Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Improving Sugar Beet Production by Management of Nitrogen Nutrition under Saline Conditions

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Abstract

Limited freshwater resources are the main obstacle to prospective development in most arid and semi-arid regions. Agriculture in arid and semi-arid lands faces with a number of combined challenges such as management of water, salinity, soil fertility and the use of appropriate plants. Sugar beet is an industrial crop with high potential for salt water use for irrigation. Using saline water for irrigation dictates adjustment of plant nutrition management. Among the plant mineral nutrients, nitrogen nutrition management is one of the most important factors required for improving crop productivity and profitability under arid and semi-arid climates. However, research reports regarding on improved sugar beet nitrogen nutrition under saline conditions are highly scarce. The present study was aimed to estimate the optimal nitrogen nutrition rate for sugar beet grown under saline conditions. in pot experiment, sugar beet plants were grown in sandy culture and irrigated with nutrient solutions contents three levels of salinity [0, 60 and 120 mM NaCl] and three N concentrations [100, 300 and 500 ppm). the increase in the nitrogen nutrition rate from 100 to 300 ppm led to a significant increase of the root fresh yield by 35 %, 82 % and 54 % and shoot fresh weight by 137 %, 151 %, 111 % at 0.0, 60 and 120 mM NaCl, respectively. raising nitrogen rate in nutrient solution from 300 to 500 ppm significantly decreased the root fresh weight by 20 %, 4 % and 22 %, but the shoot fresh weight continued to increase by 21 %,34 % and 12 % in compared to 300 ppm nitrogen. In spite of sharply decreased in sucrose percentage of roots as the result of increase nitrogen rate from 100 to 500 ppm, but this negative effect has obviously reduced under salinity levels. regarding effects of nitrogen rates on nitrogen use efficiency under salinity levels, the highest nitrogen use efficiency was estimated at 300 ppm nitrogen under 60 mM NaCl level. the highest nitrogen level (500 ppm) gave the less efficient use of nitrogen nutrition under all salinity treatments.

Keywords: mineral content, nitrogen nutrition: salt stress: sugar beet: sugar quality: osmotic potential

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