



Sugar Mills and Their Consequences: A Study of Environment and Public Health Issues

Dr Seema Yadav

Department of Chemistry

Ramabai Government Women PG College, Akbarpur, Ambedkar Nagar, Uttar Pradesh

Abstract

Sugar mills are one of the most important task along Indian industrial region which greatly responsible for rural economy. Rural formers of india and their socio- economic development are also depend on these industries. A huge amount of farmers and labours are engaged in the sugar cultivation and the production. They transform the cane to their industries and get money to maintain their living life and social arrangements. A sugar industry also generates odor and dust, which need to be controlled. The principal source of air pollution in sugar mills relates to boiler emissions. Steam boilers are used in sugar industry to produce electricity and for heat in different stages of production of electricity, like as crystallization process. Boilers are operated under three different conditions: fuel oil only, bagasse only, mixed fuel (fuel oil and bagasse). The choice of fuel source significantly changes the emissions mix. Sulphitation process in sugar refining is also responsible for generating SO_x gases. Hydrogen sulfide, sulfur dioxide, oxides of nitrogen and trace metals is emitted from the mills. The combustion of Bagasse produces ash and fly ash also. Approximately Fuel gas contains 4500mg/ml of fly ash on an average. This is a visual nuisance as well as a health concern. These problems are particularly high in boilers.

Keywords: Sugar Industries, bagasse, air pollution, fuel gas, rural economy.

Introduction: Industrialization is an important task for the development of our country. Industry is the group of productive organizations that produce or supply goods, services, or sources of income. Sugar industry is one of them. A sugar industry is a factory that perform sugar cane to produce raw sugar which later converted in to white sugar. Sugar mills is one of the most important task along Indian industrial region which greatly responsible for rural economy. Rural formers of the India and their socio-economic development are also depend on these industries. There are 756 installed sugar factories in the country as on 30.11.2021, with sufficient crushing capacity to produce around 350 lakh MT of sugar. The capacity is roughly distributed equally between private sector units and co-operative sector units. The capacity of sugar mills is, by and large, in the range of 2500 TCD-5000 TCD bracket but increasingly expanding and going even beyond 10000 TCD. Out of 756 installed sugar mills, 522 mills are operational and operated in sugar season 2021-22.

Bagasse, molasses and press mud are the fundamental byproducts of sugar mills. In addition to the effects of bagasse, sugar manufacturing also generates odor and dust that should be controlled. The dust can easily pollute other products and my surroundings also, while odors have the potential to seriously affect neighbouring communities. Organic dust such as that found in grain elevators, flour processing plants and sugar refineries is extremely volatile in nature. All it takes is a heat source or spark to trigger an explosion.

Any equipment, including industrial hose assemblies that transport these products, needs regular inspection and maintenance. During normal and regular uses of a hose assembly, the built-in static wire or the helical wire that is used to complete the electrical circuit for static grounding can get damaged. If the hose assembly is crushed or kinked, it must be checked for electrical continuity before further use. Since pesticides may sometimes present in sugar cane liquids, odors and dust particles from sugar manufacturing can have detrimental consequences in our environment.

Impact of sugar industries : Water is the basic requirement of animal life on this earth. Only 3% approx of total water on earth is available as fresh water, of which a small portion (0.01%) is available for human consumption. About 1.5 billion people have no access to drinking water globally and every year minimum 5 million people die due to lack of water and water related diseases. Ground water is primary and compulsory source for drinking, domestic uses, agricultural activities etc. So many activities of human body is depend upon the ground water in our surroundings. The water is not pure in chemical sense. The impurities present naturally is quit smaller but due to respective growth of industries basically sugar industries affect the ground water quality greatly on chemical sense. On resulting this the Geological activities and physio - chemical parameters are disturbed. Industrial pollution has been continues to be a major factor causing the degradation of the environment control around us, affecting the water we use, the air we breathe and the soil we live on. Impact of sugar mill effluent to our surroundings is Physico-chemical and biological characteristics of sugar mill effluent, Bioremediation of various industrial effluent flowed on out side to the mill.

Environmental pollution from sugar industries:

The sugar mill effluent is mainly discharged from floor, wastewater, and condensate water formed by leakage (Rathore et al., 2000; Ezhilvannan et al., 2011). The disposal of polluted wastewater is one of the main problems of recent days to be faced in the future with its increased adverse effects (Bharagava et al., 2008; Moazzam et al., 2012) It has also been reported that sugar mill effluent contains a high magnitude of pollution load and caused adverse effects on soil and biological system (Ayyasamy et al., 2008). Sugar industry is basically seasonal in nature and operates approx. for 150-210 days in a year (November to May) (Kolhe et al., 2009). A significantly huge amount of waste is produced during the manufacturing of sugar and provide us a high amount of pollution load, particularly in terms of suspended solids particles, organic matter, and press mud, bagasse and air pollutants also.

