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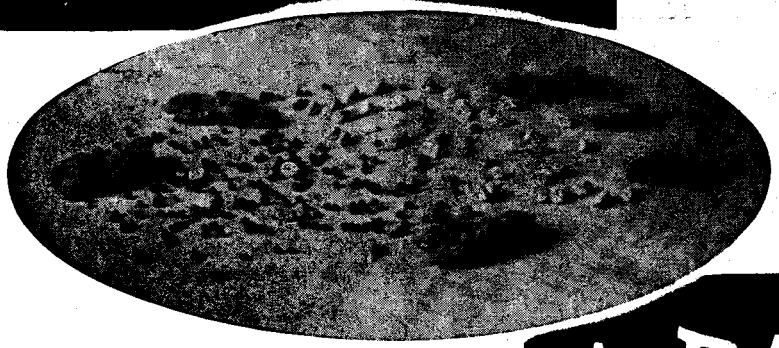
MANURING OF SPICES



A REVIEW

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M.Sc., Ph.D. (Lond.)

The aspect of plant food application in crop production is now slowly gaining the importance it deserves in the case of food crops as well as cash crops like sugarcane, cotton, oilseeds, jute, etc. During the last decade or two, the spice crops of India have emerged not only as cash crops yielding substantial revenue to the grower but also as dollar-earners for the country. Spices have thus secured a prominent place in the structure of national economy. No wonder, the use of manures and fertilisers to increase the production of spices, which in turn would mean earning more foreign exchange for the country, should find a pride of place in the cultivation of spice crops.

In this article the manuring and fertilising practices prevalent in spice farming in India and the future trend, as also the practices obtaining in some other important spice growing countries, are reviewed.

PEPPER

Until very recently, manuring of pepper vines was not considered an important factor in pepper production on the South West Coast of India, because for pure plantations of pepper either virgin forest land rich in humus or land left uncultivated for at least six years were generally chosen. Such rich land did not require manuring to begin with. In mixed household gardens also the need for manuring pepper vines does not generally arise as the fertility of the soils of these gardens is constantly replenished by the refuse and other things thrown out of the homestead. The 'Standard' and other trees of the home gardens which are of economic importance are usually manured and the pepper vines get benefitted thereby.

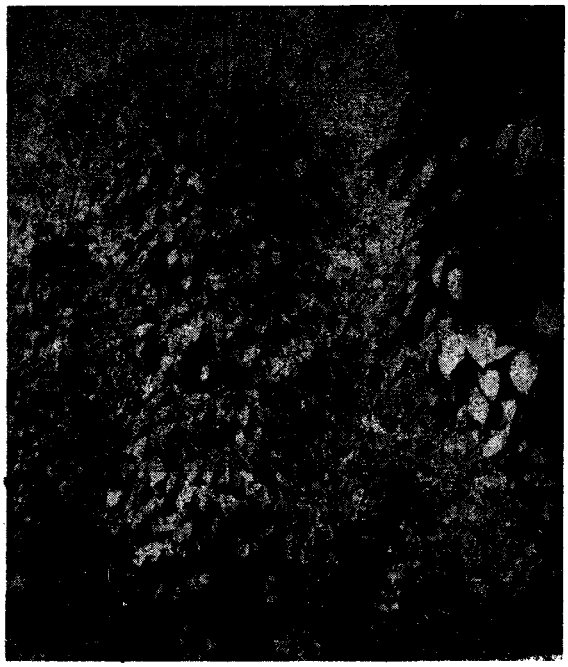
The position in large scale plantations of pepper is entirely different. Experienced pepper growers are, however, of the view that even on the virgin land pepper yields begin to decline from about the fifteenth year after planting, and to maintain the normal productivity level, the soil has to be replenished with humus and other nutrients.

