Effect of Farm Yard Manure and NPK on Cassava

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Exploitation of hybrid vigour in cassava showed the genetic potential for nutrient utilization and improvement of the total biological yield.

Significant tuber yield increases were obtained by the application of farm yard manure in combination with nitrogen, phosphorus, and potash. Farm yard manure with nitrogen, or a combination of nitrogen, phosphorus, and potash were the next best treatments. The lowest tuber yields were recorded in the phosphorus or potash treated plots.

Bitterness of the tuber was increased by the application of farm yard manure and nitrogen, whereas potash reduced it.

Several cassava hybrids evolved at the Central Tuber Crops Research Institute, Trivandrum, have recorded two- to threefold increases in yield compared to the local varieties (Magoon et al. 1970). Cassava is an exhaustive crop, and the soil becomes depleted very quickly by repeated cultivation. Therefore, it is essential to maintain productivity of the soil so that the genetic potential of the hybrids for high yields can be exploited. In a trial conducted with varying levels of farm yard manure (FYM) ranging from 0 to 25 t/ha, the tuber yield increased significantly up to 15 t/ha, but 12.5 t/ha FYM was found to be the optimum. Similarly, testing levels of nitrogen ranging from 0 to 200 kg/ha showed a response to nitrogen up to 125 kg/ha. In another trial conducted with varying levels of potash (0–150 kg K_2O/ha), tuber yield was significantly increased up to 100 kg K_2O/ha, beyond which there was a gradual decline in yield. Thus, based on extensive manuring trials, a dose of 12.5 t/ha FYM and NPK at 100 kg/ha was found to be economical for maximizing the yield of promising hybrids (Mandal et al. 1971, 1973; Mohan Kumar et al. 1971). The present investigation was undertaken to determine the response of cassava to FYM and NPK alone and in combination on growth, yield, and quality of cassava.

Materials and Methods

A replicated manuring experiment was conducted during 1973 and 1974 using the hybrid H-226 on the Institute farm where the soil is an acid laterite. The treatment combinations were as follows: (1) FYM, N,P,K, alone; (2) N + P, N + K, P + K, and N + P + K; (3) FYM plus either N, P, K, NP, NK, PK, or NPK; and (4) control (no manure).

Farm yard manure (12.5 t/ha) and NPK (100 kg/ha) each were applied in respective treatments. Planting was during May/June and harvesting during February/March (10 months after planting).

Observations on plant height and number of leaves produced and retained per plant were taken at different stages of growth. Data on number of tubers per plant, mean size of tubers, and the tuber yield (t/ha) were recorded at harvest. Qualitative characteristics like carbohydrate content, HCN content, and cooking quality of tubers were analyzed by standard methods.

Results and Discussion

The observations on plant height, total number of leaves produced per plant, and the number of leaves retained were taken during growth and at maturity.

Plant Height

Application of nitrogen alone or in combination with P and K significantly increased plant height. Further significant increase in height was achieved by the addition of FYM. However, application of K and P alone or in combination reduced height considerably (Fig. 1).

Leaf Production and Retention

Maximum leaf production (319 per plant) and retention (64 per plant) were observed in treatment FYM + NPK. The effect of N alone and in combination with P or K was also pronounced, whereas the application of K alone recorded the lowest leaf production (214 per plant) i.e. 33% reduction over FYM + NPK (Fig 2a, b).

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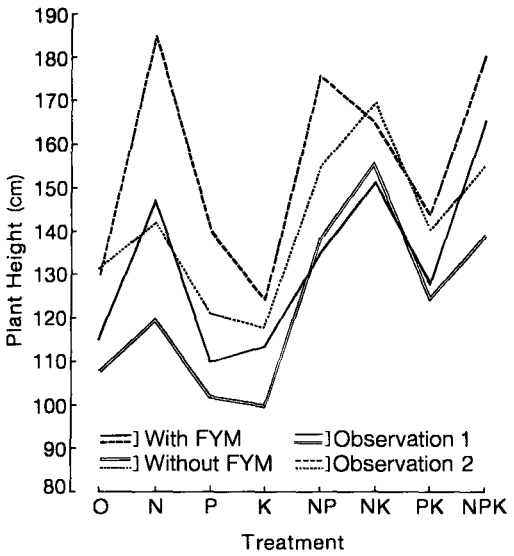

Fig. 1. Influence of various treatments on plant height.

