

**"BHADRA" (MO 4)—A HIGH YIELDING DWARF VARIETY
FOR KUTTANAD**

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The low lying area of Alleppey and Kottayam districts of Kerala is popularly known as Kuttanad. The paddy fields in Kuttanad lie below MSL. and hence these are separated from lakes, rivers and canals by ring bunds. The area enclosed by a ring bund is usually referred to as 'Padasekharam'. The size of the individual 'Padasekharam' varies from 4 hectares to 960 hectares and the total area of 'Padasekharams' is about 54,000 hectares. The soil is highly acidic as the pH varies from 3.5 to 5.5. The common practice is to take a single crop in an year during the 'Punja' season which extends from October-November to January-February and leave the land as water fallow during the rest of the period. But of late an additional crop is taken in a limited area during April-May to August-September.

Before the introduction of high yielding varieties, Ptb-20 was one of the most popular varieties grown in Kuttanad. Apart from its high yield potential and general tolerance to pests (Anon., 1974, 1975) as compared to other tall varieties, this variety has superior grain quality attributes such as volume-weight and milling outturn. Hence this variety used to fetch a higher price in the market. But being a tall *indica* variety it does not respond to higher dose of fertilisers. In order to evolve a dwarf high yielding variety possessing good grain quality attributes suitable to be cultivated during the Punja season of Kuttanad, breeding programme was initiated at the Rice Research Station, Moncompu, Alleppey District.

Materials and Methods

IR-8 and Ptb-20 were crossed with IR-8 as female parent in 1967-68 and the F_1 generation was grown during the same year. Single plant selections were made in F_2 and in subsequent generations up to F_7 . Replicated trials with the three promising cultures M-11-57-5-1, M-11-14-4-2 and M-11-51-1 selected on the basis of their performance in preliminary yield trials at the Research Station were conducted in two State Seed Farms and in two cultivator's fields during 1976-77. The two popular high yielding varieties Jaya and Bharathi served as checks in these experiments. The performance of the best culture among these was tested against the two pre-release cultures 1065 and 1-5-4 received from the Rice Research Station, Pattambi and the three high yielding varieties Jaya, Aswathi and Sabari. Screening for Brown plant hopper tolerance in the field and under green house conditions were tested at Moncompu, AICRIP, Hyderabad, and at the College of Agriculture, Vellayani.

The test lines were screened in the laboratory at Moncompu according to the seed box technique. The test lines were sown in the seed boxes of size 60 x 45 x 10 cm at a distance of 5 cm between rows with the susceptible check T (N)₁ on either side and a row of resistant check Ptb-33 in the middle of the box. In each box there were 9 test lines, two rows of T (N)₁ and a row of Ptb-33. When the seedlings were 10 days old, the test lines were thinned to a uniform stand of 20 seedlings/row. On the tenth day second and third instar Brown plant hopper nymphs were released in the box so as to get a heavy insect pressure on the seedlings. The test lines were scored on 0-9 scale when more than 90% of the susceptible check T (N)₁ succumbed to hopper attack (Anon, 1975). The quality analysis of the promising cultures was done at the Centra] Rice Research Institute, Cuttack.

Results and Discussion

Grain Yield

Yield data from the District trials are shown in Table-1. Culture M-11-57-5-1 recorded the highest yield in three out of four trials. In the trials at the State Seed Farm, Valachira, Cul. M-11-57-5-1 was found to be significantly superior to both the check varieties and to the culture M-11-84-4-2. In the trial at Arunootimangalam, the culture M-11-57-5-1 was found to be on par with Bharathy which recorded the highest yield. In the cultivator's field at Nedumudy the culture M-11-57-5-1 recorded the maximum yield and this was significantly superior to check varieties. Although the results of the trials at Punnakunussery was not statistically significant the highest yield was recorded by the culture M-11-57-5-1. Pooled analysis of the results of all the four trials confirmed the superiority of the culture M-11-57-5-1 over the check varieties and the other culture. The average yield of M-11-57-5-1 was 5950 kg/ha as compared to the average yield of 5269 and 5160 kg/ha of Bharathy and Jaya,

When M-11-57-5-1 was tested against the two pre-release cultures from Pattambi and the three dwarf high yielding varieties released by the State, the maximum yield was recorded by this culture (Table-2). This culture recorded an yield increase of 15.7 and 6.7% over the pre-release cultures 1065 and 1-5-4 respectively. The increase in yield over the dwarf varieties Jaya, Sabari and Aswathi were 7.2, 15.2 and 2.6% respectively.

Tolerance to Brown plant hopper

Seedling screening tests at the Moncompu Research Station showed that the damage score of the culture M-11-57-5-1 was 4.4 on a 0-9 scale. Tests at the AICRIP, Hyderabad recorded a damage score of 2.2 on a 0-5 scale (Annual Report, 1977). Thomas (1977) had also indicated the tolerance of this culture to the Brown plant hopper infestation.