Some growers in Malabar and South Kanara manure their vines with cattle manure and wood ash. In the Travancore-Cochin region applying liquid cattle manure or cattle manure and wood ash two or three times in a year, particularly to the vines planted against large trees in household gardens is fairly common. In North Kanara and Mysore where pepper vines are trained to areca palms, heavy application of green leaf mulch to a depth of 2 to 3 ft. is given in alternate years. Cattle manure at the rate of one basketful (25-30 lbs.) is applied to each tree in the next season. The pepper vines receive the benefits of the attention bestowed on the areca palms.

Only few experiments on the manurial requirements of pepper have hitherto been conducted in India. Experiments at the Agricultural Research Station, Thaliparamba, Madras State, some 25 years ago, showed that humus content of the soil, in other words, the nitrogenous substances available in the soil, was all important. Pepper vines responded very favourably to application of fish manure, ½ lb. per vine, recording about 75 per cent increase in yield. Another trial carried out at the same station from 1929 to 1939 showed that application of slaked lime at the rate of ½ lb. per vine in alternate years increased the yield of vine by about 100 per cent. The most favourable response was obtained when nitrogenous and phosphatic fertilisers were applied in conjunction with slaked lime. Manurial experiments conducted at the Agricultural Farm, Konni, in the erstwhile Travancore-Cochin have shown that application of 3 ozs. of ammonium sulphate and 10 ozs.

of superphosphate per vine increased the yield by about 33 per cent.

Application of burnt earth as practised in Malaya, Sarawak and Indonesia as well as by some pepper growers in India, increased the yield. These results in conjunction with the benefit derived by the application of wood ash to pepper vines clearly indicate that pepper is a potash lover.



Pepper vines respond very well to application of balanced fertilisers.

In Sarawak application of forest top-soil supplemented with burnt earth and wood ash was a common practice till some years ago. As the forest top-soil became scarce, burnt earth and wood ash alone were applied to young vines. Nitrogenous manures such as prawn and fish refuse, and bean cake alone or in conjunction with natural phosphatic manures like guano or burnt earth were usually applied to the bearing vines. Due to the boom in pepper prices in recent years, in Sarawak, heavy applications of manures and fertiliser mixtures to step up yields are given.

Blacklock reported in 1954 the following doses of manures to pepper vines in Sarawak :

(1) Upto about five pounds of phosphatic guano per vine, four times in a year after the vines have started bearing.

(2) Two to five pounds of prawn or fish refuse, three to four times in a year, with heavy applications to the bearing vines in July-August after the harvest of the crop.

(3) Three to five pounds of bean cake per vine, applied three times a year.

The above methods of manuring each vine were to provide about 0.60 lb. nitrogen, 0.75 lb. phosphoric acid and about 0.4 lb. potash annually.

In Malaya, Cambodia and Indonesia similar manuring practices with modifications exist.

Field trials conducted by the Department of Agriculture, Sarawak have given the following tentative results :

(1) Placement of fertilisers within eight to twelve inches of the vine, every six to eight weeks, gives better results compared to topdressing.

(2) Manures should be applied in small doses at fairly frequent intervals instead of in large doses at long intervals.

(3) The response of vines to application of sulphate of ammonia, about one ounce per vine as topdressing, is better if it follows a basal placement of phosphatic fertilisers.

(4) Placement application of rock phosphate at the rate of four ounces every two to three months gives good results.

(5) Incorporating pig manure in the soil around the vines at the rate of two pounds every two months is found to be beneficial.

(6) Small dressings of muriate of potash, upto 2 ozs. every two to three months, made the vines healthy and vigorous.

It should be remembered that frequent applications of manure, 3 to 4 times in a year, are possible only in the equatorial regions of Sarawak, Indonesia, Cambodia, Malaya, etc., where rainfall is evenly distributed througnout the year. The soils of the West Coast of India are in several respects, especially in nitrogen and lime deficiency, similar to those of the above mentioned regions but the uneven and seasonal distribution of rainfall in India makes frequent applications of manures not feasible and useful.

