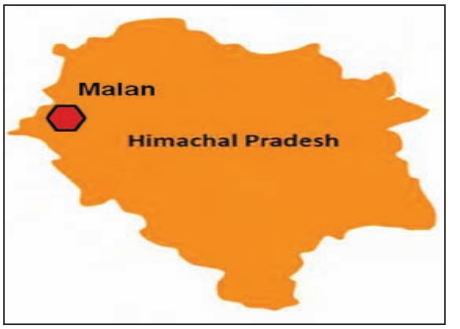
MALAN

Rice and Wheat Research Centre, Kangra
CSK Himachal Pradesh Krishi Vishvavidyalaya
Himachal Pradesh

The rice and wheat research center at Malan was established in Kangra district in 1970 under CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur. The main mandate was development of high yielding varieties for favourable irrigated environments in mid to low altitude areas. And also to rejuvenate and improve red rices adapted to cooler climates in mid to high altitude areas of the state from 1000 to 2000 m altitudes.



Major Contributions to AICRIP

Crop Improvement

Varieties/hybrids identified/released

- Till date twenty three rice varieties were developed in different agro climatic conditions by this centre for commercial cultivation. During 2001-2014, seven new rice varieties namely HPR 2143, HPR 1068, HPR 2612 (Palam Basmati 1) and HPR 2720 (Palam Lal Dhan 1) for irrigated areas in mid hills (650 to 1500m); Sukara Dhan 1 for rainfed areas in mid-hills (650 to 1300m); and Bhrigu Dhan (a red rice variety) & Varun Dhan japonica varieties for high hills of HP were released by the State Variety Release Committee for general cultivation in the State. Sukara Dhan 1 was released by the Central Variety Release Committee also for rainfed upland areas of HP, Meghalaya and Uttaranchal. Bhrigu Dhan is a japonica line released in high altitude areas (above 1000m) of the state particularly in Kullu Valley and parts of Mandi and Shimla districts where people prefer short grain, low amylose sticky rice.

Rice varieties & hybrids released during 1970-2014

Name	Year	Adaptability	Maturity (Days)	Av.Yield (q/ha)
Varieties				
T 23*	1971	Irrigated (<1000 m)	140-145	25-30
IR 579*	1975	Irrigated (<1000 m)	140-145	40-45
Himdhan*	1978	Irrigated (<1000 m)	130-135	35-40
Himalaya 1*	1982	Irrigated (mid-hills)	115-120	40-45
Himalaya 2*	1982	Irrigated (mid-hills)	120-125	35-40
Himalaya 741*	1986	Irrigated & rainfed (mid-hills)	115-125	38-42
Himalaya 799*	1992	Irrigated (<1000 m)	120-125	37-40
Naggar Dhan*	1992	Irrigated (>1400m)	135-140	35-40
RP 732*	1992	Irrigated (mid-hills)	130-135	50-55
Himalaya 2216*	1994	Irrigated (mid-hills)	125-130	38-42
RP 2421*	1994	Irrigated (mid-hills)	120-125	37-40
Kasturi	1994	Irrigated (<1000 m)	135-140	30-35
VL Dhan 221	1994	Rainfed (mid-hills)	100-105	25-30
Palam Dhan 957*	2000	Irrigated (mid-hills)	125-130	40-42
Hassan Serai*	2000	Irrigated (<1000 m)	120-125	28-32
Sukaradhan 1	2004	Rainfed (mid-hills)	115-120	28-32
HPR 2143	2005	Irrigated (mid-hills)	125-130	35-40
HPR 1068	2005	Irrigated (mid-hills)	120-125	38-45
Bhrigu Dhan	2005	Irrigated (>1400 m)	150-155	33-44
Varun Dhan	2007	Irrigated (>1400 m)	140-145	25-36
Palam Lal Dhan 1 (Improved Begmi)	2013	Irrigated (>1000 m)	130-135	35-40
Palam Basmati 1 (HPR 2612)	2013	Irrigated (>1000 m)	125-130	40-45
HPR 2656		upland condition		
Hybrids				
HRI 152 (ARIZE 6129)	2007	irrigated upto 1000m		
Arize Swift		up to an altitude of 1000 m		

Note: * Susceptible to the leaf and neck blast

- Collection, evaluation, maintenance and characterization of hill rice germplasm: Out of 500 germplasm lines contributed by the center to National Germplasm Bank in 1977, 189 were received back from NBPGR and 172 lines are being maintained. Every year the local germplasm collected from different parts of the state is being grown for maintenance, evaluation, characterization and use in crosses.





Bhrigu Dhan


Crop Production

Agronomy

- A new recommendation for upland rice includes sowing of rice crop in rows of 20 cm apart using 60 kg graded seed ha^{-1}. For broadcast method of sowing, the seed rate should be enhanced to 80 kg ha^{-1}.
- A large area of rice cultivation in HP is done with the direct sowing of sprouted seeds under puddled conditions while transplanting is practiced in areas having assured irrigation facilities. For managing weeds in these eco systems, use of Pyrazosulfuron ethyl @ 0.025 kg a.i. ha^{-1} applied at 8-12 days after sowing (DAS) for direct seeded sprouted rice and 8-12 days after transplanting (DAT) for transplanted rice was recommended for controlling grassy, broad leaved weeds and sedges under both sets of conditions.
- First fortnight of June is the optimum time for sowing of rice under aerobic conditions. Any delay in sowing results in significant reduction in yield.
- Pre-emergence application of Flucetosulfuron 20 g ha^{-1} (2 – 3 days after transplanting, DAT) or post – emergence application of Bispyribac sodium 25 g ha^{-1} (15 – 20 DAT) or Penoxsulam + Cyhalofop-butyl 135 g ha^{-1} (15 – 20 DAT) were found to be highly effective in managing weeds in transplanted rice and found better than Butachlor 1500 g ha^{-1} (5 – 7 DAT).

