# Environmental Impacts of Sugarcane Industry – A Case Study on Kurungulam Mills in Thanjavur, India

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***Abstract*— Sugar industries are a backbone to Indian industrial development. It also generates employment to rural population. The effluents are major environmental problem in sugarcane industries. The effluents generated in mostly organic having small quantity of inorganic material. The major discharges are waste water, bagasse, pressmud and molasses. Owing to its nutrient enrichment, the byproducts of sugarcane are analyzed for full utilization of wastage in sugar industry. The treated is used for irrigation purposes, the bagasse is used to generate electricity and paper production and press mud or filter cake is used as manure and molasses is used for distillery . The objective of this study to discuss the Environmental problem related to sugarcane industry.**

***Index Terms*— Bagasse, Pressmud, Wastewater, Molasses, Distillery**

## I. INTRODUCTION

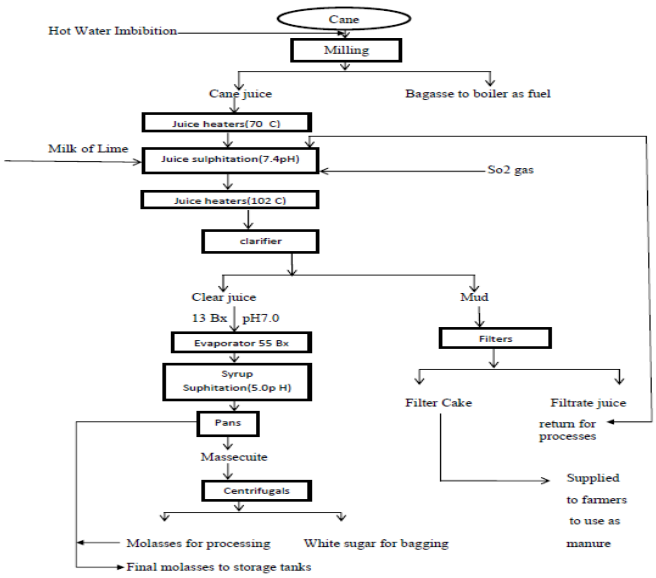
Sugar is one of the essential articles of daily food for the masses and its importance as a part of balanced diet cannot be ignored. It is so sweet that it's every day use brings sweetness in the life of public. According to our holy scriptures in the past feast was used to be broken with sugar cane juice, but now sweetness is depleting from the same juice. Seeing the fully grown up crop of sugar cane the farmer either repent or is obliged to fire the same. Cane area is continuously increasing, yet despite the record production of sugar cane farmers and mill owners are cursing for their misfortune with their arguments. The sugar industry ranks second among the major agro based industries in the country next only to cotton textiles. Sugar industry not only occupies a unique place on the international map, but also a significant role in the national economy. It is rightly said that sugar was produced and consumed in India at a time when the words was not aware of it. India primarily being an agriculture country requires the growth and expansion of those industries, which are based on agriculture.

## II. AREA OF STUDY

The study was done by a comprehensive study through primary data collection and secondary literature survey for secondary data collection. First of all the study area was selected and a reconnaissance survey took place. Aringar Anna sugar mill is in Kurungulam, T hanjavur, Tamilnadu, India. Here sugar is refined by double sulphitation process which means adding SO2 gas. As per COINDS/8/1980-81 of Central Pollution Control Board (CPCB), this factory is classified on the basis of crushing capacity as medium unit-2500T/D. The period of operation of sugar mill is from early November to the end of May or June.

### *A. Sugar Manufacturing Process*

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write "C.N.R.S.," not "C. N. R. S." Do not use abbreviations in the title unless they are unavoidable (for example, "IEEE" in the title of this article).




The clarifier sludge is further filtered through filter presses and then disposed off as solid waste. The filtrate is recycled to the process and the entire quantity of clarified juice is treated by passing Sulphur dioxide gas through it. Color of the juice is completely bleached out in the process. It is then sent to the vacuum pan where the thickened syrup is boiled for three to four times as per purity in order to extract the concentrated and cooled successively to obtain more than one crops of crystals. The final liquor, called 'Molasses', which is still very rich in sugar content is sold to various distilleries. The separated crystals are passed on to hopper conveyors where hot and cooled air is passed through the crystals. Finally finished product is bagged and stored in godowns.

