

Studies on Ratooning in Vaigai and Bhavani Rice Varieties

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A field study was conducted to assess the suitability of short and medium duration rice varieties viz., Vaigai and Bhavani respectively for ratoon cropping, response to nitrogen levels and heights of cutting of the planted crop at the time of harvest. The study clearly indicated that Bhavani as a ratoon crop, applied with 120 kg N/ha and harvested at 20 cm height gave the maximum yield (4851 kg/ha). Ratooning with Bhavani, besides producing higher yield, gave way of raising a short duration pulse as third crop in Periyar-Vaigai Project area of Madurai region.

Introduction of high yielding varieties had a breakthrough in the production of food crops, and adequate inputs at optimum time, also had its own desirable effects. In the Periyar-Vaigai project area, the rice farmers raise two main crops in a year viz., I crop followed by II crop and this involves more expenditure.

In recent years, ratooning and its management in rice lends a helping hand to the farmers. This practice will be adopted where water is available for a month after the harvest of the crops. It does not involve much expenditure in raising nursery, preparatory cultivation and on inputs. At present, the rice crop is being cultivated in the entire Periyar command area from June to middle of February. The system of irrigation does not give any scope for raising a third crop with available water. At this juncture, ratooning deserves encouragement for raising a third crop with available water to maximise the produc-

tion per unit area, with this object in view, a study was undertaken to assess the suitability of short and medium duration varieties viz., Vaigai and Bhavani respectively for ratooning and to select the best.

MATERIAL AND METHODS

Main crop of Bhavani and Vaigai respectively were raised on 20th and 24th June 1977 at the Agricultural College and Research Institute, Madurai adopting recommended package of practices. The crops were harvested leaving 10, 15 and 20 cm height of cutting.

Graded dose of N viz., 90, 120 and 150 kg and P₂O₅ and K₂O at 45, 60 and 75 kg/ha in each were applied on 7th day after harvest.

The experiment was conducted in a split plot design with three replications. The varieties and nitrogen levels were allotted to the main plot and heights of cutting to the sub-plots. A net

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plot size of 6.6 x 4.8 m² was utilised. A spacing of 20 x 10 cm and 20x15 cm was adopted for Vaigai and Bhavani respectively.

Weather data

The rainfall recorded during the crop period, October, November and December was 93.9, 168.1 and 190.2 mm respectively as against the average of 197.6, 143.7 and 68.4 mm respectively for the past 10 years for the same period. The maximum and minimum temperature were normal compared to the past 10 years.

RESULTS AND DISCUSSION

Plant height

The different levels of N, as well as varieties did not exert any influence on plant height on 30th day it was significantly different at maturity. The variety Bhavani was distinctly taller than Vaigai at maturity and difference in tallness was found in ratoon crop also. The maximum plant height was recorded at higher level of nitrogen.

Height of cutting significantly influenced the plant height at tillering stage and cutting at 10 cm produced maximum height.

Significant results were found between nitrogen levels and height of cutting. The three levels of nitrogen tried, produced a linear trend of increased height at maturity.

Productive tillers per hill

Among the varieties tried, Bhavani as ratoon crop produced significantly more number of productive tillers per hill (12.07) compared to Vaigai (9.07) which may be due to genetical difference. Nitrogen levels did not exert any influence on the number of productive tillers per hill in both the varieties. However, interaction effect between varieties and nitrogen levels was found to be significant (Table I).

Filled grains per panicle

A reduction in the number of filled grains per panicle was observed in the ratoon crop of Vaigai and Bhavani compared to planted crop. The ratoon crop of Bhavani was found to be superior (73.91) in the production of filled grains per panicle than Vaigai (57.15).

The treatment differences between nitrogen levels were significant. But the number of filled grains decreased as the N level increased. These results were in conformity with the findings of Kalyani Kutty *et al.* (1968) and Osda *et al.* (1973).

Heights of cutting in the ratoon crop had also significant effect on the filled grains per panicle. Among the cuttings, the cutting at 20 cm height registered the maximum number of filled grains (71.17) per panicle than the rest.

Grain yield

Among the two varieties, Bhavani recorded the highest yield both in planted (7095 kg/ha) as well as ratoon crop (4851 kg/ha) than Vaigai planted (6540 kg/ha) and ratoon crop (3294 kg/ha) respectively. Comparing per day produc-

tion, the ratoon rice Bhavani produced 65.55 kg/day when compared to the ratoon rice Vaigai, which recorded 47.05 kg/day. This can be attributed to the differences in total duration of the crop varieties under study.