Table 1

Yield data of District trials conducted at State Seed Farms and Cultivators' fields during 1976-77 (Grain yield kg/ha)

Culture No.	S. S. Farm Valachira	S. S. Farm Arnootti-mangalam	Nedumudi	Punna-kunnu-ssery	Mean yield over 4 locations
M-11-57-5-1	3654	6079	6128	7837	5956
Bharathy	2765	6103	5002	7204	5269
Jaya	2888	5772	4987	6987	5160
M-11-84-4 2	2281	5303	6069	7940	5372
M-11-51-2.	3451	5185	5590	7506	5427
C D 0.05	623kg/ha	584kg/ha	756kg/ha	Not sig.	460kg/ha.

Table.2

Yield of grain, No. of productive tiller/hill, Duration and BPH count/hill of the trial with pre-release cultures and varieties of medium duration conducted at R.R.S., Moncompu during 1976-77

Culture No.	Mean yield in kg/ha	No. of Ear bearing tillers/hill*	Duration in days (seed to seed)	Mean BPH count/hill
M 11-57-5-1	5151	16.4	126	7.9
Sabari	5018	13.5	129	26.6
Cul-1-5-1	4927	9.5	129	24.1
Aswathy	4471	12.3	124	24.5
Cul-1065	4450	10.6	129	34.9
Jaya	4395	9.6	123	35.9
C D 0.05	418kg/ha	—	—	3.97/hill

* Spacing 15 x 15 cm.

Observations on the Brown plant hopper incidence in the yield trials conducted at the Research Station showed that the least number of adults and nymphs was in this culture (Table-2). For this, 10 random hills were selected. The mean insect populations per hill varied significantly among the different cultures and varieties, the range being 7.9 to 35.9.

Grain quality

The quality analysis of the grain. (Table-3) reveals that the culture M-11-57-5-1 has good milling percentage and protein content, besides other desirable attributes like non-stickness and good level of volume expansion.

The morphological description of the culture M 11-57-5-1 is furnished in Table-4.

Table 3

Grain quality attributes of culture M-11-57-5-1

L/B	2.11
Classification	Short bold
Kernel Colour	Red
Abdominal white	Present
Hullingpercentage	79.5
Milling percentage	73.5
Head rice	36.5
Alkali value	7.0,7.0
Water uptake	350
Amylose	21.06%
Volume	4.0
Kernel length	9.0 mm
Protein	10.16%
Elongation ratio	1.76

Table 4

Morphological description of the Variety Bhadra

Plant height	81 cms
Colour	Green
Length	35.6 cm
Width	9.5 mm
Flag leaf	Green and erect
Leaf sheath colour	Green
Ligule	Cream with greenish tinge.
Collar	White
Stigma colour	Cream
Outer glume colour	Cream

Lemma and palea	Light green ripening to brown furrow
Awn	Absent
Apiculous	Light green
Fertility	Fertile
Panicle	Medium compact and exerted
Leaves at maturity	Late leaf senescence
Panicle length	21.4cm
Pericarp	Red
Kernel appearance	Red rice
Grain size:	
Length	5.11 mm
Width	2.42 mm
Shape	Short bold
Physiologic features:	
Photoperiodic reaction	Weakly photosensitive
Dormancy	Non-dormant
Maturity	125-130 days seed to seed during September to February
Resistance to lodging	Non-lodging
Shattering	Non-shattering.

Summary

IR-8 and Ptb-20 were crossed in 1967-68 at Rice Research Station Moncompu in order to evolve a high yielding variety possessing good grain quality attributes. Culture M-11-57-5-1 is a derivative of the above cross. It has recorded significantly higher yield than the popular high yielding varieties Jaya and Bharathy in the experiments in the Research Station, in State Seed Farm and in cultivators' fields. It was also superior to two other varieties Sabari and Aswathi under Kuttanad conditions. Further, this possesses additional attributes like good tolerance to Brown plant hopper and desirable grain qualities. This culture was released by the variety Release Committee of the State as a variety under the name "Bhadra" (M 04).

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സംഗ്രഹം

കൂട്ടനാട്ടിലേക്ക് യോജിച്ച അത്യുൽപ്പാദനശേഷിയുള്ള ഒരു കുറിയ ഇനം നെൽ വിത്തു മകൊമ്പ് നെല്ല് ഗവേഷണ കേന്ദ്രത്തിൽ വികസിപ്പിച്ച് എടുക്കുകയുണ്ടായി. പി. റി. ബി-20, ഐ. ആർ-8 എന്നീ ദിനസ്സുകൾ തമ്മിൽ ബീജസങ്കലനം വഴി സംയോജിപ്പിച്ച് എടുത്തിട്ടുള്ളതാണ് ഈ വിത്തു. 125-130 ദിവസത്തെ മുപ്പുള്ളി ഔ ദിനസ്സിന് അത്യുൽപ്പാദന ശേഷിക്കു പുറമേ ചുണ്ണമ്പായയെ ഒരു പരിധിവരെ ചെറുത്തുനിൽക്കാനുള്ള കഴിവുമുണ്ട്. ഭദ്ര (ഏം fl)-4 എന്ന പേരാണ് ഈ വിത്തിന് കൊടുത്തിരിക്കുന്നത്.

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