In-Situ Incorporation of Press Mud Cake in Sugarcane Fields: Impact on Manorial Value of Soil Environment

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***Abstract*— Filter cake, filter-press, press mud, filter mud and mill mud, all refer to the same soil-like residue obtained by filtration of the mud, which settles out in the process of clarification of the juice from sugarcane, known as Press mud, which is spongy, amorphous and brown- to- brownish white material, contains sugar fiber cingulated colloids including cane wax, aluminizes inorganic salts and soil particles. Press mud cake is produced by the supplication or carbonation, about 3 to 7% of the amount of cane crushed in a sugar factory, which is essential for sustaining soil health's as well as cause environmental pollution hazard and public health problems. Alternative methods are needed to manage to this press mud cake by mixing in the soil. Present study is conducted as a passable alternative method for adding in the soil. Twenty tone of press mud cake per hectare was incorporated into soil with two doses of nitrogen (75kg and 150 kg), and aztobacter (10^4 No) Soil sample were drawn periodically at 0 (before giving treatment), 90,180,270 and 360 days of incubation . Press mud cake with 20t/ha with aztobactor and nitrogen 75kg/ha gives significantly improved manurial value of soil environment**

Keywords*— *pressmud cake,omponent; sugarcane; envorinmental polution; manurial value;

I. INTRODUCTION

Filter cake is one of the by-products of sugarcane that can release the major nutrient elements required by plants when it is incorporated into the soil sometimes apply filter cake in sugarcane fields, though the industry depends more on inorganic fertilizers than on filter cake. Pruss mud cake is among the cellulosic carbohydrate residues and waste materials that are currently being investigated for their high potential for bioconversion in Thailand (Sundhagul and Atthasampunna, 2006). In the production of sugar, the receipted impurities present in the cane juice just after removal by the filtration (table:-1) in rotary vacuum filters or by the bath type filter process form a waste by product of sugar industry, serves as rich source of plant nutrients For every 100 tonnes of sugarcane crushed, about 3 tonnes of press mud cake is left behind as by-product. It has been estimated that 2.7 million tonnes of press mud is produced every year in our country.. It contains 25.07to 26 percent organic carbon, 0.86 to 1.07 percent of total N,. 2.42 to 2.62 percent of P and 1.60 to 1.75 percent of K (Kumar and Mishra, 1991. The activity of microbial in the soil improvement due to addition of an effective source of carrier material for microbial inoculants (Jauhia 1990). It is also reported that Synergistic effect due to addition of Azatobactor, conjunction with fertilizer nitrogen and press mud was also observed (Ramalinga Swamy et al 1996, Banagar et al 1993) Press mud contains trace quantity of micronutrients and prevents soil erosion, crusting and cracking, adjust soil pH, improves drainage and promotes normal bacterial and microbial growth in the soil.

Material and Method.

In situ incorporation, press mud cake in the field for experiment was conducted during four consecutive year's i.e. 2002 and 2009, at Indian Institute of Sugarcane Research main farm, Lucknow Uttar Pradesh India. Geographically Lucknow is located between the parallels of $26^0$5' N latitude and $80^0$6' E longitude. The experimental site is about 123.50 m above mean sea level. Soil with press mud cake 20t/ha alone, with azotobacter and two nitrogen doses of 75 & 150 kg through urea. The chemical composition of press mud cake is given in (table:-2). Soil sample were drawn periodically before (table:-3) giving treatment and after 90,180,270 and 360 days of incubation of material.. These samples were air dried and passed through 2-mm sieve. Analysis work was carried out in the laboratories of Indian

Institute of sugarcane Research Lucknow Analytical methods of U.S. Salinity Laboratory Staff (1954) were followed or otherwise mentioned. All the calculations were made on oven dried soil weight basis Soil pH was determined by pH meter having combination electrode after calibrating with buffer solutions of pH 7.0 and 9.0 (Systronic) The Electrical conductivity of soil was measured at 25^0C in the soil and water saturated suspension ratio of 1:2.5 by glass electrode conductivity meter (Systronic) (Jackson,1973). Organic carbon was determined by Walkley and Black (1956) rapid titration or wet oxidation method The data collected about soils was subjected to analysis of variance (ANOVA) by STEEL and TORRIE, 1960

Result and Discussion

In this experiment, the press mud cake obtained by the carbonation process form the sugar mil was used the value of pH. In water was (1:2.5) in the alkaline range. The electrical conductivity (1:5) mmhos/cm showing the presence of soluble salt in press mud cake . It was observed from table 3 that there appeared to be a tendency for pH to decrease with the press mud cake, but the change was hardily measurable at the end of incubation. It was further decreased with the addition of N. The decrease in pH might be due to release of weak organic acid formed upon press mud cake decomposition. It is also observed that press mud cake alone or with N increased electrical conductivity of the soil very slightly due to stabilization of salt present in the soil by organic acid formed during the press mud cake decomposition.. Similar observation was reported by (Singh & Yadav *et al*. 1999). It is also observed that alone trash or with nitrogen increased slightly the electrical conductivity or salt content of soils due to the solubilization of salts present in soil the organic acids formed during decomposition of trash

