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Effect of distillery spentwash irrigation on the yields of top vegetables (Creepers) cultivated in untreated and treated soil

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ABSTRACT

Cultivation of top some vegetables (creepers) by distillery spentwash irrigation in untreated and treated soil was studied. The primary treated distillery spentwash (PTSW) and 33% spentwash were analyzed for their additive plant nutrients such as nitrogen, phosphorous, potassium, sulphur and other physical and chemical parameters. Untreated soil (plot-1) and treated soil (plot-2) were tested for chemical and physical parameters. The top vegetable (creepers) seeds (Namadhari and Mahyco) were sown in the prepared pit dimension of 2' x 2' in both plot-1 and plot-2. Seeds were irrigated with raw water and 33% spentwash. The nature of yields were studied and compared. Irrigation with 33% spentwash showed more yield for all vegetables in plot-2 as compared to plot-1 that spent wash treated soil was enriched with plant nutrients.

Key words : Top vegetables (creepers), Distillery spentwash, Yield, Untreated soil, Treated soil

INTRODUCTION

Ethanol is manufactured by the fermentation of molasses (one of the important byproducts of sugar industry) distilleries. In India, about 40 billion liters of waste water is annually discharged from distilleries, known as raw spentwash, which is characterized by undesirable color, foul odor, high biological oxygen demand (BOD: 5000-8000mg/l) and chemical oxygen demand (COD: 25000-30000mg/l) (Joshi *et al*., 1994). Raw spentwash is normally discharged into open land or near by water bodies resulting environmental, soil and underground water pollution (including threat to plant and human/animal lives). The raw spentwash is highly acidic and containing easily oxidisable organic matter. Distillery spentwash has highest content of nitrogen and plant nutrients (Ramadurai and Gerard, 1994). By installing biomethenation plant in distilleries, reduce the oxygen demand of raw spentwash. The resulting spentwash obtained is called primary treated spentwash (PTSW) and primary treatment to raw spentwash increases the nitrogen (N), potassium (K), and phosphorous (P) contents and decreases the calcium (Ca), magnesium (Mg), sodium (Na), chloride (Cl^-), and sulphate (SO_4^{2-}) (Mahamod Haroon *et al*., 2004). PTSW is rich in potassium (K), sulphur (S), nitrogen (N), phosphorous (P) as well as easily biodegradable organic matter and its application to soil has been reported to be beneficial to increase sugar cane (Zalawadia *et al*., 1997), rice (Devarajan and Oblisami, 1995), wheat and rice yield (Pathak *et al*., 1998) and ground nut quality and physiological response of soybean (Ramana *et al*., 2000). Diluted spentwash increases the growth of peas shoot length, leaf number per plant, leaf area and chlorophyll content. The spentwash (SW) contained an 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 SW, which can be used as a substitute for chemical fertilizer. The spentwash could be used as a complement to mineral fertilizer to sugarcane. The spentwash contained nitrogen, phosphorous, potassium, calcium, magnesium and sulphur and thus valued as a fertilizer when applied to soil through irrigation water. Higher concentration of spentwash causes delay in seed germination, seedling growth and chlorophyll content in sunflower (*Helianthus annuus*) and the spentwash could safely used for irrigation purpose at low concentration. Diluted spentwash could be used for irrigation purpose without adversely affecting soil fertility (Kuntal *et al*., 2004; Raverkar *et al*., 2000) and crop productivity (Ramana *et al*., 2000). 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 Bahadur, 1998). The diluted effluent irrigation improved the physical and chemical properties of the soil and further increased soil microflora (Kuntal *et al*., 2004; Devrajan and Rajanna, 1994). The application of diluted spentwash increased the uptake of Zinc (Zn), Copper (Cu), Iron (Fe) and Manganese (Mn) in maize and wheat as compared to control and the highest total uptake of these were found at lower dilution levels (Ramana *et al*., 2001; Rajendran,

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