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MANURING THE COCONUT

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MANURING THE COCONUT

BY E. J. VERGHESE

STOP THIS PLUNDER, PLEASE

IT is the sacred duty of every well-wisher of the Indian Coconut Industry to bring home to every coconut grower, the experts' warning "stop this plunder of the coconut garden". The coconut grower believes that like the "Kamadhenu" of the Puranas, the "Kalpavriksha"—"tree of heaven"—will yield in plenty, season after season, year after year, *ad infinitum* with little or no effort on his part. He, therefore, removes from his garden everything that is of any cash value or economic importance: nuts, husks, shells, leaves, petiole bases, spathes, etc., and finally when the tree is unable to yield any more, it is felled and removed for house construction. Even the grass growing in the garden is used as fodder for cattle. The cattle manure along with the kitchen ash obtained by burning as fuel coconut fronds and other waste products is taken away for application to cereal food crops or tuber or other cash crops giving an immediate cash return. Considerable amounts of essential plant nutrients such as nitrogen, phosphoric acid, potash, lime, trace element salts, etc., are thus removed annually from each acre of a coconut plantation. This continued exploitation and constant drain of the life blood results in the malnutrition of the palm. Its vitality is impaired and it succumbs to various diseases and to a slow premature death. Every coconut grower should wake up to this great danger and stop the plunder of the coconut garden and put back to it at least a part of what is taken away, lest nut production be too low or altogether stop.

Shri E. J. Verghese, B. A., M. Sc., is Analytical Chemist, Central Coconut Research Station, Kasaragod.

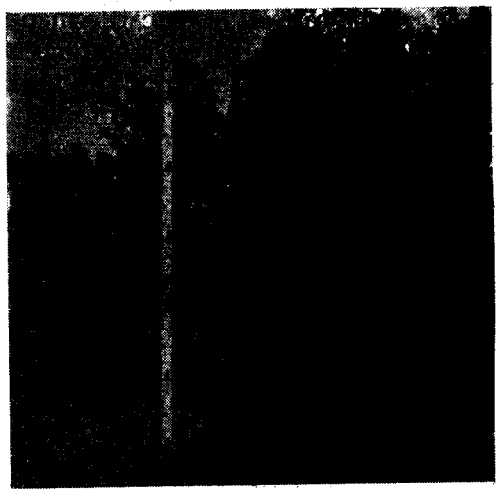
A medical outlook.—How to regenerate the deteriorating coconut palm? A very often asked question indeed! The problem must be approached with the outlook of a medical man treating a tubercular patient. He builds up the natural vitality of the patient, giving him at the same time some quick acting remedies to promote some immediate relief. The effect of such double action is more beneficial and more lasting.

The rational way.—The most rational way to regenerate the coconut palm is, then, by a system of manuring which will gradually build up the natural fertility of the soil and will also supply the essential plant foods in a readily available and quick acting form—in other words by a judicious combination of natural or organic manures and mineral or chemical fertilizers.

