https://doi.org/10.29321/MAJ.10.A02499

Madras Agric. J. 71 (7) 455—458 July 1984.

EFFECT OF APPLICATION OF ORGANIC MATTER AND PHOSPHORUS ON THE YIELD OF MAIZE GRAIN AND MOBILISATION OF P IN THE SOIL

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Organic manures at 15 t/ha had a significant effect in increasing the available P from the native and applied sources. Increasing the P application (0 to 120 kg/ha) increased the available P content in the soil. Addition of organic manure (15 t/ha) coupled with P (80 kg P_2O_5/ha) had significantly increased the grain yield. Organic manures at 15 t/ha application increased the straw yield.

Efficiency of added P depends on a number of factors and its efficiency can be enhanced by the combination of organics with phosphatic fertilizers. The efficiency of various organic sources in enhancing the P mobilisation and also its effect on grain yield has not been studied in detail and therefore the present investigation was undertaken.

MATERIALS AND METHODS

A field experiment was laid out in Tamil Nadu Agricultural University Farm, Coimbatore, with maize var. Ganga-5. The nutrient status of the experimental field was as fallows : available N-280 kg/ha; available P - 6.8 kg/ha ; available K-530 kg/ha; organic carbon 0.58% and pH 7.8. The treatments included four levels of P (0, 40, 80, 120 kg P_2O_5/ha) and two levels of organic manures (10 t and 15 t/ha) which was supplied through two sources, viz., Farm yard manure and municipal compost. The experiment was laid out in split plot design with three replications. Available P content (Olsen, *et al.*, 1954) in the soil was estimated at 60th day after harvest. The yield of maize grain was recorded.

RESULTS AND DISCUSSION

Available P content :

The results showed that increasing levels of P application had increased the available P content upto 80 kg P_2O_5/ha. Further addition of P i.e., 120 kg P_2O_5/ha had decreased the available P content at 60th day and also at harvest. The addition of organic munure viz., compost and FYM had significantly increased the available P_2O_5 at all levels of P_2O_5 application. This indicated that organic manures had a significant effect in increasing the available P_2O_5 from the native and added sources of P. As would be seen from the results (Table 1), the mere additon of compost at 10 t/ha had increased the available P_2O_5 to 7.40 kg/ha (control). Addition of 40 kg P_2O_5/ha increased the available P_2O_5 to 8.57 kg/ha from 5.80 kg P_2O_5/ha (control), and the addition of compost at 15 t/ha could still increase the available P_2O_5 to the level of 9.37 kg P_2O_5/ha. Although increasing the application of P_2O_5 increased the available P_2O_5 content in soils, neither compost not F.Y.M. addition could increase the available P_2O_5 substantially. However, 120 kg

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P_2O_5/ha with the addition of F.Y.M. or compost (15 t/ha) had a significant effect in increasing the available P. The results revealed that increasing levels of P in combination with organic manures had significant increase in the available P_2O_5 in soils. This may be due to some sort of triggering action and also solubilisation of native phosphorus (Pareck and Gaur. 1973) and also due to reduction of phosphorus fixing capacity of soil (Dhanapalan Mosi *et al*, 1975 and Singh and Hariram, 1977).

Among the organic manures, both compost and F.Y.M. had almost similar effects in increasing the available P_2O_5 in soil. Although the 15 t/ha level of organic matter application had a slightly greater effect in increasing effect in increasing the available P_2O_5 than 10 t/ha. The results had clearly indicated the profound influence of organic manure in mobilizing the phosphorus in the avaliable pool from the insoluble form of phosphorus.

Table 2 provides the information on grain yield of maize. It was found that phosphorus application independently upto 80 kg did not have significant influence on the grain yield. A slight increase in yield was recorded for 120 kg P_2O_5 level. However, application of organic manures had significantly increased the yield of grain because of the high availability of phosphorus in the soil. The grain yield was highest in the P_3 treatment followed by P_2 which was on par. This may be due to response to P application. Higher response of applied phosphorus in maize was observed (Anon., 1979).

