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NOTE

AFTER EFFECT OF GIBBERELLIC ACID ON POMEGRANATE TREES[1]

A. Sepahi and H. Sharifi[2]

ABSTRACT

Measurements were made regarding the severity of winter injury and reduction in fruit number in the year following the treatment of pomegranate (*Punica granatum* L.) trees with Gibberellic acid (GA_3) at 0, 250, 500 and 1000 ppm with six different modes of application to control fruit cracking. GA_3 caused a reduction in the number of marketable fruits in the following year. Concentration of 1000 ppm resulted in an increase in the amount of dead wood due to winter injury. Both of these adverse effects were correlated to delay in leaf yellowing caused by GA_3 application.

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اثرثانویه اسیدجیبرلیک روی درختان انار

علیرضا سپاهی وحبیب اله شریفی

بترتیب استادیاران اصلاح نباتات وباغبانی گروه زیست شناسی دانشگاه اصفهان

خلاصه

اندازه‌گیریهائی دررابطه با شدت سرمازدگی وکاهش تعداد میوه درسال بعدازبکاربردن اسیدجیبرلیک با غلظت های صفر، ۲۵۰، ۵۰۰ و ۱۰۰۰ قسمت درمیلیون با شش روش محلول پاشی جهت جلوگیری ازترکیدگی انار بعمل آمد. اسیدجیبرلیک باعث کاهش تعداد میوه درسال بعدازمحلول پاشی گردید. غلظت ۱۰۰۰ قسمت درمیلیون موجب افزایش سرمازدگی شد. هردواین اثرات نامطلوب با تاخیردرزردشدن برگها ناشی ازکاربرد اسیدجیبرلیک همبستگی داشت.

INTRODUCTION

Pomegranate (*Punica granatum* L.) after grapes and pistachios

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is the third most important orchard product in Iran. It covers about 32,000 ha (including the young non-bearing orchards) with 37,000 tons of production per year (5). Fruit cracking is one of the most important problems in pomegranate production. Up to 76.6% cracking has been reported (1). In a preliminary experiment, Sharifi and Sepahi studied the effect of GA_3 on reducing pomegranate cracking. They showed that even their lowest used dosage (250 ppm) controlled fruit cracking. However, some of the treatments resulted in a substantial delay in leaf yellowing and abscission in the fall. Development of autumn color and leaf senescence in some deciduous trees have been delayed by application of GA_3 treatments (2, 3). It was suspected that this delay could result in an increase in winter injury. Moreover, severe fruit reduction in some trees such as cherries, plums, apricots and almonds, in the year following GA_3 application has been reported (6). The present study was conducted to investigate the possible adverse effects of GA_3 application on pomegranate trees.

MATERIALS AND METHODS

In the summer of 1984, data were collected from trees treated with GA_3 in 1983 (4). The 24 treatments were obtained by a factorial combination of two factors: a) GA_3 concentration with 4 levels and b) six modes of application. Measurements were made on percentage of dead wood as a result of winter injury, and the number of fruits at harvest. To estimate the percentage of the dead wood, the tops of the trees which had completely died out in the winter due to some of the treatments were used. The circumference (C) and the height (H) of these trees were measured. The trees were then sawed off at the ground level and weighed. The volume (V) of these was estimated by, $V = \frac{4}{3} \Pi \frac{H}{2} (\frac{C}{2\Pi})^2$. The regression equation of weight on the estimated volume was determined to be, $W = 1.1 + 1.65\ V$. This equation was then used to estimate the weight of other trees. For each tree, the dead branches

were weighed and the percentage of dead wood (PDW) to the estimated total weight was calculated. Multiple regressions of W on C and H, and that of W on C^2 and H were also tried resulting in poorer fits. Regarding the number of fruits, two separate adjustments were made using the analysis of covariance: one for the variation in the previous year's fruit number (PFN) and another one for variations both in PFN and PDW.

