COCONUT RESEARCH INSTITUTE

LEAFLET No. 9

(Revised Edition)

LOCALLY AVAILABLE MATERIALS OF MANURIAL VALUE

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1. From time to time enquiries have been received concerning the manurial value of various locally available materials, and a number of analyses has been carried out on such samples as have been sent with these enquiries. The present leaflet collects together the information so accumulated. The leaflet is not however confined to the writer's work, but also includes information obtained from other sources such as the studies of the Chemist of the Department of Agriculture.

The rise in the prices of imported fertilizers and the possibility of shortage of some of them, render it necessary to utilize to the full such waste and other materials as may be available locally.

The leaflet endeavours to indicate in each case the average composition of the various materials with respect to manurial constituents, and based on this the rates of application for coconut palms. Where possible, particulars are also given of the source of each material, the quantities likely to be available and the probable cost. In case of doubt as to the economic price at which such materials may be bought, the Soil Chemists Department may be consulted.

The substances referred to are roughly classified as follows :—

(*a*) Potash manures.
(*b*) Oil cakes and similar materials.
(*c*) Bulky organic manures, mostly nitrogenous.
(*d*) Phosphatic manures.

2. Potash Manures

Experiments have shown potash to be a primary manurial requirement of coconut palms, application of at least 1 lb. potash (K_2O) every two years being recommended. This is usually provided in manure mixtures by 2 lb. of Muriate of Potash. In each material here mentioned, the amount equivalent to 1 lb. potash (or 2 lb. Muriate of Potash) is indicated.

(*a*) **Kitchen Ash** :—Small-holders in particular should conserve all the kitchen ash that can be collected and used as potash manure. Such ash should be stored under cover and protected from rains which would wash out the potash.

Kitchen ash contains usually about 3 per cent. of potash. A kerosene tinful weighs about 16 lb. ; two-tinfuls can thus be considered equivalent to 2 lb. of Muriate of Potash. Such ash is usually bought for five cents a tinful, which may be considered cheap.

(*b*) **Ash of Butt-ends and Fronds** :—It is the practice on some estates to burn heaps of fronds in the field, collect the ash and use as fertilizer. This ash contains about 2 per cent. potash and so three kerosene tinfuls may be considered equivalent to 2 lb. Muriate of Potash.

(*c*) **Husk Ash** :—Husk ash is very rich in potash, and the proper utilization of husks is very desirable.

Further particulars regarding the preparation and use of husk ash will be found in Leaflet No. 5. (The Utilization of Husks on Coconut Estates) and in a publication entitled ' The Manurial Value of Coconut Husk Ash ', published in the *Tropical Agriculturist*, Vol. 97, 78-81.

(*d*) **Cinnamon Leaf Ash** :—This is obtainable in the Southern Province in limited quantities and contains about 1.5 per cent. potash (four tinfuls equivalent to 2 lb. Muriate of Potash).

(*e*) **Citronella Grass Ash** :—This is a valuable potash manure with 7 per cent. potash, available in large quantities in the Matara District. Unfortunately it is often kept in open heaps and subject to leaching. 14 lb. of this ash may be considered equivalent to 2 lb. of Muriate of Potash.

(*f*) **Paddy Husk Ash** :—This is of extremely variable composition and manurial value. Its average potash content is stated to be 2 per cent., but samples analysed by the writer have shown only traces.

(*g*) **Salt Sediment** :—Salt sediment obtainable locally at the salterns contain variable quantities of potash. One sample analysed contained 2 per cent. potash while another showed only a trace. It should not be therefore purchased except on a guaranteed analysis.

3. Oil Cakes

(*a*) **Coconut Poonac** :—Under certain conditions the use of coconut poonac as manure deserves consideration. Early in 1940, considerable stocks became available locally owing to lack of export markets, at prices which made it an economic nitrogenous fertilizer.

Ground-nut cake has been used in Ceylon more than any similar material as an organic source of nitrogen. Compared with Ground-nut cake (7 per cent nitrogen) at *Rs. 95·00 per ton, coconut poonac containing 3 per cent N, may be valued at *Rs. 40·00 per ton, in a crushed condition suitable for application. Crushing costs about *Rs. 5·00 per ton. There is also the cost of additional transport, which will be rather more than double that on Ground-nut cake. To Chilaw, for example, transport for one ton coconut poonac is *Rs. 4·94. The transport on an equivalent amount of Ground-nut cake (i.e. 3/7 of a ton) is Rs. 2·12. The extra rail transport for Chilaw may therefore be regarded as *Rs. 2·82 per ton.

