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Effect of Rice (*Oryza sativa* L.) + Pulse Intercropping System on Yield and Nutrient Uptake

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In terms of land use, growing crops in mixed stand is regarded as more productive than growing them separately (Andrews and Kassam, 1976). Besides yield advantage of intercropping, it becomes necessary to know the nutrient uptake pattern of such system. The intercropping of legumes with cereal offers scope for developing energy efficient and sustainable agriculture (Papendick *et al.*, 1976).

A field experiment was conducted during the summer season of 1989 at Assam Agricultural University, Jorhat to evaluate the nitrogen and phosphorus uptake pattern in rice + pulse intercropping system and its effect on grain yield of rice and pulse. Two pulses, viz., greengram 'AAU-34' and blackgram 'T-9' were intercropped with direct-seeded rice 'Rasi' in 2:1, 4:1, 2:2 and 4:2 row proportions of rice : pulse. Sole crops of each variety was raised for comparison. The experiment was laid out in randomised block design with 3 replications. The soil of the experimental site was sandy loam in texture with pH 5.1, organic carbon 0.89% and available N, P_2O_5 and K_2O 249, 25.75 and 167.5 kg/ha, respectively. Plant samples were analysed for N and P following standard procedure. The total rainfall received during the crop season (February-June) was 656.4 mm.

The uptake of N and P was significantly influenced by different treatments (Table 1). The total uptake of N was maximum at rice + greengram system and was statistically superior to rice + blackgram. This was due to the differential response of component crops included in the system (Ahmed and Rao, 1982). Among the sole crops, greengram removed maximum quantity of N (Mongia and Gangwar, 1991). Though the individual uptake of N was reduced in intercropping than their respective sole crops, the total uptake of N was statistically superior in intercropping over sole cropping. The demand for total N was significantly more by 2:1 followed by 2:2, 4:1 and 4:2 proportions.

Similar trend of response was observed for P. The total harvest of N and P were 44 and 27 per cent higher in intercropping system over sole cropping. Higher removal of nutrients under inter-cropping over sole crop was reported by Sanchez (1976).

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TABLE 1

Uptake of nitrogen and phosphorus as affected by intercropping and its effect on grain yields.

Treatments	N-uptake (kg/ha)			P-uptake (kg/ha)			Grain yield (kg/ha)		Rice equivalent (kg/ha)
	Rice	Pulse	Total	Rice	Pulse	Total	Rice	Pulse	
Sole crop									
Rice	26.84	—	26.84	3.41	—	3.41	1527	—	1527
Greengram	—	39.68	39.68	—	6.82	6.82	—	341	1363
Blackgram	—	20.34	20.34	—	3.71	3.71	—	262	785
CD at 5 %	—	2.53	4.18	—	1.26	0.51	—	14	112
Cropping system									
Rice + greengram	23.32	21.76	45.08	2.98	3.51	6.47	1136	178	1848
Rice + blackgram	25.86	12.51	38.38	2.87	2.48	5.35	1132	137	1544
CD at 5 %	0.57	1.27	2.09	0.09	0.63	0.25	NS	7	56
Row proportion									
R:P 2:1	29.73	18.64	48.02	2.92	4.19	7.11	1071	178	1702
R:P 4:1	29.65	10.12	39.77	3.60	1.32	4.93	1414	91	1736
R:P 2:2	14.76	22.08	41.84	2.51	3.23	5.74	996	213	1761
R:P 4:2	19.60	17.71	37.31	2.64	3.22	5.87	1052	149	1585
CD at 5 %	0.81	1.79	2.96	0.14	0.89	0.36	63	10	79
Sole Vs. Intercropping									
Mean of sole crops	26.84	30.01	28.95	3.41	5.26	4.65	1527	302	1225
Mean of intercropping	24.59	17.13	41.73	2.92	2.99	5.91	1134	158	1696
CD at 5 %	1.09	1.90	2.75	0.18	0.94	0.34	85	11	74

Market prices of commodities (Rs/ha) : Rice, 200; Greengram, 800; Blackgram, 600; R. Rice; P. Pulse

The grain yields of rice, greengram and blackgram were reduced under intercropping than their respective sole crop yields. However, in terms of rice-equivalent, rice + greengram was more productive over rice + blackgram. This higher yield was supported by significantly higher uptake of nutrients by the system. Among the row proportions, 2:2 ratio produced higher rice-equivalent over 4:2 and was at par with 4:1 and 2:1. In respect of rice equivalent, intercropping of greengram and blackgram with rice produced 38 per cent yield advantage over sole cropping.

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REFERENCES

Ahmed, S. and Rao, M. R (1982). *Field Crops Res.* **15** : 147-161 (in) *Advances in Agronomy* Vol. 41 pp. 68.

Andrews, D. J. and Kassam, A. H. (1976). *In* Multiple Cropping (R. I. Papendick, P. A. Sanchez, and G. B. Triplett, eds.), pp. 1-10. Spec. Pub. No. 27, Am. Soc. of Agron., Madison, Wisconsin.

Mongia, A. D. and Gangwar, B. (1991). Nutrient balance under multiple cropping sequences in an acid soil. *Indian J. Agron.*, **36** (1) : 17-22.

Papendick, R. I., Sanchez, P. A. and Triplett, G. B. (1976). Multiple Cropping. pp 378. Spec. Pub. No. 27. Am. Soc. of Agron. Madison, Wisconsin.

Sanchez, P. A. (1976). Properties and management of soils in the tropics. John Wiley and Sons, New York