RESULTS AND DISCUSSION

Mean separations for PDW, number of fruits adjusted for PFN and number of fruits adjusted for PFN and PDW are presented in Table 1. The results showed a significant decrease in fruit number due to GA_3 application and an increase in PDW at 1000 ppm. The significant difference among the number of fruits adjusted for PFN and PDW indicated that the reduction in fruit number was due to the direct effect of GA_3 rather than to its indirect effect through an increase in the amount of dead wood. Adverse effects of GA_3 on all the three stages of flower bud initiation, differentiation and development have been reported (6). Mode of application had a significant effect on PDW. There seems to be an increase in winter injury due to late application of GA_3. This is expected from the delay in leaf yellowing with later applications (4). There was also a significant interaction between GA_3 concentration and mode of application, with response to concentration being much higher in the cases of treatments with later dates (Fig. 1). Correlation coefficients between the days to leaf yellowing and fruit number (adjusted for PFN and PDW), and days to leaf yellowing and PDW were -0.59 and 0.56 respectively; both being significant at 1% level. From the results of the original experiment (4) and the follow up study, it can be concluded that, as far as fruit cracking is concerned, GA_3 concentration is a more determining factor. Time of application, however, should also be considered, especially

Table 1. Mean separations for the percentage of dead wood (PDW), number of fruits adjusted for the variation in the previous year's fruit number (PFN), and number of fruits adjusted for PFN as well as PDW, using the analysis of covariance.

Source of variation	PDW	Fruit No. adjusted for PFN	Fruit No. adjusted for PFN & PDW
Concentration (ppm)			
0	2.3b*	57a	55a
250	3.8b	38b	36b
500	6.3b	26bc	25bc
1000	21.5a	12c	16c
Mode of application			
applied on June 26	5.8ab	28	27
applied on July 27	6.0ab	28	27
applied on Aug. 27	19.1a	41	45
½ dose applied on June 26 & ½ on July 27	1.8b	38	36
½ dose applied on June 26 & ½ on Aug. 27	5.8ab	26	24
½ dose applied on July 27 & ½ on Aug. 27	12.1ab	38	40

*Means followed by the same letter are not significantly different using Scheffe's test.

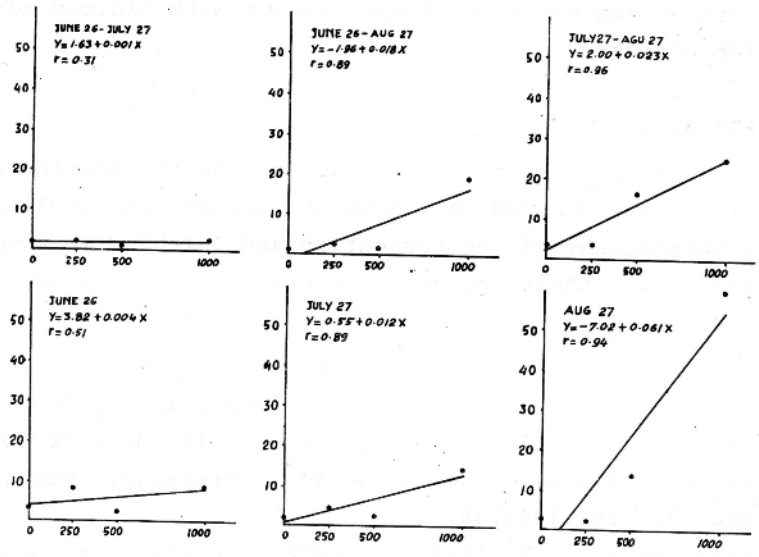

Fig. 1. Regression of percent dead wood on GA_3 concentration (ppm) for different modes of application.

with respect to the severity of winter injury as well as the percent of sunburned and undeveloped fruits. Early applications caused an increase in percentage of undeveloped fruits (4), whereas late applications resulted in winter injury. Applications during the hot month such as those involving the July 5th treatments increased the percentage of sunburned fruits (4). Thus it seems that attempts should be made to determine the minimum GA_3 concentration that can control fruit cracking and the time of application with minimum adverse side effects.

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