RESEARCH PAPER International Journal of Agricultural Sciences, Vol. 5 Issue 1, January to May, 2009 : 108-113

Impact of distillery spentwash irrigation on the growth of leafy vegetables in untreated and treated soil

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ABSTRACT

A field experiment was conducted to study the impact of distillery spentwash on the growth of different leafy vegetables. The distillery spentwash *i.e.*, primary treated distillery spentwash (PTSW) and 33% distillery spentwash were analyzed for their physical and chemical parameters. Experimental soils plot 1(untreated soil) and plot 2 (treated soil) were tested for their physico-chemical parameters. The leafy vegetable seeds (Namadaries and Mahyco) were sowed in the prepared land dimension of 3' x 4' blocks in both plots. Seeds were irrigated with raw water and 33% spentwash. The nature of the growth of plants were studied and compared. Application of 33% spentwash shows the efficient growth of plants in plot 2 compared to plot 1.

Key words : Leafy vegetables, Experimental soil, 33% distillery spentwash, Growth rate, Potential growth, Treated, Untreated.

INTRODUCTION

Molasses (one of the important byproducts of sugar industry) is the chief raw material for the production of alcohol in distilleries. They produce about 40 billion liters of wastewater known as raw spentwash, which is characterized by high biological oxygen demand (BOD: 5000-8000mg/l) and chemical oxygen demand (COD: 25000-30000mg/l) (Joshi *et al.*, 1994).

Generally spentwash is discharged into open land or near by water bodies results number of environmental hazards including threat to plant and animal lives. The raw spentwash is highly acidic and containing easily oxidisable organic matter (Patil *et al.*, 1987). Spentwash contains highest content of nitrogen and plant nutrients (Ramadurai and Gearard, 1994). By adopting biomethenation plant in distilleries, reduces the oxygen demand of raw spentwash, this is called primary treated spentwash and is rich in nitrogen (N), potassium (K), and phosphorous (P) and decrease in calcium (Ca), magnesium (Mg), sodium (Na), chloride (Cl^-), and sulphate (SO_4^{2-}) (Mohamed Haron and Subash Chandra Bose, 2004). Also it contains easily biodegradable organic matter and its application to soil has been reported to be beneficial to increase the yield of sugar cane (Zalawadia *et al*., 1997), rice (Deverajan and Oblisami, 1995), wheat (Pathak *et al*., 1998), quality of groundnut (Amar B Singh *et al*., 2003) and physiological response of soyabean (Ramana *et al*., 2000). Diluted spentwash increases the growth of shoot length, leaf number per plant, leaf area and chlorophyll content of peas (Rani and Vastava, 1990). The spentwash consists excess of various forms of cations and anions, which are harmful to plant growth. The concentration of these constituents should be reduced to beneficial level by diluting the spentwash, which can be used as a substitute for chemical fertilizer (Sahai *et al.*, 1983). The spentwash could be used as a complement to mineral fertilizer to sugarcane (Chares, 1985) and thus valued as a fertilizer when applied to soil through irrigation water (Samuel, 1986). Higher percentage of spentwash irrigation causes decrease in seed germination, seedling growth and chlorophyll content in sunflowers (Helianthus annuus) and the spentwash could be safely used for irrigation purpose at lower concentration (Rajendran, 1990 and Ramana *et al.*, 2001) without adversely affecting soil fertility and crop productivity (Raverkar *et al.*, 2000, Kuntal *et al.*, 2004 and Kaushik *et al.*, 2005). Twelve pre sowing irrigations with the diluted spentwash had no adverse effect on the germination of maize but improved the growth and yield (Singh and Raj Bahadue, 1998). The diluted spentwash irrigation improved the physical and chemical properties of the soil and further increased soil microflora (Deverajan *et al.*, 1994, Kuntal *et al.*, 2004 and Kaushik *et al.*, 2005). Application of diluted spentwash increased the uptake of Zinc (Zn), Copper (Cu), Iron (Fe) and Manganese (Mn) in maize and wheat, the highest total uptake of these were found at lower dilution than at higher dilution levels (Pujar, 1995). The diluted spentwash increase the uptake of nutrients, height, growth and yield of leafy vegetables (Chandraju and Basavaraju, 2007, Basavaraju and Chandraju, 2008, and Chandraju *et al.*,

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