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Efficacy of Inorganics and Organics to Potato

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ABSTRACT

Trials were conducted to compare the inorganic and organic sources of both nitrogenous and phosphotic fertilizers. Similar performance of the inorganic sources of the nutrients under the present soil condition for short duration crops like potatoes, is observed. When it is combined with application of bulky organic manures, the performance seems to be better.

INTRODUCTION

Farmers in the Nilgiris, apply, in general, the Nanjanad mixture to potato crop. Fifty per cent of N and P are in the form of groundnut cake meal and steamed bone meal, respectively. These organic forms of fertilizers are very costly when the price is compared with inorganic forms per unit nutrient value. Further, groundnut cake meal can be used as a cattle feed and steamed bone meal is not available in plenty. The nutrient content in the organic fertilizers is not constant. It varies depending on many factors. In addition, both N and P from the above sources are not released in sufficient quantities to short duration crops like potatoes.

Taking into consideration the acidic nature and other physical and chemical properties of the soils of Nilgiris, organic form of P or N is to be theoretically expected to give a very good response in terms of yield, in addition to its beneficial effects in building both the physical and chemical properties of the soil. Therefore, this study was undertaken to compare the merits of both the organic and inorganic forms of N and P.

MATERIALS AND METHODS

The trial was laid out at the Agricultural Research Station, Nanjanad during main season, 1968 with 8 main treatments and 2 sub-treatments in a split plot design with 4 replications.

The details are furnished below:

Main treatments:

1. Control
2. N as ammonium sulphate and P_2O_5 as Thomas phosphate.

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3. N and P_2O_5 as groundnut cake and Thomas phosphate.
4. N and P_2O_5 as ammonium sulphate and steamed bone meal.
5. N and P_2O_5 as groundnut cake and steamed bone meal.
6. N as groundnut cake (50 per cent N) and ammonium sulphate (50 per cent N), P_2O_5 as steamed bone meal (50 per cent N) and Thomas phosphate (50 per cent P_2O_5).
7. N as groundnut cake (50 per cent N) and ammonium sulphate (50 per cent N) and P_2O_5 as Thomas phosphate.
8. N as ammonium sulphate and P_2O_5 as steamed bone meal (50 per cent P_2O_5) and Thomas phosphate (50 per cent P_2O_5).

Sub-treatments :

1. No manure
2. 2000 Kg/ha manure.

N, P_2O_5 and K_2O were given as basal dressing at the rate of 6, 24 and 6 kg/da respectively. The presence of N in steamed bone meal and the P_2O_5 in groundnut cake have also been taken into account. Wherever Thomas phosphate was a treatment, ammonium sulphate was applied 10 days after

TABLE 1. Yield and analytical data of main season 1968

Main treatments							
Yield		Soil P		Plant P		Plant N	
Q/da	Per cent over control	in ppm	Per cent over control	Per cent	Per cent over control	Percent	Per cent over control
19.9	100	57.5	100	0.360	100	3.74	100
25.2	127	77.5	135	0.410	114	4.20	112
23.5	118	72.5	126	0.420	117	4.06	109
25.0	126	62.5	109	0.325	90	4.23	113
22.3	112	62.5	109	0.325	90	4.06	102
19.4	97	72.5	126	0.415	115	3.90	104
21.2	107	77.5	135	0.460	128	3.85	103
22.9	115	72.5	126	0.420	117	4.23	113

TABLE 2. Yield and analytical data of autumn season 1368

Main treatments							
Yield		Soil P		Plant P		Plant N	
Q/da	Per cent over control	in ppm	Per cent over control	Per cent	Per cent over control	Per cent	Per cent over control
10.2	100	62.5	100	0.415	100	3.81	100
12.2	120	72.5	116	0.470	113	4.28	112
12.0	118	72.5	116	0.415	100	4.08	107
12.4	124	67.5	108	0.405	98	4.23	111
11.1	109	67.5	108	0.380	92	4.08	107
11.5	113	67.5	108	0.430	104	4.23	111
11.9	117	72.5	116	0.435	105	3.88	102
11.4	112	67.5	108	0 415	100	4.23	107

planting or soon after sprouting whichever is earlier to avoid loss of ammoniacal nitrogen due to the presence of free calcium oxide in Thomas phosphate. Top dressing of 2 Kg/da as ammonium sulphate was applied to all the plots during the first hoeing and weeding.

