PATTAMBI

Regional Agricultural Research Station
Kerala Agricultural University
Kerala

This station established in 1963 under Kerala Agricultural University was one of the co-operating AICRIP center since the start of the project. Testing the adaptability and suitability of improved varieties in various trials.

Major contributions to AICRIP

Crop Improvement

Plant Breeding

- Efforts for yield improvement, initially improvement of traditional rice varieties resulting in the release of 34 improved traditional varieties with an average yield of 800kg/ha to 2500kg/ha. These improved traditional varieties are known nationally and internationally as donors for biotic and abiotic stress resistance breeding.
- PTB 10- Thekkancheera, very short duration variety posses' gene for high photosynthetic efficiency is utilized throughout the world in hybridization programmes.
- PTB- 33 is another important donor variety, carrying genes against 3 biotypes of BPH. PTB 18, PTB 21 are also worth mentioning as donors of multiple resistance.
- Annapoorna (PTB 35) is the first short duration high yielding variety of India, developed through hybridization released in 1966 from Pattambi. Subsequently

24 high yielding varieties suitable for different rice ecosystems were released from this station.

- Jayathi (PTB 46) is an internationally known high yielding multiple resistant variety released from Pattambi.
- Hybrid rice research programme was launched to identify effective maintainers or restorers for CMS lines. KAURH2, a white kernelled hybrid has been developed.
- Many varieties with abiotic stress tolerance were also released from this station. PTB 47 and PTB 48 (Neeraja and Nila) are high yielding varieties with tolerance to deep water submergence. PTB 42, 43 and 55 are drought tolerant suitable for upland rice cultivation. PTB 44 (Rashmi) is mutant with salinity resistance. Mangala Mahsusri (PTB 53) and Karuna (PTB 54) are tolerant in iron toxicity and shallow flooding.
- Collection, conservation, characterization and evaluation of rich genetic diversity of rice was initiated in this station.
- Genetic Stocks Registered: Two of the varieties, Athira and Harsha have been registered with PPV&FR Authority.

Recently released varieties

Swetha (PTB 57)
Released in 2002. Semi tall, non lodging, medium tillering, erect and photoperiod insensitive variety, suitable for transplanting during second crop season. Duration is 140-145 days. Grains are straw coloured with white kernels (milling % 71.5). Moderate resistance to gall midge and stem borer, low susceptibility to blast, brown spot, sheath blight and sheath rot with a grain yield of 4.5 - 5.0 tonnes/ha

Anashwara (PTB 58)
Photosensitive, semi-tall non-lodging variety with red, medium bold grains. Duration of 125-130 days. Moderately resistant to blast, sheath blight, leaf folder, stem borer and gall fly. Released in 2007 by 'γ' irradiation of PTB 20 has excellent cooking quality.

Samyuktha (PTB 59)

Photo-period insensitive, medium tillering variety of 112 - 117 days duration. This short-bold red kernelled rice variety is moderately resistant to major pests of rice crop. Released in 2010. It is non-lodging in the koottumundakan system of cultivation, with non-shattering grains and moderate dormancy.

Vaishakh (PTB 60)

Red, short bold variety with 117- 125 days duration. Suitable for direct seeding during kharif season in uplands. Tolerant to moisture stress. Moderately resistant to blue beetle, stem borer and whorl maggot.

Released varieties from RARS Pattambi with AICRIP tested data

Sl. No.	Variety	Year of Release	IET No.
1	Annapoorna (Ptb 35)	1966	
2	Rohini (Ptb 36)	1971	
3	Aswathy(Ptb 37)	1971	
4	Triveni (Ptb 38)	1971	11747
5	Jyothi(Ptb 39)	1974	2700
6	Sabari(Ptb 40)	1974	2236
7	Bharathi(Ptb 41)	1974	16707
8	Suvarnamodan(Ptb 42)	1978	
9	Swarnaprabha(Ptb 43)	1985	8301
10	Rasmi(Ptb 44)	1985	7344
11	Matta Triveni (Ptb 45)	1990	
12	Jayathi (Ptb 46)	1990	
13	Neeraja (Ptb 47)	1990	11525
14	Nila (Ptb 48)	1992	
15	Kairali(Ptb 49)	1993	12419
16	Kanchana(Ptb 50)	1993	13636
17	Aathira (Ptb 51)	1993	12888
18	Aiswarya (Ptb 52)	1993	12421

Sl. No.	Variety	Year of Release	IET No.
19	Mangala Mahsuri (Ptb 53)	1995	14083
20	Karuna (Ptb 54)		
21	Harsha (Ptb 55)	2001	16707
22	Varsha(Ptb 56)	2002	16709
23	Swetha(Ptb 57)	2002	14735
24	Anashwara(Ptb 58)	2006	17608
25	Samyuktha (Ptb 59)	2010	22127
26	Vaishakh (Ptb 60)	2010	22128

