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Effect of various establishment methods on the growth and yield of rice

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Abstract : Experiments were conducted during the *kuruvai* seasons of 1995 and 1996 to study the effect of various establishment methods in rice on the growth and yield. Three rice varieties (ADT 36, ASD 18 and ADT 42) were evaluated with seedling broadcast method in comparison with the farmer's random and line planting methods. The results revealed that by broadcasting the seedling, there was not much reduction in the yield of rice and it was comparable with that of line planting. The labour consumption in seedling broadcast method (160 man hours) was only 1/3 of line planting. This method also helped to cover larger area within short time. Among the test varieties, ADT 42 and ADT 36 performed better. *(**Key words** : Rice establishment method, Seedling broadcast, Random planting, Line plating.)*

In India, rice is being grown in an area of 42 million ha with a production of about 82 million tonnes. The growth rate during 1994-95 was estimated at 5.3 per cent as against 3.8 per cent in 1993-94. However at the present level of production growth, India would be required to add annually not less than 2.5 million tonnes of rice to sustain the present level of self sufficiency (Pillai, 1996). In Tamil Nadu rice is cultivated over an area of 2.7 million ha with a production of 7.16 million tonnes. Cauvery delta zone is the potential area of traditional rice cultivation in Tamilnadu. This zone accounts for about 22.3 per cent of the rice area and 25.3 per cent of rice production of the state .Hence it is named as "The Rice Bowl of Tamil Nadu "

In this zone, rice is cultivated in three distinct seasons *viz, kuruvai* followed by *thaladi* (in double crop wetlands) and *samba* (in single crop wetlands) *Kuruvai* rice solely depends on the cauvary river water from Metturdam, whereas *thaladi* and *samba* rice utilises heavy monsoon rains at the beginning of the season besides supplemental irrigation by canal water. Hence, time of release of mettur dam water for irrigation decides the *kuruvai, thaladi* and *samba* rice production. When the water is released late ie., beyond the scheduled date of June 12th, the harvest of late kuruvai and planting of *thaladi / samba* crops overlap, leading to labour shortage in this zone. To overcome this farmers have to adopt a labour and time saving planting technique to cover large area during *kuruvai* season in the cauvery delta zone. Transplanting cost equals 15 per cent total rice production cost. Transplanting delayed by labour shortage lowered the rice yield (Pyarelal *et al.* 1982). Keeping this in mind, the present investigation was carried out with the following objectives.

i. To find out the suitable technology to reduce the cost on labour for planting paddy.

ii. To verify the response of rice varieties to various planting methods.

iii. To work out the cost benefits for planting methods.

Materials and Methods

Field experiments were conducted during *kuruvai* season of 1995 and 1996 at Tamil Nadu Rice Research Institute, Aduthurai to evaluate the best rice establishment method in three *kuruvai* rice varieties. The three rice establishment methods tried were, line planting (M_1), random planting (M_2) and seedling broadcast (M3). Rice varieties, ADT 36 (V_1), ASD 18 (V_2) and ADT 42 (V_3) were raised in split plot design with three replications. Rice seedling aged 25 days were used for this purpose. All the other cultural operations were followed as per the recommendations. Observations on plant height, number of tillers/hill, number of grains/panicle, grain and straw yield were recorded. Based on the return and cost of production, the benefit-cost ratio was worked out for each method.

Results and Discussion

The results indicated that during *kuruvai* '95, there was no significant influence by both the varieties and method planting on the plant height of rice. Seedling broadcasting had significant influence on number of tillers by recording 18.6 tillers and found superior to other methods. High tillering was possible because of shallow planting and less root damage. ADT 42 has recorded the maximum grain yield of 5.3 t ha^{-1} and found significantly superior over other treatments. There was no significant difference in the grain yield under various method of planting. But maximum grain yield of 5.0 t ha^{-1} was recorded under random planting. The grain yield with line

Table 1. Growth and yield characters of rice under various treatments

Treatments	Plant height (cm)		No. of tillers / hill		No. of grains/panicle	
	Kuruvai '95	Kuruvai '96	Kuruvai '95	Kuruvai '96	Kuruvai '95	Kuruvai '96
V_1	72.0	97.1	12.1	11.7	107	109
V_2	74.9	94.7	12.5	12.2	102	98
V_3	73.0	99.2	13.6	13.1	111	107
CD (P=0.05)	NS	NS	NS	NS	NS	NS
S_1	72.3	97.8	9.5	9.4	106	107
S_2	71.8	97.8	10.1	9.4	107	102
S_3	75.7	95.3	18.6	18.2	108	105
CD (P=0.05)	NS	NS	2.44	1.83	NS	NS
V_1S_1	74.7	97.5	9.7	9.7	103	119
S_2	70.3	96.9	7.7	8.8	107	98
S_3	71.0	96.8	18.9	16.6	131	109
V_2S_1	72.1	93.5	10.5	8.3	107	88
S_2	73.7	98.3	10.9	9.5	108	104
S_3	78.7	92.4	15.9	18.8	91	103
V_3S_1	70.1	102.5	8.1	10.1	106	114
S_2	71.5	98.5	11.7	9.9	106	104
S_3	78.7	96.7	20.9	19.3	121	104
CD (P=0.05)	NS	NS	NS	NS	NS	NS

