

Influence of Nitrogen and P_2O_5 on the Yield of Ginger^{*}

by

K. M. THOMAS¹

Synopsis: The results of trials conducted over a period of four years on ginger (*Zingiber officinale*) at the Agricultural Research Station, Ambalavayal are reported in this paper. It has been suggested that for raising an economic crop of ginger on virgin soils in Wynad, application of N and P_2O_5 is not necessary provided the crop is supplied with ten tons of organic manure and 15,000 lb of green leaf mulch per acre.

Introduction: Ginger, *Zingiber officinale* Rose is an important spice crop of India. Though the crop is grown throughout the country, its cultivation is mostly confined to South India, particularly the West Coast. Out of a total area of 40,000 acres under this crop in the whole of the country, Kerala alone accounts for 25,000 acres. Kerala produces about 70 per cent of the total production of ginger in India.

Ginger is believed to be a native of tropical Asia. It grows from sea-level up to an elevation of 5,000 feet. The crop thrives well in areas which have an average rainfall of 2,500 mm. under rainfed conditions. In Kerala, the crop is raised purely as a rainfed one.

Ginger is an exhausting crop and requires heavy manuring. Cultivators in Kerala generally apply only organic manures to the crop in the form of cattle manure and jungle leaf, the latter being supplied to act more as a mulch than as a manure for the crop. Cultivators very seldom apply in-organic fertilizer to the crop.

Until recently, no systematic trials were reported to have been carried out anywhere in India on the manurial requirements of ginger. The only reference on the subject so far as the author knows is a publication by Potascheme—Bangalore, "Fertiliser trials on Paddy Pepper, Ginger, and Tapioca in Kerala State (1961)" Kerala Department of Agriculture and Potascheme. A few simple trials on the crop were carried out by them in collaboration with the Kerala Department of Agriculture in the Kottayam district during the three seasons 1957-'58 to 1959-'60. Their trials showed that balanced N. P. K. treatment not only gave statistically high yields but also economic returns. The trials have also indicated the importance of K in conjunction with N and P_2O_5 for obtaining high yields and profits. But the difference in yield between control and 'NP' was not significant in any of the seasons.

¹ Agricultural Research Station, Ambalavayal.

* Received on 16-2-1965.

With a view to study whether ginger crop respond to the application of nitrogenous and phosphatic fertilizers, either alone or in combination, in the Wynad regions of Kerala State, where the crop is a major money crop, field-experiments were carried out at the Agricultural Research Station, Ambalavayal, under the auspices of the I. C. A. R. for four consecutive years from 1955—'56 to 1958—'59. The results of these trials are discussed in this paper.

Material and Methods: The trial was laid out on virgin soil in all the seasons. The variety of ginger used for the trial was Wynad local, which is the local commerical variety used by the ryots. The experiments were conducted on statistical basis as per lay out furnished below :

Design	—	Randomised block
Replications	—	Four
Treatments	—	Nine

(1) No fertilizer, (2) 50 lb N per acre, (3) 100 lb N per acre, (4) 45 lb P₂O₅ per acre, (5) 90 lb P₂O₅ per acre, (6) 50 lb N+45 lb P₂O₅ per acre, (7) 50 lb N+90 lb P₂O₅ per acre, (8) 100 lb N+45 lb P₂O₅ per acre, (9) 100 lb N+90 lb P₂O₅ per acre.

Plot size — Gross — 22' × 16'

Net — 12' × 12'

Nitrogen was applied in the form of ammonium sulphate and P₂O₅ in the form of super phosphate. The former was applied with the first shower received after planting and the latter a month in advance of planting. All the plots including control (i. e. no fertilizer) were given a basal dose of cattle manure at the rate of 10 tons per acre and 15,000 lb green leaf applied in two doses namely 10,000 lb at the time of planting and the rest 45 days after planting.

Since none of the treatments gave any statistically significant results in the first year, one more treatment was introduced during the subsequent years, by increasing the level of nitrogen to 150 lb per acre. The number of treatmental combinations was thus raised to 12 as follows.

(1) No fertilizer, (2) 50 lb N per acre, (3) 100 lb N per acre, (4) 150 lb N per acre, (5) 45 lb P₂O₅ per acre, (6) 90 lb P₂O₅ per acre, (7) 50 lb N+45 lb P₂O₅ per acre, (8) 50 lb N+90 lb P₂O₅ per acre, (9) 100 lb N+45 lb P₂O₅ per acre, (10) 100 lb N+90 lb P₂O₅ per acre, (11) 150 lb N+45 lb P₂O₅ per acre, (12) 150 lb N+90 lb P₂O₅ per acre.

All the plots received identical intercultural operations namely three weedings and two earthing ups. The plots were harvested simultaneously and the yield of green ginger was recorded.

