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Economics of Rice Varieties as Influenced by Combination of Plant Densities and Fertilizer Levels under Late Sown Conditions

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A B S T R A C T

A field experiment was conducted on a sandy clay loam soil at college farm of Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad, Telangana during the *kharif* seasons of 2014 and 2015 to study the economics of rice varieties as influenced by combination of plant densities and fertilizer levels under late sown conditions. Same cost of cultivation was recorded for the three varieties, MTU 1010, Rajendra and Pradyumna. Among the treatments the highest cost of cultivation was noticed with (T_9) *viz*., P_3 (15 cm × 10 cm) in combination with F_3 (195-86-90, N, P_2O_5 and K_2O). The highest gross returns were recorded significantly by MTU 1010 over Rajendra and Pradyumna. Among the combination of planting density and fertility levels, the highest gross returns was recorded with the treatment (T_9) *viz*.,P_3 (15 cm × 10 cm) in combination with F_3 (195-86-90, N, P_2O_5 and K_2O). It was on par with (T_8) *viz*., P3 (15 cm × 10 cm) in combination with F_2 (153-59-68, N, P_2O_5 and K_2O). The highest net returns (₹51595, 57974 and 54784 ha^{-1} during 2014, 2015 and in pooled means, respectively) and B:C ratio (1.30, 1.46 and 1.38 during 2014, 2015 and in pooled means, respectively.) were recorded by MTU 1010 over Rajendra and Pradyumna. Among the combination of planting density and fertility levels, the highest net returns were recorded with the treatment (T_8) *viz*., P_3 (15 cm × 10 cm) in combination with F_2 (153-59-68, N, P_2O_5 and K_2O) (₹57690, 63864 and 60777 ha^{-1}). It was on par with (T_9) *viz*., P3 (15 cm × 10 cm) in combination with F_3 (195-86-90, N, P_2O_5 and K_2O).

Introduction

Rice [*Oryza sativa* (L.)] is one of the most important staple food crops in the world. However, more than 90 per cent of rice is consumed in Asia, where it is a staple food for a majority of the population, including the 560 million hungry people in the region (Mohanty, 2013). In Asia, more than two billion people are getting 60-70 per cent of their energy requirement from rice and its derived products. Among the rice growing countries, India has the largest area (42.27 m ha) and it is the second largest producer (105.24 m t) of rice next to China (144 m t). With an average productivity of 2.49 t ha^{-1}, though increasing marginally, but is still well below the world's average yield of 4.36 t ha^{-1} (FAOSTAT Database, 2014). At the current population growth rate (1.5 %), the rice requirement of India by 2025 would be around 125 m t (Kumar *et al*., 2009). The importance of continuing to develop new rice varieties to guarantee India's food security and support the region's economic development needs no special emphasis. Varieties play a vital role in maximizing of yield by improving the input use efficiency. The adverse effect of late transplanting can also be minimized by selecting suitable cultivar as magnitude of yield reduction varies with the rice cultivars. Plant population exerts a strong influence on the rice growth and grain yield, because of its competitive effects, both on the vegetative and reproductive development.

Optimum plant spacing ensures plants to grow properly both in their aerial and underground parts through utilization of solar radiation and nutrients, therefore proper manipulation of planting density may lead to increase in the economic yield of transplanted rice. Balanced fertilization right from the very beginning of crop growth is utmost essential to achieve better harvest of crop (Singh and Namdeo, 2004). Usually, rice yield declines when transplanting is delayed beyond the optimum time (Ologunde, 1987). The optimal date of transplanting of any field crop depends on the environmental conditions required for good growth and development. The farmer therefore seeks to manage the relationship between the crop and its environment in order to optimize growth and yield.

The present study is proposed to study the economics of rice varieties as influenced by combination of plant densities and fertilizer levels under late sown conditions.

Materials and Methods

Field experiment was conducted during the *kharif* season of 2014 and 2015 at Agricultural College Farm, Rajendranagar, Hyderabad. The experimental site was geographically situated at an altitude of 542.6 m above mean sea level, on 17^0 19^1 N latitude and 78^0 24^1E longitude. It comes under Southern Telangana zone of Telangana. The soil was sandy clay loam in texture, neutral in reaction (pH 7.2) with 0.49% of organic matter, with low available nitrogen (180.8 kg ha^{-1}), high available phosphorus (38.6 kg ha^{-1}) and potassium (312 kg ha^{-1}).

The experiments were laid out in a split plot design with three replications. Three varieties MTU 1010, Rajendra and Pradyumna as main plot treatments, three plant densities (P_1: 20 x 20 cm, $P_{2:}$ 15 x 15 cm and $P_{3:}$ 15 x 10 cm), three fertilizer levels ($F_{1:}$ 111-32-45, $F_{2:}$ 153-59-68 and $F_{3:}$ 195-86-90) as sub plot treatments.