- In direct seeded rice grown under puddled irrigated conditions, post emergence application of Bispyribac sodium + Metamifop 70 g ha^{-1} used with or without wetter gave best control of weeds.
- A number of trials were conducted every year to evaluate the performance of promising genotypes of rice in AVT - 2 (Advanced Varietal Trials - 2) under varying nitrogen levels in both direct seeded upland conditions as well as irrigated transplanted conditions (early and medium maturing genotypes).
- Method of rice establishment trials over years revealed that the transplanting gave significantly higher grain yield while lowest yield was recorded with the zero tilled direct seeding.
- Addition of green manure (dhaincha / sunhemp) along with recommended fertilizer dose resulted in significantly higher grain yield of rice.

Crop Protection

Entomology

Emerging pests - For the first time hopper burn due to mixed populations of WBPH and BPH was observed in mid hills of the state during 2007. Chaffer beetle adults hither to unknown pest has become a major pest which feeds on the rice panicle during milky stage. White tip nematode was found to be associated with rice crop at nursery stage. Root-knot nematodes are becoming an alarming problem in rice-wheat eco-system. Black beetle found to damage upland crop during nursery stage. Hispa emerged as a major pest causing severe damage in many districts.

Hopper burn in farmers fields

Hispa adults and damage

Chemical control measures recommended for various pests after evaluation:

- Rice hispa: Spray chlorpyriphos 20EC (0.05%) 1250 ml /ha at 10 DAT or 40 days old crop (direct sown), followed by another spary of chlorpyriphos (0.05%) or Neemazal (0.3%) or Econeem (0.5%) after 40 days of first spray.
- Stem borer: Apply carbofuron (Furadon 3 G) by broadcasting in 3-4 cm deep standing water @ 1 kg a.i./ha at 10 days after transplanting, if necessary spray 500 ml methyl parathion in 500 water/ha.

- Leaf folder: Clip-off the affected leaves. Remove graminaceous weeds. Spray 1250 chlorpyriphos 20 EC (0.05%) or 835 ml monocrotophos 36 EC (0.06%) in 500 L water /ha on the appearance of pest.
- Planthoppers (WBPH & BPH): Monitor the rice fields at weekly intervals to notice the appearance of the pest; spray carbaryl 50 WP @ 1500 g/ ha or monocrotophos 1500 ml /ha; repeat application if hopper population persists beyond a week after application; and while spraying nozzles should be directed at the basal portion of the plants.
- Chaffer Beetle: Spray Cypermethrin 10 EC @ 625ml per hectare or Chlorpyriphos 20EC @ 1250 ml per hectare at panicle emergence stage.
- Case worm: Spray Spinosad 45EC @ 125ml in 500 litre water per hectare at the emergence of pest.

Chaffer beetles & damaged grains

Caseworm damage, adult & cases

Plant Pathology

- Blast, false smut, glume discolouration and brown spot are the major constraints in the rice production in the State. Of late, bacterial leaf blight and sheath blight, diseases of tropics have started appearing in mid-hills of the State while minor diseases of rice *viz.*, sheath rot, leaf scald and narrow brown leaf spot are also regularly appearing during the crop season.

Control measures developed under rice pathology programme:

- ***Rice blast:*** Use of resistant varieties coupled with seed treatment with tricyclazole (Beam 75WP) or carbendazim (Bavisitin 50WP) @ 2g/ kg seed. Spray of carbendazim (0.1%) at tillering, panicle initiation and booting stages or tricyclazole (0.06%) at panicle initiation and booting stages.
- ***False smut:*** Two sprays of copper oxychloride 50 WP @ 0.3% at heading and 10 days thereafter.

- Grain discoloration: First spray of Bavistin 50WP @ 0.1% at the time of earhead emergence, second spray of Indofil M45 @ 0.25% 10 days after and third spray of Blitox 50WP @ 0.3% 10 days after second spray.
- ***Brown spot:*** Two sprays of propiconazole (Tilt 25 EC) at 45 and 65 days after transplanting.
- Field monitoring of virulence's: Field monitoring of virulences in Pyricularia grisea has also been the important part of the rice pathology programme at this centre which helps knowing the extent of variation within the blast pathogen at the centre.

Screening of rice germplasm in Uniform Blast Nursery

Blast infected seedlings of rice in UBN

- **Identification of new molecules against location specific diseases:** New molecules promising against blast include, tricyclazole (Beam 75WP), Metominostrobin 20 SC, RIL 013/F1 35 SC, Kasu B 3 SL, Protéga 300 SC, Rhizocin 3 L, Biofer, Defender, Florezen- P, Trichozen- T, Sivic 75 WP, Kitazin 48 EC, Hexaconazole 75 WG (RIL-012/F1), kresoxim methyl 40% + Hexaconazole 8% WG (RIL-068/F1 48WG), Azoxystrobin 25 SC (Amistar), Kresoxim methyl (Ergon 44.3SC), Trifloxystrobin 25% + Tebuconazole 50% (Nativo 75 WG), Tricyclazole 45% + Hexaconazole 10% (ICF-110), Tricyclazole 18% + Mancozeb 62% WP (MERGER) etc.
- **Integrated disease management:** Integrated disease management trials have also been conducted by combining different disease management practices like adoption of resistant/ moderately resistant varieties/ locally released hybrids, recommended dose of fertilizers coupled with need based application of chemicals (tricyclazole 75 WP) which are effective for the management of rice blast.