

NOTE

EFFECT OF GIBBERELIC ACID ON FRUIT CRACKING IN MEYKHOSH POMEGRANATE¹

H. Sharifi and A. Sepahi²

ABSTRACT

Twenty four treatments resulting from a factorial combination of four gibberellic acid (GA_3) concentrations of 0, 250, 500 and 1000 ppm and six modes of application were tried on pomegranate (*Punica granatum* L.) trees to control fruit cracking. GA_3 prevented fruit cracking with no significant difference among concentrations and modes of application. There was a delay in leaf yellowing and abscission due to GA_3 application. The delay was more pronounced with higher dosages and later dates of application.

تحقیقات کشاورزی ایران .

جلد سوم شماره دوم ۱۳۶۳

اثر اسیدجبرالیک روی ترکیدگی انار رقم " میخوش "

حبیب‌الله شریفی و علیرضا سپاهی

استادیاران باغبانی و اصلاح نباتات گروه زیست‌شناسی دانشگاه اصفهان

خلاصه

بیست و چهار تیمار ناشی از ترکیب فاکتوریل چهار غلظت اسیدجبرالیک شامل صفر، ۲۵۰، ۵۰۰ و ۱۰۰۰ قسمت در میلیون با شش روش هورمون پاشی جهت جلوگیری از ترکیدگی انار مورد بررسی قرار گرفت. اسیدجبرالیک از ترکیدگی جلوگیری نمود ولی بین غلظتها و همچنین بین روشهای هورمون پاشی اختلاف معنی داری مشاهده نشد. زرد شدن برگها و برگ ریزان درختها در اثر هورمون پاشی بتعویق افتاد و این تاخیر با غلظت های بالاتر هورمون و تاریخ های دیرتر هورمون پاشی زیادتر گردید.

1. Contribution from the Department of Biology, University of Isfahan, Iran. Received 7 August 1984.

2. Assistant Professors of Horticulture and Plant Breeding, respectively.

INTRODUCTION

Fruit cracking is one of the most important problems in the production of pomegranates (*Punica granatum* L.). Pant (3) and Josan *et al.* (2) reported 63% and up to 76.6% cracking, respectively. Increase in air temperature (3), irregularity in watering and lack of moisture (4), wide variation in the soil moisture content and air humidity as well as boron deficiency (6) and cultivar differences (5) have been mentioned as causes of pomegranate cracking. Plamenac (5) reported a range of 6.5 to 38.0% cracking depending on different cultivars, while Josan *et al.* (2) showed even a wider range of 3.6 to 76.6%. Josan *et al.* also showed that no cultivar was free from this problem. The severity of cracking also varied with year and a range of 6.3 to 47.6% was reported (5).

Little work, if any, has been done on this problem in Iranian Universities (1) or elsewhere. The present experiment was conducted to study the effect of gibberellic acid (GA_3) on cracking.

MATERIALS AND METHODS

Twenty four treatments resulting from a factorial combination of two factors: concentration of GA_3 with 4 levels and mode of application with 6 levels, were applied to pomegranate trees of a cultivar locally known as Meykhosh in a 5-year old orchard near Natanz, in the summer of 1983. The GA_3 concentrations were: (a) 0, (b) 250, (c) 500 and (d) 1000 ppm. The modes of application were: (a) one application on June 26, (b) one application on July 27, (c) one application on August 27, (d) half of the hormone applied on June 26 and the other half on July 27, (e) half of the hormone applied on June 26 and the other half on August 27 and (f) half of the hormone applied on July 27 and the other half on August 27. A washing up

liquid at the rate of 0.1% was used as wetting agent. In the case of controls only a solution of the wetting agent was applied. Due to lack of previous knowledge on the varietal uniformity in the orchard, the treatments were applied to the single-tree-plots according to a completely randomized design with 12 replications, intending to eliminate the data from the off-types. The pomegranates were harvested on October 27.

RESULTS AND DISCUSSION

Mean separations for the different characteristics, based on the Student-Neuman-Keuhl's test at 5% level, are presented in Table 1 and the simple correlation coefficients between the characteristics are shown in Table 2.

