

EFFECT OF SOME GROWTH SUBSTANCES ON FLOWERING
AND FRUITING OF OLIVE TREES

By

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INTRODUCTION

Olive (Olea europaea L.) cultivation plays an important role in the economy of many countries. In Spain, Italy, Greece and Turkey about 180, 160, 79 and 59 million trees are planted, respectively. In addition, olive cultivation increases the land value where the soil is unsuitable for other crops and contributes to soil conservation (Denis, 1977 and Sansoucy, 1984). In exploiting new reclaimed areas, drought resistant plants which are of economic importance are selected. Among these plants which can thrive under such conditions is the olive tree.

According to the latest statistics of the Ministry of Agriculture in 1984, the area occupied by olive trees in the Delta and Nile Valley in Egypt reached about 6217 feddans. Besides 20,000 feddans are believed to be scattered in the northern coastal belt and the different oasis.

The greatest part of Egypt is covered by wide arid deserts. However, cultivated land only occupies about three percent of the total area. Thus, some of this area are planned for new olive plantation on the reclaimed land particularly at Sinai, the North western coast and the New valley.

Olive cultivation in arid and remote areas of Egypt where hand labour is scanty, gives a great economic potential but the problem of olive intensive labour harvest with alternate bearing habit constitutes a great obstacle which face olive cultivation expansion.

This work was originally planned in the hope of minimizing these two problems. The application of some abscission promoting substances namely Ethrel, Alar and Salicylic acid, to facilitate mechanical harvest was adopted. The application of GA3 in order to overcome alternate bearing habit or in other words to regulate the cropping of olive trees was the other dimension in this work.

Additional experiment was conducted to evaluate different promoters and inhibitors during the course of fruit growth curve to study the changes occurring in some chemical components during the fruit development.

REVIEW OF LITERATURE

The use of different abscission promoting substances is a rather new approach in solving the problem of intensive labour harvest for many fruit trees particularly these of olive, so the review of literature on this subject is rather scanty in some materials. Our review will be concentrated on the effect of the different chemicals used in this study on the different aspects investigated in this work. On the other hand, we have collected the latest general characteristics of olive trees to help us in the comparison of different criteria.

I. Effect of some abscission-promoting substances on fruit removal force, leaf abscission and fruit drop.

a) Ethrel [(2-chloroethyl)phosphonic acid]:

Hartmann et al. (1970), found that the application of Ethrel at 2250 p.p.m. to several olive cultivars in warm, low humidity conditions reduced considerably the fruit removal force, enhanced leaf abscission and ethylene evolution from both leaves and fruits. The addition of urea at 1.35% to the spray augmented ethylene production and abscission effects. They also stated that cultivar responses to Ethrel were varied, NAA blocked Ethrel activity, particularly, if

applied before or with Ethrel, When applying NAA 2 or 3 days after Ethrel application it reduced leaf abscission with maintaining fruit abscission. Rain fall shortly after Ethrel application greatly reduced its activity in both ethylene production and abscission induction. Ethrel abscission effects were reported to be greater in warm than in cool condition.

Jacoboni et al. (1971), reported that when spraying olive trees cv. Moraiolo on 25 November with Ethrel at 2500 or 3000 p.p.m. with or without urea at 1%, the SR₁₂ mechanical harvester used in December removed 44.9% of fruits from the unsprayed (control), 94 to 98% from trees treated with Ethrel. The addition of urea to Ethrel increased defoliation. The force required for fruit detachment (360.4g. for the control) fell to 20-40 g. after Ethrel treatment.

Calabrese and Sottile (1971), in Italy, working on six-year old olive trees cv. Moraiolo sprayed with Ethrel at 100, 250 or 500 p.p.m. reported that after 14 days from spraying and 2 shakings of 8-12 seconds the best result obtained with Ethrel was 33-41% fruit drop while with unsprayed (control) was 24% only. During the following 2-5 months leaf drop was higher in sprayed than in control trees.