Organic manures.—As organic manures are derived from the remains of dead

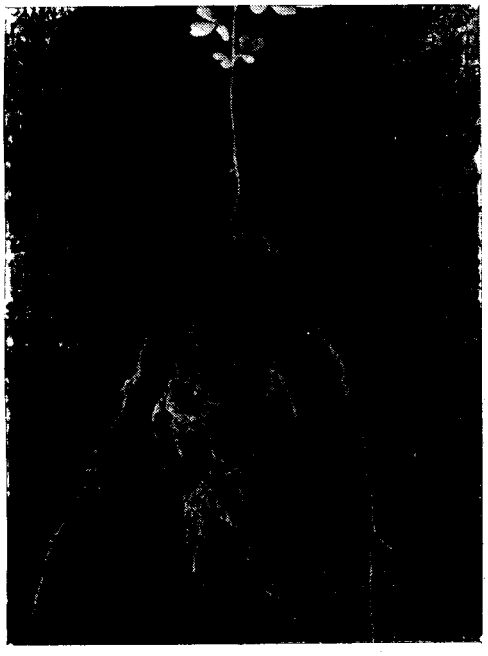
animals and plants, they contain the natural manurial principles. "Corruption" as the saying goes, "is the Mother of vegetation". These manures improve the chemical, physical and biological conditions of the soil, maintain a favourable air and water regime around the plant roots and render better utilization of any artificials that might be added to the soil. Their effects as judged by steady yields, are more permanent. Most Indian soils are deficient in organic matter and organic manures meet this demand. Organic matter, it may be stated, is a store house of mineral plant nutrients. It is the source of inorganic nutrients providing both the known and unknown elements of biological importance. It has also been known that certain organic compounds and complexes —growth promoting and protective agents —present in the organic matter or humus in conjunction with nitrogen fixing organisms have a physiological function and lead to the general well-being of the plants both by improved nutrition and disease resistance.

Availability of organic manures.—But organic manures such as cattle manure, composts, oilcakes, bone meal, etc., are available only in very limited quantities. Statistics have shown that the amount of cattle manure produced in India is about 120 million tons, dry weight, and in terms of the manurial ingredients this amounts to 0·6 million tons of nitrogen, 0·3 million tons of phosphoric acid and 0·6 million tons of potash. The amount of town refuse compost produced annually in India is approximately 10 million tons, containing 0·05 million tons of nitrogen, 0·04 million tons of phosphoric acid and 0·1 million tons of potash. Oilcakes produced annually in India may be computed at 3 million tons; of this a large proportion is used as cattle food and roughly about 0·7 million tons are used as manure, supplying 0·03 million tons of nitrogen, 0·01 millon tons of phosphoric acid and 0·01 million tons of potash. It has been shown that 4·2 million tons of nitrogen, 2·1 million tons of phosphoric acid and 7·3 million tons of potash are removed annually from the soil by the principal crops of India. It is obvious that to maintain soil fertility these quantities of nutrients have to be added to the soil and something more to improve crop yields, and that the part played by farm yard manure, composts and oilcakes is rather insignificant. It may also be added that considerable quantities of these manures are used for short duration cash crops. Even if all the available sources of these manures are marshalled, they will be enough to manure only a fraction of the cultivated land in India, more particularly land under a perennial crop like the coconut. It is needless to repeat that the only remedy to meet the requirements of organic matter and inorganic nutrients of the coconut gardens is to evolve a pattern of manurial schedule woven round a system of green manuring combined with suitable quantities of mineral fertilizers applied suitably.



A bush of *Crotalaria Striata*

Green manure.—Green manure is an excellent organic manure. It supplies organic matter to the soil and confers on it all the benefits and advantages of organic matter mentioned above. Further, it releases soil phosphates, increases the solubility of potash, lime and phosphoric acid and possibly of magnesium and iron and other trace elements, causes the nutrients to move upwards and get deposited near the root zone, improves the mechanical condition of soils by action of roots, helps soil aggregation or structure, increases retentivity of soil moisture, prevents soil from excessive heat so that microflora are not killed and is also an insurance against the erosion of soil by wind and water and loss of plant nutrients by leaching. The green manure crop, if it belongs to the leguminous family of plants, has also the great advantage of fixing atmospheric nitrogen, *i.e.* converting unavailable gaseous nitrogen of the atmosphere, by means of the nodular organisms contained in their roots, into available nitrogenous plant foods. The green manure crop will feed on the nitrogen so fixed and will make abundant growth so that when it is cut and buried in the soil, it will release for the benefit of the other crops large amounts of nitrogen and other nutrients. Sunnhemp *(Crotalaria juncea)*, wild sunnhemp *(Crotalaria striata)* and cowgram *(Vigna unguiculata)* are the most suitable leguminous green manure plants for coconut plantations. They may be grown *in situ*, *i.e.* they may be grown in the coconut garden and cut down at the proper stage of growth and buried in the garden itself. These green manure crops may reasonably be expected to give a total outturn of 5,000 to 10,000 lbs. of green stuff per acre. This will supply, in addition to the organic matter, plant foods corresponding to about 40 to 80 lbs. nitrogen, 10 to 20 lbs. phosphoric acid and 30 to 60 lbs. potash.



