

# ADUTHURAI

**Tamil Nadu Rice Research Institute (TNRRI)  
Tamil Nadu Agricultural University  
Tamil Nadu**

Agricultural research station, established in 1922 at Aduthurai was upgraded as Regional research station under in 1962 with the mandate of solving problems of rice cultivation in Cauvery delta comprising of Thanjavur, Tiruvarur, Nagapattinam, parts of Trichy, Cuddalore & Pudukkottai. The research station was further elevated as Tamilnadu State Rice Research Institute in 1981 with the mandate of catering the needs of rice farmers across the delta region.



## Major contributions to AICRIP

### Crop Improvement - Plant Breeding

- 48 high yielding varieties and one hybrid were released. 14 rice varieties introduced. Recently, the varieties such as ADT 42 (IET 13239), ADT 43 (IET 14879), ADT 44(IET 14099) and ADT 48 were tested under AICRIP and released for cultivation in Tamil Nadu.

## Popular varieties released from TNRRI, Aduthurai



### ADT 36

Parentage - Triveni / IR 20

Duration (Days) -110

Average yield (Kg/ha) -4000

Grain type - Medium

Special features-Resistant to Blast and Brown Planthopper

### ADT 37

Parentage - BG 280-12/PTB 33

Duration (Days) -105

Average yield (Kg/ha) - 6200

Grain type - Short bold

Special features - Resistant to many pest and diseases



### ADT 43

Parentage - IR 50/White ponni

Duration (Days) -110

Average yield (Kg/ha) - 5900

Grain type - Medium slender

Special features - Resistant to Green Leafhopper, high tillering and fine rice



### ADT (R) 45

Parentage - IR 50/ ADT 37

Duration (Days) - 110

Average yield (Kg/ha) - 6100

Grain type - Medium slender

Special features - Resistant to Gall midge and moderately resistant to Brown Planthopper



**ADT 44 (2000)**

Parentage - selection from OR 1128-7-S1 (IET 14099-IR 56/OR 142-99).

Duration (Days) - 145-150

Average yield (Kg/ha) - 6214

Grain type - Medium slender

Special features - Resistant to GLH, blast, field resistant to stem borer and brown spot and field tolerant to leaf folder.

Suitable for growing in samba season of Tamil Nadu.

**ADT (R) 47 ( 2005)**

Parentage: ADT 43/Jeeragasamba

Duration (days): 118

Average yield (Kg/ha): 6157

Special features: semi-dwarf, erect, non lodging habit It has profuse tillering capacity suitable for SRI cultivation. Moderately susceptible to leaf folder, stem borer, white backed plant hopper and sheath blight.

**ADT 49**

Parentage: CR 1009/J.Samba

Average yield - 6170 kg/ha: Potential yield - 10,200 kg/ha

Grain type: Medium slender, white rice with 1000 grain weight of 14.0g

Special features: Moderately resistant to blast, sheath rot, sheath blight, RTD, brown spot and leaf folder.

**ADT (R) 46 -( 2002)**

Parentage - ADT 38/CO 45

Duration (Days) -135

Average yield (Kg/ha) - 6178

Grain type - Long slender

Special features: Semi-dwarf plant stature and non-lodging. Suitable for cultivation in Samba/Thaladi seasons in Tamil Nadu .Field resistance to stem borer and leaf folder.

**ADT (R) 48 (2005)**

Parentage:

IET 11412/IR 64, ADT (R) 48

Duration (days):99

Average yield (Kg/ha):8750

Grain type - Long slender

Special features: Resistant to stem borer, green leaf hopper and gall midge. Suitable for direct seeding under water scarce contingent situations as well as for transplanting for late Kuruvai season in Nagapattinam and Thiruvarur districts.

**ADT 50**

Parentage - BPT 5204/CR 1009

Duration - 150 days; suitable for Samba season (August sowing)

Average grain yield - 5945 kg/ha;

Potential yield - 10,494 kg/ha

Grain type: Medium slender rice with less 1000 grain weight of 15.9g

Special features: Resistant to leaf folder, moderately resistant to stem borer and moderately susceptible to GLH, brown spot, blast and RTD

## Crop production

### Agronomy

- Major breakthrough achieved in rice crop establishment techniques wherein direct seeding, SRI method of cultivation and ICM have not only increased yield but also have the potential to save inputs like land, labour, water and seed to considerable extent.
- 100 % RFD application was found promising for all the RBCS (R - R, R - W, R - M, R - P, R - OS) in both the seasons. Organic manures in conjunction with recommended NPK gave higher REY and gross returns in all RBCSs.
- Introduction of new herbicide molecules like Bispyribac-sodium, Penoxsulum and Metamifop and mixtures like Bensulfuron-methyl + Pretilachlor for different rice eco-systems have been found effective.
- Combination of herbicide, Bensulfuron-methyl + Pretilachlor (post emergence) in conjunction with Glyphosate (pre-planting) are effective for transplanted condition and Penoxsulum 24 SC @ 0.020 - 0.025 kg a.i./ha and Pyrazosulfuro - ethyl 10 WP @ 0.020 kg a.i. (20 DAS) for direct seeded rice.



