COCONUT POONAC AS MANURE

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INTRODUCTION

AT present large stocks of coconut poonac produced by local mills are available at relatively cheap rates owing to lack of export markets, and their disposal has become a serious problem. The price of poonac which before the war was Rs. 80 a ton has come down to Rs. 30 per ton (nom.) at the time of writing. During the war of 1914–1918 a similar situation even led to the use of poonac as fuel in the mills. Such a procedure is obviously a flagrant waste of good cattle food and/or manure.

In the March number of this journal, Crawford (2) has discussed the use of coconut poonac as food for livestock. Numerous inquiries have been received by the Coconut Research Scheme regarding the possible use of coconut poonac as a manure on coconut estates, and it is hoped that the information given in this article will be of interest.

It is primarily as a feeding-stuff that coconut poonac should be regarded, and its use as manure is less desirable, even if not so patently wasteful as its use as fuel. Theoretically the live-stock population of Ceylon should be able easily to absorb the annual local output of poonac. However, difficulties of economics and distribution at present stand in the way of such absorption, and the question of using surplus stocks as fertilizers has to be considered.

Further, since the outbreak of the war, owing to the embargo on exports from producing countries and lack of transport facilities, difficulty has been experienced in obtaining normal supplies of inorganic fertilizers such as calcium cyanamide, sulphate of ammonia and nicifos. Fertilizer firms are thus from time to time unable to supply full requirements of these manures to estates, and in mixtures inorganic nitrogen is partly (in some cases up to 50 per cent.) replaced by organic nitrogen, particularly in the form of groundnut cake.

At the same time the prices of inorganic nitrogenous fertilizers have risen considerably. Calcium cyanamide which was about

Rs. 136 per ton at the commencement of the war has risen to just over Rs. 200 at the moment of writing; and the other inorganic nitrogen manures have followed a similar trend. With further complications in the international situation, the supply of these fertilizers may be even more seriously affected, while prices may soar to a prohibitive level.

It is therefore expedient to explore the potentialities as fertilizers of materials locally available, and in this connexion the possibility of utilizing coconut poonac at economic rates deserves the utmost consideration.

GRADES OF COCONUT POONAC

The different types of coconut poonac locally produced are classified below :—

1. Mill poonac (expeller and hydraulic)
2. Chekku poonac.
3. Parings poonac.
4. Sediment poonac.

Of these the bulk of the local poonac is mill poonac—expeller and hydraulic—of which in normal times about 300,000 cwt. are exported annually. Small quantities of chekku poonac are available. If is of interest to mention that, in the early days of coconut planting, it was the practice in some estates to convert the whole crop of nuts into oil in chekkus on the estates, and use the chekku poonac as manure either direct or by using it as food for cattle and utilizing the cattle manure produced. Sometimes poonac was mixed with cattle manure and applied in trenches. Parings poonac is prepared in desiccated coconut mills from the parings or the shavings of the nut produced during the manufacture of desiccated coconut. Parings poonac is much preferred to ordinary poonac as a cattle food and higher prices are paid for it. However, it differs little from the latter in chemical composition and food value, and the higher price is apparently based on little more than prejudice. Sediment poonac is produced in limited quantities in D. C. mills and differs materially in chemical composition and manurial value from the other grades. It is obtained from the scum formed in the tanks containing the coconut water and washings of the nuts. The scum is boiled with a little water in flat pans and the oil, called drain oil, periodically skimmed off. The sediment is pressed in iron or stone presses and the residue sold as oil cake [cf. Child (1) and Joachim (3)].

CHEMICAL COMPOSITION AND MANURIAL VALUE

The chemical composition of various grades of poonac are given in Table I., taken from *Coconut Research Scheme, Ceylon Bulletin*, No. 3, p. 13 (5).

TABLE I.

Composition of Poonac Samples

		Moisture.	Oil.	Ash.	Organic matter.	Nitrogen.
1.	Expeller poonac ..	9·8..	8·1..	5·5..	76·6..	3·36
2.	Chekku poonac (calculated) ..	13·3..	26·9..	3·3..	83·4..	2·20
3.	Parings poonac (*a*) ..	10·3..	6·6..	4·8..	84·9..	3·58
	,, ,, (*b*) ..	8·7..	11·3..	6·9..	84·4..	3·17
	,, ,, (*c*) ..	12·2..	8·0..	4·4..	83·4..	3·25
	,, ,, (*d*) ..	9·1..	9·0..	6·6..	84·3..	3·25
4.	Sediment ,, (*a*) ..	27·4..	19·6..	7·2..	65·4..	5·34
	,, ,, (*b*) ..	24·0..	20·9..	7·3..	68·7..	5·55
	,, ,, (*c*) ..	7·9..	23·2..	8·3..	83·8..	7·22

While sediment poonac contains as much as 7 per cent. nitrogen, the other grades (excluding chekku poonac) contain about 3 per cent. Sediment poonac and chekku poonac also contain a large amount of unextracted oil compared to the other grades.

