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INVESTIGATIONS ON PHOSPHATE AND POTASH MANURING OF TRANSPLANTED RICE

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Studies on phosphatic manuring of flooded rice have yielded conflicting results. While Mukerjee (1955), Ghose *et al* (1956), and Rao *et* al. (1967) observed positive response to applied phosphate, Sethi *et al.* (1952) found no significant effect due to phosphate application. Studies conducted in the waterlogged sandy loam soils of the Rice Research Station, Pattambi, Kerala, over a period of 35 years (1933-1968) did not show any marked response to phosphate manuring. (Nair and Pisharody, 1970). Neither the forms nor the doses had appreciable effect on rice yield. Adequate phosphorus in the soil, however, is essential for nitrogen uptake and if phosphate is limiting, plants do not grow normally and yields are depressed (Lockhard, 1959; Aiyar 1946). It is of interest, therefore, to study the number of rice crops that can be successfully grown in the flooded soils without phosphate fertilization,

Materials and Methods

The soil of the experimental site was a sandy loam derived from low level laterite, acid in reaction, and moderately fow in available nutrients.

The analysis of th soil revealed the following characterestics.

Mechanical:

Coarse sand-16.42%; Fine sand-29.51 %; Silt-7.60 Fine silt-20.32%; Clay 22.40%:

Chemical:

Organic carbon–0.92 %; Available P_2O_5 in air dried unmanured soil 11.7 kg/ha; Available P_2O_5 in wet unmanured soil–18.3; Available K_2O in air dried unmanured soil–160 kg/ha; pH air dried soil–5.3; pH wet soil-6.1.

The experiment was conducted for six seasons commencing from the first crop (June-September) season of 1974-75. The design of the experiment was Randomised block replicated four times There were ten treatments (Table 1). The test variety was Triveni. All the treatments received a uniform dose of nitrogen at 70 Kg per hectare in two equal splits at planting and panicle initiation stages. The doses of phosphorus (P_2O_5) and potash (K_2O) were 35 Kg each per hectare. The gross plot size was 6.6x 3.6 m. Seedlings were raised in wet nursery beds and transplanted at a spacing of 15 cm x 15cm with two seedlings per hill.

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The experiment was conducted in the same site without altering the randomisation of treatments.

Results and Discussion

The data gathered on pH, available P_2O_5 and available K_2O of the soil in the experimental plots at the end of the second crop season in each year are presented in Table 2. The pH of the soil showed no marked variation even after continuous cropping for 6 seasons The status of available P_2O_5 in the soil, on the other hand, varied in response to addition of fertilizers. The content of available P_2O_5 in the plots receiving N, P and K in all the seasons exhibited a fall from 10.4 kg ha to 7.4- kg/ha, In the plots receiving N alone regularly, the available P_2O_5 declined to 8.3 kg/ha from 10.1 kg/ha and this plot had the maximum available P_2O_5 after continuous cropping for six seasons. But the mean grain yield per hectare was the lowest in this treatment. This shows that the measurement of available P_2O_5 in the soil has no relation with the quantity of phosphatic fertilizers applied in the soil. Nelson, (1957) obtained mo response to various rates of application of P_2O_5 even on soils deficient in P, This lack of response, was attributed to fixation of added P, transformation of native phosphate to available forms under flooded conditions and inadequacy of the analytical methods used to evaluate the available P. These might be the reasons for the low available P measured in the treatment receiving P in all the seasons in the present study also.

The grain yield recorded under each Treatment for six seasons are presented in Table 1. Of the 10 treatment combinations: treatment 1 received N, P and K during all the seasons while the treatment 10 received N only. Treatments 2 and 3 received P in alternate seasons and treatments 4 and 5 received P once in three seasons Similarly treatment 6 and 7 received K in alternate seasons while 8 and 9 received K once in three seasons only (Table 3).

During none of the seasons the treatment differences were significant Nevertheless, in the first and second seassns, the treatment receiving N alone recorded higher yields than that receiving N, P and K regularly (Treatment 1). During the third and fourth seasons, on the other hand, the plots receiving N alone produced the lowest yield of all treatments. It should be mentioned here that crop growth was relatively poor in this treatment during the last two seasons of the trial and physiological disorders resembling zinc deficiency and iron toxicity were noticed. Later, the symptoms were identified as phosphate induced Zn deficiency in this particular treatment. Similar observations on phosphate induced zinc deficiency have been reported by Sharma *et af.,* (1968). It has also been reported that in sandy loam and clayey soils, applied phosphate has a tendency to depress the zinc availabity (Seshachalam, 1971).

