

RESEARCH ARTICLE

Response of rice-rice cropping system to different agronomic management practices

■ K. Tejeswara Rao, M.M.V. Srinivasa Rao and D. Nagarjuna

SUMMARY

Experiments were conducted during *Kharif* and *Rabi* seasons of 2015-16 and 2016-17 in farmers fields to study the effect of different agronomic management practices on yield and net returns of rice-rice cropping system in 2 different mandals of Srikakulam district of Andhra Pradesh. The results revealed that yields of rice-rice cropping system were significantly higher over farmer's practices, by adoption of all the recommended package of practices which includes maintenance of optimum plant population and application of recommended dose of NPK and zinc fertilizers at right stages of the crop growth to both the crops in the cropping system.

Key Words : Nutrient management, Rice-rice cropping system, Optimum population

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Rice-rice is one of the predominant cropping systems in Srikakulam district of Andhra Pradesh. Mostly the fertilizer application is based on the single crop rather than the cropping system as a whole. The imbalanced continual as well as indiscriminate use of fertilizers in the system as well as indiscriminate use may also decrease in crop yields. Plant population is

another yield limiting factor especially in short and medium duration rice varieties, hence a study was undertaken to find the response of rice-rice cropping system to different agronomic management practices.

MATERIAL AND METHODS

Experiments were conducted in 24 farmer fields of Veeraghottam and Seethampeta mandals during *Kharif* season and *Rabi* seasons of 2015 -16 and 2016-17 in Srikakulam district. The soil was sandy clay loam to clay with a pH range of 6.25 to 8.32, EC of the soil were ranging between 0.12 to 3.35 and low to high in organic carbon (0.12 to 1.09%), available N(133 to 314 kg ha⁻¹). The experiment was conducted with four different agronomic management practices at 24 locations in

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Randomized Block Design. The rice variety NLR-34449 (Nellore Mahsuri) was sown during *Kharif* season 2015-16 and 2016-17, rice varieties NLR-30491 (Bharani) and NLR-34242 were sown during *Rabi* seasons 2015-16 and 2016-17, respectively. The four different agronomic management practices adopted in *Kharif* and *Rabi* seasons were farmers practice (planting rice randomly in zig-zag manner without maintaining the optimum plant population (20-29 hills m⁻²) imbalanced and improper application mostly top dressing of phosphorus) of fertilizers without any basal application of ZnSO₄. Maintenance of optimum plant population with recommended package of practices (15 x 15 cm spacing with 80:60:50 kg N : P₂O₅ and K₂O per ha in *Kharif* season and 15 x 10 cm spacing with 100:60:50 kg N, P₂O₅ and K₂O Per ha in *Rabi* season. Application of fertilizers at right time as well as application of fertilizers at right time as well as application of ZnSO₄ @ 50 kg/ha along with farmers practice influence the grain yield and net returns of rice were studied in rice-rice cropping system.

RESULTS AND DISCUSSION

Grain yield of rice-rice cropping system were significantly different by agronomic management practices (Table 1). The results of the experiments conducted in rice-rice cropping system during *Kharif* and *Rabi* season of 2015-16 and 2016-17 indicated that traditional practice which was adopted by the farmers resulted in grain yield of 5.62 t/ha 7.00 t/ha during *Kharif* 2015-16 and 2016-17, respectively and 6.16 and 6.64 t

ha⁻¹ only during *Rabi* season 2015-16 and 2016-17 respectively. With the adoption of optimum plant population the yields increased by 6.4 per cent (5.98 t ha⁻¹) and 10.2 per cent (7.71 t ha⁻¹) during *Kharif* season 2015-16 and 2016-17, respectively and 4.83 per cent (6.64 t ha⁻¹) and 13.0% (7.51 ha¹) during *Rabi* season 2015-16 and 2016-17, respectively. Similar results were obtained by Nandini Devi and Ibopishak Singh Singh (2000); Yadav and Tirupathi (2008) and Sujathamma *et al.* (2012). Early and medium duration varieties responded positively to the optimum plant population densities and showed increased yields, which might be due to their short vegetative phase when compared to the long vegetative phase of long duration varieties this shortage time for tillering is compensated by optimum number of hills m⁻² with the basal application of ZnSO₄ @ 50 kg ha⁻¹ to both the rice crops in the cropping systems along with farmers practice increased the grain yield by 10.8 per cent (6.23 t ha⁻¹) and 6.2 (7.43 t ha⁻¹) during *Kharif* 2015-16 and 2016-17, respectively and 4.46 per cent (6.44 t ha⁻¹) and 9.4 per cent (7.26% t ha⁻¹), respectively during *Rabi* season 2015-16 and 2016-17. Results indicate that zinc application is required for both the rice crops in the cropping system as against the existing recommendation of zinc application once in three seasons, similar results were reported earlier by Rajendra Prasad *et al.* (2000). Adoption of all recommended package of practices resulted in 17.9 per cent (6.63 t ha⁻¹) and 17.8 per cent (824 t ha⁻¹), respectively during *Kharif*, 2015-16 and 2016-17. This shows the significance of optimum plant population, balanced

Table 1: Grain yield (t ha⁻¹) of rice-rice cropping systems as influence by different agronomic management practices

Treatments	Grain yield (t ha ⁻¹)			
	<i>Kharif</i> , 2015-16	<i>Rabi</i> , 15-16	<i>Kharif</i> , 2016-17	<i>Rabi</i> , 2016-17
Farmers practice (FP)	5.62	6.16	7.00	6.64
FP + Improved planting management	5.98	6.64	7.71	7.51
Recommended package of practices	6.63	6.92	8.24	7.96
FP+Zn SO ₄	6.23	6.44	7.43	7.26
C.D.(P= 0.05)	0.17	0.23	0.32	0.18

Table 2: Net returns (Rs. ha⁻¹) of rice in rice-rice cropping system as influenced by different agronomic practices

Treatments	Net returns (Rs. ha ⁻¹)				Mean
	<i>Kharif</i> , 2015-16	<i>Rabi</i> , 2015-16	<i>Kharif</i> , 2016-17	<i>Rabi</i> , 2016-17	
Farmers practice (FP)	25038	33894	38542	21509	29476
FP+ Improved planting management	25926	36250	45600	25247	33256
Recommended package of practices	33744	40861	53682	30623	39728
FP+Zn SO ₄	28693	35967	42874	23795	33832

fertilizer application and need of zinc application to both the crop in a cropping system to increase the yields which in turn positively influence the net returns.

Higher net returns of the rice in rice–rice cropping system was realized with the adoption of recommended package of practices in both the year of experimentation (Table 2). This might be due to higher grain yield and lower cost of cultivation than farmers practice which in contrast results in higher cost of cultivation and lower grain yield. Maintenance of optimum plant population densities resulted in increased yield. The need of zinc application to both the crops in rice-rice cropping system is clearly demonstrated as against the existing recommendation of zinc application once in three seasons.

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