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COCONUT RESEARCH INSTITUTE

LEAFLET NO. 9

THE USE OF LOCALLY AVAILABLE ORGANIC MATERIALS FOR MANURING COCONUTS.

1. INTRODUCTION

THERE are many locally available organic materials such as cattle and goat dung, poultry droppings, fish refuse, and the ashes of plant material which can be profitably used for manuring coconuts *provided that they are supplemented with the other necessary manures to form a balanced manure mixture to meet the requirements of coconut palms.* For instance cattle dung has a composition of about 0.6% N, 0.3% P_2O_5, and 0.4% K_2O, whereas the annual N, P_2O_5 and K_2O requirements of a bearing coconut palm on Ceylon soils (see CRI Advisory leaflet No. 36) are in the proportions of about 1: 0.6: 1.8. Cattle dung must therefore be supplemented with additional sources of potash. Similarly salvinia-ash, or citronella grass ash which contain 7-8% K_2O must be supplemented with nitrogenous and phosphatic manures. Where supplementary additions are made in the form of inorganic fertilizers such as muriate of potash, saphos phosphate, and ammonium sulphate, they can be purchased as unmixed straight fertilizers under the Coconut Fertilizer Subsidy Scheme.

Most locally available organic manures are by-products, or waste products of agriculture. Their concentration of plant nutrients is generally low in comparison to inorganic fertilizers, so that they have to be applied in much larger quantities than the latter. When evaluating the economics of using such manures, their costs of transport and handling should also be taken into consideration. The annual cost per palm of inorganic fertilizers as recommended in our Advisory Leaflet No. 36 is *about* Re. 1/- (subsidised rate). It would not be profitable to use locally available organic manures if the cost per palm considerably exceeds this figure.

Ideally, the use of such manures should be restricted to where they are available cheap in close proximity to the land on which they are to be used. Long distance transport of bulky manures may prove to be highly uneconomical.

The use of these bulky organic manures would be of particular benefit on coarse sandy soils which are poor in organic matter and carry little or no surface vegetative cover. They would help to increase the organic matter content of the soil and their nutrient and moisture holding capacities.

2. **Nutrient compositions.**

The chemical composition of individual samples is bound to be variable. The table below indicates the approximate chemical compositions which can be expected in some of the commonly available local materials of organic origin which can be used for manuring coconuts. These figures which are based on samples analysed at the CRI, and also on published data, serve as a guide to the quantities of the different materials to be applied to palms, and the amount of supplementary fertilizers which may be required.

When purchasing animal manures such as cattle or goat dung from outside sources, care should be taken to ensure that the manures are not adulterated with sand.

Cattle Manure: In comparison to other farm animals, cattle produce the largest amount of manure. Although it has the lowest content of plant nutrients, it is one of the most important of animal manures. More than half the nitrogen, and at least 75% of the potash excreted by cattle is in the urine, while most of the phosphate is in the dung.

Goat manure: Comparatively rich in plant nutrients, goat dung contains about twice as much as cow dung.

Poultry manure: This is the richest of animal manures. Its nitrogen and phosphate contents are largely determined by the type of feed. Poultry manure ferments rapidly, and if exposed to air, loses a large part of its nitrogen as ammonia. Deep litter mixed with paddy husk or saw dust kept off the rain helps to reduce loss of nitrogen, specially if a little gypsum and superphosphate is also added. Lime or wood ashes should **not** be added as they would release ammonia.

Salvinia Weed: In certain areas there are accumulations of Salvinia weed collected from tanks, water courses and paddy fields. The fresh material contains about 85% moisture, 0.1% N, and 0.3% K_2O It can be profitably used on coconut palms both as a mulch for conserving moisture, and as a manure. Since it is low in nitrogen content it is better used for making composts.

Fresh Salvinia weed is very bulky. Where its cost of transport is prohibitive, it may be burnt and the ash used as a potash manure. The ash is a valuable source of potash, containing as much as about 8% K_2O (1 lb. muriate of potash, 60% K_2O, being equivalent to 7 1/2 lbs. Salvinia ash).

Ashes: There are various other ashes such as kitchen ash (3% K_2O) paddy husk ash, (2% K_2O), ash of butt ends and fronds (2% K_2O, and 3.5-5.5% P_2O_5), coconut husk ash (20-30% K_2O, 2% P_2O_5) which can be profitably used as potash manures. After burning, these should be collected and stored under cover, protected from rain as otherwise the potash in the ashes would be washed out. *Ashes should not be mixed with fertilizers containing ammonium salts, or urea.* They should be supplemented with organic sources of nitrogen such as cattle manure, dry fish etc.

