

# “Vellayani-I”, A New Short Duration Paddy Strain

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In Kerala short duration varieties of paddy are grown during the *Viruppu* (I crop-April to July) and *Punja* (III crop-November-January to February-April) seasons. The area under paddy in these two seasons taken together is approximately 60% of the total area of 1.99 million acres under the crop in this State. The short duration strain Ptb. 10 is popular in both the seasons. But in recent years this strain is losing popularity because of its lodging and non-dormant nature. The requirement of a better, short duration strain having a wide adaptability to be grown both in the *Viruppu* and *Punja* seasons to serve as a suitable substitute for Ptb. 10 is very keenly felt in this State. The work reported in this paper was undertaken with the object of developing a strain which satisfies these specific requirements.

## Materials and Methods

The cytogenetic effects of thermal neutron irradiation on dry seeds of Ptb. 10 was studied at the Atomic Energy Establishment, Trombay. Seeds of 13 mutant types developed in these studies were received in the Botany Division of the Agricultural College and Research Institute, Vellayani

by the end of 1963. These types formed the basis of the present investigation.

Seeds of all the 13 types belonging to N. 11 generation were sown in small plots for observation and multiplication along with Ptb. 10 during April 1964 (*Viruppu* season). The selected types (N. 12) were tested for duration in the *Punja* season of 1965. During the *Viruppu* season of the same year two selected mutant types, 2-13-1 and 27-2 (N. 12) were compared with the standard strain Ptb. 10 in a comparative yield trial. In the *Punja* season of 1966 the yield trial was repeated to specifically compare the mutant type 2-13-1 (N. 13) with Ptb. 10. The data on important characters were analysed and results interpreted.

## Results

### 1. *Viruppu* season - 1964

The 13 mutant types grown in observational plots showed high variation for several plant characters, such as stature of plants, flowering duration, uniformity in flowering, panicle type, size of grain, ripening colour of fertile glumes, colour of the pericarp and awns. Two types, viz., 2-13

and 27-2 were found to be desirable for the following reasons.

(i) They were short duration types possessing the same duration (95 days - seed to seed) as that of Ptb. 10.

(ii) They were awnless,

(iii) They had better earhead characters and larger number of grains per earhead than Ptb. 10.

Type 2-13 was found to segregate into two types for earhead characters. Selection was made for compactness of grains on the earhead. The selected type was numbered as 2-13-1. For critical evaluation of economic characters the two types, 2-13-1 and 27-2 were carried forward. The grains of the former type were medium fine with straw glumes and white rice, whereas those of the latter were bold with brown glumes and red rice.

### 2. *Punja season — 1965*

The two mutant types were found to have the same duration as Ptb. 10 in the *Punja* season also. The stand of the crop,

however, was not uniform. Yield data were, therefore, not collected. The earhead characters were found to be as impressive as those of the previous season and better than Ptb. 10. Type 2-13-1 was found to be stable.

### 3. *Viruppuseason — 1965*

The comparative yield trial laid out to study the relative performance of the two types in relation to that of Ptb. 10 was successfully completed. A randomised block design was adopted for the trial. The condition of the crop was excellent. Observations were made on the following characters:

- (i) Flowering duration
- (ii) Number of productive tillers
- (iii) Final height of plants
- (iv) Length of earhead
- (v) Number of grains per earhead, and
- (vi) Yield of grain.

The data collected are tabulated and the mean values are presented in Table I.

**TABLE I**

Plant Characters of Cultures in Comparison to those of Ptb.. 10

Sl. No.	Characters	2-13-1	27-2	Ptb. 10
1.	Duration in days (sowing to flowering)	72	73	73
2.	Mean number of productive tillers per plant	8.0	8.4	8.8
3.	Mean height of plants (cm)	142.6	124.5	129.3
4.	Mean length of earhead (cm)	24.3	21.3	24.4
5.	Mean number of grains per earhead	158	142	104
6.	Yield of grain (lbs per acre)	6635	6435	4401

It may be seen that there is marked difference between the three varieties with respect to all the characters except flowering duration and number of productive tillers.

It was observed that the earheads of type 27-2 had a large proportion of chaff, particularly in the basal portion. The percentage of chaff in this type was estimated to be 33.6 as against 9.6 in Ptb. 10.

#### 4. *Punja* season — 1966

The two varieties 2-13-1 and Ptb. 10 were grown in large sized plots. The stand of the crop was not uniform. Tillering in this transplanted crop was not as profuse as that of the dibbled *Viruppu* crop. Both the varieties had the same flowering duration (sowing to flowering, 60 to 64 days). Flowering in type 2-13-1 was marked by its uniformity. It is estimated that this type gave an increased yield of 53.5% over the standard variety Ptb. 10. Per acre yield was not calculated since the stand of the crop was not uniform. The plant and grain characters of this type were studied and recorded. The data were tabulated, analysed and results presented under description of the strain.