The results indicated a substantial decrease in % cracking by GA_3 application but with no significant difference between concentrations. There was an increase in % of sunburned fruits, a delay in leaf yellowing (days from harvest) and a decrease in refractometer reading of the juice with increase in GA_3 concentration. The hormone caused a substantial increase in % of undeveloped fruits.

Mode of application had no significant effect on % cracking; however, treatments involving the June 26 application resulted in a higher number of undeveloped fruits. It seems that early application of the hormone prevented the abscission of the late flowers, thus increased the number of undeveloped fruits. Early application also resulted in an increase in the thickness of the skin. However, because of non-significant correlation between skin thickness and % cracking ($r = 0.11$) it may be concluded that GA_3 reduced cracking by increasing the elasticity of the skin rather than increasing its thickness. There was a delay in leaf yellowing with late application of GA_3 . From the negative correlation between date of leaf yellowing and refractometer reading it

Table 1. Mean separations at 5% level for different characteristics of pomegranates treated with GA₃. For the first three characteristics mean separations were done on the transformed data but the results are presented in the original form.

Source of variation	Cracking %	Sunburned %	Undeveloped fruits %	Days to leaf yellowing	Skin in percent of fruit	Refracto- meter reading
Concentration (ppm)						
0	16.5a*	2.7c	6.0b	4.5d		16.86a
250	2.0b	9.9b	26.1a	22.6c		16.80ab
500	0.5b	11.1ab	26.6a	30.5b		16.67ab
1000	0.6b	12.9a	30.5a	33.4a		16.40b
Mode of application						
applied on June 26	4.9b	6.1b	37.7a	15.6c	44.9a	
applied on July 27	6.0b	11.2a	6.3b	23.4a	44.8a	
applied on Aug. 27	3.9b	7.1b	5.2b	26.3a	40.7b	
$\frac{1}{2}$ dose applied on June 26 & $\frac{1}{2}$ on July 27	5.8b	10.6a	37.2a	19.0b	44.3a	
$\frac{1}{2}$ dose applied on June 26 & $\frac{1}{2}$ on Aug. 27	3.4b	8.0ab	38.5a	25.8a	40.9b	
$\frac{1}{2}$ dose applied on July 27 & $\frac{1}{2}$ on Aug. 27	5.4b	11.9a	8.9b	26.7a	38.1b	

* Means followed by the same letter are not significantly different using the Student-Newman-Keuhl's test.

Table 2. Correlation coefficients between characteristics of pomegranate trees and fruits after GA₃ application.

	Sunburned %	Undeveloped fruits %	Days of leaf yellowing	Skin in percent of fruit	Juice in percent of berry	Refractometer reading
Cracking (%)	-0.80**	-0.38 NS	-0.94**	0.11 NS	0.36 NS	0.31 NS
Sunburned (%)		0.25 NS	0.80**	0.00 NS	-0.30 NS	-0.36 NS
Undeveloped fruit (%)			0.19 NS	0.24 NS	-0.20 NS	0.28 NS
Days to leaf yellowing				-0.19 NS	-0.35 NS	-0.48*
Skin in percent of fruit					0.00 NS	0.26 NS
Juice in percent of berry						-0.32 NS

** Significant at 1% level

* Significant at 5% level

NS Not significant

can be concluded that fruit maturity was delayed due to GA₃ application. However, a reasonable delay in leaf yellowing could result in higher yield, whereas excessive delay might cause winter injury. Neither concentration nor mode of application had any effect on the amount of juice in fruit.

Further research including use of lower GA₃ concentration is needed to determine the mechanisms and the means of prevention of pomegranate cracking.

ACKNOWLEDGEMENT

The authors express their appreciations to the Foundation of the Oppressed (Bonyadeh Mostazaffan) for providing them with a pomegranate orchard for this experiment. They would also like to thank Mr. Mohammad Ali Haghighi and Mr. Enayatollah Delfani, technicians of the Foundation and Isfahan University respectively, for their valuable assistance in conducting the experiment.

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