Solt tolerance of some agriculture crops during early growth stages

Mohamed Ahmed El–said Al–shazly

The purpose of this investigation was to study the salt tolerance of some agricultural crops during early growth stages. A comparison of wheat and sunflower plants was carried out with respect to their salt tolerance and nutrient uptake. Two experiments were performed to achieve these purposes.Germination experiment:The germination experiment was conducted to determine the effect of different concentrations of salts i.e. NaC1, Na2SO4 and seawater on germination rate (G.R), germination percent (G.P) and germination strength (G.S) of wheat grains and sunflower seeds soaked in different concentrations of proline amino acid (0, 10, 20, 30 and 40 mg/I) in sand culture technique. The tested salts were 0, 5, 10, 15 and 20 dS/m. Seawater (having 53 dS/m) was diluted to obtain the mentioned concentrations. The results obtained could be summarized as follows:- Increasing salinity levels (NaCI, Na2SO4 and diluted seawater up to 20 dS/m) gradually decreased the germination rate of wheat and sunflowea, NaCI being more effective in this respect.- The germination rates of sunflower seeds were higher than that of wheat grains at different levels of salinity.- The germination rate of both grains and seeds soaked in polutions containing different levels of proline amino acid was higher, compared the those that were notsoaked.- The germination percent of tested wheat grains and sunflower seeds gave similar trend to that obtained for germination rate with increasing levels of NaCI, Na2SO4 and diluted seawater in the cultural mediaandalsowithincreasing proline levels.- Increasing NaCI, Na2SO4 and diluted seawater in the cultural media markedly decreased shoot and root lengths for both seedlings, NaCI being more effective.- The root length seemed to be more adversely affected than shoot length especially, at high salinity level.- The treated wheat grains and sunflower seeds with proline amino acid at different concentrations stimulated the shoot and root lengths and decreased the adverse effect of different salts on germination strength.Growth and uptake experiment:This experiment was conducted to study the response of growth and ion distribution of wheat arid sunflower plants to different salts, i.e. NaC1, Na2SO4 and seawater at different concentrations (0,5,10,15 and 20 dS/m). The seedlings of plants sprayed with different treatments of proline (0,10,20,30 and 40 mg/L). The results obtained could be summarized as follows: Increasing salinity levels (from 0 to 20 dS/m) consistently decreased the dry matter yield of shoots and roots for both wheat and sunflower plants.-The roots being more affected than the shoots, particularly for wheat plant, indicating that sunflower plant was more relatively salt-resistant than wheat plant.-NaC1 salinity was found to be generally most effective on the dry matter yield of wheat and sunflower plants compared to that of Na2SO4 as well as seawater.- Spraying wheat and sunflower plants with proline amino acid decreased the adverse effect of different salts on the dry matter yield of shoots and roots for both plants.- Increasing salinity levels in the media was, as expected, associated with an increase in Na and CI contents of both plants, more response was generally obtained in shoots of wheat and sunflower receiving NaC1 compared to Na2SO4 and seawater. This response is being more obvious for wheat plant (relativelysalt-sensitive).-Addition of proline amino acid to wheat and sunflower plants through foliar application at seedling stage minimized the adverse effect of salinity on plant growth and consequently decreased the accumulation of Na and Cl in plant tissues. This effect being more obvious in sunflower plant than in wheat plant. - Increasing the level of NaC1, Na2SO4 and seawater was followed by a gradual decrease in nitrogen, phosphorus and potassium -contents for

both plants. NaCI salt being mosteffective.- N, P and K content in wheat plant (relatively salt-sensitive) were less than that of sunflower plant (relatively salt-resistant).- Addition of proline amino acid up to the level of 40 (mg/L-')increased N, P and K contents in wheat and sunflower plantscompared to control treatments.-This stimulation in N, P and K contents was more pronounced with NaC1 salt than that with Na2SO4 and seawater.-Increasing salinity levels from 0 to 20 dS/m was accompanied by a gradual decrease in Fe, Zn, Mn and Cu content of wheat andsunflower plants.- NaC1 salt was more effective on the content of Fe, Zn, Mn and Cu than of Na2SO4 and seawater.Generally', plants of wheat which had' lower Fe, Zn,Mn and Cu content were found to be more salt-sensitive and had markedly lower amounts of dry matter production than those of sunflower plants having higher Fe, Zn, Mn and Cucontent.- The plants of wheat and sunflower sprayed with proline amino acid were contained a higher content of Fe, Zn, Mn and Cu. This increase being more pronounced in sunflower plant than in wheat plant and with NaC1 than Na2SO4 and seawater, probably due to the tendency of sunflower plant (relatively salt-resistant) to accumulate more proline than of wheat plant (relatively salt-sensitive).