CHEMICAL NOTES (7).

THE MANURIAL VALUE AND DECOMPOSABILITY OF COCONUT FIBRE DUST.

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A number of queries has recently been received by the Chemical Division of the Department on the manurial and agricultural value of coconut fibre dust. Analyses of two samples of coir dust obtained through the courtesy of the British Ceylon Corporation Ltd., were therefore made by Mr. D. G. Panditteseker e, Assistant in Agricultural Chemistry. The ash constituents and nitrogen were determined by ordinary analytical methods, pentosans by Krober and Tollen's method and lignin by the method recommended by Waksman (1). The results of analysis are shown in table I below.

Table I.

	Fine coir dust.		Coarse coir dust.		Sample of coconut husk.
	on air-dry material. %	on material at 100°C. %	on air-dry material. %	on material at 100°C. %	on material at 100°C. %
Moisture	15·77	—	20·39	—	—
*Organic matter	73·19	86·87	76·77	96·43	96·5
+Ash	11·04	13·13	2·84	3·57	3·5
	100·00	100·00	100·00	100·00	100·00
+Containing sand	7·82	9·29	·69	87	·36
,, phosphoric acid	·06	·07	·04	·06	·08
,, lime	·67	·79	·69	·87	·94
*Containing nitrogen	·84	1·00	·31	·39	·26
,, potash	·33	·39	·26	·33	·31
Lignin	31·76	37·71	34·75	43·65	45·45
Pentosan	10·10	11·95	10·74	13·10	19·15
Ratio of pentosan to lignin	·32		·30		·42

It will be noted that the sample of fine coir dust has a much higher ash and lime content than the coarse sample. This is due to the presence of limestone and sand particles in the former. In other respects the analytical composition of the two grades of coir dust is similar. The actual manurial value of coir dust is small, the present samples containing only ·3 per cent. nitrogen, ·4 per cent. lime and ·05 per cent. phosphoric acid. These samples, however, are comparatively rich in potash which they contain to the extent of ·9 per cent. The analysis of a sample of coconut husk is shown for comparison. The potash content of this particular sample of husk is unusually low, the average potash content of coconut husk being about 1·5 per cent.

From the point of view of decomposability, as measured by the pentosan/lignin ratio, the data indicate that coir dust will decompose in the soil only very slowly as its pentosan/lignin ratio is less than ·5, which ratio Rege (2) has shown is the minimum required for the slow decomposition of organic materials in soil. That required for rapid decomposition is greater than unity. Compared with that of fibre dust the pentosan/lignin ratio of coconut husk is slightly higher, viz., ·42, but is still so low that this material will also be only very slowly decomposed in the soil, unless the decomposition is accelerated by other means. Experiments on the conversion of coconut husk and coir dust into artificial manure by an extension of the Adco process have recently been initiated on a few coconut estates. In this process the pentosan/lignin ratio of the raw material is brought up to the standard required by the addition of easily-decomposable, high pentosan-containing green materials, *e.g.*, grass or green-manure leafy material.

Coir dust absorbs over eight times its weight of water and parts with it comparatively slowly. This is seen from table II below which shows the maximum water-absorbing capacity of and rate of loss of moisture from moisture-saturated samples of coir dust, loamy soil, sandy soil, sandy soil mixed with 2 per cent. of its weight of coir dust, and sandy soil with a surface mulch of coir dust respectively.

Table II.

	Maximum water-holding capacity. Initial moisture. Per cent.	Per cent. moisture at end of					
		1st day	2nd day	3rd day	4th day	5th day	7th day
Loamy soil.	41·8	25·3	12·6	4·4	2·9	2·9	—
Sandy soil.	24·3	11·9	2·5	0·3	—	—	—
Sandy soil + coir dust (incorporated).	33·2	19·0	10·0	1·6	0·1	—	—
Sandy soil + coir dust (as surface mulch).	24·3	12·6	3·4	1·5	0·7	0·2	—
Coir dust.	823	655	514	348	178	79	17

It will be observed that by the incorporation of 2 per cent. by weight of coir dust with the sandy soil the maximum water-holding capacity of the latter is increased by nearly 40 per cent. and the rate of loss of moisture is slower than from the soil itself. Coir dust can therefore be advantageously incorporated into sandy soils along with green and artificial manures. Coir dust can also be used as a surface mulch for light soils in dry districts during periods of drought, but it should be applied in thick layers if the rate of loss of soil moisture is to be appreciably reduced. Coir dust is also useful for improving the physical condition of heavy clay soils.

REFERENCES.

1. Waksman and Tenney. The composition of natural organic materials and their decomposition in the soil: I. Methods of quantitative analysis of plant materials. *Soil Science* Vol. XXIV. No. 4.
2. Rege. Bio-chemical decomposition of cellulosic materials, with specific reference to the action of fungi. *Ann. Appl. Biology.* Vol. XIV. No. 1.