#### Discussion

Thirteen mutant types were grown in observational plots during the first season. Attention was concentrated on two types, 2-13 and 27-2 because they had the same duration as that of Ptb 10. (seed to seed-95 days) and possessed desirable earhead characters. Selection was made in type 2-13 for compactness of grains on the earhead and the selected type was numbered as 2-13-1.

In the first three seasons types 2-13-1 and 27-2 had the same duration as Ptb. 10. Because they have the same duration, both

in the *viruppu* and *punja* seasons, they can be said as period bound varieties. During the *Viruppu* season of 1965 both the types gave significantly higher yields than the standard variety Ptb. 10, the types 2-13-1 and 27-2 giving 50.8% and 46.2% increase respectively. The excellent condition of the crop is reflected in the very high yield (4401 lbs per acre) of Ptb. 10.

Type 27-2 is slightly shorter than Ptb. 10 in stature (Plate I). The number of grains on the earhead is much higher, though the earhead is shorter in length (Plate II). But this type shows high sterility of spikelets especially at the basal part of the earhead. This is the only defect standing in the way for the immediate economic utilization of this type. Further selection on this type for high fertility is in progress.

Type 2-13-1 is taller than Ptb. 10 in stature (Plate I). The increase in yield in this type is mainly through an increase in the number of grains per earhead (Plate II). In the *viruppu* season of 1965 when the crop condition was excellent it gave a higher yield by 50.8% over the standard strain Ptb. 10, whereas in the *punja* season of 1966, in spite of the stand of the crop being not as good and uniform as in the *viruppu* season, it gave an increased yield by 53.5%. This high yield was obtained under medium fertilisation (40-40-40). These observations, therefore, suggest that this type is capable of giving a higher yield by more than 50% over the standard strain irrespective of the season and stand of the crop. The type being superior and stable is advanced to the status of an improved strain and is designated as Vellayani-1 (Plate III). This strain being period bound (seed to seed-95 days) is capable of growing well and giving high yield both in the *Viruppu* and *Punja* seasons. It is therefore a better yielder than Ptb. 10 which is one Of

the best strains with respect to yield in the short duration group of varieties in this State. Field observations have also indicated that **Vellayani-1**, under medium fertilisation, is non-lodging and the grains are less sprouting on the earhead than Ptb. 10 (Plate IV). The grains of this strain are medium fine with straw glumes and white rice in contrast to medium bold grains with brown glumes and red rice of Ptb. 10 (Plates V and VI).

Because of these specific advantages, **Vellayani-1** is recommended for gener 1 cultivation in all short duration seasons

in the different rice tracts of this State. Experiments to find out the optimum spacing, fertiliser requirement etc. of this strain are in progress. It is proposed to conduct large scale **demonstration-cum-seed multiplication** trials during the next *punja* season in the different agricultural regions of the State. Thereafter the strain will be released for general cultivation.

A complete morphological description of the strain, including grain characters, adopting the schedule of Hutchinson, **Ramiah** and others (1938) is given below.

#### DESCRIPTION OF THE PADDY STRAIN VELLAYANI-I

Experiment Station	:	Botany Division, Agricultural College and Research Institute, Vellayani.
Type	:	Vellayani-1. Developed by selection from irradiated material.
Season	:	I Crop ( <i>Viruppu</i> ; April to July) III Crop ( <i>Punja</i> : November-January to February-April).
Duration	:	Seed to seed - 95 days
Pigmentation		
Coleoptile	—	Colourless
Leaf sheath	—	Green
Sheath axil	—	Light green
Internode	—	Light green
Leaf junctura	—	Straw colour
Auricle	—	No auricle
Ligule	—	Straw colour
Pulvinus	—	Light green
Septum	—	Cream
Leaf blade	—	Green
Sterile glumes	—	Light Green
Lemma & <i>palear</i>	—	Green
Apiculus	—	Cream
Stigma	—	Cream