Table 1

Grain yield of Triveni rice corresponding to different treatments

	Treatments						Grain Yield (Kg/ha)						
	1974–75		1975–76		1976-77		1974–75		1975–76		1976–77		
	First crop	Second crop	First crop	Second crop	First crop	Second crop	First crop	Second crop	First crop	Second crop	First crop	Second crop	Mean
1	NPK	NPK	NPK	NPK	NPK	NPK	3511	3223	3538	2381	2262	2127	2840
2	NPK	N-K	NPK	N-K	NPK	N-K	3560	3042	3758	2271	2615	2458	2951
3	N-K	NPK	N-K	NPK	N-K	NPK	3643	3144	3605	2337	2548	2524	2967
4	NPK	N-K	N–K	N-K	N-K	N-K	3566	3276	3406	2138	2249	2293	2821
5	N-K	NPK	N-K	N-K	N-P	N-K	3346	3267	3538	2337	2637	2623	2958
6	NPK	NP-	NPK	NP-	NPK	NP-	3649	3210	3638	2249	2482	2480	2951
7	NP–	NPK	NP–	NPK	NP–	NPK	3467	3056	3781	2083	2328	2403	2853
8	NPK	NP–	NP-	NPK	NP-	NP-	3566	3236	3627	2194	2372	2315	2885
9	NP-	NPK,	NP-	NP-	NPK	NP-	3616	3267	3649	2315	2535	2469	2975
10	N—	N–	N–	N—	N—	N–	3538	3329	3263	2017	2328	2260	2789
			F Test				NS	NS	NS	NS	NS	NS	NS

NS *Not Significant

—Skipping over of P or K according to position

Table 2

Soil pH, available P_2O_5 and K_2O at the end of the second crop of each year

Tr. No.	Treatments 1974-75 First crop	1974-75 Second crop	1975-76 First crop	1975-76 Second crop	1976-77 First crop	1976-77 Second crop	1974-75 pH	1974-75 P_2O_5	1974-75 K_2O	1975–76 pH	1975–76 P_2O_5	1975–76 K 0	1966-77 pH	1966-77 P_2O_5	1966-77 K_2O
1	NPK	NPK	NPK	NPK	NPK	NPK	5.2	10.4	223	5.2	10.2	246	5.3	7.4	228
2	NPK	N- K	NPK	N K	NPK	N-K	5,2	10.3	247	5.3	10.2	238	5.3	7.2	230
3	N-K	NPK	N-K	NPK	N-K	NPK	5.1	9.9	248	5.2	9.8	256	5.2	7.7	244
4	NPK	N-K	N-K	NPK	N-K	N-K	52	9.5	238	5,2	8.8	240	5.3	7,8	200
5	N-K	NPK	N-K	N-K	NPK	N–K	5.3	9.8	252	5.3	9.1	236	5.4	7,9	230
6	NPK	NP-	NPK	NP-	NPK	NP-	5.2	9.9	269	5.3	9.9	232	5.2	6.9	224
7	NP-	NPK	NP-	NPK	NP–	NPK	5.3	10.1	254	5.3	10.4	168	5.1	7.1	220
8	NPK	NP–	NP-	NPK	NP-	NP–	5.3	10.4	250	5.4	10.2	219	5,2	7.7	200
9	NP-	NPK	NPK	NP–	NPK	NP-	5.2	11.2	260	5.2	10.9	220	5.2	7.1	180
10	N- –	N– –	N– –	N– –	N– -	N- -	5.1	10.1	239	5.2	10.2	210	5.2	8.3	200

-skipping-over application of P or K according to position·

Table 3

Mean grain yield (kg'ha) in each season as influenced by phosphorus and potach applied regulary and at intervals

Seasons	Application of P and K along with N in every season	P applied once in 2 seasons	P applied once in 3 seasons	K applied once in 2 seasons	K applied once in 3 seasons	N alone in every season
74-75 i crop	3511		—		—	3538
74-75 II crop	3223	3182	—	3192	—	3329
75-76 I crop	3538	3682	3472	3710	3638	3263
75-76 II crop	2381	2304	2238	2166	2255	2017
76-77 1 crop	2262	2582	2443	2405	2454	2328
76-77 II crop	2127	2591	2458	2442	2392	2260
Mean of six seasons	2840	2848	2653	2783	2685	2789

സംഗ്രഹം

ഫോസ്ഫോറസ്, പൊട്ടാഷ് വളങ്ങളും രണ്ടു പൂവുകളിലൊരു പ്രാവശ്യവും മൂന്നു പൂവുകളിലൊരു പ്രാവശ്യവും വീതം മാത്രം ഇട്ടുകൊടുക്കുന്നതു ഈ വളങ്ങളും തുടർച്ചയായി എല്ലാ പൂവിലും നൽകുന്നതുപോലെ പട്ടാമ്പി നെൽ ഗവേഷണ കേന്ദ്രത്തിൽ പരീക്ഷിച്ചുനോക്കിയതിൽ (1974-75 മുതൽ 1976-77 വരെ) ത്രിവേണിയിനം നെല്ലിൻവിളവിനെ സംബന്ധിച്ചിടത്തോളം ഗണ്യമായ യാതൊരു വ്യത്യാസങ്ങളും കണ്ടില്ലെന്നുമാത്രമല്ല തുടർച്ചയായി വളപ്രയോഗം നടത്തിയപ്പോഴും നെൽവിളവിൽ കുറവുണ്ടാകുന്നതായും കണ്ടു. P K, വളങ്ങളും തുടർച്ചയായി നൽകുന്നതിനുള്ള നിലവിലുള്ള നിർദ്ദേശങ്ങളും ഈ പശ്ചാത്തലത്തിൽ പരിഗണിക്കേണ്ടതാണ്.

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