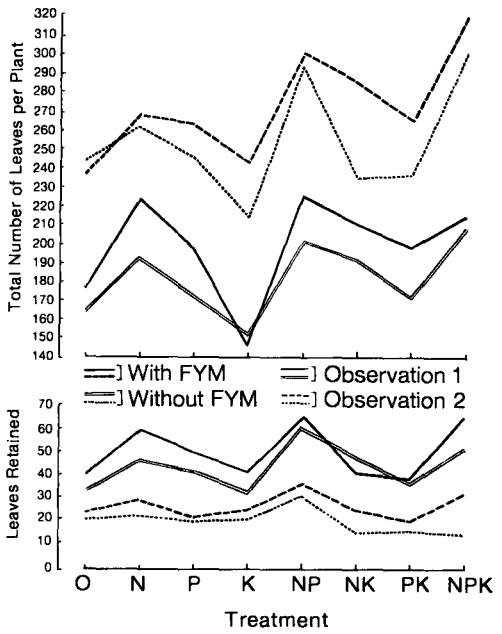

Fig. 2. Influence of various treatments on (A) total number of leaves per plant and (B) number of leaves retained per plant.

Tuber Yield, Size, and Number

The mean tuber yield, tuber size, and tuber number per plant are presented in Table 1. It is clear that N alone or in combination with P or K has a significant effect on tuber yield. Similar trends were observed in the case of tuber size, which agrees with the reports of Singh et al. (1973) in *Dioscorea alata*. A significant effect of K on production of more tubers was also observed (Table 1). The enhancement of tuber production with the application of K was recorded by Dean (1971) for sweet potato. However, the treatment FYM (12.5 t/ha) + NPK (100 kg/ha) gave a significant increase in yield over other treatments.

HCN and Starch Content of Tuber

The data on tuber analyses (Table 2) reveal that the HCN content of the tubers was increased in treatments FYM, N, and FYM + N, whereas the starch content of the tubers showed an increasing trend with the application of potash. Similar observations of increased levels of HCN in cassava tubers with FYM application were recorded by Thomas Kurien et al. (1975).

Cooking Quality of Tuber

Organoleptic tests on cooked tubers indi-

Table 1. Tuber yield (t/ha), tuber size (g), and tuber number/plant.

	O/FYM	N	P	K	NP	KK	PK	NPK	S.E.
Tuber yield (t/ha)									
Without FYM	15.8	18.7	17.0	15.2	19.7	22.4	18.1	24.0	±0.655
With FYM	18.6	24.4	18.6	18.2	24.1	23.2	21.6	27.1	±1.84
Tuber size (g)									
Without FYM	187	235	205	170	262	253	184	276	±8.94
With FYM	220	299	233	206	294	295	240	294	±25.10
Tuber no./plant									
Without FYM	5.02	5.04	5.31	5.63	5.64	6.19	6.15	6.27	±0.227
With FYM	5.52	5.78	5.61	6.05	5.97	6.31	6.57	6.87	±0.638

Table 2. Effect of FYM and NPK on HCN and starch content of tubers.

	O/FYM	N	P	K	NP	NK	PK	NPK	S.E.
HCN (μg/g)									
Without FYM	103	175	98	68	158	105	75	98	±2.34
With FYM	113	180	120	85	173	135	85	120	±6.75
Starch content (%)									
Without FYM	25.7	24.0	25.8	26.4	24.3	26.3	27.7	25.1	±0.49
With FYM	25.1	25.0	25.4	26.7	24.7	27.7	27.9	25.4	±1.41

cated that N alone or FYM + N gave a bitter taste and a harder texture. On the other hand, K alone or P + K gave a nonbitter taste and a softer texture.

It may be concluded that though nitrogen significantly increased the tuber yield, it considerably affected cooking quality, particularly taste. However, the addition of P + K to N improved the quality.

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Mineral Nutrition of Cassava and Adaptation to Low Fertility Conditions

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In experiments using solution culture techniques, cassava was shown to be more tolerant than maize and soybean to low pH and high levels of aluminium and manganese. The requirements for potassium, nitrogen, and calcium for maximum growth are comparable to other crops. In the case of phosphorus, the needs are higher than other crops. Nevertheless the data show that cassava tolerates low calcium, nitrogen, and potassium in the root zone better than other crops. The plant has an ability to bulk roots at low phosphorus levels.

Cassava has earned a reputation for being well adapted to soils of low fertility. Thus, the ability of cassava to produce some yield, albeit low, in subsistence agriculture systems on soils of low fertility status has contributed greatly to its success over other staple food crops. Despite claims that cassava cultivars adapted to low soil fertility conditions show reduced ability to respond to fertilizer application, the results of

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