Cigliano and Bono (1971), in Italy, sprayed Ottobratica olive trees with Ethrel at 100 or 200 g/100 L water on 28 November when 10% of fruit were ripe. The harvest was at intervals from 12 December to 20 March using a mechanical shaker. They found that no difference was observed between these treatments which resulting the collection of 85% of crop when compared with 50% of the crop of unsprayed trees.

Cartechini and Standardi (1971), in Italy compared the effect of Ethrel and NAA applications, Ethrel (1000-5000 p.p.m.) was applied 20 days before harvesting. The best results were obtained with Ethrel at 2000 and 3000 p.p.m. On the other hand, when applying NAA at 50 p.p.m. with Ethrel in an attempt to reduce leaf drop the effectiveness of Ethrel was reduced, and when NAA was applied 2 days after Ethrel treatment leaf drop increased.

Cigliano and Bono (1972), reported that the effectiveness of Ethrel in facilitating abscission was confirmed. The best Ethrel application was at the beginning of fruit ripening with 480 p.p.m. if no rain fall 8-10 h. after treatment occurred, within some leaf fall was recorded after the treatment and was quite serious in the cv. Pendolino. The application of Ethrel gave excellent results when mechanical

shakers were used, Ethrel treatment was also advantageous when shakers were not used.

Lavee et al., (1972) in Israel, reported that in large scale mechanical harvesting trials with olive cv. Sourì, the application of Ethephon increased fruit drop average of 26% when used for 3 seasons.

Cavusoglu (1973), in Turkey studying the effect of Ethrel application on the olive fruit removal force at 1000, 2000 or 3000 p.p.m. on 28 November, 6 and 13 December, reported that fruit removal force was least at the highest concentration but the second and third applications added little to the effect of the first one. He added that, when the trees were shaken by hand the 2 higher concentration gave best results. Meanwhile, leaf drop and shoot damage were highest after the third application of 3000 p.p.m. and the first application at this concentration caused most pre-harvest fruit drop.

Vitagliano (1975), in Italy reported that, Ethephon application at 1000 p.p.m. 16 days before commercial harvest reduced the fruit removal force of olive cv. Frantoio

by 73%. The application induced high level of fruit drop and some defoliation (7%) for Ethephon.

Sanchez-Raya et al. (1975), applied aqueous solution of acetylene and of Ethrel at 6 cm³/5L to 80-years old olive tree on 24 October, 10 November, 24 November or 10 December. They found that, Ethrel and especially acetylene applied on the earliest date advanced olive ripening by about 40 days. Ethrel generally gave the best results regarding fruit abscission.

Natali and Vitagliano (1975), in Italy reported that Ethephon at 1500 p.p.m. applied in early November 15 days before harvest lessened fruit stalk resistance, especially in the olive cv. Frantoio. They also added that Ethephon increased the preharvest drop especially in cv. Frantoio, and thereby reduced the amount released by mechanical shaker from trees of such a cultivar. The treatment had little effect on cv. Maraiolo.

Lavee and Haskal (1975), in Israel when treating different olive cvs. under different irrigation regimes with 1500 p.p.m. Ethephon to facilitate manual or mechanical harvest, found that in all treated different cvs. 1500 p.p.m.

was satisfactory and increased the efficiency of both mechanical and manual picking. In most cases at higher concentrations leaf drop increased. The wetting agent (Regulaid) was of more additive effect than Triton X100 or calcium nitrate (0.3 M). Morning sprays were more effective than those given at noon.

Claudio (1975), in Italy reported that Ethephon sprays at 1500 p.p.m. on Coratina olive variety markedly reduced fruit removal force in the first season where a 42% reduction was obtained after 7 days and 54% reduction after 14 days from treatment. In the second season the maximum reduction was evident at 3-4 days after treatment. No abnormal leaf abscission or pathological effects were apparent in the two seasons.

Ben-Tal and Lavee (1976), in Israel found that, Ethephon was effective in reducing the fruit removal force required for harvesting olives. The lowest fruit removal force value was achieved after 7-8 days from Ethephon treatment. Raising the pH of the Ethephon spraying solution to pH.7 increased ethylene evolution markedly and decreased both the fruit removal force value and the time needed to achieve it.