

The effect of NaCl salinity on the germination and seedling of sugar beet and cabbage

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Objectives

Due to the increasing salinity problem, researchers should emphasize the important crops on which humans depend. Sugar beet (*Beta vulgaris* L.), and cabbage (*Brassica oleracea* L.) are considered important vegetables species in the world. The present study was therefore initiated to investigate the extent of salinity on the germination and early vegetative growth of sugar beet and cabbage.

Materials and Methods

Seeds of both plant species, sugar beet (*Beta vulgaris* L.) and cabbage (*Brassica oleracea capitata* L.) differing in salt sensitivity, were used in the experiments. For the experiments plastic Petri dishes (87 mm diameter, 15 mm height) with a tight-fitting lid were used. The solution consisted of 0.0 (control), 0.5, 1.0 and 1.5% NaCl. For each vegetables species 10 seeds for each of the four NaCl treatments were used. Seed were allowed to germinate in laboratory condition on filter paper (Whatman No 2) in Petri dishes soaked in a solution of the respective salt concentration.

Results

The germination of sugar beet and cabbage was strongly inhibited by both 1.0 and 1.5% NaCl applications. The percentage of germination was less than 10% after application of 1.5% NaCl for both of these plant species (Figure 1). The germination response of the both plant species under investigation showed marked differences in the timing of initiation and completion of germination. Figure 2 indicated that Sugar beet completed germination earlier as compared to cabbage. A continuous increase in length of root and shoot was observed in subsequent hours of germination in both vegetables species in the control as well as salt treatments. There was no measurable length of roots and shoot of these plant species, particularly at the highest level of salinity (1.0 and 1.5% NaCl). Great inhibition, particularly in root growth, occurred with NaCl treatments for sugar beet and cabbage seedlings but shoot growth shows no inhibition. Decrease in length of root was more pronounced as compared to shoot in particular at 0.5% NaCl salt treatments in sugar beet and cabbage. In contrast, the lowest inhibition of shoot growth was observed in sugar beet (Figure 3 and 4).

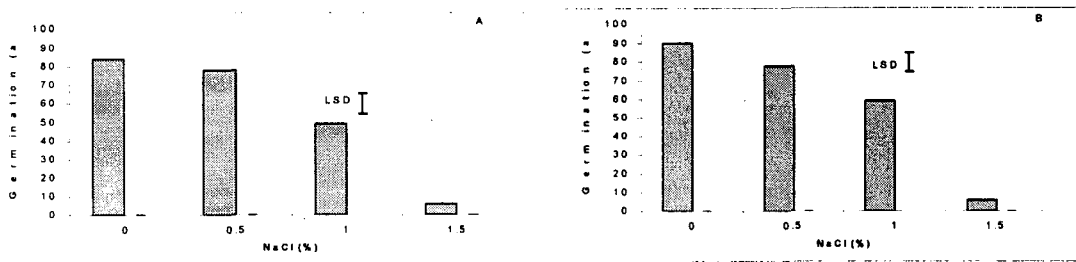


Figure 1. Effect of NaCl concentration on the germination of cabbage (A) and sugar beet (B) seeds

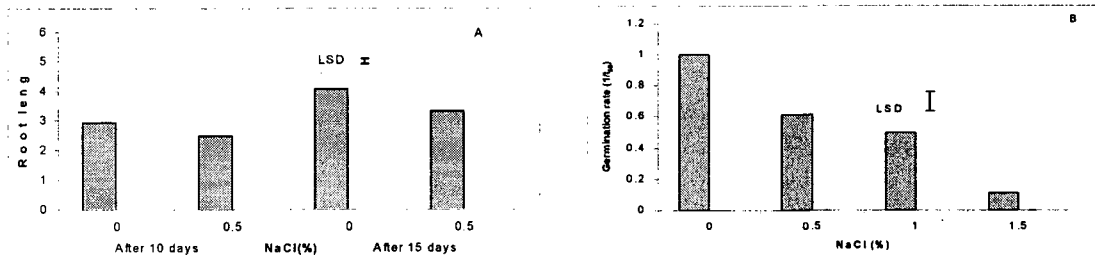


Fig.2. Effect of NaCl concentration on germination rate (1/t₅₀) of cabbage (A) and sugar beet (B) seeds.

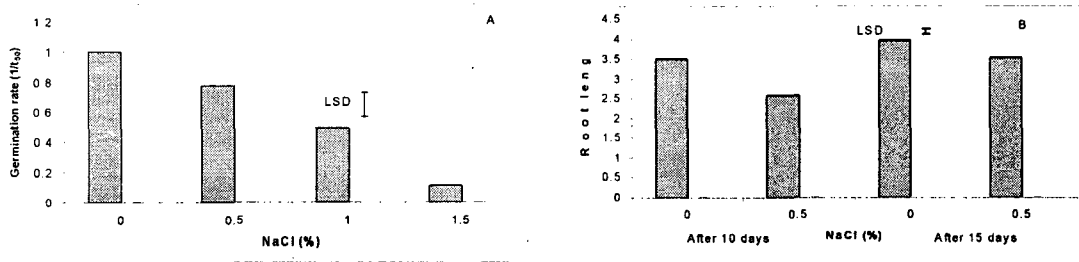


Fig.3. Effect of NaCl concentration on root length of cabbage (A) and sugar beet (B) after 10 and 15 days.

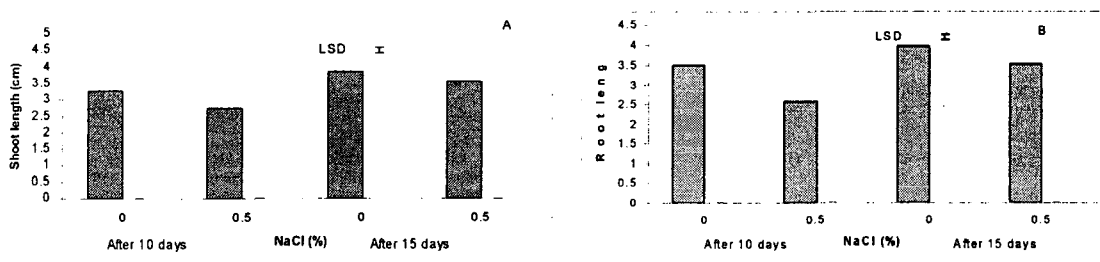


Figure 4. Effect of NaCl concentration on shoot length of cabbage (A) and sugar beet (B) after 10 and 15 days