Chemical composition of some common locally available organic materials of manurial value

Material	*% Moisture*	*% N.*	*% P_2O_5*	*% K_2O*
Cattle dung (fresh)	45–55	0.4–0.8	0.2–0.4	0.3–0.6
Cattle dung (dry)	8–12	0.7–1.5	0.35–0.7	0.55–1.1
Cattle urine	—	1.1	traces	1.5
Goat dung	10–15	2–3	0.4–0.7	1–1.5
Poultry droppings (deep litter with saw dust, paddy husk)	30–60	1–1.5	0.8–1	1–1.5
Pig dung (fresh)	—	0.55	0.5	0.4
Farmyard manure	5–8	0.7–1.6	0.34–0.65	1.1–1.5
Composts	—	0.6	0.3–0.6	0.2–0.8
Salvinia weed (fresh)	85	0.13	traces	0.28
Fish refuse and dried fish	—	2–4	2–4	traces
Animal ash (from municipal incinerator)	—	nil	7	traces
Kitchen or wood Ash	—	nil	—	3
Coconut husk ash	—	nil	2	20–30
Ash of butt-ends and fronds	—	nil	3.5–5.5	2
Paddy husk ash	—	nil	1	2
Citronella grass ash	—	nil	—	7
Salvinia ash	—	nil	traces	8
Cinnamon leaf ash	—	nil	—	1.5

Blanks indicate that the figures are not available.

The following table gives the approximate equivalent of various organic materials in terms of the straight fertilizers ammonium sulphate, muriate of potash, and saphos phosphate. This will be helpful in estimating the quantities of the manures to be applied equivalent to our recommendations for the application of inorganic fertilizers to young and bearing palms given in CRI Advisory Leaflets No.8 and 36 respectively. The figures will also help in evaluating the economics of using these organic manures.

NITROGENOUS MANURES

	(A) *Quantity of material equivalent to* 1 *lb. Ammonium Sulphate* (*lbs.*)	(B) *Quantity of Saphos phosphate, in the amount of material specified in Column* (A) (*lbs.*)	(C) *Quantity of Muriate of Potash, in the amount of material specified in column* (A) (*lbs.*)
Cattle dung fresh	35	2/5	1/4
Cattle dung, dry	20	2/5	1/4
Goat dung	10	1/5	1/5
Poultry droppings — (deep litter)	20	3/5	1/3
Pig dung	30	1/2	1/5
Farmyard manure	20	1/3	2/5
Compost	35	1/2	1/4
Fish refuse and dry fish	7	3/4	traces
Salvinia weed (Fresh)	160	traces	3/4

POTASH MANURES

	(A) *Quantity of material equivalent to* 1 *lb. of Muriate of Potash* (60%K_2O)	(B) *Quantity of Saphos Phosphate in amount of material specified in Column* (A)
Kitchen or wood ash, 20 lbs.	...	—
Coconut husk ash, 2 1/2 lbs.	...	1/5
Ash of butt ends and fronds, 30 lbs....		4
Paddy husk ash 30 lbs.	...	1
Citronella grass ash 8 lbs.	...	—
Salvinia ash — 7 1/2 lbs.	...	—
Cinnamon leaf ash — 40 lbs.	...	—

Blanks indicate that figures are not available.

3. MANURING ADULT PALMS.

The recommendations made below are based on the fact that an adult bearing palm requires annually about 0.8 — 1 lb. N, 0.5–0.6 lbs. P_2O_5, and 1.5 — 1.8 lbs. K_2O.

(*a*) **Cattle manure:** It has been observed that a pair of local cattle will excrete in 8 nights about 150 lbs. fresh dung and 5 1/2 gallons urine which together contain about 1 lb. N, 0.2 lb. P_2O_5, and 0.9 lb. K_2O Where cattle manuring is done by tethering animals round palms, the practice should be as follows:—

Tether a pair of cattle round a palm for 8 nights per annum, and also apply 1 1/2 lbs. saphos phosphate and 1 1/2 lbs. muriate of potash, 60%K_2O.

In the alternative apply per palm annually:—

250 lbs. fresh cattle manure (or 150 lbs. dry cattle manure), supplemented with 1/2 lbs. saphos phosphate, and 1 1/2 lbs. muriate of potash (60%K_2O) (or 30 lbs. Kitchen ash, *or* 45 lbs. ash of butt-ends and fronds or 45 lbs. paddy husk ash, or 4 lbs. coconut husk ash, *or* 12 lbs. Salvinia ash or citronella grass ash, *or* 60 lbs. cinnamon leaf ash).

