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CONTROL OF FRUIT DROP IN PINEAPPLE SWEET ORANGE WITH THE USE OF GROWTH REGULATORS

A.U. Malik. M. N. Malik, M. I. Chaudhry & M. Ashfaq*

Department of Horticulture,
University of Agriculture, Faisalabad.
**Entomological Section Ayub Agricultural*
Research Institute, Faisalabad

Growth regulating substances (2, 4-D, GA_3 and planofix) were applied in different doses to minimize the fruit drop in Pineapple, sweet orange. The summer or June drop was reduced significantly by all the treatments except 2, 4-D (20 ppm) and GA_3 (10 ppm), while pre-harvest drop was significantly checked by 10 and 20 ppm 2, 4-D. An overall best results were obtained by 10 ppm, 2, 4-D (12.5%) and 300 ppm planofix (14.4%) compared to the control (25.5%). High concentration tended to produce larger fruits. The GA_3 treatments induced roughness of fruit rind while planofix induced smoothness with better juice contents.

INTRODUCTION

In Pineapple cultivars, almost 6% of the total bloom, set fruit and only 11% of it reach to maturity (Choudhry and Malik, 1988). Since the first report of Gardner (1941) about NAA in controlling fruit drop in sweet orange, research work is undergoing to find out the most effective chemicals and their concentrations for controlling fruit drops. The present studies were intended to test different growth regulators in this regard under Faisalabad conditions during 1987.

Ali and Rashid (1964) were successful in minimizing pre-harvest fruit drop in Kinnow mandarin with 10-20 ppm 2, 4-D and 15-20 ppm of NAA spray two months before harvest. Daulta and Beniwal (1983) observed fruit weight of 178 g with GA_3 and with 2, 4-D at 10 ppm of 177 with juice of 51.8 and 53.3%, respectively in Campbell Valencia orange.

MATERIALS AND METHODS

Uniform trees of Pineapple sweet orange in the Experimental Fruit Garden Department of Horticulture, University of Agriculture, Faisalabad furnished the experimental material for these research studies. The growth regulating substances included: 2, 4-Dichlorophenoxy acetic acid (2, 4-D) gibberellic acid (GA_3) and planofix-(A commercial product containing 1-napthyl-acetic acid, NAA).

Experiment was designed according to Randomized Complete Block Design (Steel and Torrie, 1980) consisting three replications.

The treatments were control, 10, 15 and 20 ppm spray of 2, 4-D and GA_3 or 250 and 300 ppm planofix.

The dropped fruit at pre-harvest stage were denoted by T_9 for comparing fruit characters.

Six branches of uniform size, (4.5 - 5.5 cm in diameter) were selected on each tree keeping two branches at random as an experimental unit. Plants were sprayed 10-15 days before probable time of heavy droppage, i.e. June drop and pre-harvest drop. First spray was carried on May 1 and second on September 1. Fruit drop was observed from May 1 to October 30 while fruit analysis was accomplished in June and October at June and pre-harvest fruit drop stage, respectively.

and 4.6, respectively. Stylar-end decay and fruit splitting could be the main causes of fruit drop while day-night temperature fluctuations between 28 to 40°C along with high rain fall (86.2 mm) and relative humidity (62.6%) might be the other contributing factors (Levitt 1964). At pre-harvest stage 10 and 20 ppm 2, 4-D showed the least fruit drop of 2.4 and 2.6%, respectively. A fairly good amount of fruit was destroyed by fruit fly during September-October. An overall best results for total fruit drop control were

Table 1. Tree picked vs dropped fruit at June drop stage

Kind of fruit	Weight (g)	Size (cm)	Peel thickness (cm)	Weight of peel (%)	Weight of pulp (%)	Juice content (%)	Number of healthy seed/fruit	Aborted seed (%)
Tree picked	60.8 a	4.8 a	0.4	29.3 a	43.5 b	27.2 a	3.3 a	54.6 a
Dropped	38.3 b	4.0 b	0.3	27.5 b	49.5 a	23.0 b	1.6 b	79.3 b

Any two means not sharing a letter in common are different significantly at 5% probability.

Data on June drop, post June drop, pre-harvest drop and total fruit drop were collected. Physical characteristics such as fruit weight, fruit size, weight of peel and pulp, thickness of peel, weight of juice and total and mean number of healthy seeds fruit^{-1} were also observed.

RESULTS AND DISCUSSION

The results (Fig. 1) pertaining to fruit drop showed that application of 300 ppm planofix reduced June drop and thus the lowest fruit drop (6%) was recorded compared to the highest (11.1%) in the control. The GA_3 @ 20 ppm and 2, 4-D @ 10 ppm showed better performance than the others. At post-June interval (July-August), minimum fruit drop was observed with 10 ppm 2, 4-D and 250 ppm planofix sprays, i.e. 4.2

obtained for 10 ppm 2, 4-D (12.5) and 300 ppm planofix (14.4) compared to the control (12.5). These results are in agreement with those of Ali and Rashid (1964).

Fruit analysis at June drop stage (Table 1) showed that tree picked fruit were more in weight and size compared to dropped fruit. Peel thickness and weight were also more in tree picked fruit. While pulp was significantly more in dropped fruit (49.5%) against that for tree picked (43.5%). Although total number of seeds (health + degenerated + aborted) in dropped fruit were more but the mean number of healthy seeds fruit^{-1} were significantly more in tree picked fruit (3.4) than dropped (1.6). Early fruit drop appeared to be related with less viable seeds in fruits.

