COMBATING HARMFUL SALT ACCUMULATION BY VARIOUS MODES OF WATER APPLICATION

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Abstract

A soil column study was undertaken to evaluate the two modes of water application, viz., ponding and sprinkling on the salts displacement in a vertical column. The soil was packed layer wise at bulk unit weight of 1.13gm./cc on dry basis upto 40cm. and 70 cm. depths. A head of 5.0 ± 0.2 cm. was maintained for ponding and the sprinkling was applied at the rate of 2 mm. per hour. It was observed that sprinkling is more efficient for salt displacement as compared to ponding. The salt removed was observed maximum at the top layer. The accumulation of CI was found higher in sprinkling. A remarkable increase in the values of EC was observed in the lower layers in the sprinkling mode of water application.

Introduction

Soil salination and alkalination is one of the most serious threat to cultivable land. The problem occurs in varying intensities, depends on region to region. The soluble salts present in the soil, accumulates in the root zones due to evaporation and transpiration in arid and semi-arid regions. Accumulation of salts chlorides, sulphate, nitrates of calcium, magnesium potassium and sodium, adversely effects the crop growth and soil becomes unfertile.

The reclamation of saline soil is largely a matter of leaching excess soluble salts from the root zone. Distribution and removal of water soluble salts mainly depends on soil and salt type and quantity and method of water application. In general, two modes of water application, viz. continuos ponding and intermittent or transient pending. It was reported by various scientists that the mode of water application has considerable effect on salt displacement in the soil profile.

The present study was undertaken to evaluate the effect of modes of water application on leaching of salts in laboratory soil columns on the soil collected from *Jasara* block, District of Allahabad.

Materials and Methods

The Soil sample were collect from 0-20 cm. depth, mixed thoroughly and air dried. The sample was sieved to less than 2 mm. sieve. The experiment were carried out in a vertical column of PVC pipe 1 m. & 60 cm. in length and 10.8cm. internal diameter. The each column was fitted with filter paper at the bottom and the soil was packed layer wise to achieve the desirable bulk unit weight of 1.13 gm/cc (dry basis), till the 70cm. and 40 cm. were filled. Each column was positioned vertically.

The displacement of salts were studied under two modes of water application, continuous ponding and sprinkling. A head of 5.0 ± 0.2cm. maintained at the soil surface through a mariotte bottle arrangement. The prinkling was applied at average rate of 2 mm. per hour using hypodermic needles. The leachests were collected and analysed. The soil samples were also collected from the varying depths.

Results and Discussion

A column study was conducted by taking suitable design for four treatments, the amounts of leachets collected from 40 cm. and 70cm. depth in ponding and sprinkling modes, are presented in table 1. It may be observed from the data for 40cm. depth, the amount of leached collected in sprinkling is sufficiently high as compared to ponding for same amount of water application in various treatments. Table 1 also shows that the leachate collected from 70cm. soil column for various treatments at may be observed from the table that the leachate collected in case of sprinkling are considerably high as compared to ponding.

It was found that the time taken to infiltrate the water and its movement downward in the soil column was remarkably high in sprinkling as compared to ponding due very low rate of sprinkling 2.00 mm/hr. It is apparent from the experiment that the complete wetting of soil along the column has not be achieved as the free in filtration of water in case sprinkling was concentrated at centre of soil column as compared to ponding in which complete wetting of soil column has been achieved for both 40cm, and 70cm. of depth of column.

The pH, EC and CI concentration at 0, 10, 20, 30, 40, 50, 60, 70cm. depth in 70 cm. Soil column and 0, 5, 10, 15, 25, 30, 35, 40 cm. depth in 40cm. Soil column for various treatment of ponding and sprinkling. It was observed from the fig. 1 that the pH value in case of ponding of 40cm. of soil was increased 8.26 to 8.42 due to movement of leachate downward, but in case of sprinkling the accumulated salt was higher than ponding for the same depth. The similar trends was observed for 70cm. soil depth.

A remarkable decrease in the value of EC in ponding and sprinkling was observed in the fig. The value of EC was at the quite low top layer and increases remarkably at the bottom layer for 70cm. of soil column in both the cases of ponding and sprinkling. Not a much variation was observed in the values of EC for 40 cm. soil column. It was found that the increase in the EC value are more rapid in case of sprinkling.

At the top layer it was observed that CI value for the top layer was quite low but

2. The collection of the salts was found to be more in sprinkling as compare to continuous ponding.
3. The salt removal on the top layer and 10, 15cm. depths was maximum because of the concentration increases at bottom layer.
4. The duration for leaching of salts for both the depths was more in sprinkling than continuous ponding.

Table1 : Characteristics of Water Application Modes

Depth (cm)	Mode	Rate of water Application (mm/hr.)	Time Taken in leaching (min)	vol. of water applied (ml)	vol. of leachate (ml)
40	Ponding	4 ± 0.2cm	193	1500	600
	Sprinkling	2.0 mm/hr.	1330	do	720
70	Ponding	4 ± 0.2cm	800	2000	500
	Sprinkling	2.0 mm/hr.	3660	do	660

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