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EFFECT OF GIBBERELLIC ACID ON THE FRUIT SIZE OF VARIOUS CITRUS VARIETIES

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Little effect of GA on the size of citrus fruits like Kinnow, Blood Red, Pine Apple and Valencia Late was noticed by applying three sprays 10, 50 and 100 ppm of its concentrations at three intervals of 30, 45 and 60 days from the flowering stage onward. The use of GA for commercial purposes, therefore, requires further studies.

INTRODUCTION

The effect of Gibberellic acid, and many other growth regulating substances on the fruit size is well established (Coggins *et al.* 1958, Robert *et al.* 1958, Krimbas *et al.* 1959, Crane and Grossi 1960, Weaver 1960, Katar *et al.* 1960, Zuravel *et al.* 1960, Modibowska 1960). However, Liebster and Kettner (1959) and Saleh (1960) did not observe any effect of different doses of gibberellic acid on various apple, pear and strawberry varieties. The present study deals with the effect of various concentrations of gibberellic acid on the fruit size development of various sweet orange and mandarin varieties in this region.

MATERIALS AND METHODS

Nine plants of each variety of Kinnow mandarin, Pine Apple, Blood Red and Valencia Late sweet oranges were selected at random from the Experimental Fruit Garden, University of Agriculture, Lyallpur. Four branches on each of three trees of every variety were sprayed three times with four concentrations of GA i.e., control, 10, 50 and 100 ppm from the flowering stage. Three plants of each variety were sprayed at three intervals of 30 days, 45 days and 60 days separately.

Measured quantities of Gibberellic acid were dissolved in a few drops of 95 per cent ethyl alcohol and then the volume was made up with distilled water according to each concentration used. Every time new solution was prepared for using at different intervals. The plants were sprayed with hand automizer during the mid-day to ensure its complete effect on plant parts. The adjoining shoots were kept unaffected by this chemical by providing a card board in between the two shoots.

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The experiment was laid out according to complex design. There were four treatments on each plant. Three plants of each variety were selected separately for three intervals.

Six fruits on each branch were selected at random and their length and diameter were recorded. The average fruit size was calculated for statistical interpretations in each treatment.

RESULTS AND DISCUSSION

The results below describe the effects of application of four concentrations at three intervals on three sweet orange and one mandarine variety.

Data on average fruit size, as mentioned in Table 1, have indicated that statistically insignificant effects were obtained on Kinnow, Blood Red and Valencia Late varieties. In case of Pine Apple variety, however, 100 ppm gibberelline applied at 45 days interval proved better than other treatments but it was at par with the control (Table 2). In other cases the untreated fruit proved better than some of the treated ones (Tables 1 and 2). Liebster and Kettner (1959), Robert *et al.* (1959, Saleh (1960), and Kater *et al.* (1960) have also noted that Gibberellic acid did not affect fruit size. Krimbas *et al.* (1960), Smith (1960), Weaver (1960) and Zuravel *et al.* (1960) claimed that Gibberellic acid has given positive effects. Still other workers like Mosolova *et al.* (1959), and Crane and Grossi (1960) have achieved even negative effects of gibberellin applications. Moreover, Coggins *et al.* (1951) showed negative as well as no effect in various citrus fruits.

The present studies show that G.A. applications had increased the fruit size in some cases, decreased in others while it did not affect few of them at all which agrees with the already referred findings of various research workers studying responses of G. A. in different plant species. These different responses of various plant species to G.A. could be explained on the grounds of their diversified genetic constitution. In the present studies the varieties of the same species of *Citrus sinensis* Osbeck have also shown different responses to G.A. treatments which indicate the varied effects of GA on plants even possessing minor genetic variations. It is suggested that controlled soil and climatic conditions, proper time and amount of application of GA may be required to have all its merits and demerits on the fruit size development of vairous fruit crops before recommending future use of GA in the fruit industry.

TABLE 1. *Average fruit size (cm) of the four varieties under different concentrations of GA and intervals of application*

Treatments	Kinnow	Pine Apple	Blood Red	Valencia Late
C_2	3.28	C_3 4.38	C_3 4.47	C_2 4.09
C_3	3.21	C_4 4.26	C_1 4.40	C_3 3.99
C_1	3.19	C_1 4.23	C_2 4.39	C_1 3.97
C_4	2.95	C_2 4.21	C_4 4.13	C_4 3.78
SE	0.44	SE 0.06	SE 0.44	SE 0.35
I_2	3.18	I_2 4.52	I_1 4.50	I_1 4.09
I_1	3.13	I_3 4.28	I_2 4.42	I_2 3.95
I_3	3.08	I_1 4.02	I_3 4.12	I_3 3.91
SE	0.37	C.D.1 .15 C.D.2 .20	SE .39	SE .28

SE = Standard Error
C.D.1 = At 5 per cent level
C.D.2 = At 1 per cent level

Concentrations : C_1 = 10 ppm. C_2 = 50 ppm. C_3 = 100 ppm. C_4 = Control

Interval :
I_1 = Three sprays were repeated after one month.
I_2 = Three sprays were repeated after one and a half month.
I_3 = Three sprays were repeated after two months.

TABLE 2. *Average fruit size (cm) under different interactions of concentrations of GA and intervals of application*

Interactions	Kinnow	Pine Apple	Blood Red	Valencia Late
C_3 I_3	3.39	C_3 I_2 4.62	C_1 I_2 4.64	C_2 I_1 3.23
C_1 I_1	3.36	C_4 I_2 4.52	C_3 I_1 4.58	C_3 I_1 4.20
C_1 I_2	3.21	C_1 I_2 4.49	C_1 I_1 4.54	C_1 I_2 4.20
C_2 I_1	3.19	C_2 I_2 4.44	C_2 I_1 4.49	C_2 I_2 4.19
C_3 I_2	3.18	C_3 I_3 4.38	C_2 I_2 4.43	C_3 I_3 4.13
C_2 I_2	3.18	C_1 I_3 4.29	C_3 I_3 4.41	C_1 I_1 4.96
C_4 I_2	3.13	C_4 I_3 4.28	C_4 I_1 4.40	C_4 I_1 3.94
C_2 I_3	3.13	C_2 I_3 4.14	C_2 I_2 4.38	C_4 I_3 3.89
C_3 I_1	3.03	C_3 I_1 4.14	C_2 I_3 4.29	C_2 I_3 3.86
C_1 I_3	2.99	C_3 I_1 4.05	C_4 I_2 4.23	C_4 I_2 3.76
C_4 I_1	2.93	C_4 I_1 3.96	C_1 I_3 4.00	C_1 I_3 3.75
C_4 I_3	2.81	C_1 I_1 3.90	C_4 I_3 3.74	C_3 I_2 3.64
SE	.74	C.D.1 .29 C.D.2 .39	SE .86	SE .02
CxI		CxI		CxI

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