Physiological studies on nutritional status and productivity of olive treas under new lands condition

Kamal Bashir Eassa

The present investigation was conducted during three successive seasons 1994, 1995, and 1996 to study the effect of soil and foliar fertilization on the leaf mineral concentration, vegetative growth, generative growth, fruiting and fruit quality of Manzanillo and Picual olive varieties grown in South Tahrier region which suffer from the death of terminal and axillary buds and poor productivity. The trees under study were ten years old when the investigation was started. The trees received the normal fertilization usually followed and the same culturalcare. The treatments used in 1994 were :-1-Control (normal fertilization).2-Borax added as soil fertilizing at 1/4 kg / tree.3-Borax added as soil fertilizing at 1/2 kg / tree.4-Chelated calcium (12%) added as soil fertilizing at 40 gm / tree. 5-Chelated iron (15%) added as soil fertilizing at 40 mg I tree. 6-Chelated zinc (13%) added as soil fertilizing at 40 gm / tree. 7-Chelated manganese (13%) added as soil fertilizing at 40gm/ tree.8-Copper sulphate added as soil fertilizer at 40 gm / tree. 9-Copper sulphate added as soil fertilizer at 40 gm / tree.10-Sodium molybdate added as soil fertilizer at 2.5 gm / tree.11-Ammonium molybdate added as soil fertilizer at 4 gm/ tree.12-Magnesium sulphate added as soil fertilizer at l kg / tree.13-Magnesium sulphate added as soil fertilizer at .500 gm / tree.14-Spraying chelated iron (13%) at 0.1%.15-Spraying chelated zinc (13%) at 0.1 %.130 SUMMARY AND CONCLUSIONS16-Spraying chelated manganese (13%) at 0.1%. 17-Spraying borax at 0.3%.18-Spraying borax at 0.5%.19-Spraying chelated calcium at 0.3 %.20-Spraying copper sulphate at 0.1%.The obtained results could be summarized as follows :-A. Leaf minerals contentA. 1. Leaf nitrogen content :Soil fertilizing with borax at 250 and 500 gm / tree, calcium at 40 gm / tree, and manganese at 40 gm / tree significantly decreased leaf N content, while the other treatments have a little effect in this respect.Spraying trees of the two studied varieties with borax at 0.3 and 0.5 % and calcium at. 0.3 % significantly decreased the leaf N percentage. On the other hand, spraying trees with iron, zinc, manganese or copper at 0.1% significantly increased leaf N content.A.2.Leaf phosphorous content :Soil application of borax at 250 and 500 gm / tree, calcium at 40 gm / tree, sodium molybdate at 2.5 gm / tree, ammonium molybdate at 4gm / tree and magnesium sulphate at 500 and 1000 gm / tree significantly decreased P leaf content, while all foliar application treatments used except calcium treatment significantly increased leaf P content.A.3.Leaf potassium content :All soil application treatments used decreased leaf K content. On the other hand, all foliar treatments’except calcium treatment (0.3 %) significantly increased leaf K percentage.A. 4. Leaf calcium content :Soil fertilization with iron, zinc,manganese and magnesiumsulphate significantly decreased calcium percentage than control and the other treatments. On the other hand, spraying the two studied varieties of olive trees with iron, zinc, manganese or copper at 0.1 % concentration or calcium at 0.3% significantly increased leaf calcium percent than control and the other treatments used, while spraying borax at 0.3% and 0.5% caused a reverse effect in this respect .A. 5. Leaf magnesium content :Soil fertilization with calcium, only the treatment whichsignificantly increased leaf magnesium content, while soil application with copper at 20 and 40 gm / tree and sodium molybdate at 2.5 gm / tree have the opposite effect in this respect.Spraying olive trees of the two studied varieties with calcium at 0.3% and borax at 0.5% significantly increased leaf Mg content,