Root nodules of two month old *Crotalaria Striata* grown in washed sand in Pots

However, these quantities of manures are not sufficient enough to maintain a bearing coconut garden and it is necessary to add further quantities of the essential plant foods in the shape of artificial fertilizers such as amonium sulphate or sodium nitrate to supply nitrogen, superphosphate or rock phosphate to supply phosphoric acid and muriate of potash or sulphate of potash to supply potash.

The following schedule of manuring based on the above principles may be considered to be suitable for the West Coast conditions taking into view the incidence of the two monsoons and their duration. The programme may suitably be modified to suit local rainfall and other climatological conditions prevailing in the different tracts.

Schedule of manuring.—(1) With the receipt of the heavy pre-monsoon showers in April–May, apply a mineral fertilizer sufficient in quantity to supply about 0·25 lb. nitrogen (N), 0·5 lb. phosphoric acid (P_2O_5) and 0·75 lb. potash (K_2O) per tree. This would amount to an application of 1·25 lb. ammonium sulphate, 3·0 lb. superphosphate and 1·5 lb. muriate of potash per tree. Normally about 75 lbs. of ammonium sulphate, 180 lbs. of superphosphate and 90 lbs. of muriate of potash would be required to manure one acre of a coconut garden. The manure is best applied broadcast uniformly in the garden and incorporated into the soil by ploughing or by digging with a mammotty. The seeds of the green manure plant, *viz.*, *Crotalaria striata*, *Crotalaria juncea* or cowgram at 20 to 25 lbs. per acre may then be broadcast and covered with a light plough. With the monsoon rains the green manure crop will grow up well and be ready for incorporation in about three months' time.

(2) When the green manure crop has put on maximum vegetative growth, it may be slashed and applied uniformly over the entire garden. It may be buried under by ploughing with a mould-board plough or by digging with mammotty. It may also be applied in the case of young plantations or when trees are widely spaced and are far apart in limited areas round about the trees in shallow circular basins. There is also a practice of applying manures in long linear trenches in between rows of trees, the position of the trenches being shifted from year to year, so that in a few years' time the whole garden will get the benefit.

(3) Along with the green manure, apply fertilizers to supply 0·25 lb. Nitrogen (N), 0·5 lb. Phosphoric acid (P_2O_5) and 0·75 lb. potash (K_2O) per palm (*i.e.*, 75 lbs. ammonium sulphate, 180 lbs. superphosphate and 90 lbs. muriate of potash per acre).

(4) Repeat steps 1, 2 and 3 every year.

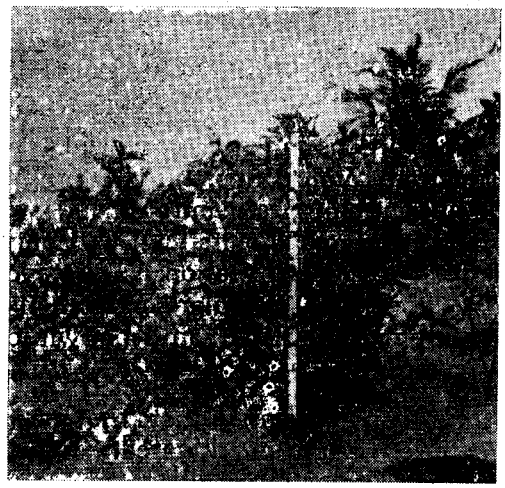
Explanation.—In the above schedule the yearly application of mineral fertilizers has been fixed at 0·5 lb. nitrogen (N), 1·0 lb. phosphoric acid (P_2O_5) and 1·5 lb. potash (K_2O) per tree per year; but it is given in two doses—one half before the monsoon at the time of sowing the green manure crop and the other half at the time of incorporating the green manure towards the end of the monsoon rains which is the usual time when manures are applied to coconut palms. The advantages of an early application of a portion of the manure to the green manure crop are:

(*i*) The availability of a small quantity of readily assimilable nitrogenous manure will go a great way in quickly establishing the green manure crop in the early stages of its growth, particularly if the crop is being introduced for the first time.

