survey are presented in Table 1. A total of 48 farmers were contacted during survey. Most of the fields surveyed were under irrigated ecosystem while some fields were under upland or rainfed lowland ecosystem. In general, weather conditions were not very favourable for rice cultivation as there was incidences of drought like situations in early part of the season resulting in delayed planting (Table 4). The details of different varieties cultivated in different districts are presented in Table 2. The particulars of rice area during 2022 in the surveyed districts are presented in Table 3. Commonly cultivated varieties were HYVs like Swarna (MTU 7029), Lalat, Khitish, Swarna Sub-1, Kanak, GS-4, Bullet, Ratna, Jamuna, MTU 1017, CR 1017, Shatabdi (IET 4786), Swarna Sub-1, Pratiksha, CR Dhan 800, Rajendra Mahsuri, IET 4096, MTU 1001 and MTU 1010

and some local scented varieties like Gobindobhog, Madhuri, Nayanmoni and others. Some farmers in Howrah and Hooghly also cultivated some hybrids like Arize 6444 Gold, Arize 6129 Gold, Arize 6201, KRH 2, Bio 453 and PAC 8744. Variety wise area of selected rice varieties in different surveyed districts are presented in Table 6.

Table 4: Details of weather data in the surveyed districts of West Bengal in 2022

Weather parameters	Months							
	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan
Nadia								
# of Rainy days	05	13	15	11	07	-	-	-
Total rainfall (mm)	67.2	171.2	183.5	361.3	64.0	3.3	0	0
MMT (°C)	29.85	27.88	28.27	29.22	26.15	22.16	18.07	15.29
Maximum temp (°C)	35.21	30.33	32.48	33.65	31.90	29.11	26.03	23.40
Minimum temp (°C)	24.50	25.44	24.07	24.80	20.41	15.22	10.12	7.19
Howrah								
Total rainfall (mm)	193.8	322.7	431.2	316.2	162.44	7.44	92.18	-
MMT (°C)	31.6	28.65	28.6	29.55	27.05	22.3	19.5	NA
Maximum temp (°C)	34.8	32.3	31.4	30.5	30.5	29.1	25.8	NA
Minimum temp (°C)	28.4	25	25.8	28.6	23.6	15.5	13.2	NA
Sunshine hours	4.1	5.3	3.2	2.1	0.9	1.3	1.8	NA
Hooghly								
Total rainfall (mm)	204.04	153.19	243.60	140.05	91.77	0	0	-
Purba Bardhaman								-
# of Rainy days	22	29	26	25	12	0	0	-
Total rainfall (mm)	113.5	103.5	196.1	160.3	83.9	0	0	-
Maximum temp (°C)	34.5	33.7	32.7	33.0	32.6	29.9	28.0	-
Minimum temp (°C)	26.4	26.5	26.7	26.1	23.3	16.6	13.8	-

MMT: Monthly mean temperature

Table 5: General Question of Rice Cultivation In District (To Be Filled By The Cooperator In With The Officials From State Department of Agriculture

Parameters	Districts			
	Nadia	Howrah	Hooghly	P.Bardhaman
Total Area under HYVs in the district (ha)	173174 ha	60,000 ha	237246 ha	328704 ha
Most prevalent HYVs in the District	Swarna, IET 4786	Swarna	Swarna	Swarna
Total area under rice hybrids in the district (ha).	70 ha	400 ha	2357	NA
Most prevalent rice hybrids in the district	Arize 6444 Gold	Arize 6444 Gold Arize 6129 Gold	Arize hybrids, KRH 2	NA
Total area under basmati/scented in the district	Nil	10-20 ha	4375 ha	45451 ha
Most prevalent basmati varieties in the district	Nil	Pusa Basmati 1	Gobindobhog	Gobindobhog
Seed replacement rate	70%	30%	75-80%	NA
Whether farmers are using any heavy equipments like transplanted/combine harvester	Yes; Combine harvester	Yes, Combine harvester	Yes	Combine harvester
Mention water saving technologies like SRI/laser	SRI by some farmers	Negligible	SRI	SRI