**Nitrogen response trial**



**Long term effect of nutrition on SRI**

## Crop protection

### Entomology

- Multiple pest resistance: RRU-2004, OR-2060-9, RRU-9630, and CNB-1259-5-2-1 found free from stem borer and leaffolder damage. Salkathi, RRH 20, WGL 31996, RP 4511 – 257 found to have multiple resistance against leaffolder , stem borer and whorl maggot. RP 4688-53-2-1255 (Aganni x INRC 3021) and donor parent INRC3021 along with TKM6 recorded grade 1 (resistance) against stem borer, BPH and leaffolder. Shyamala x Danteshwari cross and IR64 sub1 was found to possess multiple resistance.



Field screening



Nethouse screening

- Ecological studies: Raising medium duration Pusa basmati (Thaladi) and short duration IRRI 1552 (Kuruvai) in two rows for every 15 rows of main crop was found useful in reducing stem borer damage.
- Biocontrol & Biodiversity studies: Population richness and evenness of the arthropods in direct sown and transplanted rice monitored showed that transplanted crop had the higher levels of pests and predatory fauna than the direct sown crop.
- Species complex and parasitoids dominance in lepidopteran pests in rice indicated up to 79 % natural parasitisation in rice stem borer egg mass under natural condition and *Telenomus* and *Tetratrachus* are the two major indigenous parasitoids found and in more than 50 % of the parasitized egg masses both the species have occurred together and of the two the former was more in proportion (60- 78 %).
- Inoculative release of *Trichogramma japonicum* (@ 40,000/ac) at 40 days after transplanting sequenced with installation of kairomone septa at weekly interval for four times was found useful in augmenting the egg parasitoid in the field.



- The purple foliage entry IRR1 1552, besides attracting stem borer was also found to serve as 'feast crop' to host maximum number of egg parasitoids viz., *Telenomus* and *Tetrastrichus* and thereby helps in *in-situ* conservation.
- Chemical control: A number of new molecules were tested against major pests of rice and found effective. These include:
  - ♦ Stem borer & leaf folder - Indoxacarb 15 EC @ 200ml/ha and Flubendiamide 480SC @ 30 g a.i./ha, indoxacarb 15 EC 30 g a.i./ha, Bifenthrin. Combination products like Flubendiamide + Fipronil, Imidacloprid + Ethiprole.
  - ♦ BPH - Pymetrozine, Lambda-cyhalothrin, Virtako, Dinotefuran and Imidacloprid. Imidacloprid + Ethiprole @ 125 g/ha followed by RIL -IS-109 (Flubendiamide 4 % + Buprofezin 20 % SC).
  - ♦ Rice leaf mite-Fenpyroximate @ 50 g a.i. /ha followed by Diafenthiuron @ 450 g a.i./ha were effective against.

In pesticide compatibility studies, the following chemicals were found compatible and effective:

- ♦ Indoxacarb 15 EC @ 200ml/ha + Tricyclazole 75 WP @ 200 gm/ha.
- ♦ Profenophos 50 EC @ 400 ml/ha + Propiconazole 25 EC 200 ml/ha.
- ♦ Dinotefuran and Tricyclazole, Flubendiamide + buprofezin or suthion (Triazophos) when applied with either hexaconazole or tricyclazole.

### Other technologies developed:

- Pheromone molecules in leaf folder were formulated and evaluated both in TRRI, Aduthurai (*M. patnalis*) and IIRR, Hyderabad (*C. medinalis*). In IIRR, Hyderabad blend B7 and B6 elicited response in *C. medinalis* and in Aduthurai the blends were found ineffective against *M. patnalis*. A leaf folder blend (B4) elicited orientation response (kairomone) in the larval parasitoid *Xanthopimpla*.
- **TNAU indigenous lure**-Experimental results revealed that the TNAU indigenously developed pheromone blend was effective in attracting YSB male moths.

### Plant pathology

- Sprouted seed treatment with Bavistin @ 40 or 60 g / 100 lit. of water / 60 kg of seed and nursery spraying @ 40 or 60 g/25 lit. of water / 8.0 sq. m nursery area were effective in the control of BLB.
- Seed soaking method with fungicides pyroquilon (Gr.5.0) and carbendazim (Gr.5.2) found effective in the control of blast.
- Host Plant Resistance-Rice culture No.11767 was found resistance to BLB disease. Rice cultures IR 26 and IR 20 were resistant to BLB, stem rot and false

smut diseases. Bhavani and ADT 31 were found to be resistant to brown spot, sheath blight and leaf smut diseases of rice.