Crawford (*loc. cit.*, p. 171) quotes an analysis of chekku poonac with an oil content of 15·0 per cent. Our experience is that chekku-pressing seldom reduces the oil content of the poonac below 20 per cent., and even considerably higher figures have been obtained on samples examined at the Coconut Research Scheme. In any case Crawford expresses the opinion that this high oil content makes chekku poonac definitely unsuitable for feeding in considerable quantities to certain classes of livestock.

The Carbon : Nitrogen ratios of poonac samples are given below :—

TABLE II.

Carbon : Nitrogen ratios of Poonac Samples

	Per cent. Carbon.	Per cent. Nitrogen.	C/N.
	(Corrected for moisture).		
Mill poonac (Hydraulic).. ..	50·59 ..	3·48 ..	14·54
Expeller poonac	48·87 ..	3·92 ..	12·47
Parings ,, ...	50·95 ..	4·10 ..	12·43
Sediment ,, ...	64·10 ..	7·58 ..	8·46

Although manure with a C/N ratio greater than 10 may be considered unsatisfactory for annual crops, this may not be a material disadvantage for perennials such as coconuts, tea and rubber. For perennials, particularly coconuts producing nuts throughout the year, without any definite growth periods during which nitrogen has to be supplied as in the case of annuals, the immobilization of soil nitrates in the process of decomposition of the poonac will only be temporary, as the micro-organisms will subsequently decay and release plant food.

Sediment poonac, however, in spite of its oil content has a narrow C/N ratio below 10 and could be considered a manure as good as groundnut cake.

As far as its fertilizer value is concerned (as with chekku poonac) the high oil content reduces proportionately the percentage of nitrogen and other fertilizing ingredients. The oil in itself is hardly likely to have any deleterious effect on the soil; indeed N. R. Dhar (*Hadar* Nov., 1938; & *Nature*, 1940, Vol. 145, 632) of Allahabad has recently claimed that, contrary to the general belief, fats are readily oxidized in tropical soils and provide considerable energy for nitrogen fixation.

Poonac also contains about 1·3 per cent. potash and 1·5 per cent. phosphoric acid.

THE RELATIVE VALUES OF POONAC AND IMPORTED MANURES

The price per ton and unit values of N in calcium cyanamide, sulphate of ammonia, ground-nut cake, and coconut poonac are given below for comparison :—

	Per cent. Nitrogen.	Price per ton.	*Unit value of Nitrogen.
		Rs. c.	Rs. c.
Calcium cyanamide ..	.. 19	.. 200 0	.. 10 53
Sulphate of ammonia ..	.. 20·6	.. 200 0	.. 9 71
Groundnut cake ..	.. 7	.. 100 0	.. 15 0
Coconut poonac (expeller)	.. 3	.. 30 0	.. 10 0

It will be seen that at Rs. 30 a ton coconut poonac costs nearly the same as inorganic manures and is distinctly cheaper than groundnut cake.

The increased cost of transport of bulky manures such as poonac should also be considered. For every ton of cyanamide that would be replaced by poonac nearly 6 tons of the latter have to be used. Handling charges such as application would be correspondingly heavy. On the average the all-in-transport and handling charges of about Rs. 7 per ton should be added to the cost of manure in most coconut districts.

It should also be remembered that expeller poonac is sold in the form of hard lumps, which should be crushed to a fine meal (such as groundnut cake sold for manure) before application. The cost of crushing should therefore be added to the cost of manure.† Assuming crushing to cost Rs. 5 per ton, the total cost per ton including freight and transport charges would be Rs. 42.

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*The unit value of nitrogen, &c., in fertilizers is calculated as the actual cost of 22.4 lb. of nitrogen or 1/100 part of a ton. This is obtained by dividing the cost per ton by the percentage of nitrogen, &c.

†We are now informed that Messrs. British Ceylon Corporation are prepared to supply ready-ground poonac at Rs. 35 per ton f.o.r., Colombo.

As mentioned before, when manure firms are unable to supply the full requirements of nitrogen in the inorganic form 50 per cent. of the nitrogen is replaced by groundnut cake. At an inclusive cost of Rs. 42 a ton, which will then cost Rs. 14 a unit of nitrogen, it would not be uneconomic to use coconut poonac instead of groundnut cake in coconut manure mixtures.

In conclusion it may be necessary to consider the question of the present serious problem of coconut poonac stocks from the wider aspect of national expediency and to encourage its use as manure so long as there are no technical objections.

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