Salt tolerance of mango and olive plants in response to mycorrhizae inoculation

Taha Naguib Abdo El-Sayed Maklad

This study was conducted during the two successive seasons of 2000 and 2001 to throw some light on the role of mycorrhizal inoculation with mycorrhizae fungi i.e. Glomus australe and Gloms macrocarpum and calcium foliar sprays as well as their combination in enhancing salt avoidance of Koroneiki olive transplants (Olea europaea L.) ”moderate tolerant” and Hindy Bissinara mango nurslings (Mangifera indica, L.) ”sensitive to salt stress”. Thereupon, this study included two experiments as follows:Experiment I:This experiment was carried out at the nursery of El-Kanater Research Station, Horticulture Research Institute. In the first week of March of both seasons, one hundred and fifty six Koroneiki olive transplants of one-year-old rooted cuttings, similar in growth vigour were transplanted into 30 cm pots filled with clay and sand (3 kg soil/pot) with a ratio of 1:1, respectively, (one plant/pot). However, the pots were divided into thirteen groups. The first group of pots was filled with unsterilized soil and the transplants were irrigatedwith tap water ’control’. The second group of pots was filled with sterilized soil and transplants were irrigated with tap water. The third group of pots was filled with sterilized soil and the transplants were sprayed with chelated calcium at 1% twice a year i.e. mid-April and mid-June in both seasons and the transplants were irrigated with tap water. The fourth and fifth groups of pots were filled with sterilized soil, inoculated with two species of mycorrhizae fungi namely: Glomus australe and Glomus macrocarpum, respectively and the transplants were irrigated with tap water. On the other hand, saline water solutions were derived from six solutions to achieve a balance of cations and anions with sodium adsorption ratios (SAR) of 12. Stock solutions were CaC12, MgSO4, KC1, K2SO4, Na2SO4 and NaCl. Furthermore, the sixth and seventh groups of pots were filled with sterilized soil and the transplants were irrigated with saline water at 3000 and 6000 mg L-1, respectively. The eighth and ninth groups of pots were filled with sterilized soil and the transplants were sprayed with chelated calcium 1% twice a year in mid-April and mid-June and the transplants were irrigated with saline water at 3000 and 6000 mg 1:1, respectively. The tenth and eleventh groups of pots were filled with sterilized soil, inoculated with Glomus australe fungus and the transplants were irrigated with saline water at 3000 and 6000 mg L-1, respectively. Finally, the twelfth and thirteenth groups of pots were filled with sterilized soil, inoculated with Glomus macrocarpum fungus and the transplants were irrigated with saline water at 3000 and 6000mg 1:1, respectively. Besides, pots of salt treatments were leached periodically to prevent salt accumulation.Consequently, this study included thirteen treatments, arranged in a randomized complete block design with four replicates for each treatment and each replicate was represented by three transplants (one transplant/pot).Experiment II:Effect of water salinity, mycorrhizalinoculation and calcium foliar sprays on growth, leaf chemical composition and leaf mineral content of mango nurslings.This study was carried out at private nursery at Giza Governorate. In mid-March of both seasons, one hundred and seventeen Hindy Bissinara nurslings of one-year-old similar in growth vigour were transplanted into 30 cm pots (one plant/pot) filled with clay and sand (3 kg soil/pot) at 1:1 ratio, respectively. These pots were divided into thirteen groups to receive one of the following treatments:(1)The first group of pots was filled with unsterilized soil and the nurslings were irrigated with tap water ’control’.(2)The second group of pots was filled with sterilized soil and the nurslings were irrigated with tap water.(3)The third group of pots was filled with sterilized soil and the nurslings were sprayed with chelated calcium at 1%twice a year i.e. late-April

and lat-June in both seasons and irrigated with tap water.(4)The fourth and fifth groups of pots were filled with sterilized soil and the soil was inoculated with Glomus australe or Glomus macrocarpunt fungi, respectively and the nurslings were irrigated with tap water.(5)The sixth and seventh groups of pots were filled with sterilized soil and the nurslings were irrigated with saline water at 1000 and 2000 mg 1:1, respectively.(6)The eighth and ninth groups of pots were filled with sterilized soil and the nurslings were sprayed with calcium at 1% and irrigated with saline water at 1000 and 2000 mg 1:1, respectively.(7)The tenth and eleventh groups of pots were filled with sterilized soil, inoculated with Glomus australe fungus and the nurslings were irrigated with saline water at 1000 and 2000 mg I:I, respectively.(8)The twelfth and thirteenth groups of pots were filled with sterilized soil, inoculated with Glomus macrocmpum fungus and the nurslings were irrigated with saline water at 1000 and 2000 mg 1,-1, respectively.Generally, these treatments were arranged in a randomized complete block design with three replicates and each replicate had three nurslings (one nursling/pot). Moreover, pots of salt treatments were leached periodically to prevent salt accumulation.The response of olive and mango nurslings to water salinity, mycorrhizal inoculation and calcium spray as well astheir combination were evaluated through the determination of some vegetative growth parameters, root growth and some dry weight parameters, leaf chemical composition and leaf mineral content. The obtained results could be summarized as follows:Experiment I:Effect of water salinity, mycorrhizal inoculation and calcium foliar sprays on growth, leaf chemical composition and leaf mineral content of Koroneiki olive transplants.