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Impact of brewery effluent on blackgram (*Vigna mungo*)

A. PRAGASAM* AND A.K. DIXIT
Department of Plant Science, K.M.Center for Post Graduate Studies, Pondicherry - 605 008 (U.T.), India

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SUMMARY

The length, fresh biomass, tolerane index, phytotoxicity, total free amino acids and proline contents of 15 days old seedlings of *Vigna mungo* treated with different concentrations (10,25,50,75 and 100 percent) of brewery effluent and mere water were estimated. All the parameters studied were found to be more than control in the plants treated with 10,25,50 and 75 percent concentrations of the effluent and less than control in those treated with 100 percent concentration. Maximum values were recorded in the plants treated with 50 percent concentrtion. Values of percent phytoloxicity of all concentrations of the effluent, except 100 percent, were found to be negative and indicate the stimulatory effect of the effluent. The present work suggests that the diluted brewery effluent can be used as liquid fertilizer for better growth of crop plants.

Key words : Brewery effluent, Vigna mungo, Seedling length, Biomass, Tolerance index, Phytotoxicity, Amino acid, Proline

The unabated growth of human population increased the necessity for large scale production of food grains, medicines, textiles, stationeries, automobiles, chemicals, electrical appliances etc. The agricultural activities involved the application of chemical fertilizers and pesticides and resulted in soil pollution. The fertilizer, chemical and pharmaceutical factories; textile and paper mills; automobiles and cardboard industries; tanneries; distilleries; breweries and refineries release an enormous quantity of effluents into the ecosystem. As industrialization and civilization are inseparable human civilization and pollution are also insepaprable. So, the problem of pollution can be solved only though a change in our attitude to consider waste not as a nuisance and its disposal as a great problem. But it can be considered as a source material for various other useful activities.

The possibility of making use of effluents of industries and domestic wastes for agricultural purposes, after proper treatment and desired dilution, has been worked out by several scientists (Alum factories: Bhiravamurthy and Appalaraju, 1982; Breweries: Ajmal and Khan, 1984; Chemical factories: Rajesh Kumar *et al*., 1990; Dairies : Trivedy and Kirpekar, 1991; Distilleries: Pragasam and Kannabiran, 2004; Fertilizer factories: Sahai and Srivastava, 1985; Paper mill: Misra and Behera, 1991; Sugar mill : Kumar and Bhargava, 1998; Textile mills: Vijayarengan and Lakshmanachary, 1993).

The study of literature reveals that a number of works has been carried out by many scientists to reveal the effects of the effluents of several industries on plants and soil properties. But work on the effuents of breweries on crop plants is meagre. So the present work has been taken up to study the phisico-chemical properties of brewery effluent and its effects on *Vigna mungo* (L.) Hepper cv. Vamban.

MATERIALS AND METHODS

There are 29 breweries in India which produce branded beer. Beer is a fermented beverage with low alcohol content made from various types of grains such as barley, wheat, maize etc. The waste liquid released after beer production is called effluent. The South India Corporation Agencies (SICA) Breweries Limited, Pondicherry is the first in India to be awarded the ISO 9002 and 14001 certification. It produces beer under the brand names Haywards 5000, Haywards 2000, Haywards Lager Beer, Hi-Five and Royal Challenge Premium Lager Beer. It has the production capacity of 2.5 million cases of beer per annum. For every litre of beer produced 10 litres of effluent is released. About 650 Kilolitres of effluent is released on every working day. After a series of steps in the process such as malt production, wort production, fermentation, filtration and beer production the effluent is treated aerobically and let into the canal.

The effluent was collected from the main outlet of the brewery and analysed for its physical and chemical properties using standard methods as recommended by American Public Health Association (APHA, 1975). Different concentrations of the effluent (10,25,50,75 and 100 percent) were prepared by mixing the raw effluent with water (V/V). Certified seeds of *Vigna mungo* were obtained from Perunthalaivar Kamaraj Krishi Vigyan Kendra, Pondicherry. Twenty seeds in each pot were sown and treated with 500 ml of each concentration of the effluent daily. A control set treated with water was also maintained. Three sets were maintained for each concentration. 15 days old seedlings were used for analysis. The parameters such as length of seedling, biomass of seedling, tolerance index, phytotoxicity, total free amino acids and proline contents were studied. The standard procedures of Chou *et al*., 1978 (Percent phytotoxicity). Moore and stein, 1948 (Total free amino acids) and Bates *et al*., 1973 (Proline) were followed

*Author for correspondence