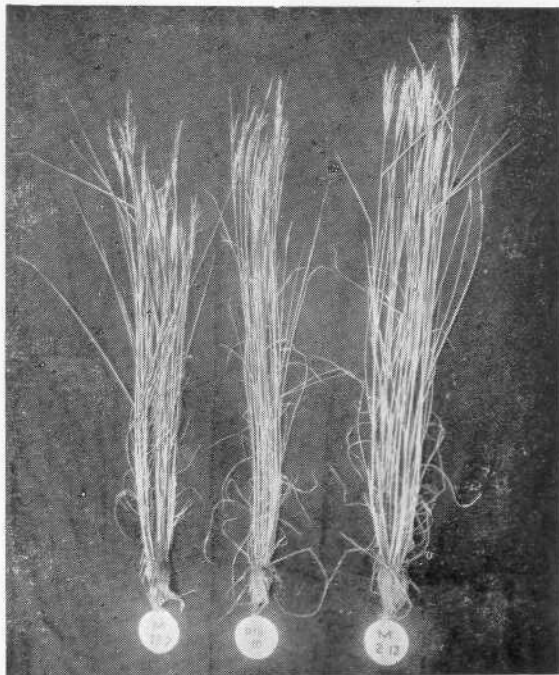


PLATE I. Comparison of plant heights of mutant types 27-2 and 2-13-1 with Ptb. 10. Note the well exerted nature of the panicle in type 2-13-1.

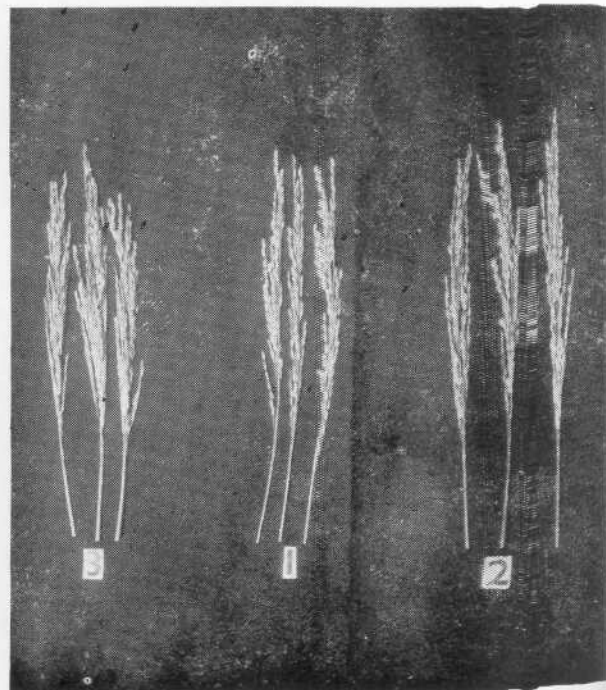


PLATE II. Earhead characters 1. Ptb 1C 2. Mutant type 2-13-1 3. Mutant type 27-2.

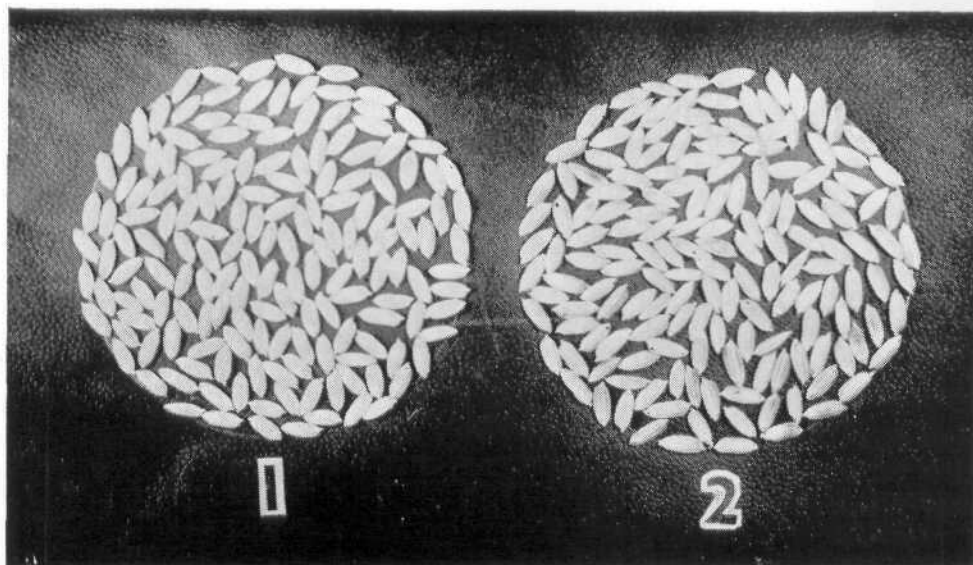


PLATE V. Comparison of grain size and glume colour 1. Vellayani-I. 2. Ptb 10.