The trial has been repeated during autumn 1968. The plots received N, P_2O_5 and K_2O at the rate of 9, 16 and 3 Kg/da respectively, as basal dressing only. Soil and plant samples were collected from the plots on the 75th day after planting and total P and N were estimated.

RESULTS AND DISCUSSION

The yield data are furnished in Table 1. Maximum yield was obtained in plots where both N and P have been supplied in inorganic forms or in plots which received the entire N as ammonium sulphate and P as steamed bone meal. Minimum yield response was recorded in plots which received the entire N and P as either organic fertilizers or as in the Nanjanad Mixture (treatment No. 6). This trend was observed during autumn 1968 also. During both the seasons manured plots recorded better yields than control plots. The yield differences bet-

TABLE 3. Economics of the trials

T. No.	Input per da. in rupees *	Main season 1968		Net profit if control is 100	Autumn Season 1968		
		Receipt in rupees per da **	Additional income over control per da.		Receipt in rupees per da.	Additional income over control per da	Net profit if control is 100
1	0.00	1157.28	—	100	639.83	—	100
2	65.90	1516.21	293.03	125	1180.11	474.38	174
3	89.04	1397.74	151.42	113	722.10	−6.77	99
4	62.40	1487.20	267.52	123	755.26	53.03	108
5	66.94	1393.37	69.15	115	669.08	−44.69	94
6	71.66	1196.14	−32.80	97	702.67	−8.82	99
7	66.75	1241.05	17.02	102	697.08	−9.50	99
8	64.69	1360.61	138.64	112	704.16	−0.36	100

* Other cost of inputs being equal to all the treatments, extra input cost on nitrogenous and phosphatic fertilizers alone have been calculated. (Price as on August, 1968).

** Price per quintal of the produce at Rs. 75.00 for seeds, Rs. 60.00 for Big and small chats and Rs. 40 for other grades.

'da' denotes decare (1/10 hectare)

ween treatments were however not statistically significant indicating the suitability of the other combinations of fertilizers also in place of Nanjanad mixture. Experiments were carried out at the Agricultural Research Station, Nanjanad to test the efficacy of Farm Mixture with other mixtures supplying an equal amount or half as much of phosphoric acid either as super or as bone meal (Anonymous, 1954). Mixture with super as the sole carrier of phosphoric acid behaved just like the Nanjanad mixture.

Whichever plots received the entire phosphorus as inorganic fertilizer recorded the maximum available soil phosphorus (T. No. 2, 3 and 7). P content in the plant samples also indicated the same trend. Nitrogen content of the plants showed that

whenever N was supplied as inorganic fertilizers, the potato crop is able to absorb the maximum (T. No. 2, 4 and 3). When both N and P are supplied as inorganic fertilizers, the uptake of both N and P are found to be the maximum from those plots.

A new soil phosphorus level has been built up in the farm soils where the experiments were conducted. Under such conditions inorganic forms of P and N gave good responses for short duration annual crops like potatoes. Whenever, the source of nutrient supply is either substituted or supplemented with organic forms, it is of no added advantage probably due to the low rate of mineralisation of organic forms.

On the other hand the inorganic sources of nutrients reduced the cost of input considerably, resulting in 25 per cent more profit by the use of inorganic fertilizers. Where one of the inorganic sources of fertilizers are partially or completely substituted by the organic forms, the increase is only up to 15 per cent (Table 3).

During the autumn season, the same trend is observed but the profit obtained by the use of inorganic fertilizers is even 74 per cent over control. Whenever the entire N was in the inorganic form the performance in yield was either second to the treatment where both N and P were in inorganic forms, or the loss was at the minimum. This stresses the need to supply at least N in the inorganic form.

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