Production Oriented Survey-2022

Parameters	Districts			
	Nadia	Howrah	Hooghly	P.Bardhaman
leveling/DSR being used by the farmers				
Whether survey team gave any advice to the farmers during survey? If yes, then what are those	Technical advice	NA	Advised to adopt water saving technologies like SRI, DSR etc	NA
What are the general problems in rice cultivation in the district?	Suitable variety to replace Swarna	-	Late onset and uneven distribution of rainfall	Labour shortage and irregular rainfall
Please provide any farmers association in the district	FPO/FPC existing	8 Nos FPO	35 FPO/FPC registered	NA
Whether availability of labors is sufficient?	Limited availability	Yes	Yes	No
Whether there is any marketing problem of the produce?	No; due procurement by Govt	Yes	No	Yes
Any major irrigation/power generation project in the district	No	NA	Nil	No
Any soil testing program undertaken?	Yes	Yes	Yes	No
Any farmers' training program was organized by the state department of Agriculture/ University	Yes; By State dept. of agriculture	Yes	Yes	Yes

Table 6: Variety wise area coverage (ha) in different districts of West Bengal during *Kharif* 2022

Variety/hybrid	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Swarna	30000	NA	92750	328704
Jamuna			56245	
Pratiksha	20000	NA	18210	
MTU-1010 (Kharif)	20000	NA	14520	
MTU-1010 (Boro)	25000	NA		
MTU 1010 (Aus)	14000	NA		
Shatabdi (Kharif)	13000	NA		
Shatabdi (Boro)	40000	NA		
MTU 1010 (Aus)	10000	NA		
Gobindobhog			4375	45451
CR Dhan 800			3540	
Rajendra Mahsuri			2872	
IET 4786			15588	
IET 4096			3504	
MTU 1001			12417	
Hybrids		400	2357	
Others	5000			8800 ha

Table 7: General information

Parameters	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
# of talukas/blocks covered	2	1	1	1
# of villages surveyed	6	1	5	5
# of farmers interviewed	15	10	10	13
Field ecosystem	Irrigated	Upland (50%); RL (50%)	IR (100%); Upland (20%)	IR (100%); RL (30%); Upland (10%)
Weather conditions during cropping season	Abnormal (60%); Drought	Abnormal (100%); Drought	Abnormal Drought (100%)	Abnormal (20%); Drought
Crop stage when survey was made	Mature	Heading	Mature	Mature
Crop rotations	Common crop rotation practices followed by farmers were rice-mustard, rice-jute, rice-onion-rice, rice-rice-jute, rice-mustard-vegetables, rice-pulses, rice-vegetables-rice, rice-potato-rice, rice-potato-sesame, rice-mustard-rice, rice-fallow and others			

IR: Irrigated; RL: Rainfed lowland

A. Cropping system and rice yield: Farmers adopted different cropping systems. Common crop rotation practices followed by farmers were rice-mustard, rice-jute, rice-onion-rice, rice-rice-jute, rice-mustard-vegetables, rice-pulses, rice-vegetables-rice, rice-potato-rice, rice-potato-sesame, rice-mustard-rice and rice-fallow (Table 7). Average rice yield among different HYVs and hybrids ranged from 3500-7200 kg/ha while in case of aromatic short grains the yield was 3200-5600 kg/ha (Table 8).

Table 8: Average yields of different rice varieties as reported by the farmers

Varieteis	Nadia	Howrah	Hooghly	P. Bardhaman
Pratikshya	4000-5100			
Lalat	4500-4800			
Shatabdi	4100-6600		5400-5600	
Swarna	3500-4800	4700	4950-6400	3500-6000
IET 4786	4500		5400-5600	4500-5400
Lal Swarna	4500			
GS-4		4400-4650		
Santoshi		5000-6100		
Patnai		4500		
Mali-4		5700-5920		
Powhali			7200	
Bullet			6600	
Ratna			6000	5400-5500
Jamuna			7200	
MTU-1017			6600	
IET-7021			4808	
CR-1017			3900	
Khitish				5100-6000
Gobindobhog			3600-5600	
Nayanmoni	3200-3500			
Madhuri	3600			

B. Rice consumption pattern: Survey was conducted on consumption pattern of rice among the farmers in different surveyed districts of this part of West Bengal. Majority (>80%) of the farmers contacted from Nadia and Hooghly were in the medium income group while more than 70% of the farmers from Howrah and Purba Bardhaman were in the poor category. Average per capita consumption of rice per month was 4-15 kg rice. More than 90% of the farmers from Nadia and Purba Bardhaman told that they consumed only rice while about 80% of the farmers contacted from Howrah and Hooghly told that their main meal consisted of both rice and wheat. About 60-100% of the farmers contacted from different districts told that they preferred parboiled rice. On an average, about 43% farmers told that they preferred fine grain rice. In general, there was no change in the food habit.