(*b*) **Goat manure:** Apply per palm annually:—
40 lbs. goat dung, supplemented with 1 1/2 lbs. saphos phosphate and 1 1/2 lbs. muriate of potash (60%K_2O) (or 30 lbs. wood ash or any one of the other potash manures mentioned above equivalent to this quantity of potash).

(*c*) **Poultry-manure:** Apply per palm, annually:—
100 lbs. deep litter poultry droppings, *and*
1 1/2 lbs. saphos phosphate, *and*
1 1/2 lbs. muriate of potash (60%K_2O

(*d*) **Pig manure:** Apply per palm annually.
150 lbs. pig dung, *and*
2 lbs. muriate of potash (60%K_2O)

(*e*) **Farmyard manure:** Apply per palm per annum:
75 lbs. farmyard manure
1/2 lb. Saphos phosphate,
1 1/2 lbs. Muriate of potash (60%K_2O) *or*
30 lbs. wood ashes. *or*
1 1/2 lbs. coconut husk ash *or*
any one of the other potash manures mentioned above equivalent to 1 1/2 lbs. muriate of potash.

(*f*) **Compost:** Apply per palm per annum.
150 lbs. compost,
1 lb. Saphos phosphate
2 lbs. Muriate of potash (60%K_2O) *or*
40 lbs. wood ash, or
the equivalent of any one of the other potash manures mentioned above.

(*g*) **Fish residues and dry fish:** Apply per palm per annum.
25 lbs. fish residue or dry fish.
3 lbs. muriate of potash (60%K_2O) or the equivalent of any one of the other potash manures mentioned above.

(*h*) **Salvinia weed (fresh):** Apply per palm per annum.
200 lbs. fresh salvinia weed,
3 lbs. ammonium sulphate.
2 lbs. muriate of potash (60%K_2O)
2 lbs. Saphos phosphate.

Organic manures are best applied in trenches or basins round the palm. After application, they should be covered over with soil.

4. MANURING OF PLANTING HOLES, SEEDLINGS, YOUNG PALMS

(A) **Planting Holes** — When preparing planting holes, specially in the case of second plantations, and also on new plantations on poor sandy soils, mix the top soil used for filling each planting hole with — one item from each of the following four columns.

Column (1)	*Column* (2)	*Column* (3)	*Column* (4)
20 lbs. Dried cattle dung *or* 35 lbs. Fresh cattle dung *or* 10 lbs. Goat dung *or* 20 lbs. Deep litter poultry droppings *or* 20 lbs. Farmyard Manure *or* 35 lbs. Compost *or* 7 lbs. Fish refuse or dry fish	10 lbs. Kitchen ash *or* 1¼ lbs. Coconut husk ash *or* 15 lbs. Paddy husk ash *or* 3½ lbs. Salvinia ash *or* 4 lbs. Citronella grass ash *or* 20 lbs. Cinnamon leaf ash *or* ½ lb. Muriate of potash ($60\%K_2O$) *or* 15 lbs. Ash of butt ends and fronds*	1 lb. Saphos phosphate	2 lbs. Ground dolomitic limestone

**Saphos phosphate is not necessary when ash of butt ends and fronds is used.*

(B) **One year and two year old seedlings** — This may be made up of either one item each from the 3 columns in Table I (a) or one item each from the two columns in Table I (b).

TABLE I

I (a)

Column (1) *N*	*Column* (2) *P*	*Column* (3) *K*
25 lbs. Dry cattle dung *or* 45 lbs. Fresh Cattle dung *or* 25 lbs. Farmyard manure *or* 45 lbs. Compost *or* 12 lbs. Goat dung	¾ lb. Saphos Phosphate	6 lbs. Kitchen Ash *or* 1 lb. Coconut husk Ash *or* *10 lbs. butt ends & fronds ash *or* 10 lbs. Paddy husk ash *or* 2½ lbs. Salvinia Ash *or* 2½ lbs. Citronella Ash *or* 15 lbs. Cinnamon 1 leaf Ash *or* ⅓ lb. Muriate of Potash

I (b)

Column (1) *NP*	*Column* (2) *K*
25 lbs. Deep litter poultry droppings *or* 9 lb. fish refuse or dry fish	10 lbs. kitchen ash *or* 1¾ lbs. coconut husk ash or *or* 15 lbs. butt ends & fronds ash *or* 15 lbs. Paddy husk ash *or* 3½ lbs. Salvinia ash *or* 3½ lbs. Citronella ash *or* 20 lbs. Cinnamon leaf ash *or* ½ lb. Muriate of Potash (60% K_2O)

**Saphos phosphate is not neccessary where ash of butt ends and fronds is used.*

(C) **3 Year Old Palms** —This may be made up of either one item each from the 3 columns in Table II (a) or one item each from the two columns in Table II (b).

