KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science campus, Bengaluru

1.	**Project Reference No:** 46S_MTech_025
2.	**Project Title:** **"Study on Recovery of Wax from Sugarcane Industrial Press mud for the Improvement of Agricultural Soil Fertility"**
3.	**Name of the College & Department:** **Angadi Institute of Technology and Management, Belagavi.** **Department of Civil Engineering** **M.Tech. Program** **on** ***"Wastewater Management, Health and Safety Engineering"***
4.	**Name of the Student:** **Mr. Shreedhar Ullagaddi** (USN: 2AG21CWH10) **Name of Project Guide:** **Dr. B.T. Suresh Babu,** Professor, Dept of Civil Engg.

Project Synopsis in Brief

5.	**Keywords:** Press mud, Wax, Dewaxination, Sugarcane, Petroleum Eather, Toluene.
6.	**Introduction / Background:** Sugar industries are considered as the second largest major Agro industries in India. About 520 sugar industry are existing in India and 24 industries are in Belagavi district, Karnataka. These industries are producing several waste by products like, bagasse, molasses and pressmud having high potential value. Out of which pressmud is produced during clarification of sugarcane juice. About 3.5 to 4.0% of sugarcane pressmud is obtained per ton of cane crushing process. It is a soft spongy, amorphous and dark brown material containing, water content of 70-80%, sugar content of 0.9-1.5%, fibre content of 15-30%, cane wax of 5-6%, organic and inorganic substances, Nitrogen, Phosphorus, Calcium, Sulphur and other substances in varying amount. The use of chemical fertilizer is not so economical to the agricultural farmers. Hence this sugarcane press mud by product is used as a source of soil nutrient. Since it is having high water holding capacity and nutrient value. The disadvantage of using press mud is wax content and causing effect on soil

fertility and deteriorates the physical properties of soil in future and reducing the crop yield. Hence the extraction of wax from the press mud will increases, the quality of press mud as an organic manure. Bhosale P.R, et al [1], were studied on extraction of sugarcane wax from press mud from sugar industries. Bhosale P.R, et al [3], were also studied on physico-chemical characteristics of waxed and dewaxed press mud and its effects on water holding capacity of soil.

7. Objectives:

The main objective of this project work is to study on, extraction of Sugar cane wax from press mud to improve the soil fertility as an Agriculture product. Based on the above main objective of this project, we have drawn some of the specific objectives.

Specific objectives:

To achieve the above main objective, we have drawn some of the following specific objectives.

- Collection of Technical information, on extraction of wax from sugarcane press mud.
- Reconnaissance survey on selected sugar industries in Belagavi district and collection of pressmud samples for studies.
- Experimental set up for analyses and laboratory studies on extraction of wax from sugarcane press mud.
- Evaluation of result and preparation of report.

8. Methodology:

8.1) Materials used for Studies:

Following are the study has been carried out on dewaxing of sugarcane press mud. Sample are collected from two sugar industries which are selected in Belagavi district, which are nearer to the Belagavi city. One industry is from Gokak Taluk, Belagavi district, (Satish Sugars Ltd., 65km). This sugar industry is having crushing capacity of 10,000 tpd and the generation of press mud is 350-400 tpd.

Second industry is from Raibag Taluk, Belagavi district (Shivshakti Sugar Ltd., 85km). This industry is having crushing capacity of 3500 tpd and generating press mud of 120-140 tpd.

From these industries, two times press mud samples are collected, each time of 5 kg was brought to the laboratory for studies.

8.2 Laboratory Studies:

Experimental studies are carriedout in the Env Engg. laboratory.

Glassware's/Instruments used

- Separating funnel - 250 ml and 500 ml capacity.
- Reagent bottles - 250 ml.
- Conical flask- 50 ml.

- Porcelain dish-50 ml cap.
- Dedicators for cooling.

- Glass droppers of 10 ml.
- Petri dish.
- Glass rod for mixing process.
- Steel container-500 ml cap.
- Filter metallic [steel].

Chemicals used:

- Petroleum Ether [solvent].
- Toluene [solvent].
- Isopropyl alcohol.

Wax Extraction Procedure Carried out:

- Sugarcane press mud waste was collected from 2 industries for lab studies.
- Experimental setup made in Env Engineering laboratory of Civil Engg. department of our institution.
- Known weight of raw press mud sample was taken for studies [100gms].
- Boiled water was mixed with press mud sample. (1:2.5).
- Decanted the filtrate water from the mixture and collected in a oil and grease separation flask.
- Now petroleum ether was mixed well with the solution allowed for 30 minutes to settle down all settleable solids.
- Supernatant liquid was separated.
- Waxy substance mixture retained on the top layer, was collected separately in a porcelain crucible.
- This solution was oven dried to a temperature of 80 ’C cooled to the room temperature using desiccators.
- The dry residue remaining in the crucible was mixed with isopropyl alcohol and raw wax was separated.
- The results obtained are discussed in next chapter 9.0 and shown in tabular form.

Fig. 8.1 Collection Pressmud Samples From Sugar Industry.

Fig. 8.2 Laboratory Studies on Extraction of Wax from Pressmud.

Fig. 8.3 Wax Extracted from Pressmud.

9. Result and Conclusions:

9.1 Results:

Press mud from sugar cane is one of the most complex organic by-products generated, during the clarification of sugar cane juice in sugar industry. Unless otherwise proper treatment of press mud, it cannot be used directly for agriculture purpose. About 3.5-4.0% of Pressmud is obtained per ton of cane crushing process. The advantages of using sugar cane press mud for soil application is its low cost, presence of plant nutrients and trace elements and high-water holding capacity etc. The main disadvantage in its usage, as soil conditioner, is the high wax content in sugar cane press mud [5-6%], which remains not only un utilised, but also its accumulation, there by reduces. The yield of Sugar cane and other crops. Hence it is planned to extract the wax [Dewaxing] using chemical solvent like Petroleum Ether and Toluene.