Table 9: Details of rice consumption pattern

Parameters	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Status of farmers	Medium income (100%)	Medium income (30%); Poor (70%)	Medium income (80%); Rich (20%)	Medium income (15.4%); Poor (84.6%)
Per capita monthly rice consumption (kg)	6.5-15 kg	8-10 kg	4-10 kg	8-15 kg
Composition of main meal	Only rice (93.3%); Rice + Wheat (6.7%)	Only rice (20%); Rice + Wheat (80%)	Only rice (20%); Rice + Wheat (80%)	Only rice (100%)
Preferred rice types	Polished rice (26.7%); parboiled rice (73.3%)	Parboiled rice (100%)	Polished rice (40%); parboiled rice (60%)	Parboiled rice (84.6%); Polished (15.4%)
Rice grain type preference	Fine grain (66.7%); Coarse grain (33.3%)	Fine grain (60%); Coarse grain (40%)	Fine grain (40%); Coarse grain (60%)	Fine grain (7.7%); Coarse grain (92.3%)
Any changes in food habit in last 10 years	No (100%)	No (100%)	No (90%); 10% included wheat	Yes (38.5%) NA

C. Nursery and main field Management: Average seed rate used by the farmers ranged from 30-80 kg/ha for HYVs while in case of hybrids it was 15-20 kg/ha. About 40-60% of the farmers contacted from Nadia, Hooghly and Purba Bardhaman told that they adopted seed treatment with carbendazim (2 g/kg seeds) or mancozeb (2 g/kg). Some farmers told that they treated the seeds with *Trichoderma* formulation. About 50-80% of the farmers contacted from districts Nadia, Hooghly and Purba Bardhaman told that they applied organic manure like FYM, oil cake or poultry manure in the nursery. On an average about 85% of the farmers told that they applied chemical fertilizers like DAP + urea or 10:26:26 in the nursery. Many applied SSP in the nursery. Planting was done from 1st week of July to 3rd week of August. In many areas planting was delayed due to scarcity of rain in early part of the season. In the main fields, fertilizers were applied @ 50-175 kg N/ha, 40-100 kg P₂O₅/ha and 37.5-75 kg K₂O/ha. Many farmers from Howrah district applied zinc sulfate (Table 11). About 30-70% of the farmers contacted from Nadia, Hooghly and Purba Bardhaman applied organic manure like FYM, vermicompost, mustard cake and groundnut cake in the main field.

Table 10: Details of nursery management

Parameters	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Planting time	July to August	1 st to 3 rd week of August	2 nd week of June to 3 rd week of July	1 st week to last week of July
Seed rate	40-70 kg/ha	HYVs (45 kg/ha); Hybrids (15-25 kg/ha)	HYVs (30-60 kg/ha)	30-80 kg/ha
Seed treatment (% farmers adopted)	Yes (60 %)	No (100%)	Yes (40%)	Yes (54%)
Chemicals used for seed treatment	Carbendazim (2 g/kg)	-	Carbendazim (2 g/kg); mancozeb (2 g/kg)	carbendazim (2 g/kg); <i>Trichoderma</i> formulation
Organic manure in nursery (% farmers adopted)	Yes (66.7%); FYM, Oil cake	No (100%)	Yes (50%) FYM	80% (FYM; Poultry manure)
Inorganic manure in nursery (% farmers adopted)	100% adopted SSP (0.2-0.25 kg/sq mt) or urea (500g)+SSP (2 kg)+ MOP (500 gm) per 66 mt ² or 10:26:26 (2 kg/66 mt ²) or DAP (50-75 kg/ha)+ urea (50-100 kg/ha)	100% adopted DAP (22 kg/ha) + urea (28-30 kg/ha)	50% adopted Urea (25 kg/ha) or 10:26:26 (23-25 kg/ha) or SSP (112 kg/ha) + MOP (45-50 kg/ha) or DAP (37.5 kg/ha)	92% adopted Urea (75-150 kg/ha) + 10:26:26 (150 -175 kg/ha) or 10:26:26 (3-3.5 kg/mt ²)