The increased yield, recorded in the ratoon crop of Bhavani was due to increased productive tillers per hill, number of filled grains per panicle, length of the panicle and 1000 grain weight besides duration. Thus, it is quite obvious that the two rice strains exhibited different ratooning characteristics. This is in agreement with the findings of Balasubramanian (1969), Prashar (1970), Volkova and Smetuin (1970), Rajagopalan *et al.*, (1977) and Bahar and Datta (1977). Irrespective of the varieties, the grain yield of the ratoon crop was less compared to the planted crop. This view was supported by the previous workers like, Medappa and Mahadevappa (1976), Rajagopalan *et al.*, (1977) and Bahar and Datta (1977). The ill filled grains were more in the panicles of ratoon crop compared to the planted crop (Table II)

Nitrogen levels had significant influence on the grain yield in the ratoon crop of both the varieties. The highest yield (4537 kg/ha) was obtained at 150 kg N/ha in the ratoon crop followed by 120 kg N/ha. This was supported by Nathan and Evatt (1950) who reported increased yield in the ratoon crop with successive enhancement of the levels of nitrogen. The earlier workers Ramasami and Haws (1970), Cheaney and Sanchez (1972), Bahar and Datta (1977) and Rajagopalan *et al.*, (1977)

stated that increased N produced more grain yield in ratoon crop

Heights of cutting, and the interaction of varieties and heights of cutting, had significantly influenced the yield of the ratoon crop. Among the height of cuttings, 20 cm height of cutting recorded the highest grain yield of 4497 kg/ha followed by normal height of cutting (15 cm) with 3922 kg/ha in Bhavani.

Straw yield

The data revealed, that the planted crop recorded higher straw yield than ratoon crop. The vegetative growth in the case of ratoon crop, was much shorter than planted crop and that contributed to the low yield of straw in the ratoon crop.

Bhavani ratoon crop significantly recorded higher straw yield (5984 kg/ha) than Vaigai (4915 kg/ha) because of its more leafy and tall nature.

Nitrogen levels had influenced the straw yield of the ratoon crop in both varieties. Nitrogen level of 120 kg/ha significantly recorded higher straw yield than 90 and 150 kg/ha. Interaction of nitrogen levels on varieties was also significant. The differences on straw yield evidently arose due to the difference in their stature, which again is a varietal character.

Nitrogen levels and heights of cutting had significant effect on straw yield. Significant differences were observed in all orders of interaction. Among the height of cuttings in the ratoon crop,

normal height of cutting (15 cm) recorded higher straw yield followed by 20 cm height of cutting, since it produced more number of tillers than the rest of the heights of cutting.

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TABLE 1. Effect of nitrogen levels and heights of cutting on plant height (cm) at tillering and maturity stages and number of productive tillers at harvest on ratoon rice varieties

Varieties and Nitrogen levels	(a) Plant height			(b) Productive Tillers								
	Tillering Stage C ₃	Mean	C ₁	Maturity Stage C ₃	Mean	C ₁	Maturity Stage C ₃	Mean	C ₁	C ₃	Mean	
V ₁	81.6	72.5	77.3	76.66	84.3	83.8	82.8	83.33	8.89	10.00	8.33	9.07
V ₂	76.7	78.8	74.5	76.66	89.1	91.2	89.5	89.93	11.33	12.89	12.00	12.07
Mean	79.2	75.7	75.9		86.7	87.5	86.2		10.11	11.44	10.17	
N ₁	78.6	74.5	74.5	75.80	85.3	83.5	82.6	83.46	9.33	11.17	10.00	10.16
N ₂	78.8	73.6	78.3	76.90	86.8	89.5	88.1	88.13	10.33	11.83	11.00	11.05
N ₃	80.0	79.0	75.0	78.00	88.0	89.6	87.5	88.36	10.67	11.33	10.50	10.83
Mean	79.1	75.7	75.9		86.7	83.5	86.2		10.11	11.44	10.17	
V		SED		CD		SED		CD		SED		CD
N		1.54		NS		0.97		2.15		0.22		0.48
V x N		1.89		NS		1.18		NS		0.27		NS
C		2.67		NS		1.67		3.73		0.38		0.84
V x C		1.44		2.89		0.47		0.95		0.28		NS
N x C		3.58		1.06		1.06		NS				
		2.49		NS		0.82		1.65				

TABLE II.

Effect of Nitrogen levels and height of cutting on filled grains per panicle and on yield (kg/ha)

Varieties and Nitrogen levels	(a) Filled grains per panicle				(b) Yield			
	C ₁	C ₂	C ₃	Mean	C ₁	C ₂	C ₃	Mean
V ₁	58.67	31.00	51.78	57.15	2765	3391	3725	3294
V ₂	74.89	81.33	67.55	73.91	4188	5011	5342	4851
Mean	66.78	71.17	79.67		3479	4202	4537	
N ₁	69.50	70.50	70.17	70.05	3134	3988	3702	3608
N ₂	64.50	70.67	59.34	64.83	4051	4719	3871	4213
N ₃		49.50	72.33	65.12	4582	4808	4191	4537
Mean	66.78	71.17	59.67	65.87		3922	4497	3922

	SED	CD	SED	CD
V	0.23	0.51	41.51	92.34
N	0.28	0.63	50.79	113.11
V x N	0.40	0.89	71.83	159.87
C	2.12	4.28	177.91	238.14
N x C	3.67	7.42	204.23	412.46
V x C	1.99	NS	25.53	51.94