Blacklock also mentions that continuous heavy application of nitrogenous manures is likely to cause "Sudden death" or "Wilt" of the vines.

The average yield from a vine in mixed gardens is roughly a pound of black pepper. In well organised and well cared for pepper plantations, however, the average yield of vine may be anything upto 1.5 to 2 lbs. In Sarawak, Indonesia, Indo-China, etc., the yield per vine is 5 to 6 lbs. In order to make pepper cultivation sufficiently remunerative, the yield of pepper in India has to be substantially stepped up by judicious use of manures and fertilisers. This will also help in prolonging the useful economic life of vines considerably; it may even be doubled.

Well planned experiments on the manuring of pepper have been laid out at the Pepper Research Station, Panniur, Kerala State, from which useful results may be forthcoming. The Kerala State Agricultural Department with the co-operation of Messrs. Potascheme is laying out NPK Manurial Demonstration Plots in ryots' fields in the Kottayam district. Many more well planned manurial experiments on pepper should be conducted throughout the pepper growing areas in the country, not only at the Research Stations but also in ryots' fields, in order to assess correctly the manurial requirements of the crop.

In the meantime the following suggestions on manuring pepper vines could be of help to the growers :

(1)	Well rotten cattle manure or compost	10 lbs. per vine before the S.W. monsoon.
(2)	Ammonium sulphate	1/8 lb. per vine along with cattle manure.
(3)	Groundnut or castor cake	1/2 lb. per vine in two doses just before the two monsoons.
(4)	Superphosphate or bone-meal	1/4 lb. per vine, just before the N.E. monsoon.
(5)	Sulphate or muriate of potash	1/3 lb. per vine after the S.W. monsoon.
(6)	Slaked lime	1/3 lb. per vine every second year.

Excepting slaked lime the manures or fertilisers should be applied a foot away around the stem, within a radius of 2 to 5 feet according to the age of the vine, nearer for younger and farther for older vines. Ammonium sulphate and potash manures should be applied as topdressing and the manures incorporated into the soil to a depth of about 6 inches. Slaked lime may be applied closer to the vine around the stem within a radius of 2 to 3 feet, and well incorporated into the soil.

It is also worthwhile determining the part played by minor elements in the development of pepper vines.

CARDAMOM

Cardamom is a characteristic crop adapted to a peculiar and highly specialised environment in evergreen jungles. Observations for many years have convincingly shown that the care of the soil for cardamoms is interlinked with the shade. If the shade canopy is good and provides abundant and regular leaf-fall to give sufficient mulch, the soil remains in good conditions. A high content of rotting vegetable matter in the root zone is an essential factor for the satisfactory growth of cardamoms. Marked responses have been noted to applications of compost, cattle manures and other vegetable wastes. It should also be mentioned here that the effectiveness of the manure applied depends largely on the soil moisture content.

An elaborate and well laid out experiment conducted by the Cardamom Research Scheme, Singampatti Hills, showed that an adult cardamom crop gave significantly increased yields following the application of organic manures and chemical nitrogen and potash. Application of base elements showed that manganese had a significant response while molybdenum indicated some response. Boron depressed the yield. Combinations of zinc and copper, zinc and iron, copper and molybdenum, and boron and magnesium also increased the yields significantly. Unfortunately this experiment could not be continued beyond the second year as the Research Scheme was closed down.

Phosphatic fertilisers are of very great importance in cardamom culture. Now that most of the cardamom plantations are deteriorating due to ageing and perhaps also due to the depletion of soil fertility, it is essential to conduct well planned experiments on the manurial requirements of cardamom not only at the new Research Stations for cardamoms being started in Kerala and Mysore States, but also in ryots' fields in the Singampatti area and the cardamom hills of Travancore for the larger cardamom and in the Pattiveerampatti and the Mysore areas for the smaller cardamom. Application of manures may be done just before the monsoon with the summer showers. Excepting during summer, the moisture content of the soil in the cardamom growing areas is generally fairly high.