Table 11: Details of main field management

Details	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Planting method	Random Transplanting (80%); Line Planting (20%)	Line Planting (100%)	Random Transplanting (90%); double transplanting (10%)	Random Transplanting (69.2%); Line Planting (30.8%)
Total N applied	85-175 kg/ha	75-100 kg/ha	75-120 kg/ha	50-150 kg/ha
Total P ₂ O ₅ applied	40-100 kg/ha	38-40 kg/ha	40-80 kg/ha	18-60 kg/ha
Total K ₂ O applied	37.5-75 kg/ha	40-50 kg/ha	40-75 kg/ha	30-80 kg/ha
ZnSO ₄ applied	-	80% applied 10-17 kg/ha	-	8% applied 7.5 kg/ha
Organic fertilizers applied	60% applied FYM (~ 2 t/ha)	Nil	70% applied FYM (1.5 t/ha), mustard cake (1.5q/ha); GN Cake (75 kg/ha)	31% applied FYM (3 t/ha); vermicompost (750 kg/ha)
Fertilizers applied	Fertilizers like urea, DAP, SSP, MOP, 10:26:26 etc were applied by the farmers			

Table 12: Weeds and weed management

Details	Districts				Remarks
	Nadia	Howrah	Hooghly	P. Bardhaman	
Weed intensity	Low to high	Medium	Low to medium	Medium	Weeds were common in most of the fields surveyed
Names of the weeds	<i>Cyperus rotundus</i> , <i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Marsilia quadrifolia</i> , <i>Digitaria</i> spp., Chirekota grass (Local name), <i>Cynodon dactylon</i> , <i>Pontederia crassipes</i> (formerly <i>Eichhornia crassipes</i>), Ulu grass (<i>Imperata cylindrica</i>) and some unidentified grasses and sedges				
Weedicides used	Pretilachlor (Prince), Saathi, Pendimetalin, bispyribac Sodium (Nominee Gold), paraquat (general non specific weed killer)				Most of the farmers adopted hand weeding in addition to herbicide application
Percentage of farmers applied herbicides	73.3%	Nil (only Hand weeding)	90%	~31%	
Wild rice incidence	Nil	Nil	Nil	Nil	

D. Weeds and their Management: Overall intensity of weeds was low to medium except in Nadia where weed intensity was recorded high in some places. Common weeds observed in and around rice fields were *Cyperus rotundus*, *Echinochloa colona*, *Echinochloa crusgalli*, *Marsilia quadrifolia*, *Digitaria* spp., Chirekota grass (Local name), *Cynodon dactylon*, *Pontederia crassipes* (formerly *Eichhornia crassipes*), Ulu grass (*Imperata cylindrica*) and some unidentified grasses and sedges. Hand weeding was a common practice for weed management in the surveyed districts. However, some (30-90%) of the farmers in Nadia, Hooghly and Purba Bardhaman used herbicides like pretilachlor, Saathi (pyrazosulfuran Ethyl), Pendimetalin, bispyribac Sodium and paraquat for weed control (Table 12).

E. Specific needs of farmers: Some of the common needs of the farmers were proper supply of electricity for irrigation, subsidy in fertilizers and seeds, availability of solar pump and biofertilizers, improvement in irrigation facilities, timely availability of power tillers and tractors on hire basis, proper availability of labours, timely availability of seeds and other inputs and technical knowledge in vermicompost preparation.

F. Input use: Implements like tractor, power tiller, sprayer, combine harvester, pump set and paddy threshers were used by the farmers. Progressive farmers owned these instruments and others used these implements on hire basis. 30-100% farmers in different districts told that they purchased part of their seed requirement. Deep tube wells, canal and shallow tube wells were the main sources of irrigation (Table 13). Many farmers in Howrah district told that there was scarcity of irrigation water. Majority of the farmers contacted told that fertilizers and pesticides were available in time and they were happy with their quality. In addition to their own decisions, farmers received advices from officials of state department of agriculture and private dealers.