A number of district in Uttar Pradesh having a primary agricultural work as sugarcane Production. Due to most favorable climate and susceptible soil condition approximately 48% of total cultivated area of sugarcane found in Uttar Pradesh. It provides 50% approx. of the total production in India. The byproducts of sugar industries give the hazardous impact in our daily life.

Analysis of water effluent and ground water quality to the surroundings of sugar mills:

Ground water is primary and compulsory source for drinking, domestic uses, agricultural activities etc. So many activities of human body is depend upon the ground water in our surroundings. The water is not pure in chemical sense. The impurities present naturally is quit smaller but due to respective growth of industries basically sugar industries affect the ground water quality greatly on chemical sense. On resulting this the Geological activities and physio –chemical parameters of ground water are affected.

The study was covered at the surrounding areas of Chini Mills in UP, to determine the physio-chemical characteristics about that mill. Mainly during this study sampling of water was conducted before and after the sugar mill work on. The various observations show that the sugar mill does not maintain the department of environment standard (DOE) and surface water quality standard. The EC and TDS values vary largely than their standard values. The water becomes abnormal due to high concentration of Cl^- , K^+ , Ca^{++} , SO_4^{2-} as well as great value of BOD & COD. The pH value are also not match the standard range of water. A house hold

survey was conducted also up to 100 families approx in 8 villages, majority of human beings shows negative opinions regarding the impact of sugar mill which affected greatly crops and human health life. Now a day by the proper way of operation the effluent of impure water is filtered by the mill and then forwarded to the nearest river but earlier problems are found already in surroundings.

Industrial waste water effluents: The atmosphere is polluted by the rapid industrialization which brings pollutants into the environment via several ways. Untreated industrial discharge and domestic wastewater into the environment affects both soil and water quality simultaneously. Now a day environmental pollution is one of the primary issues of our surroundings. Water is affected greatly by industries due to large amount of effluent released into water bodies. On resulting this the physico-chemical parameters of water is changed and harmful effects can be observed in plants and other living organisms. WHO 2004 announced that one-third of death and 80% of diseases in the developing nations results drinking of contaminated water. By the one ton sugarcane crushed approx. 1000 liters of waste water is exerted by sugar mills. The BOD level is 1000 to 1200 mg/liter. However it appears clean by the human eye at starting stage but after some time it turns black and somewhere radish brown. Untreated water cause adverse health effects on human beings. The process of Sugar production requires a large amount of water during so many steps and exerted almost equal quantity of effluent which contains harmful substances. The liquid and solid waste produced from sugar industries has adverse and bad effect on the ecosystem and environment also. Ground water is fundamental, unique and compulsory source for drinking and activities of morning to evening for human bodies. Now a day about target areas the water is not pure in chemical sense during these years. The water becomes impure due to high concentration of Cl^- , K^+ , Ca^{++} , SO_4^{--} as well as great value of BOD & COD. The pH value are also not match with the WHO standard of water. The impurities available and present naturally is quite smaller but due to abnormal activities of industries basically sugar industries affect the ground water quality greatly on chemical sense. On resulting this, the physiochemical parameters and ecosystems are disturbed.

Impact on health due to sugar industries: Indian sugar industry has always been a focal point for social economic growth in the rural areas in our surroundings. Now-a-days nearly 50 million sugarcane farmers and a huge number of agricultural labourers are involved in sugarcane cultivation. Sugarcane production is the sector that increase the socio-economic aspects of operating farmers in terms of employment and employability conditions, income as well as food security and health which all participate in their general well-being. Agricultural practices in sugarcane farming are the major cause of health problems. This mainly happens where the conventional pre-harvest burning is still the prevailing practice with consequences on the respiratory system and lung function. Dust emissions from sugar industries expose workers to biological agents responsible for several infections. This can also cause different allergic reactions due to sugar cane moulds present at the production site. The grinding and cleaning process can also produce noise that can exceed to 100dB. This level of noise can be harmful to the health and should produce hearing impairment to the workers. It is indicated that safety of our operators by causing damage to the hearing system is not good. Generally, it will discomfort lack of concentration or resulting in stress. The development of carcinogenic symptoms due to mutagenicity risk is also discussed in different studies which relates it to sugarcane burning urinary function and chronic kidney related symptoms have been raised in the literature. Other minor health problems are also noticed such as stress, allergic reactions and different injuries. The sugar manufacturing process use high temperatures that can cause burning issues in respiratory tract. The process of cleaning, clarifying, bleaching or disinfecting procedure used by industries causes significant risks to the health of workers. These include poisoning, burning issue in eyes and skin, allergic reactions, asthma and even carcinogenic risks. Furthermore, a few studies have been discussed the inter-linkage between impacts of sugar cane production on biodiversity and the increased risk of health problems like skin irritation, headache, coughing, running nose etc. The socio-economic impacts of sugarcane farming related to health problems have been also discussed by Richardson (2010) who was found that sugarcane labour migration in Zambia contributes to HIV and AIDS infections from 16% to 22%.

