Studies on the performance of some different broad bean cultivars under saline water irrigation conditions

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Two field experiments were carried out in EL-Sheakh Zowid Experimental Station of the Desert Research Center at North Sinai Governorate, Egypt during the growing seasons (2001-2002 and 2002-2003). This study was divided into two major experiments, the first one was to study the effect of broad bean cultivars (El Kobrosy, Reina Mora and Luz De Otone), and alternative irrigation system between saline and tap water as indicated below on growth, yield and its components, and chemical composition of broad bean plants under sandy soil conditions and drip irrigation system. The second one was carried out to determine the effect of some micronutrients as individual spray application or mixed in addition to control (tap water spray) on growth, yield and chemical composition of broad bean plants grown under sandy soil conditions.1- The first experiment:The five water treatments were arranged as follows:1-Alternative irrigation system (1:1) between saline water from well its salinity about 4000 ppm and tap water its salinity about 600 ppm.2-Alternative irrigation system 2:1 (twice irrigation from saline well and once from tap water).3-Irrigation from well its salinity about 2000 ppm.146 Summary and Condusion4-Irrigation from well its salinity about 4000 ppm.5-Irrigation from tap water its salinity about 600 ppm as control treatment.The experimental design of the 15 treatments was split plots in three replications. The water treatments were distributed in the main plots, while broad bean cultivars represented in sub-plots.The obtained results could be summarized as follows: I- Vegetative growth characters.a- Reina Mora cultivar significantly surpassed Luz De Otone which surpassed El Kobrosy in leaf area and fresh weight of shoots.Plant height showed a significant increase in cv. Reina Mora followed by cv. Luz De Otone than cv. El Kobrosy. While cv. Luz De Otone exhibited an increase in Number of branches than the other two cultivars. Reina Mora and Luz De Otone cultivars significantly surpassed cv. El Kobrosy in dry matter of shoots.b- Alternative irrigation system (1:1 and 2:1) in addition to control treatment showed an increase in plant height, No. of branches/ plant, leaf area and fresh weight of shoots than other treatments. On the other hand, irrigation from saline well about (4000 ppm) treatment gave the highest dry matter percentage of shoots than other treatments.2- Yield and its components:a-Reina Mora cultivar significantly surpassed Luz De Otone which surpassed El Kobrosy in total yield of green pods/feddan, total yield of dry seeds/ feddan, length of pod, weight of pod, weight of seeds/ pod, No. of seeds/pod, weight of 100 seeds and net weight percentage. Also, Reina Mora cultivar significantly surpassed Luz De Otone which surpassed than El Kobrosy in dry matter of seeds.b-Irrigation from saline well (about 2000 ppm) and alternative irrigation system (1:1 and 2:1) in addition to control treatment surpassed other treatments in total yield of green pods/feddan, total yield of dry seeds/feddan, length of pod, weight of pod, weight of seeds/pod, No. of seeds/pod and net weight percentage.3. Chemical composition:a- Protein, protein amino acid, Nitrogen phosphorus percentage and . .total chlorophyll content significantly increased in cv. Reina Mora than cv. Luz De Otone which surpassed El Kobrosy.•Cultivars El Kobrosy and Luz De Otone surpassed in potassium and calcium the cv. Rein a Mora.•Cultivar Reina Mora gave the lowest value in sodium and chloride.148 Summary and Conclusionb- Irrigation from well, its salinity about 2000 ppm in addition to control treatment surpassed other treatments in nitrogen andprotein content in seeds* Protein

amino acid and phosphorus percentage increased with alternative irrigation system (2:1) in addition to control treatment. While potassium increased significantly with irrigation from well its salinity about (4000 &2000 ppm).Alternative irrigation system (2:1) gave the highest value of calcium. Total chlorophyll increased with Irrigation from well itssalinity about (4000 ppm).* Alternative irrigation system (1:1) in addition to control treatment gave the lowest value from sodium and chloride. CONCLUSION:Under North Sinai conditions cvs. Reina Mora and Luz De Otone gave the highest value of vegetative characteristics and green pod yield. Also, alternative irrigation system 1:1 (once irrigation from saline well 4000 ppm followed by one from tap water) and irrigation from saline well 2000 ppm gave the highest value of vegetative characteristics and green pod yield. This treatment decreased the used amount of tap water, also saved half the amount of tap water and gave results nearly similar to the control.II- The second experiment:The aim of the second experiment was to investigate the effect of some micronutrients (Molybdenum, Zinc, Iron and Copper) usedas foliar spray individual or mixed at rate of 50 or 100 ppm in addition to control (tap water spray) on growth, yield and its components, and chemical composition of broad bean plants under sandy soil conditions and drip irrigation system from saline well about (4000 ppm)This experiment included eleven treatments arranged in complete randomized block design with four replicates.The obtained results could be summarized as follows: I- Vegetative growth characters.The morphological characteristics were significantly increased by micronutrients mixed either at 50 or 100 ppm. While leaf area increased with molybdenum at 50 ppm.2- Yield and its components:The highest value of length of pod was recorded with application of copper at concentration of 50 ppm and mixed micronutrients at concentration of 100 ppm. Weight of pod, weight of seeds/pod and weight 0.100 seeds were significantly increased with the used mixed treatments at the rates of 100 and 50 ppm.Molybdenum at 50 ppm and mixed at 100 ppm increased No. of seeds/pod. While, net weight percentage was significantly increased with mixed 100 or 50 ppm, molybdenum 100 ppm and zinc 50 ppm.Total yield of green pods/feddan, total of dry seeds/feddan and dry matter of seeds were increased when treated with mixedmicronutrients at 50 or 100 ppm and Molybdenum at 50 ppm and iron at 50 ppm.3. Chemical composition:•Nitrogen, total crude protein showed an increment with mixed micronutrients at 100 ppm compared with other treatments.•Iron at 50 or 100 ppm, also mixed at 50 ppm and molybdenum at 50 ppm gave the highest value from total chlorophyll. Meanwhile, Phosphorus percentage was significantly increasedwith molybdenum at 50 or 100 ppm copper and iron at 100 ppm.•Protein amino acids were increased with Fe at 100 ppm, Cu at 50 ppm and Mo at 100 ppm.•Molybdenum and iron at 50 ppm surpassed in potassium.•Calcium was significantly increased with control, zinc at 100 and iron at 50 ppm.•Mixed at 50 & 100 ppm, zinc and copper at 100 ppm gave the lowest value of sodium and chloride.•Molybdenum, zinc, iron and copper content increased with increasing the rate of spiay.Under North Sinai conditions with drip irrigation system from well, its salinity about 4000 ppm, the broad bean (El Kobrosy) gave the highest values of growth characters, yield and its components and chemical composition with foliar application with micronutrients mixed treatment (Mo, zn, Cu and Fe) at 50 ppm due to its role in reducing the bad effect of irrigation water salinity.