

## Techniques of controlling salinity in irrigated agriculture for sustainability

D.K. SINGH AND R.M. SINGH

Received : 27.11.2012; Accepted : 25.03.2013

See end of the Paper for authors' affiliation

Correspondence to:

**D.K. SINGH**

Division of Soil and Water Conservation Engineering, Indian Institute of Vegetable Research, Shahanshahpur, VARANASI (U.P.) INDIA  
Email: dharmendradksingh@rediffmail.com

■ **ABSTRACT** : Worldwide 10-50 per cent of irrigated agriculture is facing problems of waterlogging and soil salinity which cause loss of around 1.5 million hectare land annually. The problems of alkalinity and salinity coupled with waterlogging affect about 7.3 million hectares land in India, which reduce agricultural productivity. At the same time agriculture is facing increase in water demand at 2.4 per cent annually during 2005 -2030 as well as reducing share of water due to competing demand from industry and urbanizations. Therefore, to fulfill food and nutritional security of nation on sustained basis, both salt affected soils and waters need to be managed using appropriate techniques. Techniques for controlling salinity that require relatively minor changes are more frequent irrigations, selection of more salt-tolerant crops, additional leaching, residue management, chemical amendments, pre-plant irrigation, bed forming and seed placement. These require significant changes in management such as, changing the irrigation method, altering the water supply, land-leveling, modifying the soil profile, and installing surface as well as subsurface drainage. Where possible, furrow planting may help in obtaining better stands and crop yields under saline conditions. Studies have shown that yield obtained by the drip method with saline water was almost equal to that produced when the high quality water was applied by this method. Therefore, improved agricultural production and water productivity on sustained basis could be realized by application of techniques to manage salt affected soils and waters.

■ **KEY WORDS** : Soil salinity, Salt tolerance, Seed placement, Leaching, Bio-drainage, Surface and Sub-surface drainage, Water management

■ **HOW TO CITE THIS PAPER** : Singh, D.K. and Singh, R.M. (2013). Techniques of controlling salinity in irrigated agriculture for sustainability. *Internat. J. Agric. Engg.*, 6(1) : 273-281.

The problems of waterlogging and soil salinity are common world over. About 10-50 per cent of the irrigated lands in various countries have been affected and 1.5 million ha area is lost annually due to these problems. The waterlogged saline soils are found all over the country. In India, about 8.6 million ha area has been waterlogged saline, of which 5.6 million ha is found in irrigation commands. The irrigation development expected sustained benefits in the country, but big constraint is the problems of waterlogging and salinity development over large irrigated areas. Salinity from irrigation can occur over time since almost all water even natural rainfall contains some dissolved salts (ILRI, 1989). At the same time agriculture is facing increase in water demand at 2.4 per cent annually during 2005 -2030 as well as reducing share of water due to competing demand from industry and urbanizations. Therefore, to fulfill food and nutritional security of nation on sustained basis, both salt affected soils and waters need to be managed using appropriate techniques.

### Severity of problem :

Extent of waterlogged and salt affected areas for some states in India (Ghosh, 1991 and Tyagi, 1999) has been presented in Table 1. Water logging and salt problem have been experienced in irrigation projects all over the country examples given in Table 2. Construction of drainage canals, field drains and avoiding wastage of canal supplies have been adopted as remedial measures. However, lack of maintenance, operational constraints of large irrigation projects, and construction of highways, railway embankments and other obstructions, without providing for adequate drainage facility are still the major factors for water logging (Singh *et al.*, 2011). In the Chambal Command area soils became water logged with a few years of introduction of irrigation. In many coastal areas excessive groundwater exploitation has caused seawater intrusion, worsening the salinity problem.

Excessive soil salinity affects the soil structure and can reduce crop yields. High concentrations of salt in the soil can result in a physiological drought condition. That is, even though the field appears to have plenty of moisture, the plants