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LIME PRETREATMENT FOR FASTER DEGRADATION AND HUMFFICATION OF COIR PITH

Coir pith is a byproduct from coir industry which is non fibrous and constitutes as much as 70 per cent of the husk. It is very light, highly compressible and having high water holding capacity, which can be, used as organic source. Because of high lignin content and slow decomposition, coir pith has limited use in agriculture. Since, coir pith is high lignin material, if lignin decomposition is enhanced, humification process also could be triggered. Polyphenols are the immediate precursors of humic acid synthesis (Stevenson, 1982) and hence it is worth to attempt any chemical treatment, which will weaken the monomeric linkages of lignin. Feeler experiments were conducted to choose a suitable pretreatment based on humification of decomposing coir pith. Pretreatment with 0.5 per cent calcium hydroxide on w/w basis was found to be ideal. For pretreatment, the calculated quantity of calcium hydroxide was mixed with water and sprinkled on raw coir pith (CP) and mixed thoroughly and kept overnight. Care was taken that the moisture content of coir pith did not exceed more than 50 % of MWHC.

The pretreated coir pith was used for decomposition study using carbon dioxide evolution as an index of decomposition (Pramer and Schmidt, 1964). Six treatment combinations replicated thrice were used. The treatment details are as follows:

T_1	CT + cow dung + garden weeds
T_2	CP(L)* + cow dung + garden weeds
T_3	CP + *Pleurotus* + cow dung + garden weeds
T_4	CP(L) - *Pleurotus* * cow dung + garden weeds
T_5	CP + *Pleurotus* + cow dung + garden weeds + rock phosphate
T_6	CP(L) + *Pleurotus* + eow dung + garden **weeds** + rock phosphate

* Coir pith pretreated with lime

Additives like cow dung and garden weeds were added at the rate of 10 % w/'w basis. *Pleurotus sajar-caju*, a lignin decomposing micro-organism was added at the rate of 1000 g per tonne of coir pith. For enrichment, 2 % P_2O_5 equivalent of rock phosphate was added on w/w basis of raw material. The amount of CO_2 evolved as well as the amount of carbon loss from the decomposing system were determined from the cumulative amount of CO, evolved after 120 days of incubation. After the incubation period, samples collected from each treatment were analysed for labile fractions, cellulose and lignin content as per the procedure outlined by Sadasivam and Manickam (1996) and humic acid content was determined by procedure outlined by Schnitzer (1982).

The data corresponding to per cent C evolved as CO_2, labile fractions, cellulose, lignin and humic acid contents are presented in Table 1 as average of three replications. The raw coir pith had 20.26% labile fractions, 34.1% cellulose and 50.33% lignin. After 120 days of decomposition, all the lime pretreated coir pith showed lesser C loss compared to treatments without lime pretreatment. But with respect to lignin decomposition and humic acid percentages, all the lime pretreated treatments recorded higher lignin degradation and higher humic acid formation than the un-pretreated respective treatments. The pretreatments decreased the C loss in terms of CO, evolution. But pretreatment reduced the lignin content compared to corresponding un-pretreated ones. The lower labile fractions indicate the rapid utilization of labile molecules for the synthesis of humic acids (Stevenson, 1982). Addition of *Plcurotus* and rock phosphate had hastened the decomposition.

Since, the decomposing materials are uniform with respect to C:N ratio, the differences in the mass loss of C as CO_2 can be attributed to only three factors namely, (a) the incorporation of *Pleurotus* (b) pretreatment with lime and (c) enrichment with rock phosphate. In general, the rock phosphate and *Plcurotus* resulted in more per cent C loss whereas lime pretreatment slowed the per cent carbon loss but resulted in higher lignin degradation. The degraded lignin molecules hastened the humification process and the resultant coir pith compost was darker in colour. This may improve the acceptability by farmers.

Table 1. Biochemical compostion and humic acid content of composts after 120 days of decomposition

Treatments	% C evolved as CO_2	Labile fraction (%)	Cellulose (%)	Lignin (%)	*Humic acid (%)
T_1	4.24	34.10	18.54	44.15	1.51
T_2	3.81	29.26	30.14	36.62	2.16
T_3	5.02	30.82	17.19	42.22	1.53
T_4	4.57	33.24	25.32	35.57	2.91
T_5	5.35	31.55	17.11	41.29	1.57
T_6	4.91	33.19	22.68	34.11	2.28

*HCl UK purified ash lice humic acid

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