

Effect of some growth regulator sprays on growth fruiting and fruit quality of apple fruits

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Effect of some growth regulator sprays on growth, flowering, fruiting and fruit quality of "Anna" apple fruits. The present work was carried out through two successive seasons i.e. 1996 and 1997 in a private orchard at El-Khatatba region, Menoafia Governorate on 5-year-old "Anna" apple trees growing on M.M.106 rootstock and planted at (2 X 4m) apart on a sandy soil. The main objectives of the present research was studying the effect of paclobutrazol (PP333) and uniconazole (S-3307D) separately or in combination both at 1000 or 2000 ppm were used. Growth, flowering, fruiting, fruit quality and minerals content of "Anna" apple trees were studied. Selected trees were sprayed in full bloom or in Mid-May of 1996 and 1997 seasons. The obtained results were statistically analysed and L.S.R.'s method was used to differentiate between means. However, the obtained results can be summarized as follows : A- Effect on the vegetative growth : Spraying of S-3307D and PP333 at 1000 or 2000 ppm in Mid May hastened the growth of shoots than other treatment during 1996 season. Moreover, all treatments done at full bloom were produced short shoots than done in Mid-May. In 1997 season, all treatments sprayed at full bloom or Mid-May produced short shoots compared to control. The rate of shoot length growth were less in second season than in the first one. During 1996 season, the highest number of leaves were obtained with spraying PP333 at 2000 ppm at full bloom, whereas the least number of leaves were recorded by PP333 at 2000 ppm sprayed in Mid-May. During 1997 season, the treatment of S-3307D 2000 ppm sprayed at full bloom was superior than others in producing great number of leaves. The using of PP333 and S-3307D as growth retardant materials slightly affected leaves number in the first season but probably affected it in following season. B- Effect on flowering : Flowering % was generally higher on spur than on one year old shoot in "Anna" apples. Both PP333 and S-3307D slightly affected flowering % of "Anna" apples during 1996 season. The highest values of flowering % on spur were obtained with S-3307D 1000 ppm at full bloom + PP333 1000 ppm at Mid-May and S-3307D 2000 ppm in Mid-May. No effect to both PP333 and S-3307D on the number of flowers in inflorescence were it was 5.33 flower/inflorescence. The Mid-May applications were more effective than those applied at full bloom and these may be due to their great effect on flower bud differentiation happened in Mid-May, Lund (Shandler). C- Effect on fruiting: Fruit set and fruit abscission % were higher on spurs than on one year old shoot. The treatment of 2000 ppm S-3307D sprayed at full bloom was superior than other treatments in fruit set % in both studied seasons. However, the highest fruit set % on one year old shoots were obtained with 1000 ppm S-3307D sprayed at full bloom (1996 season) and PP333 2000 ppm sprayed at full bloom (1997 season). S-3307D was more effective than PP333 in increasing fruit set %. The higher % of fruit abscission on spurs than on one year old shoot due to the higher flower on spurs than on one year old shoots. The great effect of PP333 1000 ppm treatment spraying at full bloom on total yield compared to other treatments or control during (1996 season). The highest values of biennial bearing index were obtained with Mid-May spraying with 1000 or 2000 ppm PP333 or 1000 ppm S-3307D. Moreover) Anna apple is characterized by low biennial bearing during successive seasons. The trees sprayed at full bloom exhibited some effect in fruit numbers/spur than control. The highest numbers of fruit/tree were obtained with the trees sprayed with PP333 2000 ppm at full bloom or S-3307D 2000 ppm at full bloom. D- Effect on fruit quality: The highest fruit weight was obtained with PP333 and S-3307D 2000 ppm sprayed at Mid-May. On the other hand) all

treatments in the second season produced fruits with less weight than control. Slightly differences were noticed between different treatments and control in their fruit size. However, no treatment was superior than control in second season. The growth retardants application reduced both fruit length and width resulting in small fruits than control. All treatments reduced fruit length than control in second season. Regarding to fruit shape, it is evident that "Anna" apples tended to oblong shape but in these treatments slight increase in LIW (Length : Width) was found in the treatment of S-3307D 1000 ppm in Mid-May. S-3307D or PP333 increased the development of seeds and reached to 5-667 for PP333 1000 ppm at full bloom and 6.33 for PP333 2000 ppm at Mid-May for (1996, 1997 season respectively). Slightly effect to the used growth retardants on fruit firmness. Moreover, PP333 at 2000 ppm sprayed at full bloom produced fruits with least amounts of total soluble solids than other treatments. Additionally, total acidity was unaffected with PP333 or S-3307D. Total sugars greatly affected than other chemical components especially to those treatments sprayed only at Mid-May which reduced total sugars than those sprayed at full bloom. In (1997 season) the treatments of PP333 1000 at full bloom and S-33-7D 1000 or 2000 ppm in Mid-May produced fruits with similar colour to control trees, except of these treatments, other treatments hastened fruit colouration.

E-Effect on leaf mineral contents:

1. The reduction in leaf nitrogen content was noticed in PP333 1000 or 2000 ppm sprayed at full bloom and S-3307D 1000 ppm at full bloom + PP333 1000 ppm at Mid-May.
2. The highest values of leaf phosphorus content was obtained with S-3307D at 2000 ppm sprayed at full bloom and S-3307D 1000 ppm sprayed at Mid-May.
3. Deficient of leaf K content was noticed with control, S-3307D 2000 ppm at full bloom and PP333 at Mid-May.
4. The excessive value of leaf Ca content were obtained with all treatments including control.
5. There were an increase of leaf-Mg in all treatments.
6. S-3307D 2000 ppm sprayed at Mid-May produced leaves with highest Fe and Mn contents than other treatments. There were on excessive value of leaf Zn content.

GENERAL Spraying growth retardants as paclobutrazol and uniconazole may greatly affect the productivity of "Anna" apple trees especially at 1000 or 2000 ppm at full bloom compared to spraying in Mid-May.