Methods and techniques for maximizing efficiency of saline water for irrigation

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The current investigation aims at assessing a number of methods and techniques in order to lessen and alleviate the negative effect of salinity using saline water (EC 3.59 and 7.18 dS/m) for irrigation of plants (wheat and alfalfa) to get the maximum efficient use for such waters. Treatments involved (1) effect of irrigation (every 3-day, 6-day and 9-day), (2) gypsum addition (0, 2 and 4 ton gypsum/fed), (3) organic matter addition (rice straw compost and peatmoss, the rates application of 10, 20 and 40 cm3/kg soil), (4) increased leaching fractions (0.1, 0.3 and 0.5 in excess of the water holding capacity of the soil) and (5) mulching (plastic-sheet, rice straw raw material and coarse-sand). The experiments were executed in pots and with the saline waters. Three soils were used, a clay soil, a sandy clay soil and a sand soil. Experiments 1, 2 and 3 were executed using wheat plant, but experiments 4 and 5 used alfalfa plant. There were two waters of EC 3.59 and 7.18 dS/m used in experiments 2. In theother experiments, only water of EC 3.59 dS/m was used.Results showed that, salinity stress was alleviated by thefollowings:(1)Medium frequency irrigation giving (up to 35 % total yield increase, 91.9 % grain yield increase, up to 35 % N-uptake by total yield increase, 42.29 % P-uptake by total yield increase, 54 % N-uptake by grain increase, 43.4 % P-uptake by grain increase and 27.18 % N-uptake by straw increase).(2)Gypsum application of 2 or 4 Mg/fed gave up to 24 % total yield increase. The 2 Mg/fed gave up to 23 % grain yieldincrease, up to 26 % straw yield increase, 74.08 % K-uptake by total yield increase, 64.13 % K-uptake by grain increase and 95.22 % K-uptake by straw increase. The 4 Mg/fed gave 6.12 % P-uptake by total yield increase, 28.57 N-uptake by grain increase and 7.88 % P-uptake by grain increase.(3) Peatmoss was superior to rice straw compost; 12 % grain yield increase of the former over the latter, 12.58 % N-uptake by total yield increase of using peatmoss over rice straw compost, 8.78 % P-uptake by total yield increase of using peatmoss over rice straw compost, 9.73 % K-uptake by total yield increase using peatmoss over rice, straw compost, 21.65 % N-uptake by grain increase as using peatmoss over rice straw compost, 14.78 % P-uptake by grain increase as using peatmoss over rice straw compost and 14.32 % K-uptake by grain increase as using peatmoss over rice straw compost.(4)A modest leaching fraction of 0.1 LF gave 37.13 % alfalfa total yield increase in comparison with the greater LF of 0.5 while the 0.3 LF gave 18.46 % more N-uptake by alfalfa incomparison with the 0.5 LF; 43.60 % more P-uptake and 36.69 % more K-uptake.(5)Coarse-sand mulch was superior to plastic-sheet as well as the raw rice-straw mulch. It gave 52.94 % more alfalfa yield in comparison with no-mulching, 204.43 % more N-uptakeby alfalfa, 49.47 % more P-uptake and 50.69 % more K-uptake.Thus allowing soils not to reach an advanced stage of low moisture by short interval irrigations (and watering) mayhave a limited range. Excessive short irrigation frequencies and excessive adoption of leaching fractions may deplete the soil of plant nutrients and also lead to waterlogging withnegative consequences.