Table 13: Details of inputs used

Details	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Implements used	Implements like tractor, power tiller, sprayer, combine harvester, pump set and paddy threshers were used by the farmers. Progressive farmers owned these instruments and others used these implements on hire basis			
Source of seeds	30-100% farmers in different districts told that they purchased part of their seed requirement			
Source of irrigation	Canal (46.7%), Deep tube well (26.7%) and other sources	Deep tube well (30%); Shallow tube well (70%)	Deep tube well (70%); Shallow tube well (80%)	Canal (38.5%), Deep tube well (15.4%), Shallow tube well (23.1%); river (23.1%)
Scarcity of irrigation water	Yes (20%)	Yes (100%)	No (100%)	Yes (~24%)
Availability of fertilizers/pesticides	Available (93.3%)	Available (100%)	Available (90%)	Available (77%)
Quality of fertilizers/pesticides	Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)
Advisors to the farmers	State dept (60%); Dealers (40%)	State dept (60%); Dealers (40%)	Own decisions (10%); State dept (70%); Dealers (100%)	Own decisions (30.1%); State dept (92.3%); Dealers (76.9%)

Table 14: Prevalence of diseases and insect pests in West Bengal during *Kharif* 2022

Districts	Diseases						
	BI	NBI	ShBI	BS	ShR	FS	BLB
Nadia			L-M (5-15%)	L-M (8-20%)	L-M (5-10%)	L (5%)	L (5%)
Howrah	M (10-25%)	L-M (5-10%)		M (10-15%)		L (5%)	
Hooghly	L-M (5-15%)	L-M (5-15%)	M (10-20%)	L-M (5-15%)	L-M (5-15%)	L (2-5%)	L (5%)
Purba Bardhaman	L (2-5%)	L (2-5%)	M (10-20%)	L (5-8%)	L-S (5-30%)	L-M (2-10%)	

Districts	Insect pests						
	SB	LF	BPH	WBPH	GLH	ECC	RH
Nadia	M (15-20%)		M (15-20%)				L (5%)
Howrah	M (10-20%)						
Hooghly	M-S (10-30%)	L-M (2-15%)	M (10-20%)	L-M (5-10%)	L-M (5-10%)		
Purba Bardhaman	L-S (5-40%)	L-M (5-10%)	S (30-50%)	M-S (10-30%)	L-M (5-10%)	L-M (5-10%)	

ECC: Ear cutting caterpillar

G. Biotic stresses and their management: The details of occurrence of different diseases and insect pests are presented in Table 14. Overall, the incidences of different diseases were low to moderate except high incidence of sheath rot was recorded in some fields in Purba Bardhaman. Among insect pests stem borer was very wide spread in moderate to high intensity. High intensity of stem borer damage (up to 40%) was recorded in Pawnan village in Hooghly and Mirzapur in Purba Bardhaman on varieties like Swarna. Similarly, high intensity of BPH (up to 50%) was recorded in villages like Mirzapur, Kaikhali, Manikhar and Gram Kalna in Purba Bardhaman district on varieties like Swarna and Khitish. High incidence of WBPH was noticed in some fields in Mirzapur in Purba Bardhaman district on Swarna variety. On an average 85% of the farmers applied different pesticides for management of different pests and diseases. The details of different pesticides used by the farmers are presented in Table 15. The number of spraying/pesticide application ranged from 1-4 and very few of the farmers contacted in Nadia and Purba Bardhaman mixed 2 different pesticides before application.