while the other foliar treatments have no significant effect.A. 6. Leaf iron contentSoil application with iron, zinc and manganese have no effect on leaf iron content, while the other soil treatments significantly decreased leaf iron content. Foliar application with iron, zinc and manganese significantly increased leaf iron content, while spraying borax, calcium and copper significantly decreased leaf iron content , The other foliar application treatments had no significant effect in this respect. A. 7.Leaf zinc content :Soil application of iron, manganese and copper significantly decreased leaf zinc content of two studied olive varieties, while application of borax, calcium, sodium molybdate and ammonium molybdate were insignificant in this respect.On the other foliar application of iron, zinc, manganese each of them at 0.1% concentrations and calcium at 0.3% significantly increased leaf zinc content of the two studied varieties during the three seasons of study. Conversely, spraying olive trees with copper at 0.1% significantly decreased its zinc leaf content.A. 8.Leaf manganese content : The soil application of calcium or iron at 40 gm / tree significantly decreased leaf manganese content in the two studied olive varieties, while the other soil treatments had no effect in this respect Conversely, foliar application of iron, zinc, manganese copper at 0.1% concentrations significantly increased leaf manganese content, while spraying olive trees with 0.3% calcium caused the lowest values in this respect in comparison with the control and the other treatments. Furthermore, borax had no effect on leaf manganese content.A. 9.Leaf boron content :The soil application of borax at ’/4 or 1/2 kg / tree, iron at 40 gm / tree or manganese at 40 gm / tree significantlyincreased leaf born content. On the other hand, fertilizing trees with calcium at 40 gm / tree significantly reduced it.All foliar application treatments used except spraying olive trees under investigation with calcium at 0.3% significantly increased leaf boron content over the control. The highest value was obtained by using borax at 0.5% concentration.A. 10. Leaf copper content :The soil application of nutrient minerals had 110 significant effect on leaf copper content, while spraying olive trees of Manzanillo and Picual varieties with copper at 0.1%, calcium at 0.3% and borax at 0.3 and 0.5 % concentrations significantly increased leaf copper content than that in the control and the used treatments. The spraying of iron and zinc had no effect in this respect.B. Effect of some nutrient elements on vegetative growth : B. I. Shoot length :All Soil application treatments had no significant effect on shoot length in the two studied olive varieties.On the other hand, spraying olive trees of the two studied varieties with copper at 0.1%, borax at 0.3 or 0.5% and zinc at 0.1% significantly increased shoot length over control and the other used treatments.B. 2. Survival terminal buds percentage : The soil application with calcium, magnesium and some micro-nutrients failed to show any significant effect on the survival terminal buds of the two studied olive varieties. On the other hand, foliar application with borax at 0.3 or 0.5%, calcium at 0.3% and copper at 0.1% significantly increased survival terminal buds percentage.B.3. Survival axillary buds percentage :All soil application treatments have no significant effect on survival axillary buds of the two studied olive varieties.The foliar application of zinc at 0.1%, borax at 0.3 or 0.5%. and copper at 0.1% significantly increased survival axillary buds percentages as compared with control, while foliar application with iron, managanese and calcium have slightly and not significant increase in this respect. C Effect of some nutrients elements on generative growth :C.I. Floral buds on shoot percentage :Only soil fertilization with copper at 20 gm / tree significantly increased the percentage of floral buds on shoot than. control, while the other soil treatments had no effect in his respect.Spraying trees of the two studied olive varieties with zinc at 0.1%, borax at 0.3 or 0.5% and copper at 0.1% significantly increased the percentage of floral buds on shoots than that in the control and the other spraying treatments. C 2. Number °Blowers per shoot : All soil treatments did not effect on the number of flowers per shoot in Manzanillo or Picuaf varietiesMeanwhile foliar spaying of Manzanllo and Picual olive trees with zinc at 0.1%, borax at 0.3 or 0.5% or copper at 0.1% caused a highly significant increase in the number of flowers per shoot as compared with that of the control and the other spraying treatments. C 3.Date of full bloom :All soil fertilization treatments have no effect in full bloom of the two studied varieties.On the contrary, in a general foliar fertilization treatments induced occurring earlier full bloom by 21 days in the application with copper at 0.1% over that in the control in the two studied varieties during the three seasons of study. C 4.The percentage of perfect flowers :All soil fertilization treatments used had no effect on the percentage of prefect flowers, while foliar spraying trees of the two studied olive varieties with zinc at

