

عنوان مقاله:

Maize response to different water, salinity and nitrogen levels: agronomic behavior

محل انتشار:

مجله تولید گیاهان، دوره 8، شماره 1 (سال: 1393)

تعداد صفحات اصل مقاله: 24

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خلاصه مقاله:

Soil water, salinity and nitrogen content are three major factors affecting crop production in arid and semi-arid areas. This study was performed in two years of 2009 and 2010 in a semi-arid area in order to investigate the effects of irrigation water quantity (as main plot), quality (saline water, as sub-plot), nitrogen fertilizer (as sub-sub plot) and their interactions on growth and yield of maize hybrid SC- 704. The experimental design was split plot with three replications. Irrigation treatments consisted of I1 (1.0 crop evapotranspiration (ETc) + 0.25ETc as leaching), I2 (0.75I1) and I3 (0.5I1) applied at 7-day intervals. The salinity treatments were 0.6 (fresh water), 2.0 and 4.0 dS m⁻¹. There were also three nitrogen (N) treatments including 0, 150 and 300 kg N ha⁻¹. The results showed that maize under water and salinity stress had longer vegetative stage period by 11 and 16% compared to the control, respectively. The most sensitive trait under water, salinity and nitrogen stress was grain yield (GY) which reduced by 52.3, 25.2 and 28.0%, for treatments of 0.5I1, 4.0 dS m⁻¹ and 0 kg N ha⁻¹, respectively. Based on water productivity (WP), applied water is more efficient for GY production under lower irrigation and N fertilizer usage. Grain yield surface function approached a maximum under I2 and I1 treatments in response to increasing water and N levels. The contour plots of GY were developed at each salinity level and showed that it could be a useful management device of irrigation and N for maize GY. Based on nitrogen use efficiency (NUE) and nitrogen recovery (NR), the N application rate of 150 kg ha⁻¹ was the optimum rate for the study region especially under saline water conditions. Further, interaction result of the experimental factors showed that with adequate or limited fresh water supply, application of higher N rate (300 kg ha⁻¹) yielded higher GY. While under saline water application, lower N rates (150 kg ha⁻¹) was appropriate management for optimum maize GY with sufficient/non-sufficient irrigation. Furthermore, the threshold values of soil saturation extract, 50% GY reduction, and yield reduction coefficient of maize showed that in general maize did not tolerate salinity better under higher N application rate (300 kg ha⁻¹), although in some cases its sensitivity to salinity decreased by increasing N application rate. Keywords: Agronomic response; Maize; Nitrogen; Saline water; Salinity indices

کلمات کلیدی:

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