Conclusion: The problem of ground water quality and soil in several parts of the country has become so acute that unless urgent steps for detailed identification and abatement are taken, extensive ground water resources may be damaged. The quality of ground water depends on a large number of individuals like hydrological, physical, chemical and biological factors. The water used for drinking purpose should be free from toxic materials, living and non-living organisms and extra quantity of minerals that may produce hazardous to health. On the other hand soil contamination may cause disturbance in soil fertility, soil growing capacity and heavy metal find their path in food chain. The results of this study indicates the need for environmental awareness, adequate regulations and proper management of waste materials by the local surrounding communities. Industries should must follow Uttar Pradesh Pollution Control Board (UPPCB) & National Green Tribunal (NGT) rules and regulations who control pollution and give suggestions for its elimination time to time. There is need to check industrial pollution by implementing strictly the pollution control laws and strict control on the disposal of untreated effluents around the industries.

References:

1. S.Soloman and M. Swapna (2022) Indian Sugar Industry: Towards Self-reliance for Sustainability. Sugar Tech, 2022; 24(3): 630–650.
2. A. R. Khan, A. A. Khan and others (2019), Air pollutant emissions from sugar mills and brick kilns: impact on environment and public health, Volume 16, pages 8607–8616.
3. Anjum Tansua, Mo.Tawfikul Islaam and others., (2014) Impact of Air Pollutant on Human Health in Kushtia Sugar Mill, Bangladesh, nternational Journal of Scientific Research in Environmental Sciences 2(5):184-191.
4. Action Financial services Ltd (India). (2013). Research Report: Indian Sugar Industry, Public Limited company, Mumbai Maharashtra.
5. ANONYMOUS, (2007). “Ecofriendly utilization of recyclable organic resources from sugar and distillery industries for sustainable agriculture”. National Conference Abstracts, 6th and 7th March, 2007, Anbil Dharmalingam Agricultural College and Research Institute, Trichy – 620009 and sugar and distillery industries, Tamil Nadu.
6. Rajeev Pandey and Dr Jaswant Singh (2008) Studies On Environmental Impact Assessment Of Industrial Wastewater And Its Management For Saef Use In Agriculture.Department of invironmental sciences. Dr. RMLAU AYODHYA Uttar Pradesh. <http://hdl.handle.net/10603/244782>
7. R Verma and Dr M R Augur (2015) A Chemical Study On Impact Of Industrial Effluents On Soil and Water Around Bilaspur Department of Chemistry, Dr. C.V. Raman University, <http://hdl.handle.net/10603/225980>.
8. M A Sabitha and Dr D Sarla Thambhavani (2014) Impact of effluents of sugarcane industry on Physico chemical characteristics of soil and Biochemical parameters of selected plant Species, Department of Chemistry Manonmaniam Sundaranar University, <http://hdl.handle.net/10603/89761>.
9. B Suresh and Dr T Damodaram (2015) Effect of sugar Industry On Environmental Samples of Nelavoy Chittoor district AP,Department of Invironmental Sciences, Sri Venkateswara University Tirupati AP.
10. Adekunle AS, Eniola ITK, 2008. Impact of industrial effluents on quality of segment of Asa river within an industrial estate in Ilorin, Nigeria. NY Sci J .1(1):17–21.
11. S K Singh and Dr R M Gupta (2008); Investigations of soil metallic contents in the belt of Southern Jaunpur district Department of Chemistry V. B. S. Purvanchal University Jaunpur UttarPradesh. <http://hdl.handle.net/10603/168304>.

12. P. Deb (2013); Physico-chemical properties and water holding capacity of cultivated soil along latitudinal gradient in South Sikkim, India, Indian Journal of Agricultural Research; 48(2):120-126.
13. Shtangeeva, I.V., Vuorinen, A., Rietz, B., Christiansen, G., Carlson, L., (2001). Decontamination of polluted urban soil by plants and Our possibilities to enhance the uptake of heavy metals, J. radio.Anal.Nucl.Chem.(Articles), 249(2):369-374.
14. Manisha Basu, Manish Pandey, P.B.S.Bhadoria and S.C.Mahapatra (2009). Potential fly-ash utilisation in agriculture : A global review. Progress in Natural Science, 19(10):1173-1186.
15. Ahmed M.K., Harounm, M.A., Mahyoub J.A., Al-Solami H.M. and Ghramh H.A.(2017). Environmental impacts of the liquid waste from Assalaya sugar factory in Rabek locality, White Nile State, Sudan, International Journal of Environment, Agriculture and Biotechnology (IJEAB); 2(4):1493-1504.