Crop Production

Agronomy

- Experiments on INM were conducted with organic and inorganic manures to find out the sustainable productivity of rice in acid sandy loam soils during two main cropping seasons.
- Experiment on growing cowpea and sunhemp as intercrops in dry sown rice so as to meet the green manure requirement indicated significant improvement in grain yield due to the intercropping and subsequent incorporation of cowpea, whereas sunhemp did not show promising.
- Either liming at 600 kg/ha or 100 kg of silica was needed to ameliorate the acidic soils and improve the fertilizer use efficiency in Kerala.
- A study conducted during 1971-74 to find out the water requirement of transplanted lowland rice revealed that the water requirement of rice from transplanting to the milky stage of grain was about 1700mm and consumptive use of water amounted to 821.7 mm.
- Agronomic practices like line sowing of adequate quantity of seed rate of 60 kg/ha, using vermicompost with 50% NPK fertilizers, N in 3 splits (50% at 15 DAS, remaining 50% in two equal splits at maximum tillering and panicle initiation stage), mechanical row seeding were found to be promising in increasing the grain yield of rainfed upland rice.
- Chemicals like Butachlor, 2, 4-D and c-18649 were very effective over normal practice of weed control. Bispyribac-sodium@25 or 30 gai/ha applied 15-20 DAT (Days After Transplanting) gave excellent control of most of the annual grasses, sedges and broad leaved weeds and it was recommended for inclusion in Package of Practices
- The influence of physiological age of seedlings on growth and productivity of rice was studied using both short and medium duration varieties in 1974-76. The older seedlings produced larger number of panicles per square meter.

Plant physiology

- Plant physiology experiments were started at the station during 2005-2006 onwards. Higher N levels definitely had a higher yield but in terms Among the entries tested, Ajaya was found to possess good responsiveness to N- levels coupled with higher yield followed by NDR 359 and PA 6444 then followed by BPT 5204 and Vasumati.
- Popular high yielding varieties were evaluated for heat unit requirement during various growth phases as influenced by photoperiod and thermal regimes. Late sown set entries recorded less cumulative day period and cumulative night period requirement for maturity and recorded low yield when compared with early sown sets.

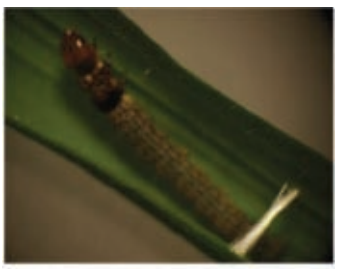
- Four entries namely, DRRH 1, KRH-2, Hyb-6444 and Jaya (check) were evaluated for the effect of maintaining soil water status at saturation level as a measure of water saving technique to normal practice. The treated set had recorded lower RWC values and plant height and lesser number of days to general flowering. Yield components were also reduced in treated entries namely tiller number, panicle number, spikelet number and grains per square meter.
- Aerobic study on rice revealed that Rasi, PA 6201, Harsha and Kanchana can perform better under aerobic condition without any yield reduction by saving 40-50% of water, with alternate weekly wetting and drying cycles, starting from 15 days after planting to maturity.
- Application of boron as boric acid@0.8 ppm significantly increased the grain yield. Boron application resulted in 9.2% increase over the control.
- Soil application of silicon solubilizer, imidazole (1.5%) and sodium potassium silicate (1.0%) during vegetative and panicle initiation stage improved the grain yield and resistance to stem borer.
- The genotypes KRH-2 and IET-21577 showed more tolerance under high temperature stress in terms of number of filled grains /panicle.
- IET23383 and IET24084 have been identified as drought tolerant lines suited for rain-fed upland condition.
- N-22 has been identified as a heat tolerant with 87.7% spikelet fertility under high temperature conditions (38-42°C).
- IET 22100 and IET 21582 are moderately tolerant to high temperature conditions.

Crop Protection

Entomology

- ***New Records of pests:*** Whorl maggot and thrips during 1971-72; Pink stem borer, *Sesamia inferens, Chilo fuscifluora, Brachmia arotrae, Leptocorisa pseudolepida* during 2005-08*; Apsilops scotinus* (Tosquinet) (Ichneumonidae: Hymenoptera) found parasitizing larvae of case worm reported first from India during 2013-14.