The fertilizer levels111-32-45 kg NPK $ha^{-1,}$ 153-59-68kg NPK ha^{-1} and 195-86-90kg NPK ha^{-1} were applied as 50 per cent N, full dose of P and 50 per cent K at the time of transplanting. Nitrogen was applied as per the treatments in 3 split doses as basal 50% and at active tillering and panicle initiation stages 25% each. The remaining half of potassium was applied at panicle initiation stage.

Gross returns (₹ ha^{-1})

Gross returns were calculated by multiplying the grain and straw yield with their respective prevailing market prices (Perin *et al.,* 1979) and presented as ₹ ha^{-1}.

Net returns (₹ ha^{-1})

The net returns were calculated by subtracting the cost of cultivation from the gross returns and presented as ₹ ha^{-1}.

Benefit:Cost ratio

The benefit cost ratio (BCR) was worked out by using the following formula

$$\text{Benefit:Cost ratio} = \frac{\text{Net returns (₹ ha}^{-1})}{\text{Cost of cultivation (₹ ha}^{-1})}$$

Results and Discussion

Gross returns

Significant variations in grain and straw yields brought about variations in gross returns among varieties, combination of planting density and fertilizer levels during both the years of study (Table 1).

Among the varieties the highest gross returns were recorded significantly by MTU 1010 (₹91145, 97523 and 94334 ha^{-1} during 2014, 2015 and in pooled means, respectively.) over Rajendra and Pradyumna. The lowest gross returns were obtained with Rajendra (₹75704, 80296 and 78000 ha^{-1} during 2014, 2015 and in pooled means, respectively).

Among the combination of planting density and fertility levels, the highest gross returns (₹100368, 106096 and 103232 ha^{-1}) were recorded with the treatment (T_9) *viz*., P_3 (15 cm × 10 cm) in combination with F_3 (195-86-90, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means respectively.

It was on par with (T_8) *viz*., P3 (15 cm × 10 cm) in combination with F_2 (153-59-68, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means, respectively.

The lowest gross returns (₹63529, 67851 and 65690 ha^{-1} during 2014, 2015 and in pooled means, respectively.) were obtained with (T_1) *viz*., P_1 (20 cm × 20 cm) in combination with F_1 (111-32-45, N, P_2O_5 and K_2O kg ha^{-1}).

These results are in agreement with the findings of Swarna (2013) and Dakshina Murthy *et al.*, (2015).

The interaction effect of varieties and plant density in combination with fertility levels during both the years and in pooled mean was found to be non-significant.

Net returns

Significant variations in grain and straw yields brought about variations in net returns among varieties, combination of planting density and fertilizer levels during both the years of study (Table 1).

Among the varieties the highest net returns was recorded significantly by MTU 1010 (₹51595, 57974 and 54784 ha^{-1} during 2014, 2015 and in pooled means, respectively) over Rajendra and Pradyumna.

The increase was 26.04, 42.7 percent during 2014, it was 26.06, 42.3 percent during 2015 and 26.05, 42.5 percent in pooled means over Pradyumna and Rajendra respectively. The lowest net returns were obtained with Rajendra (₹36155, 40747 and 38451 ha^{-1} during 2014, 2015 and in pooled means, respectively.)

Among the combination of planting density and fertility levels, the highest net returns (₹57690, 63864 and 60777 ha^{-1}) were recorded with the treatment (T_8) *viz*., P_3 (15 cm × 10 cm) in combination with F_2 (153-59-68, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means, respectively. It was on par with (T_9) *viz*., P3 (15 cm × 10 cm) in combination with F_3 (195-86-90, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means, respectively. The lowest net returns (₹27070, 31392 and 29231 ha^{-1} during 2014, 2015 and in pooled means, respectively.) were obtained with (T_1) *viz*., P_1 (20 cm × 20 cm) in combination with F_1 (111-32-45, N, P_2O_5 and K_2O kg ha^{-1}). These results are in agreement with the findings of Swarna (2013), Dakshina Murthy *et al.*, (2015).

The interaction effect of varieties and plant density in combination with fertility levels during both the years and in pooled mean was found to be non-significant.