Table 2. Rice grain and straw yield in various treatments

Treatments	Grain yield (t ha^{-1})		Straw yield (t ha^{-1})		B/C ratio	
	Kuruvai '95	Kuruvai '96	Kuruvai '95	Kuruvai '96	Kuruvai '95	Kuruvai '96
V_1	4.4	6.9	4.9	6.8	-	-
V_2	4.2	6.2	4.8	6.2	-	-
V_3	5.3	5.6	5.7	5.7	-	-
CD (P=0.05)	0.65	0.22	NS	NS	-	-
S_1	4.4	6.1	5.1	6.1	2.40	2.93
S_2	5.0	6.5	5.4	6.3	2.82	3.14
S_3	4.4	6.2	4.8	6.2	3.01	3.26
CD (P=0.05)	NS	0.30	NS	NS	-	-
V_1S_1	4.3	6.8	5.1	6.7	-	-
S_2	5.3	7.1	5.5	6.9	-	-
S_3	3.5	6.8	4.0	6.7	-	-
V_2S_1	4.5	5.7	5.2	5.8	-	-
S_2	4.2	6.5	4.8	6.4	-	-
S_3	3.9	6.4	4.3	6.3	-	-
V_3S_1	4.6	5.8	5.1	5.9	-	-
S_2	5.6	5.7	5.9	5.6	-	-
S_3	5.8	5.4	6.2	5.5	-	-
CD (P=0.05)	NS	NS	0.37	1.07	-	-

Table 3. Growth and yield of rice under various treatment (pooled data)

Treatments	Plant height (cm)	No. of tillers per hill	No. of grains per panicle	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
V_1	84.6	11.9	110.7	5.7	5.8
V_2	84.8	12.3	100.2	5.2	5.5
V_3	86.1	13.3	109.1	5.5	5.3
CD (P=0.05)	NS	NS	2.09	NS	NS
S_1	85.1	9.4	105.7	5.3	5.6
S_2	84.8	9.8	104.4	5.8	5.9
S_3	85.5	18.4	109.9	5.3	5.6
CD (P=0.05)	NS	1.38	NS	NS	NS
V_1S_1	86.1	9.7	110.0	5.5	5.9
S_2	83.6	8.3	102.3	6.3	6.2
S_3	83.9	17.7	119.7	5.2	5.4
V_2S_1	82.8	9.4	97.3	5.1	5.5
S_2	85.9	10.2	106.0	5.4	5.6
S_3	85.6	17.4	97.3	5.2	5.3
V_3S_1	86.3	9.1	109.7	5.2	5.5
S_2	85.0	10.8	105.0	5.7	5.8
S_3	87.0	20.1	112.7	5.6	5.9
CD (P=0.05)	NS	NS	NS	NS	NS

planting and seedling broadcast was comparable (4.4 t ha^{-1}) but maximum benefit-cost ratio of 3.01 was realised under seedling broadcost method which might be due to the reduction on the cost of labour for planting. Under this method only 1/3 of the labour was utilised (160 man hours) as compared to line planting (480 man hours) and random planting utilised 320 man hours.

During *kuruvai* 96 the experimental data revealed that significantly higher grain yield of 6.9 t/ ha was recorded by ADT 36 followed by ASD 18 (6.2 t ha^{-1}). The grain yields with random planting and seedling broadcost were on par. There was no significant difference in the straw yield of the varieties tested. Sometimes transplanting delayed by labour shortage lowered the rice yield (Pyarelal *et al.* 1982). The various method of planting has also not influenced the straw yield significantly. There was a labour saving of 2/3 by seedling broadcast method of rice planting. At Coimbatore, studies revealed that there was a considerable saving in labour for planting due to seedling broadcast method in addition to increased grain yield. Maximum benefit-cost ratio of 3.26 was obtained with seedling broadcast method followed by random planting (3.14)

Pooled analysis

In general the data on growth and yield characters by pooled analysis showed that there was no significant influence due to various method of planting on the growth and yield of rice varieties tested in the experiment. But the number of tillers was significantly influenced by the various method of planting and the number of grains/panicle by the different varieties tested.

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Effect of micronutrient fertilization on brinjal fruit yield in an alfisol

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Abstract : The soil application of microfood / straight micronutrients recorded higher brinjal fruit yield compared to the foliar application. The highest fruit yield was recorded by the combined application of stanes microfood (soil), composted coirpith and Azospirillum. The yield increase was 20.0, 25.6 and 32.1 per cent over NPK respectively for the application of stanes microfood (soil applied) with NPK / SMF with NPK + CCP / MF with NPK + CCP + Azo. The application of NPK alone recorded a lower yield of 174.4 g $plant^{-1}$ and the control recorded the lowest yield of 159.0 g $plant^{-1}$.***(Key words** : Micronutrients, Composted coirpith, Azospirillum, Red non-calcareous soil, Brinjal, Fruit yield).*

Brinjal is one of the most important commercial vegetable crops grown all over India for its highly nutritive value and remunerative price. Among the various production technologies, nutrition is found to exert a great influence on growth and yield. In different components of the human balanced diet, vegetables occur the prime place in predominantly vegetarian country like India. India is second only to China in vegetable production. It can be said that N, P, K fertilisers alone connot meet the projected demand of 134 million tonnes of vegetables beyond 2000 AD. Application of micronutrients which improve the chemical composition of fruits and general condition of plants has produced marked increase in yield of vegetables. There is lack of research based information on the effect of micronutrients alone particularly with / without bio softwares. Thus, the present study was carried out in a red non- calcareous soil on brinjal.

Materials and Methods

The pot culture experiment was conducted in the green house of the Department of Soil Science