GINGER

The most important ginger growing area in India is the present Kerala State, and at present only this region prepares the dry ginger of commerce. In other parts of India ginger is grown mostly for local consumption as green ginger.

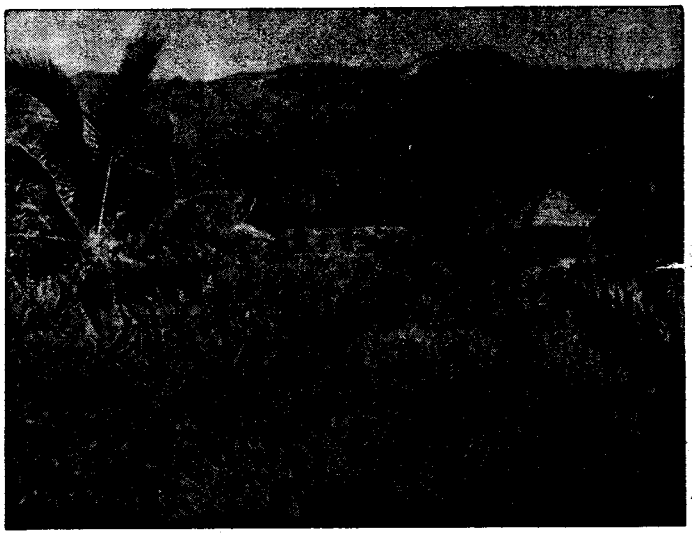
Yields of ginger depend on adequate application of plant food it being a heavy feeder. It is a well known practice to apply large quantities of green leaf mulch several times during the life of the crop. On the West Coast, beds, after planting, are mulched two or three times at monthly intervals with quick-rotting green leaves. This sort of mulching protects the young shoots from the fury of heavy rains and also serves as nitrogenous organic matter when decayed. Besides green leaf mulching, cattle manure, lime and phosphatic fertilisers are added to ensure good yields. Fresh cattle dung slurry is also sometimes splashed on top of the green leaf mulch.

In the Ananthapur district of Andhra, 50 cartloads of a mixture of cattle and sheep manure per acre are applied.

In Bengal, oil cakes at 320 lbs. per acre are applied in 3 doses.

In Khandesh (Bombay) a mixture of horse dung, cow dung and sheep dung in equal proportions, about 600 lbs. in all per acre is applied.

In Jamaica a mixture of 220 lbs. of superphosphate, 220 lbs. of ammonium sulphate and some lime was found to be very beneficial.



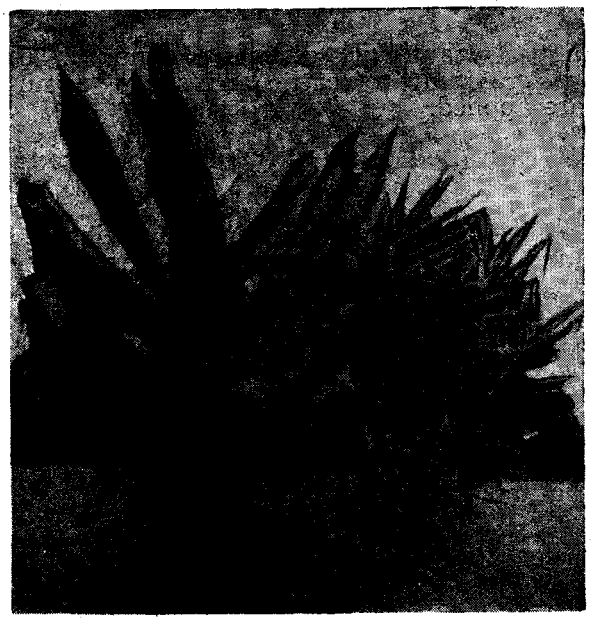
Ginger and turmeric crops intercultivated in a coconut plantation near Coorg.

In Queensland bone dust and ammonium sulphate are reported to increase the yields of ginger.