Results: The yield data of the trial carried out in the four years from 1955-'56 to 1958-'59 were statistically analysed for each season and the results are furnished below:

No.	Treatments	Yield of Ginger (in lb) per acre				Percentage on General Mean			
		1955-'56	1956-'57	1957-'58	1958-'59	1955-'56	1956-'57	1957-'58	1958-'59
1.	No fertilizer	16,970	23,372	12,932	18,748	99.7	91.9	98.9	93.4
2.	50 lb. N	15,791	23,595	12,600	21,459	92.8	101.5	96.8	106.9
3.	100 lb. N	16,607	23,187	12,660	17,584	97.5	99.7	96.8	87.6
4.	150 lb. N	...	25,319	11,707	21,324	...	108.9	89.6	106.2
5.	45 lb. P ₂ O ₅	16,108	21,009	12,841	17,427	94.8	90.3	98.2	86.8
6.	90 lb. P ₂ O ₅	15,473	21,054	11,571	18,480	90.9	90.5	88.5	92.6
7.	50 lb. N+45 lb. P ₂ O ₅	18,377	23,640	14,293	20,264	107.9	101.7	109.3	100.6
8.	70 lb. N+90 lb. "	16,290	22,052	13,567	19,174	95.7	94.8	103.8	95.5
9.	100 lb. N+45 lb. "	18,849	24,548	13,250	22,982	109.5	105.6	101.4	114.5
10.	100 lb. N+90 lb. "	18,967	24,457	13,885	22,982	111.4	106.2	106.2	114.5
11.	150 lb. N+45 lb. "	...	24,094	14,248	19,084	...	103.6	109.0	95.7
12.	150 lb. N+90 lb. "	...	24,729	13,250	21,414	...	106.3	101.4	106.7
	Standard error of the experiment	1,284	737	982					
	General Mean	17,025	23,255	13,072	20,072				
	Treatmental difference significant or not	not	not	not	not				

Discussion: From the results furnished, it is clear that the yield is not significantly increased in any year, by the application of inorganic fertilizers. The reason for lack of response to inorganic fertilizers may be due to the fact that the soil in which the crop was grown, was not deficient in essential plant nutrients and that application of basal organic manures at the rate of ten tons of cattle manure and 15,000 lb of green leaf per acre was quite adequate for the crop under these conditions.

From the general means furnished in the table, it can be seen that the yield of the crop was comparatively poor in the year 1957-'58 though the treatments were the same. The low yield during the year can be attributed only to the low fertility status of the soil since the experiment was not conducted in the same land year after year. But even under these low soil fertility, the fertilizer had little influence at all, in raising the yield of ginger. It remains to be seen whether the increase in the level of fertilizer would give positive response. But such studies may have only academic value. Even at the level of 150 lb nitrogen and 90 lb P₂O₅, the

cost of fertilizers came to Rs. 180/- per acre. So if some positive significant results are obtained by raising the level of fertilisers further, the results may not have practical importance since the extra yield obtained would not be commensurate with the additional cost of fertilisers.

It may be noted that in all the trials conducted at this station potassium was not included. Further trials are needed to study the response of the plants, if any, to all combination of N P and K. Such experiments are now in progress at the station.

Hence the trials conducted so far indicate that on virgin soils where ginger crop is generally raised in the Wynad regions of Kerala, application of nitrogenous and phosphatic fertilizers is not necessary to obtain high economical yield provided the crop is supplied with adequate quantity of basic organic manures at the rate of 10 tons of cattle manure and 15,000 lb of jungle leaf per acre. These findings are in general agreement with the results obtained from the trials conducted by Potascheme in Kottayam district. Their experiments also failed to give a positive response by application of a mixture of nitrogen and Super phosphate.

Summary: At the Agricultural Research Station, Ambalavayal, field trials were conducted to study the influence of nitrogenous and phosphatic fertilizers on the yield of ginger crop. The experiment was conducted over a period of four years on virgin soils of different fields. All plots received a basal dose of cattle manure and green leaf mulch. Results obtained in all the years indicated that the treatments did not give any significant difference in respect of yield. Hence it is concluded that for raising an economic crop of ginger, on virgin soils in Wynad, application of nitrogenous and phosphatic fertilizers is not necessary, provided the crop is supplied with adequate quantity of basic organic manures at the rate of 10 tons of cattle manure and 15,000 lb of green leaf mulch per acre. These results are in general agreement with the findings of Potascheme, Bangalore from their trials carried out in Kottayam district.

Acknowledgement: The author is greatly indebted to Sri P. K. Gopalakrishnan who was previously associated with the working of the Ginger Research Scheme, Ambalavayal in the preparation of this paper. The author is also grateful to Sri K. P. Pillay, Superintendent, Agricultural Research Station, Ambalavayal for the keen interest evinced in the Study.

The financial assistance received from Indian Council of Agricultural Research for the working of the scheme is also hereby acknowledged.