

Effect of Tillage and Humidification Conditions on Desalination Properties of Chickpea (*Cicer arietinum* L.)

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ABSTRACT

Chickpea is supposed to be a prospective crop for soil reclamation. The goal of this study was to determine the effect of tillage and humidification conditions on the chickpea desalination properties. The study was conducted by using the randomized split plot method in four replications during 2012–14 at the Agricultural Cooperative Farm «Radianska Zemlia» of Kherson region in Ukraine. The results of the study showed that the maximum salts uptake of 2.516 t ha⁻¹ from the 0–50 cm soil layer and the maximum chickpea grain yield of 3.33 t ha⁻¹ were provided under irrigated conditions with moldboard plowing on the depth of 28–30 cm. It was established that the higher chickpea grain yield is, the greater the salts uptake rate from the soil. It was also proven that the plowing depth has no significant effect on the chickpea grain yield and desalination properties. It should be mentioned that chickpea showed limited desalination properties. The crop was not able to adsorb all the sodium from the soil when irrigated with saline water.

Keywords: chickpea, irrigation, plowing depth, salinity, desalination.

INTRODUCTION

Due to the high proteins content in grain [Hulse 1991] and drought-tolerance [Katerji et al. 2001], chickpea (*Cicer arietinum* L.) is one of the most important and strategic crops grown on saline soils in arid regions [Dua 1998, Rao et al. 2002]. At the same time, soil salinity is supposed to be a severe constraint for the growth and high productivity of chickpea [Lauter, Munns 1986, Chaunan 1987, Singh 2004]. A decrease of dry biomass from 15 to 50% in different chickpea cultivars was determined due to the artificial increase of the NaCl content from 0 to 100 mM in nutrition solution [Tejera, Soussi, Lluh 2006]. Salt stress resulted in a decrease of length, fresh and dry biomass of chickpea plants roots and shoots [Van Hoorn et al. 2001, Singla, Garg 2005, Fusum, Mehmet 2007]. Total dissoluble salts content (TDS) at 4.0 dS m⁻¹ in nutrition solu-

tion inhibited nodulation, and further increasing of TDS to 7.0 dS m⁻¹ stopped it. TDS at 8.0 dS m⁻¹ resulted in complete death of chickpea plants [Elsheikh, Wood 1990]. Significant variations in the salt-tolerance were determined in different chickpea cultivars [Serraj, Krishnamurthy, Upadhyaya 2004, Vadez et al. 2007, Sohrabi, Heidari, Esmailpoor 2008]. Some of chickpea cultivars showed high salt-tolerance and yields under saline soil conditions due to their symbiosis with specific strains of *Rhizobium* [Saxena, Rewari 1992]. Besides, legumes and chickpea in particular are considered to have soil desalination properties [Qadir et al. 2003, Qadir et al. 2007, Patel et al. 2012, Kambhampati, Vu 2013]. Chickpea desalination properties under saline soil conditions have not been determined yet. The goals of this study were to determine the effect of tillage and humidification conditions on the chickpea desalination properties and productivity.

