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Irrigation management strategies for cultivation of beetroot (*Beta vulgaris*) under saline vertisols

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ABSTRACT : The experiments were conducted with beetroot (*Beta vulgaris*) as test crop in saline vertisols of Tungabhadra Project command area in Northern Karnataka, India during 2007-'08 and 2008-'09 in strip plot design with three soil salinity levels (Electrical conductivity, EC - 1.3, 2.7 and 4.3 dS m^{-1}) in main plots and five drip irrigation levels (Evapotranspiration , ET- 0.6, 0.8, 1.0, 1.2 and 1.4) with three surface irrigation levels (0.8, 1.0 and 1.2 ET) in sub-plots adopting three replications. There was significant difference in tuber yield owing to different irrigation regimes by various levels of drip and surface irrigation methods. The highest tuber yield of 19.43 t ha^{-1} was recorded by drip irrigation at 1.2 ET followed by drip irrigation at 1.4 ET (18.28 t ha^{-1}) as against the lowest tuber yield of 9.98 t ha^{-1} in surface irrigation scheduled at 0.8 ET during 2007-'08. Similarly, the highest tuber yield of 18.91 t ha^{-1} in drip irrigation at 1.2 ET and the least yield of 9.6 t ha^{-1} in the surface irrigation scheduled at 0.8 ET were registered during 2008-'09. The different levels of salinity had marked influence on tuber yield during both the years. Significantly the highest tuber yield of 18.23 t ha^{-1} and the lowest tuber yield of 11.0 t ha^{-1} were recorded, respectively in salinity levels-I and III during 2007-'08. Similarly, during 2008-'09 significantly the maximum tuber yield of 17.89 t ha^{-1} in salinity level-I and the least of 10.5 t ha^{-1} in salinity level-III were observed.

KEY WORDS : Irrigation, Drip, Surface irrigation, Irrigation levels, Salinity, Saline soil, Beetroot, Vegat

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Population growth and economic development always translate into growing pressure on use of land and water resources especially in agriculture. Though irrigated agriculture, essentially responsible for transforming India from a food deficient to a food surplus country, is under stress due to age-old nemesis of waterlogging and soil salinisation, which have serious socio-economic and environmental implications. With more intensive agriculture, there has been a rising stress on efficient management and utilisation of natural resources.

Strategies involving technological advances inter alia land use planning, land reclamation, conjunctive use of surface and groundwater and encouraging large scale adoption of sprinkler and drip irrigation system, will be required for meeting significantly higher food grain requirements. On the other hand, the dynamic processes of waterlogging, salinisation and sodification in many irrigated command areas of the arid and semi-arid regions render the lands degraded, thereby causing decline in agricultural production.

The salt affected soils of the world amount to be 970 million ha of which 250 million ha are Solanchak and Solonetz soils and approximately 650 million ha are saline and sodic phases and mark present or potential degradation. In general 7 per cent of the total soil surface area of the world is covered by salt affected lands. It is estimated that the world as a whole is loosing at least 3 ha of fertile land every minute due to salinisation/ sodification (Siyal *et al.*, 2002). The salt-affected soils form sizable area in India and according to one estimate an area of 6.73 M ha has been salt-affected in the country (Sharma *et al*., 2006). As per the future projection made on an all India basis, an area of about 13 M ha is likely to be affected by the problems of waterlogging and soil salinity in the irrigation commands of India. Waterlogging, soil salinity and saline groundwater conditions at shallow depth in Haryana are resulting in a potential annual loss of about US $ 37 M at 1998-'99 prices. About 42 per cent increase in area under waterlogging and soil salinity in southwest Punjab occurred over a 4-year period (1997-2001).

Judicious use of irrigation water in avoiding waterlogging and soil salinity is more important to enhance total agricultural production, the area under irrigation and