Table 15: Details of pest Management

Details	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
% age farmers adopting plant protection	93.3%	100%	100%	46%
Names of pesticides	Insecticides: Ferterra (4 kg/acre), lamda cyhalothrin 5%EC (2.5 ml/l), phosphamidon (2.5 ml/l), Coragen (0.3 ml/l), cartap hydrochloride (1-2 g/l) and emmamectin benzoate (1.5 ml/l) for stem borer and leaf folder; imidacloprid (0.3 ml/l), Tarzan (imidacloprid 0.03% GR), Panther (alphamethrin) (10g/15l) and Lancer Gold (Acephate 50% + Imidacloprid 18% SP) for BPH and WBPH Fungicides: carbendazim (1 g/l) and carbendazim + mancozeb (1.5 g/l) for brown spot; validamycin (1 ml/l), Bavistin (1 g/l), propiconazole (Topaz: 1 ml/l), tebuconazole (2 ml/l) and Amister Top (2 ml/l) for sheath blight; hexaconazole/Boxar (625 ml/ha) and tricyclazole (0.6 g/l) for leaf blast, brown spot and false smut			
# of pesticide sprays	1-4	2	1-2	2-4
Mixing of pesticides before application	Yes (20%) 2 pesticides	Nil	Nil	Yes (23.1%) 2 pesticides

H. Researchable issues: Among the biotic stresses, major problems in the region are brown spot, leaf and neck blast and sheath blight among the diseases and stem borer and BPH among the insect pests. Among the abiotic problems, Submergence/ drought/flash flood was the main problem. Major problems faced by the farmers were scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs. Farmers want short duration rice varieties, medium to long duration varieties with lodging resistance, varieties having tolerance to sheath blight and BPH, varieties having tolerance to submergence and drought, MS grain varieties and varieties with high iron and protein.

Table 15: Researchable issues

Parameters/Issues	Districts			
	Nadia	Howrah	Hooghly	P. Bardhaman
Rice ecology in your area	Irrigated	Upland Rainfed lowland	Upland, rainfed lowland	Irrigated; rainfed lowland
Rice cultivation only in Kharif or both Kharif and Rabi	Kharif + Rabi			
Number of years of experience in rice farming	> 20 years	10-20 years	10-20 years	> 20 years
Main biotic constraints (diseases) in your area according to you	Brown spot Sheath blight	Leaf and neck blast, Brown spot	Leaf and neck blast, Brown spot, sheath blight	Sheath blight
Extent of disease damage	10-25%	10-25%	10-25%	<10-25%
Main biotic constraints (Insect pests) in your area according to you	Stem borer BPH	Stem borer	Stem borer, BPH and leaf folder	BPH; leaf folder
Extent of insect pest damage	10-25%	10-25%	10-25%	25-50%
Main abiotic constraints in your area according to you	Submergence/ drought	Submergence/ drought	Submergence/ drought/flash flood	Submergence/ drought
Production constraints in your area according to you	Scarcity of agricultural labours, lack of irrigation facilities, unavailability of quality seeds and other inputs,			
Irrigation facilities in your area	Available; Bore well, river	Available; Bore well, river	Available; Bore well, river	Available; Canal
Normally how many years it takes to change the rice variety	5-20 years	5-10 years	10-20 Years	5-10 Years
Any other rice production issues in your area which the rice scientists need to address	BPH problem			
What is urgently required in your area as far as rice varieties are concerned				
Duration	Medium to long duration varieties with lodging resistance; short duration varieties			
Biotic stress resistance	Varieties tolerant to sheath blight and BPH			
Abiotic stress resistance	Varieties with resistance to submergence and drought			
Preferred grain quality	MS grain rice varieties			
Nutritional quality	Varieties with high iron and high protein			

Abbreviations:

Bl- Blast, NBl- Neck Blast, BS- Brown spot, ShBl- Sheath blight, ShR- Sheath rot, FS- False smut, LS- Leaf scald, StR- Stem rot, GD- Glume discoloration, NBLS- Narrow brown leaf spot, BaK- Bakanae, KSm- Kernel smut, UDB- Udbatta, KH- Khaira, BB- Bacterial leaf blight, BLS-Bacterial leaf streak, RTV- Rice tungro disease, SRBSDV-Southern rice black-streaked dwarf virus

BPH-Brown Plant Hopper, WBPH- White Backed Plant Hopper, GLH- Green Leaf Hopper, LF- Leaf Folder, SB- Stem Borer, GM- Gall Midge, RH- Rice Hispa, WM- Whorl Maggot, GH- Grass Hopper, CW- Case Worm, GB- Gundhi Bug, PM- Panicle Mite, MT- Mite, RB- Rice Bug, AW- Army Worm, WTN- White Tip Nematode, TERM- Termite, RT- Rice Thrips, HCP- Horned Caterpillar, MB- Mealy Bug, LH- Leaf Hopper, WG- White Grub, STB-Stink bugs