(*ii*) Leguminous green manure plants grow most abundantly and mobilize large quantities of plant food if well supplied with phosphates and potash and modern developments in manuring techniques favour this method of manuring the land through the legumes.

Substitutes and alternatives.—(*i*) If, for any reason, the growing of a green manure crop *in situ* is found impracticable, or if the green manure crop proves a failure, any green leaf, *e.g.*, leaves from Adathoda *(Adathoda vasica)*, Erukku *(Calotropis gigantea)*, Murukku *(Erythrina indica, Erythryna lithosperma)*, Madre *(Glyricida maculata)*, Periakolingi

(Tephrosia candida), etc., may be brought from outside and applied at the rate of



A bush of *Tephrosia Candida*

100 lbs. per tree. It will be a good plan to plant Madre *(Glyricidia maculata)* along the boundaries of the coconut garden. The plant grows rapidly and is available for cutting leaves in about two years after planting and yields plenty of green leaf.

(*ii*) Alternatively, cattle manure or compost, if available, may be used at 100 lbs. per tree.

(*iii*) Superphosphate may be replaced wholly or in part by bone meal or ground rock phosphate. The latter is cheaper and has the further advantage that it is a corrective for soil acidity, but the phosphoric acid is not so readily available as that of superphosphate. Green manure crops are, however, known to feed relatively well on rock phosphate. The phosphorus of the rock phosphate would thus be made more quickly and readily available to the coconut. The decomposing green manure crop may also have

Glyricidia maculata growing along the borders of the Coconut garden

a solvent action on the rock phosphate residues from previous applications.

(*iv*) The muriate of potash may be substituted either by ash, whenever it is available, or by sulphate of potash on equal potash basis.

(*v*) Fish manure, prawn dust and other fish or animal wastes, oilcakes and other locally available manures may also be used as manures for the coconut.

Precautions.—The following points need special attention, if the full effect of manuring is to be obtained.

(1) At the time the manures are applied, particularly at the time of burying in the green manure, there should be sufficient moisture in the soil for the decomposition of the green leaf and the fertilizers to become soluble.

(2) The gardens should be properly laid out and bunded so that there would not be any soil erosion or loss of nutrient salts by surface wash.

(3) Weed growth should be controlled by working a plough or harrow wherever necessary. Otherwise they will remove part of the nutrients meant for the coconut.

(4) In case muriate of potash is substituted by ash, care should be taken that ammonium sulphate is *not* mixed with ash or added at the same time, as the chemical action will set in and some of the nitrogen may be lost. They should be applied separately at an interval of about a fortnight or a month.

Intercultural operations.—Manure the coconut gardens for increased yields; but production can be maximised if regular intercultivation goes hand in hand with manuring. Experiments at the Central Coconut Research Station, Kasaragod, have shown that regular cultivation is more important than manuring without cultivation.

It is very essential that the garden should not be left uncultivated. Regular cultivation by ordinary tillage operations removes weeds which compete with the coconut for nutrients and moisture. It also removes the surface matting of roots and facilitates soil aeration and percolation of rain water. Cultivation also helps conservation of soil moisture. Depending upon local conditions, operations like ploughing, bunding, piling of mounds, digging, forming basins, forming dry soil mulch in summer, etc., should be done properly and at the proper time. Regular cultivation and manuring at the proper time is the key to success farming. It will surely enrich our land, the land of palms.