Allowing for this and extra cartage, it may be remarked that for coconut areas similarly situated, coconut poonac (uncrushed) may be valued for manurial purposes at *Rs. 30·00 per ton F.O.R. Colombo, in comparison with Ground-nut cake at *Rs. 95·00 per ton F.O.R. Colombo.

*These figures relate to values in 1940.

For coconut manuring, suitable mixtures including coconut poonac are :—

		Nitrogen	Phosphoric Acid	Potash
Coconut poonac	20 lb.	0·60	0·20	0·40
Saphos phosphate	2 lb.	—	0·59	—
Muriate of potash (50 per cent)	2 lb.	—	—	1·00
		0·60	0·79	1·40

or

Coconut poonac	10 lb.	0·30	0·10	0·20
Calcium cyanamide or Sulphate of ammonia ..	1½ lb.	2·29	—	—
Saphos phosphate	2 lb.	—	0·59	—
Muriate of potash (50 per cent) ..	2 lb.	—	—	1·00
		0·59	0·69	1·20

Saphos phosphate may be omitted in the case of those estates that have been manured with the old type of mixtures containing phosphoric acid in the last six years (see para 5).

Further information on coconut poonac may be obtained from an article 'Coconut Poonac as Manure'. (*The Tropical Agriculturist*, Vol. XCV, No. 1, July, 1940). The particulars of cost, etc. given in the present leaflet are as at September, 1940, and so differ somewhat from those figures in the *Tropical Agriculturist* article, which was written in May, 1940.

Application.—The question of fly-breeding in decomposing coconut poonac has sometimes to be considered. Investigations on the subject carried out by the Medical Entomologist and the Coconut Research Institute have shown that there is no danger of fly-breeding if the poonac is properly crushed and uniformly applied in a manure circle, at least 6" deep, well mixed by forking and covered with soil.

Uncrushed lumps of poonac if applied and not properly covered with soil may cause fly-breeding.

(*b*) **Sediment Poonac.**—Small quantities of sediment poonac can be obtained from Desiccating Mills. It is a valuable nitrogenous manure containing 7 per cent nitrogen, and may thus be reckoned equivalent in value to Ground-nut cake. Crushed samples are sometimes adulterated by adding coir fibre dust, but this can be easily detected by the presence of tiny strands of fibre.

(*c*) **Mee-seed Cake.**—Some limited quantities of mee-seed have been crushed in Colombo in recent years. The cake is not a particularly valuable manure, containing about 1.8 per cent nitrogen. Like Mowrah cake from India it contains a poisonous constituent and so is unsuitable as a cattle food. Mowrah cake has been used in horticulture as a worm killer and it is possible that Mee-cake may be toxic to Black beetle larvae, and so could usefully be used in admixture with cattle manure and other materials likely to attract the beetle.

4. Bulky Organic Manures

(*a*) **Cattle Manure.**—The practice of manuring coconut palms by tethering cattle is well-known and is outside the scope of this leaflet. Mention may however be made of cattle manure purchased outside the estate or holding. The following are typical analytical figures obtained, the second referring to samples purchased in the N.W.P. and the third to an Eastern Province sample with the first (a freshly collected Bandirippuwa Estate sample) for comparison :—

	(1) Fresh dung from B.E. %	(2) Sample from N.W.P. %	(3) Sample from E.P. %
Moisture	79.4	45.3	11.19
Organic matter	16.47	15.2	43.97
Ash	4.20	39.6	44.87
Nitrogen	0.36	0.37	0.89
Potash	0.16	0.41	1.09
Phosphoric acid	—	0.24	0.65
Percentage composition calculated on moisture free material			
Organic matter	79.61	27.7	49.49
Ash	20.39	72.3	50.51
Nitrogen	1.74	0.67	1.0
Potash	0.79	0.75	1.23
Phosphoric acid	—	0.44	0.73

Suitable application per palm would be as follows :—

1 cwt. of air-dry manure (or 1½ cwt. of moist fresh manure) together with a kerosene tinful of ash (or 1 lb. Muriate of Potash) per palm should be a suitable rate of application.

