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Effect of Foliar Spray of Boron and Zinc on Flowering Fruiting and Yield Quality of Olive [*Olea europaea* L.]

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Olive is native to the Mediterranean region; botanical name of Olive is *Olea europaea* and it belongs to the *Oleaceae* family. It is an evergreen tree with a height range in from 12-15 meters. Olive is characterized by its silvery-green leaves, tiny whitish flowers, and small oval shaped fruits. Olive trees are evergreen in nature and they can tolerate adverse edaphic conditions including high temperature and draught these abilities of olive tree make it one of the hardy crops and bear fruits even during the tough environmental challenges. Olive trees are alternate bearers they produce important yield for one year and lower yield in the succeeding year.

Mature tree produces almost 50,000 flowers, 10 %-15% of which set fruit this is followed by a rapid fruit drop that continues at a declining rate until 6-7 weeks after full bloom. In a year with normal flowering 1% -2% final fruit set will result in good commercial yield. Olive is of major agricultural importance in the Mediterranean region as the source of olive oil.

Olives are primarily used for oil extraction apart from this oil is also consumed as snacks, pickles. Although olive tree has been designated as a drought tolerant yet, it requires sufficient soil moisture during certain stages of growth. Unfortunately, majority of olive plantations were undertaken on hill slopes, in the drought prone areas of mid hills and valley areas of the state. Furthermore, these areas are completely devoid of irrigation facility. An erratic trend of monsoon and winter rains has become more conspicuous in the last decade which further aggravated the problem of poor growth and bearing of olive trees. Acute water stress during autumn coupled with scanty or insufficient and irregular rainfall distribution.

Botanical description of olive: Olive, (*olea europaea*), subtropical broad- leaved evergreen tree (family Oleaceae) and its edible fruit. The olive fruit and its oil are key elements in the cuisine of the Mediterranean and are popular outside the region.

Origin: The olive was native to Asia Minor and spread from Iran, Syria and Palestine to the rest of Mediterranean basin 6000 years ago. It is among the oldest known cultivated tree in the world being grown before the written language was invented.

Varieties grown in India

Arbeqina: This is small early ripening olive variety that is known for high oil content and mild flavour. It is a good choice for both table olives and olive oil production.

Coratina: This is a large late ripening live variety that is known for its high oil content and intense flavour. It is a good choice for olive oil production

Frantoio: This is a small sized early ripening early variety. That is known for its high oil content and fruity flavour.it is a good choice for both table olives and olive oil production.
Koroneiki : This is small medium sized early ripening olive variety that is known for its high oil content and mild flavour. It is a good choice for both table olive and olive oil production.

Foliar spray of B and Zn decreased fruit drop and increased fruit quality in the 'Zard' olive.

Boric acid treatments increased pollen germination than control and increased percentage of retained fruits in 'Picual' olive. Abd El-Migeed *et al.* on 'Picual' olive reported that boric acid spray at 300 mgl-1 increased fruit length.

Boron treatments either as foliar or soil applications increased percentage of retained fruits. He also reported that boric acid at 1500 mgl-1 on 'Shahany' date palm increased pulp weight, pulp/seed ratio; fruit length and diameter.

Economic Importance: olive tree is the most economically important oil producing crop in many medittarrean countries. Currently about 90% of olive trees are grown in this countries, especially in spain, Italy and Greece.it has been known to reduce blood sugar, cholesterol and uric acid. It has also been used to treat diabetes, Hypertension, diarrhea, respiratory and urinary tract infection.

Effect of zinc and boron on fruit yield and quality

Boron: Boron induces pollen tube growth resulted from its role on tryptophan synthesis as an auxin precursor biosynthesis . The main function of boron is related to cell wall strength and development, cell division, sugar transport and hormones development, RNA metabolism, respiration, indole acetic acid (IAA) metabolism and as part of the cell membranes boron can be redistributed to younger plant parts to meet the demands of the growing sinks. The boron remobilizing of olive trees is owed to formation of mannitol-borate complexes with appropriate low molecular weight ligands. Thus the increase boron concentration could be related to direct uptake by the reproductive tissue.

Zinc: zinc is required for the activity of different enzymes, including dehydrogeneses, aldolases, isomerases, RNA and DNA polymerases and involved in the synthesis of tryptophan, cell division , maintenance of membrane structure and photosynthesis and acts as a regulatory co-factor in protein synthesis .zincsulphate has positive effects on fruit characteristics in terms of fruit weight and fruit dimension. Foliar spray of zinc decrease fruit drop and increase fruit quality in olive .

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Pest and Diseases

Anthracnose: Olive anthracnose is the most important fungal disease of olive fruits worldwide. It occurs in humid olive-growing areas of many production countries and causes heavy yield losses and lowering of oil quality. In Australia Anthracnose is a moderate to major problem depending on local climatic factors. Symptoms: Causes soft circular rots on

the fruit and at high humidity produces an orange coloured slimy mass of spores on the fruit surface; commonly observed close to harvest when the fruit softens.

Control: It is recommended that protective copper sprays be applied ahead of anticipated wet/ high humidity weather conditions. Also after harvest remove all mummified fruit from the tree and cover fallen fruit and leaf trash with compost / wood chips / manure to prevent water splash reinfecting the new growth

Grey Leaf Mould: The grey mould can be seen mostly on mature leaves, with mouldy blotches developing on the underside of the leaves. The tops of the leaves turn yellow then brown, leaves then fall. Often occurs together with peacock spot, causing significant defoliation and damage to new growth and reduced crop production.

Control: This fungus infects the lower surface of the leaves, which is also more protected from spray treatments, meaning treatments need to be more radical than for peacock spot – prune and thin the tree canopy and use preventative and curative sprays. The internationally favoured control option for Grey Leaf Mould is Mancozeb a Group M3 fungicide.

Peacock Spot: Symptoms are characterised by 'peacock's eye' shaped spots of 2-10mm in diameter mainly on the upper surface of the leaf, and occasionally on the stems and fruits. Spots first appear as small pale blotches, later becoming muddy green to black, often with a yellow halo. Spots on underside of leaves are grey. Young leaves may remain symptomless. The primary impact of the disease is on reducing photosynthetic efficiency of the infected leaves. Severe infection may cause defoliation and associated loss of accumulated minerals and photo-assimilates and death of new wood, which reduces production (less flower bud initiation, fruit, smaller fruit and lower oil accumulation) in the following year.

Control: Is through the use of tolerant / resistant varieties, lower tree planting density, open up tree canopy to improve aeration; avoid overuse of nitrogenous fertilizers that increase disease susceptibility of the leaves; and the timely application of copper preventative sprays which prevent the spores from germinating (usually applied later summer and late winter) corresponding to the main infection periods, in severely affected groves an additional copper treatment in late spring may also be necessary. Modern translaminar (curative) sprays are also now available but not yet registered for use on olives.

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