TABLE — II

II (*a*)

Column (1) *N*	*Column*(2)*P*	*Column* (3) *K*
35 lbs. Dry cattle dung *or* 60 lbs. Fresh cattle dung *or* 35 lbs. Farmyard manure *or* 60 lbs. Compost *or* 18 lbs. Goat dung	1 lb. Saphos Phosphate	10 lbs. kitchen ash *or* 1¼ lbs. coconut husk ash *or* 15 lbs. butt ends and fronds ash* *or* 15 lbs. Paddy husk ash *or* 3¾ lbs. Salvinia ash *or* 4 lbs. Citronella ash *or* 20 lbs Cinnamon leaf ash *or* ½ lb. Muriate of potash (60% K_2O)

II (*b*)

Column (1) *NP*	*Column* (2) *K*
35 lbs. deep litter poultry droppings *or* 12 lbs. fish refuse or dry fish	15 lbs. kitchen ash *or* ½ lb. coconut husk ash *or* 5 lbs. butt ends and fronds ash *or* 20 lbs. paddy husk ash *or* 6 lbs. Salvinia ash *or* 6 lbs. Citronella ash *or* 30 lbs. Cinnamon leaf ash *or* ¾ lb. Muriate of Potash (60% K_2O)

**Saphos phosphate is not necessary where butt ends and fronds ash is used.*

(D) **4 year old palms** — This may be made up of either one item each from the 3 columns in Table III (a) or one item each from the two columns in Table III (b)

TABLE III

III (a)

Column (1) *N*	*Column* (2) *P*	*Column* (3) *K*
45 lbs. Dry cattle dung *or* 75 lbs. Fresh cattle dung *or* 45 lbs. Farmyard manure *or* 75 lbs. Compost *or* 24 lbs. Goat dung	1¼ lbs. Saphos phosphate	10 lbs. kitchen ash *or* 1¼ lbs. coconut husk ash *or* 15 lbs. butt ends and fronds ash* *or* 15 lbs. paddy husk ash *or* 3½ lbs. Salvinia ash *or* 3½ lbs. Citronella ash *or* 20 lbs. Cinnamon leaf ash *or* ½ lb. Muriate of potash ($60\%K_2O$)

III (b)

Column (1) *NP*	*Column* (2) *K*
45 lbs. deep litter poultry droppings *or* 15 lbs. fish refuse or dry fish	15 lbs. kitchen ash *or* 1½ lbs. coconut husk ash *or* 20 lbs. butt ends and fronds ash *or* 20 lbs paddy husk ash *or* 6 lbs. salvinia ash *or* 6 lbs. citronella ash *or* 30 lbs. cinnamon leaf ash *or* ¾ lb. muriate of potash ($60\%K_2O$)

**Saphos phosphate is not necessary where butt ends and fronds ash is used.*

(E) **5 year old palms and until bearing** — This may be made up of either one item each from the 3 columns in Table IV (a) or one item each from the two columns in Table IV (b)

TABLE IV

IV (a)

Column (1) *N*	*Column* (2) *P*	*Column* (3) *K*
55 lbs. dry cattle dung *or* 90 lbs. fresh cattle dung *or* 55 lbs. farmyard manure *or* 90 lbs. compost *or* 30 lbs. Goat dung	1½ lbs. saphos phosphate	15 lbs. kitchen ash *or* 2 lbs. coconut husk ash *or* 22½ lbs. butt ends and fronds ash* *or* 22½ lbs. Paddy husk ash *or* 5¾ lbs. Salvinia ash *or* 6 lbs. citronella ash *or* 30 lbs. Cinnamon leaf ash *or* ¾ lbs. Muriate of Potash (60% K_2O)

IV (b)

Column (1) *NP*	*Column* (2) *K*
55 lbs. deep litter poultry droppings *or* 18 lbs. fish refuse or dry fish	20 lbs. kitchen ash *or* 2½ lbs. coconut husk ash *or* 30 lbs. butt ends and fronds ash *or* 30 lbs. paddy husk ash *or* 7½ lbs. Salvinia ash *or* 8 lbs. Citronella ash *or* 40 lbs. Cinnamon leaf Ash *or* 1 lb. Muriate of Potash (60% K_2O)

**Saphos phosphate is not necessary where butt ends and fronds ash is used.*