Effect of Incorporation of Various Material on Vertical Desalinization of Coastal Saline Soils

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Abstract – The vertical desalinization is the important process in reclamation of coastal saline soils. The experiment was conducted at the Khar Land Research Station, Panvel to study the vertical desalinization rate in coastal saline soils with incorporation of various material such as sand, murum and farm yard manure (FYM) with coastal saline soils during *kharif* seasons 1996-97 to 2000-01.

The study reveals that the low leaching requirement (2.282 per cent)and more salt removed (59.416 t ha.m^{-1}) in case of sand treatment indicate its effectiveness for removing salts by vertical desalinization followed by FYM and murum treatments. Trends of rice yield indicate that highest rice yield was obtained in FYM treatment (5.272 t ha $^{-1}$). The use of FYM is suggested for vertical desalinization of coastal saline soils with average increased yield by 78.46 per cent.

Index Terms – Vertical desalinization, Leaching requirement, Salt removed, Coastal saline soils.

1. INTRODUCTION

Most of the coastal lands are characterized by flat terrain and are always influenced by sea. The average rice productivity is usually less than 2 t ha^{-1}. When adequately drained, all kinds of coastal saline soils offer good prospects for agricultural production (Devadattam and Ramesh Chandra, 1995, Rycroft and Amer, 1995, Bhattacharya, 1996).

Water logging and salinity are two major problems faced by farmers of the coastal region. Salinity can be reduced by leaching of salts solution through sub surface drainage (Bhattacharya, 1999).

The horizontal and vertical desalinization are used for reclamation of coastal saline soils. The coastal saline soils which are fertile become saline due to periodical ingress of sea/ creek water. The dominant salt content is sodium, in exchangeable complex, which need to be washed with rainwater. The very low hydraulic conductivity (1.05 cm day^{-1}) of the soil poses problem in speedy reclamation by downward movement of salts (Anonymus, 1992). An attempt has been made to reclaim coastal saline soil by incorporation various material to improve vertical drainage in the lysimeters.

2. MATERIALS AND METHODS

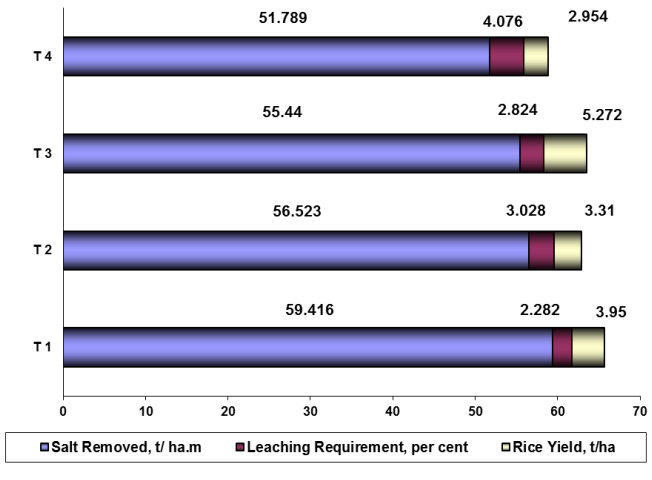
The experiment was conducted at the farm of Khar Land Research Station, Panvel during the *kharif* seasons 1996 to 2001. Four sunken type lysimeter of size 3m X 3m X 1.5 m were used for the experiment. The 25 mm G.I pipe was connected at the bottom of each lysimeters to collect leachate in underground tank. In first lysimeter sand (T_1), in second lysimeter murum (T_2), in third lysimeter FYM (T_3) were added in to the soil to the proportion of 5:1 (soil : material) and filled up to the depth of 45 cm. In forth lysimeter only soil was used. Initial soil salinity was maintained in the range of 8 to 9 dS m^{-1} by adding creek water in the lysimeters. Periodical observation of soil salinity, salinity of drained water and yield data of rice were recorded to study the effectiveness of the treatments.

3. RESULTS AND DISCUSSION

Salts Removed

The pooled data of five years is presented in Table1 and Fig.1, which clearly reveals that during crop period average salts removed were 59.416, 56.523, 55.440 and 51.789 t ha.m^{-1} from treatment T_1, T_2, T_3 and T_4, respectively. The sand was found to be very effective in desalinization of coastal saline soils as compared to other treatments. While minimum salts were removed by control treatment (T_4).

Fig. 1 : Effect of incorporated material on salt removed, leaching requirement and yield



Leaching Requirement

The data presented in Table 1 clearly indicate that average leaching requirement for all treatments of the period of 1996 to

2000 was 2.282, 3.028, 2.824 and 4.076 per cent for T_1, T_2, T_3 and T_4 , respectively. The low leaching requirement in case of sand treatment shows its effectiveness for removing the salts by vertical drainage.

Rice Yield

It is evident from the table that average yield of 3.950,3.311,5.272 and 2.954 t ha^{-1} were obtained from the sand, murum, FYM and control treatments , respectively. The highest yield of rice was obtained due to the incorporation of FYM (T_3) followed by sand (T_1), murum (T_2) and control (T_4), respectively.

Trend of salt removed and leaching requirement indicate that though sand is effective in removing the salts, it could not fulfill nutritional requirement of rice crop in coastal saline soils. Therefore, the use of FYM is suggested for vertical desalinization of coastal saline soils with average increase yield by 78.46 per cent.

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