The means of days and treatments of incubation in the soil observe that available Macro nutrient (Table: 4) increased slightly with time the control upon the decomposition of A similar decrease in pH upon addition of composed agricultural waste was observed (Yadav *et al*. 1999) alone or with treatment. This might be due to immobilization of soil N by the bacteria responsible for trash decomposition . The increase in available nitrogen in the soil due to partial relies of nitrogen present in the trash. Similar observations have been made by the by (Singh & Yadav 1986). The micronutrient increased ssignificantly with time the control upon the decomposition of trash alone or with treatment (Table: 5) this shows that addition nitrogen helped in releasing micronutrients from the trash by hastening trash decomposition

References

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Table 1:- Flow Cart of Press Mud Cake

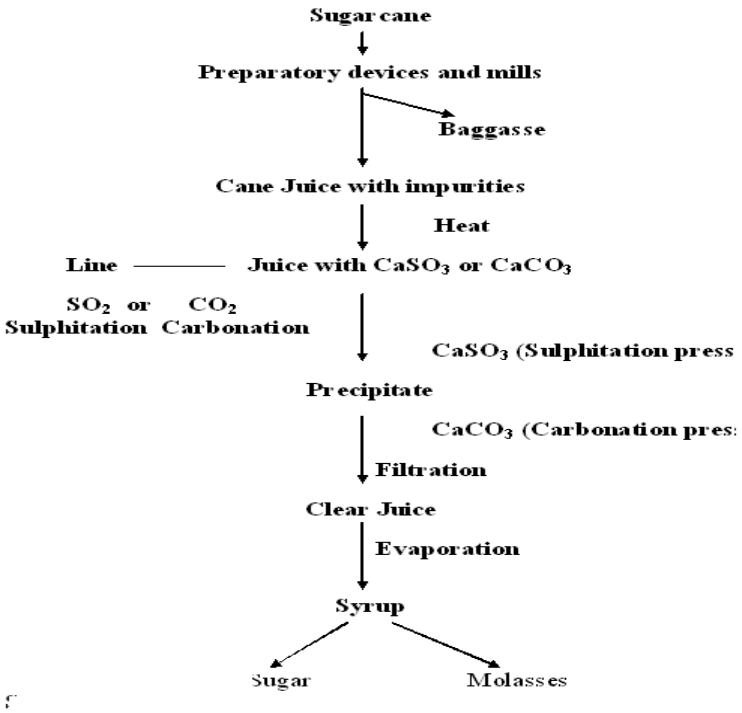

Table 2. Chemical Properties of Press- Mud Cakes on dry basis

Characteristic	Value
	Surface Soil(0-15 cm)
Available macro and micronutrients	
Available N (%)	1.1
Available P_2O_5 (%)	2.4
Available K_2O (%))	0.8
Available Fe (ppm)	2400
Available Mn (ppm)	270
Available Zn (ppm)	1501
Available Cu (ppm)	126

Table-3: Physico-chemical characteristics of the experimental soil

Characteristic	Value
	Surface Soil(0-15 cm)
A. Physico-chemical characteristics	
pH	7.76
Electrical Conductivity (E.C.) ds-m-^{1}	0.25
Organic Carbon (%)	0.52
B. Available macro and micronutrients	
Available N (kg/ha)	275.97
Available P_2O_5 (kg/ha)	42.86
Available K_2O (kg/ha)	229.68
Available Fe (mg/kg)	38.40
Available Mn (mg/kg)	8.80
Available Zn (mg/kg)	0.84
Available Cu (mg/kg)	1.90

Table: 3 Impact of Press Mud Cake on physical prosperities of the soil environment

S.No	Treatments	pH				E. C. ds-m-1				O.C. (%)				C. N Ratio			
		90 days	180 days	270 days	360 days	90 days	180 days	270 days	360 days	90 days	180 days	270 days	360 days	90 days	180 days	270 days	360 days
1	T_0	7.82	7.84	7.86	7.87	0.31	0.3	0.32	0.31	0.23	0.24	0.25	0.26	10.8	10.6	11	10.5
2	T_1	7.79	7.78	7.72	7.71	0.29	0.28	0.29	0.3	0.21	0.23	0.24	0.27	11.2	11.6	12	10
3	T_2	7.75	7.74	7.71	7.69	0.28	0.26	0.27	0.28	0.25	0.26	0.27	0.3	10.6	10.5	11	10.4
4	T_3	7.74	7.73	7.72	7.7	0.27	0.28	0.27	0.27	0.3	0.29	0.28	0.37	11.8	11.6	11	11.2
5	T_4	7.73	7.71	7.69	7.68	0.26	0.27	0.27	0.28	0.31	0.3	0.29	0.3	11.6	11.4	11	11.1
6	T_5	7.68	7.67	7.66	7.65	0.33	0.32	0.34	0.35	0.34	0.36	0.38	0.4	10.8	10.7	11	10.5
7	T_6	7.71	7.72	7.73	7.7	0.32	0.33	0.31	0.32	0.32	0.34	0.35	0.36	11.1	10.9	11	10.7
	C.V.	0.19332	0.074	0.1162	0.106	0.032	0.03	0.0383	0.0406	0.037	0.029	0.0238	0.13	0.563	0.489	5.1	0.6
	C.D	0.2004	0.077	0.1208	0.11	0.886	0.9	1.0409	1.0822	1.071	0.794	0.6487	3.21	0.406	0.355	1.4	0.46

T_0 Control
T_1 Press Mud Cake @ 20t/ha
T_2 T_1 + Azotobacter 10^4
T_3 T_1 + Nitrogen @ 75 kg/ha
T_4 T_1 + Nitrogen @ 150 kg/ha
T_5 T_2 + N @ 75 kg/ha
T_6 T_2 + N @ 150 kg/ha