Among the organic manures on both the doses, F.Y.M. had increased tha grain yield. Although at 10 t/ha dose, the increase was too small, 15 t/ha dose had a spectacular increase. The results clearly indicated that F.Y.M had a highly significant effect in increasing the grain yield than compost which may be due to the variation in chemical composition in F. Y.M. and compost. The slightly higher concentration of available P recorded at the post harvest soils in the F.Y.M. treated plots than the compost treated plots might lend support to the above observation.

Table 3 shows the data on the yield of maize straw. Application of phosphorus individually and in compination with organic manures had significant effects in increasing the straw yield. However, both compost and F. Y. M. did not significantly differed from each other. Although P_3 treatment had the highest straw yield, it was on par with other levels. Among the doses of organic matter, 15 t/ha had a greater effect in increasing the straw yield than 10 t/ha.

From the above results, it could be concluded that organic manures at 15 t/ha viz., in the form of compost or F.Y.M. had a significant effect in increasing the available P_2O_5 from the native and added sources of P. Incrasing the P application (0 to 120kg/ha) increased the available P content in the soil. Phosphorus application alone upto 80 kg/ha did dot have significant influence on maize grain yield. But, the addition of organic manure in conjunction with P had recorded significantly increased the grain yield F.Y.M. at 15 t/ha had recorded the higher grain yield than compost. Orga-

Table 1 : Available P content in the soil at 60th day and at harvest (kg/ha)
(Mean value of three replications)

Levels of P kg/ha	Levels of OM / Sources of OM	Control		10 t/ha				15 t/ha				Mean			
		60th day		Harvest		60th day		Harvest		60th day		Harvest		60th day		Harvest	
		Compost	FYM	Compost	FYM	Compost	FYM	Compost	FYM	Compost	FYM	Compost	FYM	Compost	FYM	Compost	FYM
0		5.80	6.06	7.40	6.03	6.00	6.50	6,33	6.27	6.00	6.40	6,37	6,20				
40		8.47	6.66	8.57	8.70	7.60	8 10	9.37	8,37	7.80	8,30	8.69	7 70				
80		9,20	12,10	7.97	7.07	12.10	12,10	9,30	9,57	11,70	11,70	8 62	11,90				
120		8,37	11.87	10·60	10,80	12.10	12.60	10,33	10.37	12.00	12.40	10,10	12.20				
Mean		7,96	9.18	8,63	8,16	9.46	9,82	8 83	8,64	9,38	9.70						

	At 60th day		At post harvest	
	S. E.	C. D. at 5%	S. E.	C. D. at 5%
Levels of P	0.15	0.51	0.15	0,52
Sources of OM	0,14	0,40	0.08	0,22
Levels of OM	0.14	0,40	0.08	0,22

Table 2 : Maize grain yield kg/ha. (Mean value of three replications)

P levels kg/ha.	Levels of OM / Source of OM	Control	10 t/ha		15 t/ha		Mean
			Compost	FYM	Compost	FYM	
0		1162	1482	1555	1506	1531	1447
40		1018	1801	1797	1770	1803	1638
80		1187	1935	1882	1838	2130	1794
120		1229	1670	1725	1705	1974	1661
Mean		1149	1721	1739	1704	1859	

	S.E	C. D. at 5%
Levels of P	44	152
Sources of OM	21	61
Levels of OM	21	61
Level x sources of	31	88

Table 3 : Maize straw yield kg/ha. (Mean value of three replications)

Levels of P (kg/ha)	Levels of OM / Sources of OM	Control	10 t/ha		15 t/ha		Mean
			Composit	FYM	Composit	FYM	
0		3933	4617	4460	4733	4333	4415
40		4267	5103	4923	4931	5308	4907
80		4240	5340	5467	5400	5953	5280
120		4500	5433	5457	5713	5590	5339
Mean		4235	5123	5077	5195	5296	

	S. E.	C. D. at 5%
Levels of P	36	124
Levels of OM	89	256

nic manure also had significantly increased the straw yield. It was found that 15 t/ha had a greater effect in increasing the straw yield than 10 t/ha treatment.

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