

Influence of nitrogen and salinity levels on yield, nitrogen uptake, nitrate concentration and chlorophyll content of spinach and some properties of post-harvest soil in a calcareous soil

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(Received: Sep. 7-2011 ; Accepted: May 26-2012)

Abstract

A greenhouse experiment was conducted to evaluate the effect of nitrogen (N) and salinity on dry matter yield, N uptake, nitrate (NO₃⁻) concentration, agronomic efficiency (AE), physiologic efficiency (PE), apparent nitrogen recovery (ANR) and chlorophyll content of spinach shoots (cv. Viroflay), and also total N, NO₃-N and electrical conductivity of post-harvest soil. The experiment was factorial, arranged as a completely randomized design with three replications. Treatments included five N rates (0, 75, 150, 225, and 300 mg/kg soil, as urea) and four salinity levels (0, 1, 2 and 3 g NaCl per kg soil). Results showed that application of 1 and 2 g NaCl had no significant effect on shoot yield of spinach. But application of 3 g NaCl significantly decreased shoot yield. Addition of salinity had no significant effect on plant NO₃⁻ concentration, leaf chlorophyll readings, AE and ANR of shoots, and total N of post-harvest soil; but reduced PE. Increasing N rate increased yield, total N uptake and chlorophyll readings of shoots, and total N of post-harvest soil; but reduced AE and PE. Application of high N level intensified the negative effects of 3 g NaCl salinity on reduction of spinach shoots' yield. Under the present experimental conditions, salinity tolerance level of Viroflay cultivar was higher than 8 dS/m, which is much more than the level reported in most references for spinach (2 dS/m). Application of 225 mg N (without salinity application) was the best N level for dry matter yield of spinach.

Keywords: Sodium chloride, Agronomic efficiency, Physiologic efficiency, Chlorophyll.

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