Research Paper

An Asian Journal of Soil Science

Vol. 5 No. 2 (December, 2010) : 282-286

Received : July, 2010; Accepted : September, 2010

Response of lemongrass and menthol mint to salinity stress in vertisol

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ABSTRACT

The pot culture and field experiments were conducted at Agricultural Research Station, Gangavati, Karnataka on a saline vertisol during 2004-05 and 2005-06 to study the salinity-yield relationships in lemongrass and menthol mint. Plant height, number of branches/tillers and dry matter yields of lemongrass and menthol mint were highest at 1.73 dS m^{-1} and decreased significantly with increase in salinity. Irrespective of the crop, nutrients such as Ca, K and S decreased while Na and Mg increased in the plant tissue with increased soil salinity. Both K/Na and Ca/Na ratios also significantly decreased with increase in salinity. The mean transpiration rate and stomatal conductivity were higher in menthol mint. Lemongrass with higher mean tissue K and K/Na ratio and lesser tissue Na was found relatively more salt-tolerant than menthol mint. The ability of lemongrass to maintain higher mean transpiration rate and stomatal conductivity compared to menthol mint across varied salinity levels seems to have helped in maintaining relatively lesser leaf temperature favouring its higher tolerance to salinity stress. The salinity-yield response curves were found linear for both the crops with no break points. However, a relatively higher slope was recorded in menthol mint (b=-1.0399x) compared to lemongrass (b=-0.8754x) indicating its higher susceptibility to salinity stress.

Manjunatha Hebbara, Rajesha, H.P., Ravishankar, G. and Venugopal, C.K. (2010). Response of lemongrass and menthol mint to salinity stress in vertisol. *Asian J. Soil Sci.*, **5**(2): 282-286

Key words : Soil salinity, Lemongrass, Menthol mint, Physiological parameters, Nutrient concentration, Threshold salinity

INTRODUCTION

Land degradation has become a major limiting factor in increasing crop production by way of decreased cultivable area and crop productivity. In India, about 175 million ha area suffer from different limitations of varying degrees which is getting further degraded through natural or man made processes (Singh and Dagar, 2005). Majority of these lands are treated as wastelands because of their low productivity due to soil-based constraints like waterlogging, salinity, sodicity, shallow depth, rocky substratum and sandy soils.

The extent of salt affected soils in India is reported to be 7.4 million ha (Tyagi and Minhas, 1998). More than half of this area is saline where higher concentration of salts in the root zone limits the productivity of major crops. Strategies for halting land degradation and exploring alternate land use options are need of the hour. Alternate land use strategies based on land suitability can make the enterprise more viable and profitable. These options open the scope for crop diversification, which are thought to improve the farm income. Some medicinal and aromatic crops have been found to tolerate higher salinity than arable agricultural crops which can be exploited to rehabilitate such wastelands along with economic gains. Several researchers have worked on the salt-tolerance of different aromatic crops (Singh *et al*.,1994; Prasad *et al*.,1996; Patra *et al*.,1997; Prasad *et al*.,1997; Patnaik and Debata, 1997; Prasad *et al*., 2001). The salt-tolerance of these

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