(*b*) **Composts.**—The general subject of composts is also outside the scope of this leaflet, but the composts prepared from night soil and town refuse by some Urban Councils in coconut districts should be mentioned. These are very variable, but typical samples dried and sieved generally contain about 0.6 per cent nitrogen, 0.2 per cent potash and 0.3 per cent phosphoric acid. The bulky nature in proportion to this nitrogen content and consequent high cost of transport, renders this very uneconomical except on land very close to the source of supply.

Rate of Application.—1 cwt. compost supplemented by two kerosene tinfuls ash (or 2 lb. Muriate of Potash) and 2 lb. Saphos phosphate or bonemeal per palm.

(*c*) **Goat Manure.**—Considerable quantities of goat manure are used on coconut estates.

There are contractors who are able to supply fairly large quantities of goat manure from the Wanni Districts of Galgomuwa, Maho, Madhu Road and Madawachchi.

Compared to cattle manure goat manure is a more concentrated manure. Goat manure as supplied by contractors contains about 2 per cent nitrogen, 1 per cent potash and 0.7 per cent phosphoric acid. It is worth about Rs. 40.00 per ton on the estate today.

Rate of Application.—30 to 40 lb. goat manure, supplemented by a tin of ash (or 1 lb. Manure of Potash) and 2 lb. Saphos phosphate or bonemeal would be a suitable rate of application. Goat manure is sometimes adulterated by adding sand and this can be detected by adding a basketful of goat manure to a bucket of water, stirring and allowing the sand to settle. A high content of sand shows adulteration.

Further information will be found in a publication entitled *Goat Manure* copies of which can be obtained.

(*d*) **Poultry Manure.**—Limited quantities of poultry manure may be available on estates where large flocks of poultry are kept. It is a rich manure containing as much as 5 per cent nitrogen, 3.5 per cent phosphoric acid and 2 per cent potash when air dried.

(*e*) **Fish Residues.**—Small quantities of dried fish residues can be locally obtained from boutiques. Though crushed fish contains about 4 per cent nitrogen and 4 per cent phosphoric acid, fish residues may be assessed on the basis of 2 per cent nitrogen and 2 per cent phosphoric acid.

Dried fish manures are also available cheap along the coastal areas round Udappuwa and Kalpitiya in the Puttalam district. Maldive fish dust contains about 5 per cent nitrogen and 5 per cent phosphoric acid.

5. Phosphatic Manures

There is only a very limited supply of locally available material containing much phosphoric acid, there being no deposits of mineral phosphates.

Fortunately **the results of manurial experiments show that contrary to olden ideas on coconut manuring, large applications of phosphoric acid are unnecessary.** On estates which have been regularly manured on the old lines, phosphoric acid may even be omitted for at least one two-year cycle.

(*a*) **Bones.**—A small quantity of bones are locally crushed, but the bonemeal so obtained is coarse-grained compared to the Indian product.

(*b*) **Animal Ash.**—Occasionally supplies of animal ash prepared at the Colombo Municipal Incinerator from condemned animals are obtainable. A sample analysed consisted of a mixture of 40 per cent unburnt pieces of bone (of little manurial value) and 60 per cent of fine ash, the latter containing 7 per cent phosphoric acid.

(*c*) **Fish Refuse and Fish Meal.**—Besides nitrogen these manures contain appreciable amounts of phosphoric acid, about 2 to 4 per cent in samples examined by the writer.

(*d*) **Ash.**—Besides potash, the various kinds of ash mentioned in para 2 contain appreciable amounts of phosphoric acid. Husk ash contains about 2 per cent and that of coconut fronds, butt-ends, between 3.5 to 5.5 per cent.

(*e*) **Salvinia Weed.**—In certain areas accumulations of Salvinia weed collected from tanks, water courses and paddy fields could be profitably used for manuring coconut palms. The green material contains about 0.1 per cent nitrogen, 0.16 per cent potash and 0.2 per cent phosphoric acid and about 89 per cent moisture.

100 lb. of the air dried or 200 lb. of the green material may be spread on the manure circle and cattle tethered for manuring in the usual way.

Where the cost of transport of this bulky material is prohibitive, it may be burnt and the ash used as a potash manure. The ash would contain about 2 to 3 per cent potash and 25 lb. of this ash may be considered equivalent to 1 lb. of muriate of potash.

C.A.C.