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Use of high RSC water for sustainable crop production under sprinkler irrigation system in Thar desert of Rajasthan

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ABSTRACT

Management of poor quality water in 'Thar desert' of Rajasthan is a major concern to increase the area and production of crops in this region. A field experiment was conducted at farmer's field having high RSC water (10.2 me l^{-1}) to evaluate the effect of partially neutralized irrigation water on pearl millet-wheat crop rotation in sandy soils of arid regions of Rajasthan. High RSC water was treated through gypsum tank before lifting for irrigation through sprinklers. Gypsum as per GR was added in soil before starting of experiment. Gypsum @ equivalent to 5.0 me/l RSC neutralization of each irrigation along with FYM @ 10 ton/ha was added in soil before sowing. Yield parameters (plant height, test weight and ear length) and seed and straw yields of both crops were increased with the application of gypsum @ equivalent to 5.0 me/l RSC neutralization of each irrigation along with FYM @ 10 t/ha with treated water ($2.0\text{-}2.2 \text{ me/l}$ RSC neutralization through gypsum tank). Addition of gypsum and organic matter decreased the pH and ESP of soil.

Key words: RSC neutralization, Gypsum tank, Wheat, Pearl millet, Sprinkler irrigation

INTRODUCTION

Thar desert extends in Punjab, Haryana, Rajasthan and Gujarat states of India with 650 km in length and 160 km in width. 62 per cent of its area comes in Rajasthan and lies west to Aravalis. It covers 58 per cent area and 40 per cent population of Rajasthan with 12 major districts. 4 to 6 km long and 8 to 35 m high sand dunes are main features of this region. It is mainly characterized by sandy soils, undulated topography, high percolation rates, low moisture and nutrient retentive capacity of soils, extreme of temperature (lowest in winter and highest in summer) with low RH and annual rainfall. Ground water which is very deep and of poor quality is the only source of irrigation in these areas. With the availability of electricity more and more tube wells are being installed / dug in western Rajasthan for last one decade by the farmers to irrigate the crops. However, the water table in these areas is very deep and the quality is also poor. In Bikaner, Jaisalmer and three tehsils of Churu district (Agro-climate zone 1c) the high RSC waters covers an area of 28.1%.

In 'Thar' desert of western Rajasthan soils are sandy having high infiltration rate and topography is undulating thereby, limiting the use of flood irrigation system efficiently. Through sprinklers problem of application of irrigation in these areas could be met out with regulated amount of water as per crop need. Ground water is being used for irrigation through sprinklers at many places in such areas has higher amounts of residual sodium carbonate. Due to high temperatures and high wind velocity in the desert, irrigation with these poor quality saline and alkali waters with sprinkler irrigation causes scorching of leaves particularly in day times. In uncommand area of western Rajasthan with the availability of electricity more and more tube wells are being dug for last one decade by the farmers to irrigate the crops. However, the water table in these areas is very deep and the quality is also poor. Jaisalmer, Nagaur, Sikar and Jhunjhunu districts have high residual alkalinity waters. In Bikaner district 16.1% waters have $\text{RSC} > 2.5 \text{ me/l}$, whereas in Jaisalmer, Fatehgarh and Pokran tehsils of Jaisalmer district

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