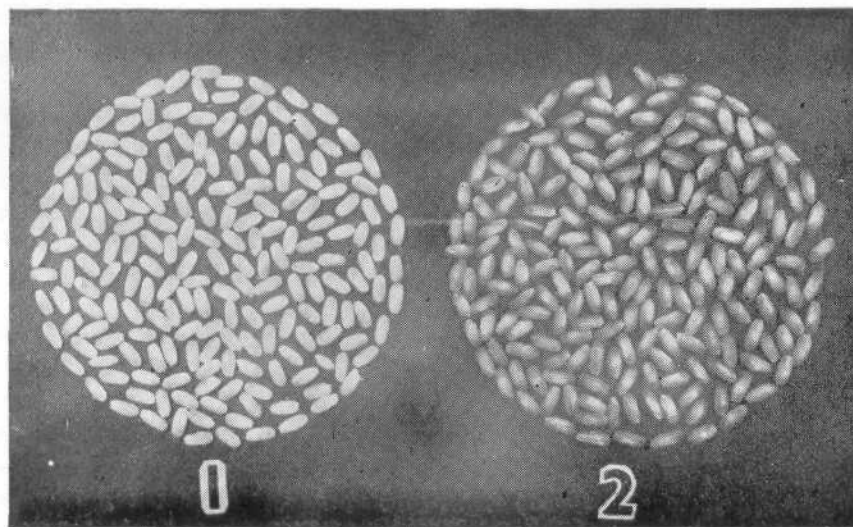


PLATE VI. Comparison of rice (kernel) colour 1. Vellayani-I. 2. Ptb 10.

Habit	— Tall plants, tillers spreading
Tillers	— Straw strong
Leaf blade	— Broad. Flag leaf is almost horizontal" in position
Inflorescence	
Panicle	— Semicompact, partially drooping, well exerted.
Glume size	— Medium
Lemma and palea colour	— Green colour ripening into straw
Awns	— Awnless
Grain	
Size	— Medium
Rice Colour	— White
Scented or not	— Non scented
Abdominal white	— Absent
Glutinous or not	— Non glutinous
Translucent or not	— Semitranslucent.
Physiological characters.	
Dormancy	— Grains require 15 days after harvest for full germination
Range of adaptability.	— Adaptable to short duration seasons.

## SCHEDULE FOR QUANTITATIVE CHARACTERS \*

Character	Mean $\pm$ S. E.
1. Height of plant. (cm.)	129.2 $\pm$ 0.86
2. No. of productive tillers per plant	9.7 $\pm$ 0.31
3. Length of panicle. (cm.)	26.0 $\pm$ 0.17
4. Exertion. (cm.)	5.0 $\pm$ 0.22
5. No. of grains per earhead	148.7 $\pm$ 2.08
6. Paddy grain.	
(i) Length (mm.)	7.90 $\pm$ 0.04
(ii) Breadth. (mm.)	2.84 $\pm$ 0.02
(iii) Thickness. (mm.)	1.88 $\pm$ 0.01
(iv) L/B Ratio.	2.78
7. Rice (kernel)	
(i) Length (mm.)	5.34 $\pm$ 0.02
(ii) Breadth. (mm.)	2.32 $\pm$ 0.02

\* Based on *Punja* season crop 1966.

(iii) Thickness. (mm.)	1.69 ± 0.01
(iv) L/B Ratio.	2.31
8. Weight of 1000 grains	
(i) Paddy grain. (g.)	23.56 + 0.07
(ii) Rice grain (Raw) (g.)	16.95 ± 0.12
(iii) Do (Parboiled) (g.)	17.54 ± 0.08
9. Percentage of rice (kernel) to paddy	
(i) By weight. (a) Raw Rice	72.26
(b) Parboiled Rice	75.17
(ii) By volume (a) Raw Rice	54.73
(b) Parboiled Rice	56.94

### Summary

Thirteen mutant types developed by neutron irradiation in Ptb. 10 were received in the Division of Botany from the Atomic Energy Establishment, Trombay. They were grown in observational plots and two short duration types 2-13 and 27-2 were selected based on desirable earhead characters.

The two types were continuously tested during the *Viruppu* and *Punja* seasons and were found to be period bound having a duration of 95 days (seed to seed). Type 27-2 gave 46.2% higher yield over the standard. But this type could not be recommended for immediate economic utilisation because of the high sterility of spikelets in the basal region of the earhead. The material is being subjected to selection for fertility.

Selection was made in type 2-13 for compactness of grains on the earhead and type 2-13-1 was thereby established. It gave higher yields over the standard Ptb. 10 by 50.8% and 53.5% in the *Viruppu* and *Punja* seasons respectively. This type, therefore, is found to give a higher yield of more than 50% over Ptb. 10 irrespective of the season and stand of the crop. It is advanced to the status of an improved strain and is designated as *Vellayani-1*.

It is recommended for cultivation in all the short duration seasons.

The new strain will be released for general cultivation after conducting trial cultivation in large plots in the different regions of this State.

A complete morphological description of the strain is also given.

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### Reference

- 1 Hutchinson, J. B. Ramiah, K. and others. (1938) The Description of Crop-Plant-characters and their ranges of variation, II-Variability in Rice. *Indian J. Agric. Sci.* 8 : 592-616.