Experiments in Travancore-Cochin revealed that application of 600 lbs. of lime benefitted the crop. A manurial mixture of 2000 lbs. of oil cake, 600 lbs. of fish guano and 600 lbs. of wood ash per acre, applied in 2 doses, one at four weeks after planting gave very good results.

Experiments conducted a few years ago in the Malabar region of the former Madras State showed that the application of 10,000 lbs. of powdered cattle manure (to supply 50 lbs. of nitrogen) had the same effect as applying half the quantity (to supply 25 lbs. of nitrogen) of cattle manure, and 25 lbs. of nitrogen in the form of ammonium sulphate. Application of lime at 1,000 lbs. per acre one month before planting, and 15 lbs. of boron was also found beneficial.

Recent manurial experiments in Malabar showed that application of nitrogen and phosphoric acid, either alone or in combination, promoted ginger crop yields while the application of lime and boron had no effect either way. Mulching the standing crop with green leaf at 15,000 lbs. per acre gave increased yields upto 233 per cent.



urmeric and ginger belongs to the same family Zingiberacea, and are similar in their plant food requirements.

The foregoing experiences make it clear that it is essential to conduct well planned manurial trials on ginger at the various Research Stations as also in cultivators' fields. These experiments should be planned with a view to finding out not only the means of increasing the yields but also making the ginger plant resistant to the common diseases. The role of potash and boron is of fundamental importance in this respect.

The Agricultural Department of Kerala State is laying out NPK Manurial Demonstration Plots of ginger in co-operation with Messrs. Potascheme in the Thodupuzha area.

Citizen Press, Park Lane, Secunderabad.

TURMERIC

Turmeric, like ginger, needs heavy manuring but it seems that turmeric can stand higher soil moisture content than ginger.

In the Guntur and Krishna districts of Andhra State, in addition to penning 800 cattle and 2,000 sheep, 50 cartloads of farmyard manure and 30 cartloads of silt are applied per acre. In the Cuddapah district besides penning 3,000 sheep, 50 cartloads of farmyard manure and 50 cartloads of silt are applied. Green leaf mulch is also applied in Kodur, Rajampet and Proddatur taluks. Besides this basal dressing, 16 maunds of groundnut cake per acre is applied in two instalments, first in September and the second 1½ months later. The powdered cake is either applied to the rows or broadcast. The inter-spaces are ploughed in order to incorporate the manure well into the soil.

In Orissa top dressing of 600 lbs. of ammonium sulphate, 600 lbs. of single superphosphate and 400 lbs. of potassium sulphate follows an application of 8,000 lbs. of sannhemp or **dhaincha** green leaves per acre. The crop is usually rotated with paddy and other grain crops, and fodder and green manure crops.

Recent manurial experiments conducted in Orissa gave the following results :—

(a) A trial of fertilisers containing P_2O_5, K_2O and MgO against **sal** ash showed no significant difference.

(b) A trial to find out a suitable mixture of nitrogen, phosphoric acid and potash indicated that application of ammonium sulphate alone increased the yield by 87 per cent. Phosphoric acid and potash did not show any distinctive effects.

(c) Trials to find out the optimum dose of wood ash for turmeric revealed that no wood ash at all was required by this crop, and the local practice of applying heavy doses of ash need not be encouraged.

(d) In an experiment to find out if **sal** leaf mulch could be replaced by different organic manures applied on equal nitrogen basis (112 lbs. per acre), it was concluded that cattle dung was as efficacious as **sal** leaf mulch with regard to manurial value. In view of the impracticability of finding huge quantities of cattle dung, application of farm yard manure of cattle penning may be resorted to.

(e) In an experiment to study the effect of varying doses of organic and inorganic nitrogen on turmeric, it was indicated that application of ammonium sulphate at 90 lbs. N per acre doubled the yield.

As in the case of other spice crops, it is desirable to conduct more well planned experiments on the manuring of **turmeric.**