

Research Article

Effect of different doses of distillery spentwash on leaching using column study

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Summary

Soil column experiment was conducted in the laboratory to find out the effect of spentwash application on leaching of salts to assess the downward movement of spentwash on groundwater quality. The treatment comprised of different doses of spentwash at the rate of 0, 25, 50 and 100 m³ ha⁻¹. The treatments were applied uniformly and mixed thoroughly in the top 10 cm of the column. The soil was left for incubation for 15 days and thereafter leaching with distilled water, the leachate samples were analyzed for various parameters like pH, EC, cations and anions at periodical intervals. The results revealed that increasing dose of spentwash application increased the pH and reduction in the EC of the leachates over the period of leaching events. Among the cations, K⁺, Na⁺, Ca²⁺ and Mg²⁺ were higher in the leachates upto 4th leaching events and thereby decreased, similar trend of results were noticed in the anions. The soil collected after 8th leaching event contained appreciable amounts of all the ions. The results revealed that there is no possibility of groundwater contamination with spentwash application in the sandy loam soil.

Key words : Column, Spentwash, Leachate, Cations, Anions

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Introduction

Application of distillery spentwash results in the accumulation of large amounts of potassium (K), sodium (Na), calcium (Ca) and magnesium (Mg) as major cations and chloride (Cl), sulphate (SO₄), nitrate (NO₃) and phosphate (PO₄) as the associated anions besides small amounts of carbonate (CO₃) and bicarbonate (HCO₃) salts in the soil. Presence of excess salts affects the plant growth due to specific ion toxicity, high osmotic pressure of soil solution, low physiological availability of water to plants and complex interaction between ions leading to imbalances. Hence, leaching of salts from the soil, particularly from the root zone, is a prerequisite for crop production whenever the distillery spentwash is applied.

The distillery industrial waste water is non toxic, biodegradable, purely of plant origin and contains large quantities of soluble organic matter and plant nutrients, which may be utilized by the plants for their growth and yield. However, the only problem with distillery effluent is its high BOD, COD and salt content being observed as non ecofriendly

(Rajukkannu and Manickam, 1997) and because of which disposal is a problem for sugarcane growing countries where distilleries has recently expanded (Jadhav *et al.*, 2005). Leaching is the process of downward movement of water through the soil. Because salts movement with water, groundwater contamination depends on the extend of leaching of these salts from the spentwash amended soils. The amounts of salts that are leached out and retained in the soil were determined through column experiment.

Resources and Research Methods

Soil column experiment was conducted under laboratory conditions to examine the mobility and transport of salts and nutrients in the soil under spentwash application. Cylindrical poly vinyl chloride tubes of 30 cm height with an internal diameter of 6 cm were used. At the bottom, a layer of filter paper (Whatman No. 1) and nylon mesh (<0.2mm) were placed and secured tightly for the free flow of water without soil displacement. Calculated quantity (1.056 kg) of soil (<2mm)