0.1% borax at 0.3 or 0.5% significantly increased the percentage of the perfect flowers while foliar spraying of manzanillo trees with copper at 0.1% decreased it, in addition, spraying Picual trees with calcium significantly decreased the percentage of perfect flowers . The other treatments had no effect in this respect.C 5.Pollen grains stainability percentage : All soil fertilization treatments used have no effect on pollen grains stainability. On the other hand, all foliar fertilization treatments used except spraying trees with copper 0.1% significantly increased pollen stainability. The highest level in this respect had the spraying olive trees three times with borax at 0.5% concentration.C.6. Pollen grains germination percentage : Soil fertilization in 1994 season with calcium, magnesium and some micro nutrients treatments have no significant effect in pollen germination percentage in the two studied' olive varieties, while all'foliar fertilization used except using copper suphate at 0.1% significantly increased it. Moreover, foliar treatment with borax at 0.5% concentration had the highest effect in this respect.D. Effect of some nutrients elements on fruit set, fruit DROP, fruiting find yeild :D.I. Fruit set percentage :Regard to the effect of the soil fertilization on fruit set percentage, all the used soil treatments have no effect on it. On the others hand, spraying olive trees under study (Manzanillo and Picual varieties) with borax at 0.3 or 0.5% and calcium at 0.3% significantly increased it, while the other foliar spraying treatments have no effect in this respect.D. 2. Fruit remained after June DROP :Soil fertilization with calcium, magnesium and some micro nutrients have no significant effect on fruit remained after June DROP in the two used olive varieties than control, while spraying the two olive varieties under study with borax at 0.3 or 0.5% and calcium at 0.3% significantly increased the number of fruitsremained after June DROP as compared with that of the control and the other treatments. The other used foliar treatments have no effect in this respect .D.3. Yield :The soil fertilization in 1994 with calcium, magnesium and some micro nutrients have no effect in the yield of the two olive varieties, while foliar spraying treatments under study with borax or calcium at 0.3% or borax at 0.5 % significantly increased yield in the two studied olive varieties during the three seasons of study. The other foliar spraying treatments used have no significant effect in this respect .E.Effect of some nutrients elements on fruit characteristics : E. I. Fruit weight :All soil fertilization treatments used have no effect on fruit weight in the two studied olive varieties, while the foliar fertilization with zinc at 0.1% and borax at 0.3 or 0.5% treatments increased fruit weight as compared with control and the other used treatments. The other foliar spraying treatments have no significant effect in this respect.E. 2. Seed weight :The soil fertilization with calcium, magnesium and some micro-nutrients in 1994 season have no effect on seed weight in the two olive varieties under study, while foliar spraying with borax at 0.5% increased seed weight during the three seasons of138 SUMMARY AND CONCLUSIONSstudy. However, the other foliar spraying treatments used have no effect in this respect.E.3 Flesh weight :All soil fertilization treatments used have no effect on flesh weight in the two studied olive varieties. Foliar fertilization with zinc at 0.1% and borax at 0.5% treatments increased flesh weight compared with control and the other treatments, while the other foliar fertilization treatments have no effect in this respect.E. 4.Flesh percentage ;All soil or foliar fertilization treatments have no significant effect on flesh percentage in the two studied olive varieties during the three seasons of study.E. 5.Fruit height :Soil fertilization with calcium, magnesium and some micro nutrients have no effect on fruit height in the two used olive varieties in 1994 season. Only foliar spraying treatment with borax at 0.5% significantly increased fruit height, while the other treatments have no significant effect in this respect during the three seasons of study.E. 6.Fruit diameter :All soil fertilization treatments used have no effect on fruit diameter in the two studied olive varieties in 1994 season, while foliar fertilization with borax at 0.5% treatment significantly increased fruit diameter as compared with that of the control and the other used treatments. On the other hand, the other foliar spraying treatments have no clear trend in this respect, during the three season of study.E. 7.Fruit shape :All soil or foliar fertilization treatments have no significant effect on fruit height / fruit diameter ratio in the two olivevarieties under study.E. 8.Fruit flesh oil content :All soil fertilization treatments used have no effect on flesh oil content in the two studied olive vorieties. Foliar fertilization with calcium at 0.3% and zinc at 0.1% treatments increased oil concentration in fruit flesh oil content as compared with that in the control and the other treatments. The other foliar spraying treatments have no significant effect in this respect during the three seasons of study.It was concluded from the results of this

study that it can be overcome the death of terminal and axillary buds on one year old shoots and low productivity of Manzanillo and Picual olive varieties grown in South Tahrir region by spraying the trees three times during the growth season in March, May and July with borax at 0.5% concentration.