



Impact of sugar industry effluent on soil

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SUMMARY

Sugar industry plays a major role in creating pollution of water bodies and soil, because effluent contain large amount of organic and inorganic chemicals. Direct discharge of effluents from this industry may have profound influence on soil physico-chemical and biological properties. Hence, characterization of the effects of sugar industry effluents on soil is an urgent need to identify the problem areas, so that proper steps could be taken up before the soil just become hardly of any use. The present study was conducted to investigate the impact of sugar industry effluents on the soil spread over an area of radius of 2 km from the mill. The soil physico-chemical parameters such as pH, electrical conductivity, nitrogen, phosphorus, potassium, iron, nanganese, zinc and copper were monitored at residential and three polluted sites and at two different depths. The analysis of the parameters shows that pH and electrical conductivity were high compared to residential site and found to decrease as the distance from the mill increased. The same trait was encountered with depth variations. The macronutrient nitrogen decreased away from the mill where as phosphorus and potassium showed increase at site 2 and a decline at sites 1 and 3, respectively. Among the micronutrients, iron was found to be high at all the sites. The iron content increased at all the sites, because of its solubility and ready availability to the soil. All the micronutrients except iron showed a similar trend of higher values at site 2 compared to sites 1 and 3. The high level of phosphorus, potassium, manganese, zinc and copper at site 2 can be attributed to the fact that leaching due to the rain.

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Industrialization is an important tool for the development of any nation. Consequently, the industrial activity has expanded so much all over the world. Today, it has become a matter of major concern in the deterioration of the environment. With the rapid growth of industries (sugar, paper, tannery, textile, sago, dye industries) in the country, pollution of natural water by industrial waste water has increased tremendously (Amathussalam *et al.*, 2002). Among them, sugar industry plays a major role in producing a higher amount of water pollution because they contain large quantities of chemical elements. They contain higher amounts of total hardness, total dissolved solids, biological oxygen demand and chemical oxygen. The effluent not only affects the plant growth but also deteriorate the soil properties when used for irrigation (Maliwal *et al.*, 2004). In addition to that, some traceable amount of heavy metals such as zinc, copper and lead were also present in the effluent (Borale and Patel, 2004).

These effluents not only increase the nutrient level but also excess tolerance limits and cause toxicity (Mishra and Sahoo, 1999).

India is the premier cane sugar producing country followed by Brazil. Jain (1996) reported that during 1994-95, the outrun of sugar in India is 16 million tonnes, raw value equaled the total outrun of sugar by Brazil and Cuba put together. Sugar industry is the largest agro processing industry in India with 2.5 per cent weight in the annual industrial production. A typical sugar industry produces a large amount of by-products, such as bagasse (the fibre residue of sugar cane), press mud (filter cake), molasses and distillery spent wash. Press mud contains about 70 per cent organic matter and 29 per cent minerals. The discharge of effluents will create pollution to the environment.

The effluent mainly disturbs soil micro and macronutrients like nitrogen, phosphorus, potassium,

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