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NUTRIENT REQUIREMENT OF RICE UNDER *KOOTTUMUNDAKAN* SYSTEM

The system of cultivating a mixture of photosensitive and photo insensitive rice varieties, coinciding their harvest with the end of the first kharif and second rabi crop season is designated as *Koottumundakan*. The system is advantageous in areas where difficulty is experienced to prepare the field for second crop due to stagnant water and in areas where transplanting of second crop is unduly delayed due to specific reasons. The productivity of the system, however, has been observed to be low and hence need substantial improvement. The present study was undertaken in this background with the objective of increasing the rice productivity with judicious nutrient supply.

The experiment was conducted at the Regional Agricultural Research Station, Pattambi during 1989-90 kharif and rabi season. The soil of the experimental site was lateritic loam, acidic and of medium fertility. Aryan (Ptb 1) for the first crop and Chettadi (local) for the second crop were the varieties in the mixture sown in a proportion of 70:30 (wt/wt) ratio during kharif season. The treatments were combinations of the recommended fertilizer schedule for a single variety (NPK 40:20:20 kg ha^{-1}) applied in three (100, 75 and 50 per cent) proportions in kharif and four (100, 75, 50 and 25 per cent) proportions for the rabi crop. All the operations, other than treatments, were carried out uniformly as per the package of practices recommendations (KAU, 1987). The varieties were successfully harvested at the end of kharif and rabi season. Data on grain and straw yields were recorded, analysed statistically (Panse and Sukhatme, 1978) and presented in Table 1 and 2.

Statistical analysis of the data did not show any significant variation in grain yield between different nutrient levels during the first crop season either in individual years or while pooling. However, a general improvement in grain yield was observed with the advancement in experimentation from the first to the third fertilization (100, 75 and 50 per cent of recommended dose), clearly indicated the ability of the *Koottumundakan* to yield well under the lower dose of 50 per cent during the first crop which was made possible by the abundant supply of organic residues.

Unlike the first crop season, grain yield recorded appreciable variation between the fertiliser levels during the second crop season except during the year 1988. Treatments which received 100 or 75 per cent of the recommended dose had significantly out-yielded the treatments which received lower dose of 50 and 25 per cent. Pooled analysis also indicated significant difference in grain yield during second crop season. Reduction of fertiliser level from 100 to 50 per cent during second crop season did not significantly reduce the yield in respect of the treatment which received 100 per cent fertiliser dose during the first crop season. However, in the case of treatments which received either 50 or 75 per cent of the recommended dose during the first crop season, there was severe yield reduction during the second crop season when the level of fertiliser was brought down to 50 or 25 per cent.

It is also observed that while the sole crop systems of rice require 80:40:40 kg ha^{-1} of NPK for two seasons as per recommended dose (40:20:20 kg per season), *Koottumundakan* required only 50:25:25 kg (20:10:10 the first and 30:15:15 for the second crop).

As in the case of gram yield, there was no significant difference in straw yield between the treatments during the first crop. However, appreciable variation was observed between the fertiliser levels during second crop season except during the year 1990. The combined straw yield production from both the first and second crop season also did not show significant variation with the changes in nutrient levels. However, straw yields during the first crop recorded 330 per cent increase over the second crop season irrespective of the treatments. Higher straw production during

Table 1. Grain yield of rice under Kootumundakan system, t ha^{-1}

Treatments *Fertilizer dose (%)		1st crop			2nd crop			Pooled Mean		
1st crop	2nd crop	1988	1989	1990	1988	1989	1990	1st crop	2nd crop	Total
100	100	21.04	23.43	28.46	26.65	26.44	23.19	24.33	25.42	49.75
100	75	20.39	19.22	25.73	27.95	26.28	21.70	21.78	25.31	47.09
100	50	19.65	21.83	28.63	27.11	25.85	21.90	23.37	24.95	48.32
100	25	20.50	21.16	29.20	24.38	25.73	18.88	23.62	23.00	46.62
75	100	21.82	21.01	29.22	29.25	25.56	21.05	24.02	25.29	49.30
75	75	19.65	20.27	20.16	29.90	29.60	21.96	22.69	27.15	49.84
75	50	17.75	18.45	27.61	24.70	20.52	21.48	21.27	22.23	43.50
75	25	18.82	22.31	27.64	22.74	23.21	20.83	22.92	21.26	44.18
50	100	18.56	20.26	28.92	27.95	23.43	24.28	22.58	25.22	47.80
50	75	20.06	22.22	26.59	27.95	27.39	•23.29	22.96	26.21	49.18
50	50	20.19	22.23	25.78	24.05	22.86	20.11	22.73	22.34	45.08
50	25	20.87	18.89	26.08	25.35	23.96	21.05	21.95	22.40	44.40
cr) (0.05)		NS	NS	NS	NS	4.20	3.20	NS	2.81	4.39

*N:P_2O_5:K_2O - 40:20:20 kg ha^{1}

Table 2. Straw yield of rice under Koottumundakan system, t ha^{-1}

Treatments Fertilizer dose (%)		1st crop			2nd crop			Pooled Mean		
1st crop	2nd crop	1988	1989	1990	1988	1989	1990	1st crop	2nd crop	Total
100	100	61.40	85.70	46.20	48.70	25.70	47.80	64.40	40.70	105.10
100	75	71.70	60.20	49.10	53.40	30.00	44.80	67.00	42.70	109.70
100	50	69.11	90.40	49.70	47.40	23.60	46.90	69.70	39.30	109.00
100	25	97.10	93.60	47.50	48.10	28.60	42.90	79.40	38.90	118.30
75	100	70.60	97.80	47.20	52.90	28.10	41.90	71.90	40.90	112.80
75	75	79.20	84.70	47.40	54.90	27.90	45.80	70.40	42.70	113.10
75	50	77.90	79.90	43.60	49.20	21.40	43.50	67.10	38.10	105.90
75	25	93.80	97.20	42.70	41.50	26.00	43.20	77.80	36.90	114.70
50	100	77.70	95.80	41.70	52.50	23.10	45.80	71.70	40.40	112.10
50	75	57.60	84.70	41.10	57.50	26.70	49.10	61.10	44.40	105.50
50	50	77.20	88.60	41.70	53.20	23.40	40.70	69.20	39.10	108.30
50	25	86.90	88.20	46.30	51.00	24.90	43.90	73.80	39.90	113.70
CD (0.05)		NS	0.91	NS	0.82	0.52	NS	NS	NS	NS

first crop season can be naturally expected since it contained a substantial quantity of vegetative portions of the second crop variety which was cut while harvesting the first crop. An over all evaluation of the data revealed that the best schedule for optimum grain and straw yield in *Koottumundakan is* to give a $N:P_2O_5:K_2O$ dose of 20:10:10 kg ha^{-1} for the first crop and 30:15:15 kg ha^{-1} for the second crop. The system facilitates reduction in cultivation cost and is a good model for effective organic recycling.

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