

RESEARCH NOTES

IS THE RECLAMATION OF DENSE SALINE-SODIC SOILS
UNECONOMICAL? — MYTHS AND FACTS

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The conventional reclamation scheme for saline-sodic soils, i.e. "gypsum application followed by heavy irrigation(s)" may be inefficient or even impossible, if there is restricted leaching of soluble sodium salts due to low profile permeability as a result of fine soil texture/excess of silt etc. These fine textured saline-sodic soils, e.g. the Satgarah soil series, are considered uneconomical (Rafiq, 1975) or technically not feasible for reclamation in Pakistan.

A group of scientists from University of Agriculture, Faisalabad comprising Dr. R.H. Qureshi, Dr. Nazir Ahmad, Dr. Muhammad Aslam and Mr. Manzoor Qadir alongwith Dr. G.R. Sandhu (the then Member, Natural Resources, Pakistan Agricultural Research Council, Islamabad) accepted the challenge to resolve the problems arising during the reclamation of dense saline-sodic soils and devised a satisfactory technology for their reclamation on the basis of field experiments conducted at the Saline Agriculture Research Substation, Sadhoke, District Sheikhpura on the Satgarah soil series for a period of two years (1988-89).

The technology consisted of spreading gypsum equivalent to gypsum requirement on the soil surface followed by irrigation and mixing into the soil surface through puddling. The ponded water was then drained (flushed) out of the field. The ponded water which contained large quantities of sodium salts, if drained properly, can remove appreciable amounts of sodium resulting in a decreased sodicity hazard. In controlled ex-

periments on the Satgarah soil series (EC_e 5.1-6.1 dS m⁻¹; SAR 34.5-40.3; pHs 8.8-9.2; silty clay loam to silty clay texture to a depth of 30 cm), two flushings with an interval of 12 hours before rice transplanting were given in both the years. Gypsum was applied according to the gypsum requirement (8.9 t ha⁻¹ for 15 cm depth) of the field at the start of the experiment. Rice-wheat-rice rotation was followed. At the end of the second rice crop, in addition to satisfactory soil reclamation, good yields of the two crops were obtained (Ahmad *et al.*, 1989; Ahmad *et al.*, 1990; Qureshi *et al.*, 1990; Qureshi *et al.*, 1992).

Later on, Ch. Altaf Hussain (the then Director, Land Reclamation, Lahore) applied the above technique on a large scale at this site and confirmed the findings of the experiment.

It is pertinent to mention that in a recent visit to a rice farm in Gujranwala district developed on a highly problematic dense saline-sodic soil, a progressive farmer, Mian Muhammad Azhar, had used a similar surface flushing technique with remarkable success. Previously, he had tried for several years the conventional techniques of gypsum, sulphuric acid and hydrochloric acid application alongwith vertical leaching without any significant improvement in the soil (Personal Communication, 1992). He employed the above technique coupled with deep chiselling to the dense soil (to a depth of 68 to 110 cm) and got astounding results in terms of soil amelioration and crop yields with rice-wheat-rice rotation.

The efficiency of the above technique can be improved further by the introduction of *Sesbania* in the crop rotation. During the rice-wheat-rice rotation, the soil is exposed to fallowing for a period of about 2½ months after the harvest of wheat crop. A short duration salt tolerant forage plant species may be grown during this period to provide a complete crop cover during the hot months of May and June to check the surface evaporation and upward movement of salts. Moreover, it can provide forage or may be incorporated in the field to enhance fertility status of the soil. The proposed crop rotation, i.e. rice-wheat-*Sesbania*-rice is expected to further accelerate the reclamation process.

It is suggested that by appropriate implementation of the above technique, the reclamation of dense saline-sodic soils can be carried out with manifold increase in land value, which benefit would far exceed any initial investment and thus make the enterprise highly economical.

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