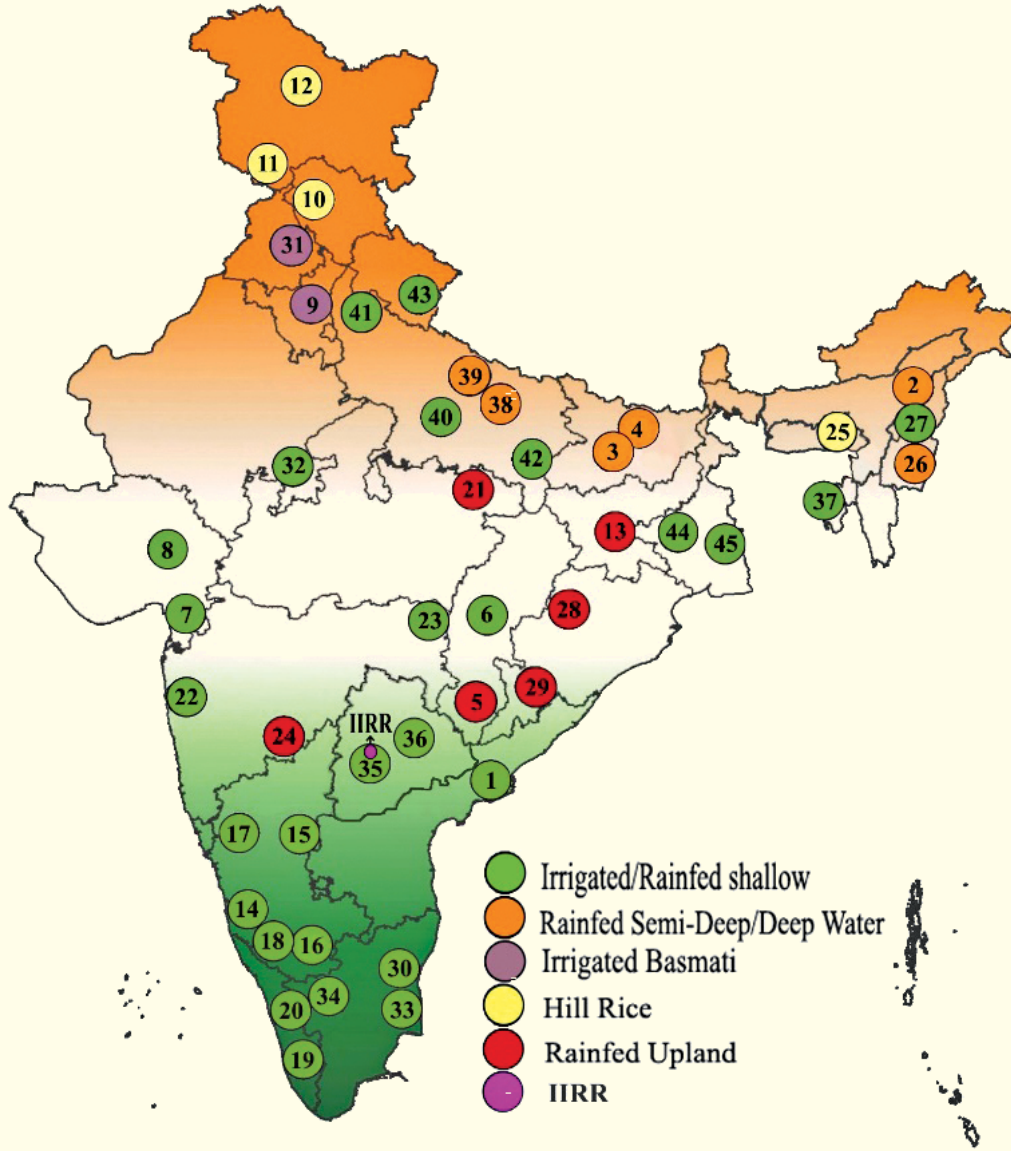
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