- Seven rice cultures viz., IET 10157, IET 9831, IET 10417, IET 9803, IET 9824, IET 9573 and IET 9190 were found to be resistant to blast and also moderately resistant to sheath rot, brown spot and grain discolouration.
- Rice cultures IET 11692, SI.1450, SI.1492, IR 64, Kankai-01-5-16 and AS 37800 showed resistant reaction to both blast.
- In the germplasm screening, the cultures GEB 24 and CB 96114 were resistant to sheath blight, AD 93001, AS 89044, IR 64 and CR 1009 were resistant to RTV and CB 96114, CB 95228, CB 96115, DR 1128-7-S1 and IR 64 were resistant to blast.
- Rice cultures viz., IR 4595-54-1-1-3, IR 68305-13-1, IET 14132, AS 95187 and DPI 2502 were found to be resistant to blast. IR 68305-13-1 was found to be resistant to rice tungro disease.
- Rice cultures CB 98004, BR 4 (a), BR 18, MTU 209-20-1, J.R 503-7, UPRI 97-5, EXPH 208, MPH 5445, Triguna and BR 1 showed resistance reaction to blast disease with Gr.3.0.
- Fourteen gene pyramided cultures were found to be resistant to BLB. The cultures with the combination of two genes Xa 13 and Xa 21 or three genes Xa 5, Xa 13 and Xa 21 performed well. The cultures CRMAS 2231-32, 35, 37,38,42,43, 44 and 50 were found to be resistant to BLB.
- Foliar spraying of fungicides edifenphos and pyroquilon at tillering, panicle initiation and flowering stages reduced the severity of blast disease. Fungicides Safeguard (0.1%), Tilt (0.1%), Beam (0.1%) and Contaf (0.2%) significantly reduced blast intensity
- Fungicides EL 273 (13.1%), Hinosan (15.0%) and Miltox (17.2%) were found to be effective in controlling of brown spot of rice.
- Two sprayings with Nickel nitrate 0.3 per cent or Nickel chloride 0.3 per cent at boot leaf stage and 15 days later significantly reduced the bacterial blight incidence and increased the yield. Soil application of potash at 50 kg K<sub>2</sub>O/ha in two equal splits at 40 and 50 DAS effectively checked the spread of BLB disease and increased the grain yield.
- Basal and top dressing of gypsum in two split doses @ 250 kg/ha effectively controlled the sheath rot disease. Spraying of Hinosan or Bavistin @ 750 ml/g/ha give better control against sheath rot.

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- For the management of sheath blight in rice, the present recommendation of seedling dip with *P. fluorescens* can be replaced with the nursery application of *P. fluorescens* @ 1.5 kg/20 cents nursery (2 days prior to pulling).
  - Botanicals formulations Ahook 5 ml/l, Neem gold 20 ml/l and fungicides Sheathmar 3L (2.5 ml/l) and Rhizocin 3 L (2.5 ml/l) were effective in containing the sheath blight.
  - Hinosan @ 350 ml/ha proved to be effective against kernel smut.
  - Two sprays of carbendazim + thiram (1:1) 0.2% or *Pseudomonas fluorescens* 1 at 0.5% at boot leaf and milky stages was effective in containing the grain discolouration and recorded higher grain yield of 4009 kg/ha with CB ratio of 3.9.
  - Azoxystrobin (Amistar 25 SC) @ 500 ml/ha was found as an alternate chemical for the recommended fungicide Carbendazim in the management of blast (63.3% disease reduction) and sheath blight (56.9% disease reduction) and increased the yield (42.5Kocide 2000-54 DF (copper hydroxide) @ 2.5 g/lit was found as an alternate chemical for antibiotics streptomycin + oxy tetracycline compound + copper oxychloride in the management of bacterial leaf blight with 43.3% disease reduction over control and 28.1% increase in yield with C.B ratio of 1:2.93.
  - Spraying fungicide Kocide 2000 54% DF @ 2.5 g/l was found very effective in the management of false smut in rice with lesser number of infected panicles (7.0%) followed by recommended fungicide Copper oxy chloride (9.2%) as against 14.5% in untreated control.
  - Kresoxim methyl (Ergon 44.3 SC) @ 1.0 ml and Trifloxystrobin 25% + Tebuconazole 50% (Nativo 75 WG) @ 0.4 g /l were found more effective in the control of sheath blight with lesser severity of 25.2 and 27.6% as compared to untreated check with 56.7% disease severity.
  - Application of new fungicides viz., Trifloxystrobin 25% + Tebuconazole 50% (0.4 g/l) and Propiconazole 25 EC (1 ml/l) at 50% PE were found to be very effective in the management of false smut