9.1 **Details of Results obtained in the laboratory**

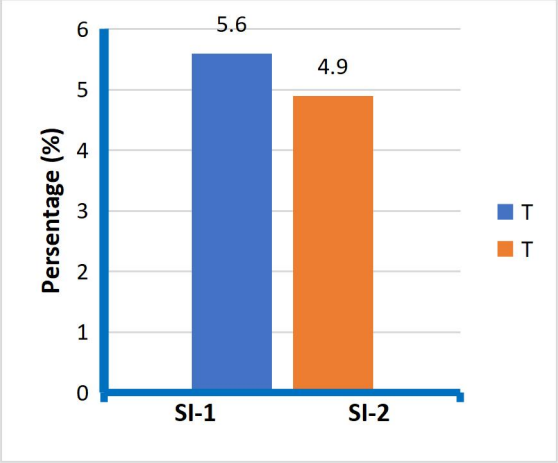
Sl. No.	Industry	Crushing Cap (tpd)	Pressmud	Moisture Content (%)	Wax Content (%)	
1.	**Industry-1** (Gokak Tq.)	**10,000**	**120-140 tpd**	62.3	T	**5.60**
2.					P	**5.20**
1.	**Industry-2** (Raibag Tq.)	**3500**	**350-400 tpd**	74.5	T	**4.90**
2.					P	**4.40**

9.2 Conclusions

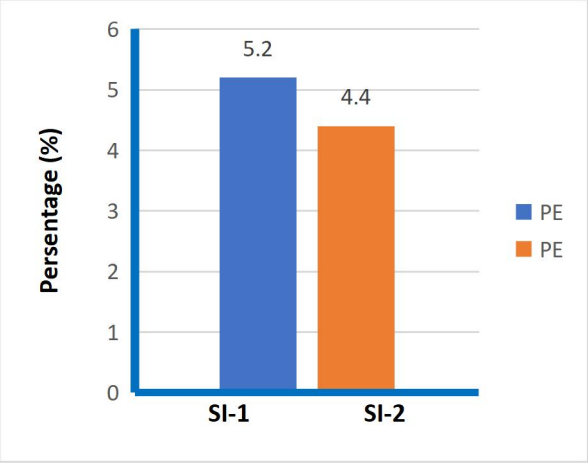
Present work is focusing on extraction of sugar cane wax from Pressmud obtained from sugar

industry. Based on the results obtained some of following conclusions are made.

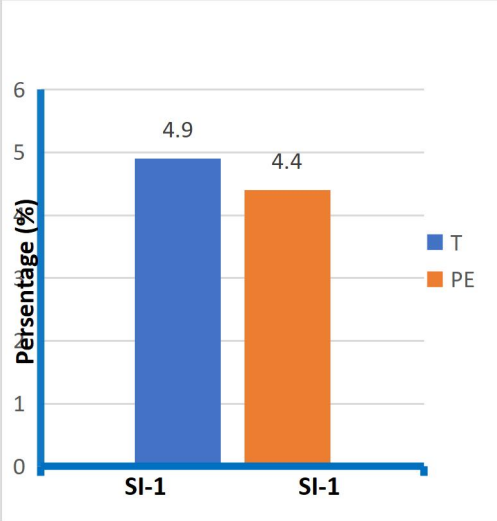
- Dewaxination process will gives improvement on agriculture Soil fertility and Crop yield.
- This technique may be considered as one of the low cost treatment method for the extraction of wax from pressmud.
- After separation of wax content from the pressmud the residual liquid/leachate may contain the plant nutrients and trace elements, which can be directly used for the agricultural purpose, instead of applying raw pressmud with treatment to the soil.
- From this process, huge amount of environmental odour nuisance can be reduced in the industrial premises.



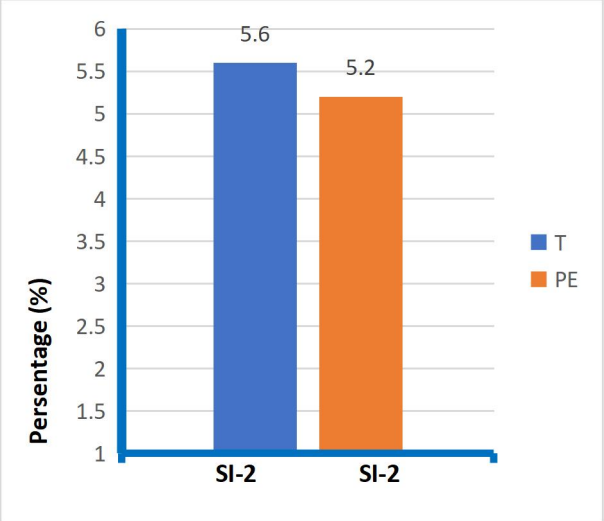
9.1 Extraction of Wax using Toluene ether



9.2 Extraction of wax using Petroleum



9.3 Percentage of Wax obtained from Gokak Sugar Industry.



9.4 Percentage of Wax obtained from Raibag Sugar industry

10. Scope for future work:

Based on the work carried out in this project work, following are the some of the suggestions made for future work.

- Characteristics of raw wax obtained from the press mud is to be studied.
- The residual liquid leachate Nutrients characteristics are to be studied.
- Utilization of residual pressmud obtained from this process can be studied for Vermicomposting process.