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ON THE EFFECT OF NON EDIBLE OILCAKES ON THE RESPIRATORY ACTIVITY OF SOIL

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It is well known that when an organic material is added to the soil, it is acted upon by various microorganisms with the liberation of carbon dioxide. The rate at which carbon dioxide is liberated depends not only on the activity of the microorganisms but also on the nature of the organic meterials added. The decomposition of organic meterials and the production of carbon dioxide in the soil are interrelated and more the carbon dioxide produced, greater will be the decomposition by the microorganisms (Selman *et al* 1923). One of the methods to study the extent of decomposition of organic materials in soil is to observe the respiratory activity of the soil treated with such materials. Since oil cakes contain various nutrients in organic combinations they are required to undergo decomposition in the soil for the release of the nutrients. Since little information on the respiratory activities of soil on addition of oil cakes is available, the investigations reported herein were undertaken. In these studies the efficacy of six non edible oilcakes has been evaluated in two typical soils of Maharashtra State by studying the respiratory activity ie. carbon dioxide production of the soil.

Material and Methods

A medium black calcareous soil from the Agricultural College farm, Poona (Clay loam, pH. 7·2, nitrogen 0·06 percent, avail. P_2O_5 41·0 mg percent, avail. K_2O 31·0 mg percent, exchangeable bases 73·39 m.e. per 100 g soil) and a lateritic soil from the Agricultural College farm Dapoli (Clay loam, pH, 5·9, nitrogen 0·14 percent, avail. P_2O_5 41 0 mg percent, avail. K_2O 23 mg percent, exchangeable bases 16·75 m e. per 100 g. soil) were used in these studies. The oilcakes used were those of neem (*Azadirachta indica*), karanja (*Pongamia glabra*,) pilu (*Salvadora oleoides*) Pisa (*Actinodaphne hookerii*), kusum (*Schleichera trijuga*) and castor (*Ricinus communis*). Each type of the cakes was applied in the soils so as to supply 100 mg nitrogen per 100 g soil. The finely powdered cakes were thoroughly mixed with the soils and the contents were brought to moisture equivalent. The carbon dioxide evolved was determined by the modified Pattenkoffers method as used by Mukerjee *et al* (1936) first after 24 hours of application and subsequently at intervals of 3 days for a period of 15 days. Crude fibre percentage in the different oil cakes was determined as per the method given in A.O A.C. 1950.

Results and Discussion

Results are given in Table 1.

It may be seen that on addition of the different cakes, the medium black calcareous soil produced a larger amount of carbon dioxide than the lateritic soil in all the

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Table 1

Quantity of carbon dioxide (mg) evolved per 100 g of different types of air dried soil treated with oilcakes at different intervals after treatment.

Oil cakes	Control	Neem	Karanja	Pilu	Kusum	Pisa	Castor
Crude fibre (percent)		5·70	6·20	6·80	12·40	2160	23·10
Intervals in days	MEDIUM BLACK CALCAREOUS SOIL						
1	2851	80·12	79·95	70·24	63·42	51·81	49·69
3	21·52	168·50	132·73	88·33	56·96	70·64	62·12
6	24·33	135·85	122·41	131·32	115·83	101·89	86·78
9	18·73	170·88	153·67	141·31	129·20	114·93	102·08
12	17·59	172·21	165·88	143·89	132·37	112·59	118·11
15	10·91	175·01	168·81	146·18	135·11	131·75	123·63
Total CO_2 respired in 15 days	121·59	902·55	823·45	721·27	632·89	583·61	543·18
	LATERITIC SOIL						
1	20·43	59·23	57·91	45·53	42·48	93·03	35·18
3	14·12	101·56	100·13	83·86	81·03	70·11	70·03
6	18·65	85·83	82·25	98·79	95·61	81·31	77·00
9	16·77	105·73	102·92	97·33	94·75	85·14	82·72
12	51·11	118·63	110·45	105·51	101·05	88·45	85·10
15	7 65	115·65	112·81	10723	104·15	93·81	91·65
Total CO_2 respired in 15 days	93·53	586·64	566·47	538·25	519·07	457·85	441.68

treatments and at all the intervals of sampling. The medium black calcareous soil had a pH of 7.2 and an exchange complex saturated with bases, exchangeable calcium dominating, while in lateritic soil the pH was 5.6 and the exchange complex containing only 16'76 m. e. exchangeable bases per 100 g soil. The low production of carbon dioxide in the lateritic soil may be ascribed to the lesser activity of micro organisms due to low pH and low exchangeable calcium in that soil (Buckman and Brady 1960, Russell 1952).

It is further observed that the quantity of carbon dioxide evolved from the treated soil of both the soil types was more than 5—8 times of that evolved from the untreated soils, showing that all the oil cakes increased the microbial activity of the soils. Agashe (1957) had also reported similar findings. However, the quantities of CO_2 evolved varied considerably with the type of cake as well as with the type of soils. Neem cake and karanja cake produced more carbon dioxide than all the other cakes in both the soils while castor cake produced the least.

In general it was observed that the production of carbon dioxide under all the cakes in both the soils increased gradually with maximum production on the last day. The order of efficieney of the various cakes to droduce carbon dioxide was neem cake > karanja cake > pilu cake > kusum cake > castor cake. This differential behaviour by different cakes might be due to their variable contents of the resistent organic groups such as crude fibre present in the cakes. For instance the crude fibre contents were found to vary from 5 to 6 percent in neem, karanja and pilu cakes and from 21 to 23 percent in pisa and castor cakes (Table 1). It may be observed that more the crude fibre contents the lesser was the rate of production of carbon dioxide in both the soils.

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