At pre-harvest drop stage (Table 2) observations recorded on fruit weight, size,

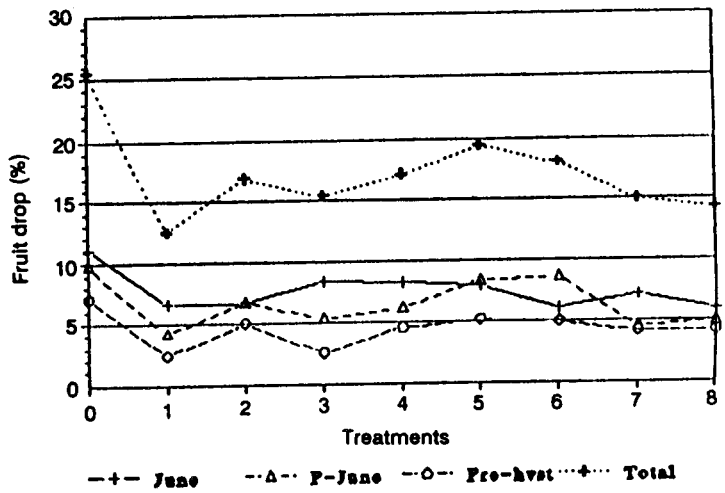

Fig. 1. Effect of growth regulators on fruit drop in sweet orange cv. Pineapple

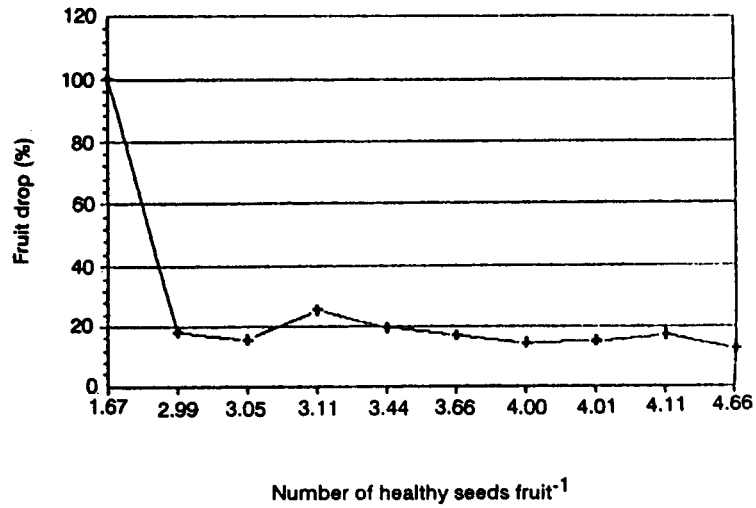

Fig. 2. Fruit drop in sweet orange cv. Pineapple as affected by mean number of healthy seeds.

Table 2. Effect of growth regulators on some physical characteristics of Pineapple sweet orange

Treatment	Fruit weight (g)	Peel thickness (cm)	Juice content (%)	Number of healthy seed/fruit
Control	120.5 de	0.45 bc	49.6	3.1 ab
2, 4-D (10 ppm)	128.1 cde	0.41 cd	49.9	4.7 a
2, 4-D (15 ppm)	139.7 bcd	0.48 bc	51.1	3.7 a
2, 4-D (20 ppm)	149.5 abc	0.50 abc	50.1	3.1 ab
GA3 (10 ppm)	135.4 bcde	0.51 ab	52.4	4.1 a
GA3 (15 ppm)	160.7 ab	0.62 ab	51.4	3.4 a
GA3 (20 ppm)	166.3 a	0.57 a	48.8	3.0 ab
Planofix (250 ppm)	144 abcd	0.49 abc	52.2	4.0 a
Planofix (300 ppm)	150 abc	0.45 bc	54.1	4.0 a
Dropped fruit	110 e	0.35 d	41.7	1.7 b

Any two means not sharing a letter in common differ significantly at 5% probability.

peel thickness, weight of peel, juice and seed content revealed that dropped fruit had lesser values compared to the intact fruit. However, non-significant difference in peel, pulp and juice contents between the two types of fruit was found. Maximum aborted seeds (82.8%) were observed for dropped fruit. The fruit weight and size increased linearly with increasing concentrations of growth regulators. Maximum fruit weight, size, and peel thickness was observed with 20 ppm GA_3 with a peel thickness of 0.57 cm while minimum peel thickness (0.41 cm) and peel (19.7%) was recorded for 10 ppm 2, 4-D. Earlier, Daulta and Beniwal (1983) obtained similar results with GA_3 application. Maximum juice (54.1%) was extracted from fruit sprayed with 300 ppm planofix. Total number of seeds were more in control but healthy seeds were maximum (4.7) in the fruits sprayed with 10 ppm 2, 4-D.

Total fruit drop was found associated with mean number of healthy seeds $fruit^{-1}$. Fruit having 1.7 or less number of healthy seeds were dropped while the fruit with 4 or slightly more were less liable to drop and expected to persist in position till ripening (Fig. 2).

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