*B. Effluent Water Treatment*

In this factory effluent treatment plant is handle a quantity of 700cu.m/day with an inlet of B.O.D of 900mg/lit. The treated effluent will be around 100 to 200mg/lit. Water points were plugged inside factory and judicious use of water is done inside factory. The raw effluent is allowed by gravity through channel to the oil trap where it shall be retained for 1 hour. During this time, oil and other floating matter shall float on the surface which will be removed frequently.

The overflow from oil trap enter into collection tank. Milk of lime is added in the collection tank to neutralize and also raise the pH to 7.5 to 8. Here it is allowed for 9 hrs to be retained. It is pumped uniformly into anaerobic tanks where reaction takes place and B.O.D is reduced to an extent of 30%. Normally 30 to 50 Kg of cow dung is added or seedling. Daily 2 kgs of urea and 1 kg of diammonia phosphate is also added as nutrients. After keeping for 30 hrs. inanaerobic tank,it is allowed by gravity to aerobic tank,where it is aerated. Oxygen is essentials for the sustenance of micro-biological activity. Here oxygen is supplied for 2 numbers of fixed aerator, which is driven by electric motors. Here 90% B.O.D is reduced and the agitated mass is allowed to settle in the secondary clarifier. To produce a high quality effluent, biomasses separated from the liquid stream. This together with thickening is accomplished in secondary clarifier.

A part of sludge from the bottom is pumped to sludge drying bed, where sludge is separated and the clear filtrate is collected and allowed to enter into anaerobic tank by masonry channel. The remaining part of sludge is re-cycled into anaerobic tank. The overflow from the secondary clarifier will treated effluent. It is used in the own factory farm. To improve the effluent treatment plant, they have settled an agency for erection and commissioning of 2 aerators additionally. By this arrangement, the water will be 100% fit for irrigation purposes.

*C. Bagasse Utilisation*

The pulp expelled after extraction of juice is called 'Bagasse'. The wet bagasse with 50% moisture content is carried to the boiler house by bagasse carrier. It is able to generate about 2kg of steam per kg on wet basis itself. With the efficient boiler usage, the factories save about 10-20% bagasse. And the bagasse has a calorific value of 1917 kcal kg and therefore is used as a fuel for steam generation in sugar mills. This factory producing 3MW. The remaining electricity were utilized by TNEB.

*D. Molasses Utilisation*

Molasses is applied in many food or non-food processes because of high content of nitrogenous compounds, carbohydrates and its sweet taste. Molasses is traditionally used in fermentation technologies to produce ethanol, so it is mainly send off to distilleries. Then it is used for manufacturing medicines in pharmaceutical industries. And it is also used by chocolate industry.

*E. Noise Pollution Reduction*

The noise is created due to machine running. So, the workers wear high quality earplugs or ear muffs to protect their ears and their hearing. The sound is not reaching outside the factory.

*F. Air Pollution*

Air pollution is one of the major problem in all industries. Here they installed 2 fly ash aerators in their boiler chimneys. The analytical report received from the Tamilnadu pollution control board reveals their aerators are working perfect

G. PRODUCTION ON FACTORY

Sugarcane fed into the cane feeder= 100%= 2500T/D
Sugar producing = 65%=1625T
Electricity production=400T
Bagasse = 25%=550T
Paper production=150T
Molasses =4%=100T
Pressmud =3%=75T

## III. CONCLUSION

*A.* By products like Molasses, Bagasse,and Press mud earn revenue to the sugar industry. None of the process streams involved in sugar manufacturing generate toxic effluents, and henceforth they can be used for irrigation purpose at lower concentrations. As discussed most of the solid waste generated is utilized by other industries; hence, solid waste disposal is not a big problem for sugar industry.

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