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Salt Tolerant Varieties: A Biological Intervention to Manage Saline and Sodic Environment and Sustain Livelihoods

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ABSTRACT

Worldwide, soil salinity causes enormous loss to crop yield. Study depicts the problem of soil salinity managed through intervention of salt tolerant crop varieties on farmers' field. For this 50 rice and wheat growers from Karnal, Jind and Sonepat districts of Haryana were interviewed along with focused group discussion. Study observed increased level of adoption of salt tolerant varieties with increase in pH and EC of the soil. In rice variety CSR 30 scored highest rank for its market price and cooking quality while CSR 36 scored highest in terms of tolerance to salt. In wheat KRL 210 variety was observed to be high resilient in terms of lodging, diseases and yield; variety KRL 19 scored highest for salt tolerance and KRL 213 variety reported high compatibility to climatic variability. Yield over existing variety and price in the market were two most important factors considered by the farmers in replacement of old variety. Significant adoption gap was observed in cultivation of salt tolerant varieties, particularly with reference to fertilizer application. Extension contact and participation were positively correlated, while land holding, pH, EC were negatively correlated with the yield of salt tolerant crop varieties. Study concluded that by using salt tolerant varieties, saline and sodic land can effectively be brought under cultivation enabling farmers to adapt to biophysical and socioeconomic stressors for sustainable livelihood.

Key words: Varietal performance, Varietal replacement, Salt tolerant varieties, Adoption gap, Salinity

Introduction

Soil salinity has been serious concern for global agriculture throughout the human history (Lobell *et al.*, 2007). It is a persistent ecological issue and major stress factor (Balal *et al.*, 2011; Saadia *et al.*, 2013), which affects economic welfare, environmental health and agricultural production (Rengasamy, 2006). Worldwide, around 1.2 billion ha land is affected by the problem of salinity and sodicity (FAO, 2007). India accounts for 6.73 Mha of salt-affected land (Mandal *et al.*, 2009). In Haryana state, an area of 2.32 lakh hectare is affected with alkalinity and 2.55 lakh hectare with salinity and water logging (Department of Agriculture, Haryana, 2014). Food production in salt affected areas can be increased through proper technological interventions like adopting crop varieties which are tolerant to salinity (Ismail, 2009; Shahbaz *et al.*, 2012).

Rice and wheat based agro-ecosystems dominate the agricultural landscape in India and cover about 9.5 million hectare area (Gupta *et al.*, 2004). There is considerable reduction in yield of rice (Rabbani *et al.*, 2013) and wheat (Perveen *et al.*, 2011, Shahbaz *et al.*, 2012) because of salinity. Use of salt tolerant varieties has been an effective biological, economical and eco-friendly approach and adaptive measure by the farmers in management of salt affected soils (Singh *et al.*,2004; Ashraf, 2009; Ismail, 2009; Gautam *et al.*, 2010).

ICAR-Central Soil Salinity Research Institute (ICAR- CSSRI), Karnal, Haryana, has developed rice varieties like CSR 23, CSR 27, CSR 30, CSR 36, CSR 43 etc. and wheat varieties like KRL 1-4, KRL 210, KRL 213, KRL 19 etc. which are popular in parts of north India (Hollington, 2000; Mishra *et al.*, 2003; Singh *et al.*, 2004; Sankar *et al.*, 2011; CSSRI, 2015). In 2011 salt tolerant rice varieties occupied area of 6.13 million hectares, while 193-thousand-hectare area by wheat varieties. During the period of 2001 to 2011, national level production from salt tolerant rice varieties was 18.40 million