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Studies on the impact of irrigation of distillery spentwash on the nutrients of creeper medicinal plants

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ABSTRACT

Cultivation of some creeper medicinal plants was made by irrigation with distillery spentwash of different concentrations. The spentwash *i.e.*, primary treated spentwash (PTSW), 50% and 33% spentwash were analyzed for their plant nutrients such as nitrogen, phosphorous, potassium and other physical and chemical characteristics. Experimental soil was tested for its chemical and physical parameters. Seeds of creeper medicinal plants (Namadhari and Mayhco) were sowed in the prepared land and irrigated with raw water (RW) 50% and 33% spentwash. The impact of distillery spentwash on proximate principles (moisture, protein, fat, fiber, carbohydrate, energy, calcium, phosphorous and iron), Vitamin content (carotene and Vitamin-C), mineral and trace elements (magnesium, sodium, potassium, copper, manganese, zinc, chromium and nickel) of creeper medicinal plants were investigated. It was found that the uptake of nutrients of all creeper medicinal plants were maximum in case of 33% spentwash irrigation than 50% spentwash and raw water irrigations.

Key words : Distillery spent wash, Creeper medicinal plants, Nutrients, Proximate principles, Harvest

INTRODUCTION

Molasses (one of the important byproducts of sugar industry) is the chief source for the production of ethanol in distilleries by fermentation method. About 08 (eight) liters of wastewater is discharged for every liter of ethanol production in distilleries, known as raw spentwash (RSW), which is characterized by high biological oxygen demand (BOD: 5000-8000mg/L) and chemical oxygen demand (COD: 25000-30000mg/L), undesirable color and foul smell (Joshi *et al.*,1994). Discharge of raw spentwash into open land or near by water bodies is a serious problem since it results in a number of environmental, water and soil pollution including threat to plant and animal lives. The RSW is highly acidic and contains easily oxidisable organic matter with very high BOD and COD (Patil *et al.*, 1987). Also, spentwash contains high organic nitrogen and nutrients (Ramadurai and Gearard, 1994). By installing biomethenation plant in distilleries, reduces the oxygen demand of RSW, the resulting spentwash is called primary treated spent wash (PTSW) and primary treatment to RSW 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-}). The 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 increase yield of sugar cane (Zalawadia *et al.*, 1997), rice (Devarajan and Oblisami, 1995), wheat and rice (Pathak *et al.*, 1998) and physiological response of soybean (Ramana *et al.*, 2000). Diluted spentwash could be used for irrigation purpose without adversely affecting soil fertility (Kaushik *et al.*, 2005; Kuntal *et al.*, 2004;Raverkar *et al.*, 2000), seed germination and crop productivity (Ramana *et al.*, 2001). The diluted spentwash irrigation improved the physical and chemical properties of the soil and further increased soil microflora (Devarajan, 1994; Kaushik *et al.*, 2005; Kuntal *et al.*, 2004). 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). Diluted spentwash increases the growth of shoot length, leaf number per plant, leaf area and chlorophyll content of peas (Rani and Srivastava, 1990). Increased concentration of spentwash causes decreased seed germination, seedling growth and chlorophyll content in Sunflowers (*Helianthus annuus*) and the spent wash could safely used for irrigation purpose at lower concentration (Rajendra, 1990; Ramana *et al.*, 2001). The spent wash contained an excess of various forms of cations and anions, which are injurious to plant growth and 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.*,

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