Table.1 Economics of rice varieties as influenced by combination of plant densities and fertilizer levels during *kharif* 2014, 2015 and pooled means

Treatments	Gross returns (₹ ha^{-1})			Net returns (₹ha^{-1})			B:C ratio		
	2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled
Main treatments (Varieties)									
V_1- MTU 1010	91145	97523	94334	51595	57974	54784	1.30	1.46	1.38
V_2-Rajendra	75704	80296	78000	36155	40747	38451	0.91	1.03	0.97
V_3- Pradyumna	80483	85538	83011	40933	45989	43461	1.03	1.16	1.09
SEm±	882	1001	940	882	1001	940	0.02	0.03	0.02
CD (0.05)	3464	3930	3690	3464	3930	3690	0.09	0.10	0.09
Sub treatments(combination of plant density and fertilizer levels)									
T_1-P_1F_1	63529	67851	65690	27070	31392	29231	0.74	0.86	0.80
T_2-P_1F_2	69686	74427	72057	30941	35682	33312	0.80	0.92	0.86
T_3-P_1F_3	72499	76939	74719	31494	35934	33714	0.77	0.88	0.82
T_4-P_2F_1	77334	82267	79801	40115	45048	42582	1.08	1.21	1.14
T_5-P_2F_2	83293	88968	86131	43788	49463	46626	1.11	1.25	1.18
T_6-P_2F_3	86917	92837	89877	45152	51072	48112	1.08	1.22	1.15
T_7-P_3F_1	90254	96402	93328	52115	58263	55189	1.37	1.53	1.45
T_8-P_3F_2	98115	104289	101202	57690	63864	60777	1.43	1.58	1.50
T_9-P_3F_3	100368	106096	103232	57683	63411	60547	1.35	1.49	1.42
SEm±	1211	1259	1233	1211	1259	1233	0.03	0.03	0.03
CD (0.05)	3444	3580	3505	3444	3580	3505	0.08	0.09	0.09
Interaction									
SEm± (Vx T)	2166	2287	2222	2166	2287	2222	0.05	0.06	0.06
CD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
SEm± (TxV)	2098	2181	2135	2098	2181	2135	0.05	0.05	0.05
CD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS

P_1:25 hills/m^2 (20x20 cm), P_2:44 hills/m^2 (15x15 cm), P_3: 66 hills/m^2 (15x10 cm); F_1: 111-32-45, F_2: 153-59-68, F_3: 195-86-90 kg ha^{-1}

B:C ratio

Among the varieties the highest B:C ratio was recorded significantly by MTU 1010 (1.30, 1.46 and 1.38 during 2014, 2015 and in pooled means, respectively) over Rajendra and Pradyumna. The lowest B:C ratio was obtained with Rajendra (0.91, 1.03 and 0.97 during 2014, 2015 and in pooled means respectively) (Table 1).

Among the combination of planting density and fertility levels, the highest B:C ratio (1.43, 1.58, 1.50) was observed with the treatment (T_8) *viz*., P3 (15 cm × 10 cm) in combination with F_2 (153-59-68, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means respectively. It was on par with (T_7) *viz*., P_3 (15 cm × 10 cm) in combination with F_1 (111-32-45, N, P_2O_5 and K_2O) and F_3 (195-86-90, N, P_2O_5 and K_2O) during 2014, 2015 and pooled means, respectively.

The lowest B:C ratio (0.74, 0.86 and 0.80 during 2014, 2015 and in pooled means, respectively) was obtained with (T_1) *viz*., P1 (20 cm × 20 cm) in combination with F_1 (111-32-45, N, P_2O_5 and K_2O kg ha^{-1}).

These results are in agreement with the findings of Swarna (2013) and Dakshina Murthy *et al.*, (2015).

The interaction effect of varieties and plant density in combination with fertility levels during both the years and in pooled mean was found to be non-significant.

References

Dakshina Murthy, K.M., Upendra Rao, A., Vijay, D and Sridhar, T.V. 2015. Effect of levels of nitrogen, phosphorus and potassium on performance of rice. *Indian J. Agricult. Res*., 49 (1): 83-87.

Kumar, R.M., Surekha, K., Padmavathi, Ch., Rao, L.V.S., Latha, P.C., Prasad, M.S., Babu, V.R., Ramprasad, A.S., Rupela, O.P., Goud, P.V., Raman, P.M., Somashekar, N., Ravichandran, S., Singh, S.P and Viraktamath, B.C. 2009. Research experiences on system of rice intensification and future directions. *J. Rice Res*., 2: 61-73.

Mohanty, S. 2013. Trends in global rice consumption. *Rice Today*, Pp. 44-45.

Ologunde, O.O. 1987. Institute of Agriculture research, ABU, Zaria. Samaru *Miscellaneous Paper*, 118: 4–6.

Perin, R.K., Donald. L.W., Edwards, R.M and Jack, R.A. 1979. From Agronomic data for farmer recommendations. *An Economic Training Manual*, CIMMYT Information Bulletin. 27: 15-33.

Singh, R.K and Namdeo, K.N. 2004. Effect of fertility levels and herbicides on growth, yield and nutrient uptake of direct-seeded rice (*Oryza sativa*). *Indian J. Agronomy*. 49(1):34-36.

Swarna, R.2013. Evaluation of CERES-Rice model under variable nitrogen levels and plant densities. *M.Sc. (Ag.) Thesis*. Acharya N G Ranga Agricultural University, Hyderabad, India.

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