White stem borer, *Chilo fusciflora*



Leaf folder, *Brachmia arotrae*

Case worm larval parasitoid, *Apsilops scotinus*

- Host plant resistance studies: PTB2, 9, 25, 26 , 32, 44, KAU 8770, 8759, 8775 RPW 6-13 and RPW 6-17showed consistent resistance to gall midge. PTB 12, 16, MO -15-6-3, NDR -118, Cul.93 showed consistent resistance with below 10% dead heart damage. IR8, PTB 33, GEB 24, Co 29, TNAU LFR FR-831311, OR-142-93, Tarori Basmati and W1263 showed resistance to leaf folder. PTB 7, 10, 12, 18, 19, 20, 21, 33, 34, Cheriya chiteeni, Parakulam, Velluthacheera, KAU cultures viz., 9401-2, 9409-6, 9409-12, F3-11-3, F5-23-2, C3-2 (KM) showed resistance to BPH. PTB 4, PTB 9, PTB 12, PTB 18, PTB 20, PTB 28, Rohini were found resistant to blue beetle.
- *Insecticides evaluated:* Seedling root dip with chlorpyiphos 20% EC @ 0.02% ; Carbofuran 3G @ 1000 g a.i/ha, Phorate 10G @ 25kg a.i.ha and carbosulfan 6G @ 1000 g a.i.ha was recommended against gall midge. Cartap hydrochloride 4 % G @ 1000 g a.i.ha, Carbosulfan 6 G @ 1000 g a.i.ha, Flubendiamide 480 SC @ 25 ga.i./a, Flubendiamide 20% WDG @ 24 ga.i./ha, Indoxacarb 14.5%SC@ 30 ga.i/ha, Spinosad 45% SC @ 45g a.i.ha was included in POP of the University for stem borer and leaf folder management. Recently, Chlorantraniliprole 18.5 SC @ 30 g a.i/ha and Flubendiamide + Buprofezin @ 210 g a.i./ha was accepted for inclusion in POP of the University for stem borer and leaf folder management. A number of insecticides tested against leaf folder were found effective. Thiomethoxam 25 G @ 25g a.i. /ha and Acephate 75%SP @ 600 g a.i./ha against leaf folder was included in POP of the University. Resurgence of leaf folder by application of carbofuran was reported from this station. Flubendiamide + Buprofezin @ 210 g a.i. /ha was aceepted for inclusion in POP of the University against BPH management. Indoxacarb 14.5%SC@ 30 ga.i/ha was found effective against blue beetle.

- *Screening for disease resistance:* The screening nurseries for evaluation of different entries for resistance to major diseases helped to find out the resistance for sheath blight, blast and bacterial blight. The new sources of resistance identified through the screening programme under AICRIP were included in the breeding programme of the centre. The pre release cultures of the station were also routinely included in the screening programme to identify new sources of resistance as well as to test the level of resistance of these cultures to blast and sheath blight. Since bacterial blight was becoming a major problem in Kerala, screening for bacterial blight resistance has been initiated from 2010 onwards

- Screening for multiple disease resistance: Attempts were also made to identify rice varieties resistant to major diseases. One such experiment to screen rice varieties against major diseases was started in 1973-74. Twenty varieties selected from various screening trial such as NSN, IRS HBN, UBN and IRDN were tested for their yield potential in a comparative yield trial with Triveni, Jyothi and jaya as check varieties.
- Research programmes to evolve rice varieties with multiple resistance to blast and sheath blight, two major diseases of rice in Kerala resulted in release of varieties Kairali, Kanchana, Athira and Aiswarya in 1993 with a fair degree of resistance to both diseases. This was continued in the following years and the varieties released with resistance to both the diseases are Mangala Mashuri, Karuna and Harsha.A culture with multiple resistance to blast, sheath blight, sheath rot and brown spot was identified and released as Swetha in the year 2002.
- Monitoring the virulence of pathogens*:* Virulence analysis of blast and BLB is being carried out and no change in pathogen population has been noticed over the years from 2008.
- Chemical control: Recommendations included in the Package of practices recommendations of KAU/ new molecules under testing in farm trials for inclusion in POP.
- Foliar spray with carbendazim (Bavistin 50WP) @1g/l or zineb (Dithane Z 78) @4g/l against blast of rice; Seed dressing with Carbendazim (Bavistin 50WP)

@2g/kg seed or Pyroquilone (Fungerone 50WP) @2g/kg against blast of rice

- Carpropamid (Protega 27 SC) @1ml/l for the control of blast; Isoprothiolane (Fuji one 40EC) @1.5ml/l was found to be effective for the management of blast.
- Foliar spray of the fungicide, propiconazole (Tilt 25EC) (1ml/l) against sheath blight.
- Trifloxystrobin 25% + tebuconazole 50% (Nativo 75WG) @0.4g/l for the control of blast and sheath blight
- Carbendazim + mancozeb (Saaf – 1.5g/l), hexaconazole 5SC (Contaf plus -2 ml/l) and propineb (Antracol 75WP) for the control of brown spot and are being tested in farmers field.
- Spraying of the fungicides trifloxystrobin 25% + tebuconazole 50% (Nativo 75WG) @ 0.4g/l, Kresoxim methyl (Ergon 44.3SC) @1ml/l or propiconazole (Tilt 25 EC) @1.0ml/l for the management of false smut being tested in farmers field
- Combination product, Flubendamide 3.5%+Hexaconazole 5% (RIL-060/ F1 8.5 WG) a ready mix formulation was tested @2 g/l and compared with hexaconazole 5EC (Contaf) @ 2 ml/l and insecticide flubendiamide 20 WG (Takumi) @ 0.35 g/l against sheath blight and leaf folder.
- Biological control of diseases and use of biopesticides: Pseudomonas fluorescenswas applied as seed treatment @ 10g/kg of seed, followed by three foliar sprays (0.2%) at 30, 60 and 90 days after transplanting was significantly superior to control in reducing the disease and increasing the yield.
- *Integrated disease management:* Use of bio control agent *Pseudomonas fluorescens* and vermicompost application significantly reduced (49%) the neck blast and increased the grain yield (12.74%) compared to the plots without any management practices.