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Studies on control of fruit drop in Kinnow

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Abstract

The present experiment was carried out during 2021-22 in Central Horticulture Research Farm of Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design with 8 treatment replicated thrice. The treatments were T₀ (Control), T₁ (2,4-D 10 ppm), T₂ (2,4-D 15 ppm), T₃ (2,4-D 20 ppm), T₄ (GA₃ 5 ppm), T₅ (GA₃ 10 ppm), T₆ (K₂SO₄ (1%)), T₇ (K₂SO₄ (2%)). On the basis of experimental finding it was found that the treatment T₅ (GA₃ 10 ppm) was found to be the best in the terms of Highest Number of flowers, Maximum Fruit set %, Minimum Fruit Drop %, Fruit Retention %, weight of fruit, Yield of fruit per plant and per hectare and quality parameters like TSS, Ascorbic acid, Titrable acidity and juice content.

Keywords: Kinnow, fruit drop, 2,4-D, GA₃, fruit drop control

Introduction

Citrus is an important genus of the family Rutaceae in the plant kingdom. Its importance is demonstrated by its wide distribution and large-scale production. It is highly prized and economically remunerative fruit. Citrus fruits have special importance due to their distinct flavors and therapeutic values. These are rich in vitamin-C with fair amounts of vitamins A & B. Besides this, they are rich source of minerals (calcium, phosphorus and iron). The juice is very refreshing, delicious and soothing (Ahmed *et al.*, 2007) [7]. Along with their consumption as fresh fruit, a large number of products and by-products are prepared and marketed with premium price (Niaz *et al.*, 2004) [25]. Citrus production is 108 million tons in the world. Brazil is the largest producer of citrus worldwide followed by USA, China and Mexico. Pakistan is among the top thirteen citrus producing countries of the world. In the country citrus is cultivated over an area of 185, 000 hectares with an annual production of 1.67 MT tones (Anon., 2005) [8]. Citrus fruits hold first position in production and have a share of about 34% in total fruit production of the country; over 93% of the total cultivated area for citrus in Punjab is under Kinnow mandarin. Kinnow is commercially cultivated due to its good yield, high Kinnow - a mandarin hybrid (*Citrus nobilis* Lour. × *Citrus deliciosa* Tan.), has become an important variety in the Punjab provinces of both India and Pakistan, occupying a major part of the area under cultivation for fruit crops. It has assumed a special economic importance and export demand due to its high juice content, special flavour, and as a rich source of vitamin C, the factors which have contributed to the success of this fruit are its beautiful golden-orange colour its abundant juice, and its excellent aroma and taste. It is a well-established fact that deficiency of K deteriorates vegetative growth, quality and production of fruit and causes heavy flower and fruit drop, which resulted in production of poor quality fruit coupled with yield losses. Among the micronutrients, zinc deficiency is the most widespread which alone occupies eleven percent of the cultivated area in India. Foliar spray of zinc sulphate (0.5%) improved the general condition of the Kinnow plants and decreases the die-back of twigs and leaf chlorosis. Although, few reports on effect of potassium and 2,4-D on fruit drop, fruit size and yield are there, however the effect of foliar application of 2,4-D along with potassium nitrate and zinc sulphate on fruit size of Kinnow has not been evaluated.

There are three types of fruit drop reported in the citrus spp. which are as follows

Post-bloom drop: This fruit drop starts soon after flowering and lead to falling of very small fruits. This drop is due to natural over-production and is not of much concern to the grower.

Summer or June drop: This fruit drop commences approximately one to two months after bloom, young developing fruit abscise from trees with excessive fruit set in June consisting of about 10 percent of the total dropped fruits.

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Pre-mature and pre-harvest fruit drop: Pre-mature and pre-harvest fruit drop, is the dropping of almost mature to harvestable fruits. Drop occurs at the peduncle and calyx junction, leading to fruit drop without the peduncle attached.

Materials and Method

The area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46 °C-48 °C and seldom falls as low as 4 °C- 5 °C. The relative humidity ranges between 20 to 94%. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

The experiment was conducted in Randomized Block Design with 8 treatment replicated thrice. The treatments were T₀ (Control), T₁ (2,4-D 10 ppm), T₂ (2,4-D 15 ppm), T₃ (2,4D 20 ppm), T₄ (GA₃ 5 ppm), T₅ (GA₃ 10 ppm), T₆ (K₂SO₄ (1%)), T₇ (K₂SO₄ (2%)).

Experimental Findings

The maximum number of flower per plant was found in the treatment T₅ (GA₃ 10 ppm) with (270.76) followed by treatment T₃ (2,4D 20 ppm) with (265.98) and the minimum number of flower was observed in T₀ (Control) with (198.68).

The maximum fruit set % per plant was found in the treatment T₅ (GA₃ 10 ppm) with (29.62%) followed by treatment T₃ (2,4D 20 ppm) with (27.35%) and the minimum fruit set % was observed in T₀ (Control) with (19.35 %).

The minimum fruit drop % per plant was found in the treatment T₅ (GA₃ 10 ppm) with (70.38%) followed by treatment T₃ (2,4D 20 ppm) with (72.65%) and the maximum fruit drop % was observed in T₀ (Control) with (80.65%).

The maximum fruit retention % per plant was found in the

treatment T₅ (GA₃ 10 ppm) with (15.68%) followed by treatment T₃ (2,4D 20 ppm) with (14.35%) and the minimum fruit retention % was observed in T₀ (Control) with (10.35%). The maximum fruit weight was found in the treatment T₅ (GA₃ 10 ppm) with (160.83 g) followed by treatment T₃ (2,4D 20 ppm) with (149.50 g) and the minimum fruit weight was observed in T₀ (Control) with (128.24 g).

The maximum fruit yield per plant (kg) was found in the treatment T₅ (GA₃ 10 ppm) with (45.65 kg) followed by treatment T₃ (2,4D 20 ppm) with (44.35 kg) and the minimum fruit yield per plant (kg) was observed in T₀ (Control) with (39.46 kg).

The maximum fruit yield per hectare (q) was found in the treatment T₅ (GA₃ 10 ppm) with (18.26) followed by treatment T₃ (2,4D 20 ppm) with (17.74) and the minimum fruit yield per hectare (q) was observed in T₀ (Control) with (15.71).

The maximum TSS (⁰B) was found in the treatment T₅ (GA₃ 10 ppm) with (12.41) followed by treatment T₃ (2,4D 20 ppm) with (12.35) and the minimum TSS (⁰B) was observed in T₀ (Control) with (11.21).

The maximum Vitamin C (mg/100g) was found in the treatment T₅ (GA₃ 10 ppm) with (28.64) followed by treatment T₃ (2,4D 20 ppm) with (27.95) and the minimum Vitamin C (mg/100g) was observed in T₀ (Control) with (24.65).

The minimum Titrable acidity % was found in the treatment T₅ (GA₃ 10 ppm) with (0.95%) followed by treatment T₃ (2,4D 20 ppm) with (1.00) and the maximum Titrable acidity % was observed in T₀ (Control) with (1.05).

The maximum Juice content % was found in the treatment T₅ (GA₃ 10 ppm) with (49.85) followed by treatment T₃ (2,4D 20 ppm) with (46.35) and the minimum Juice content % was observed in T₀ (Control) with (36.26%).

Table 1: Effect of different treatment on Number of flowers of Kinnow, fruit set %, fruit drop%, fruit retention %, fruit weight, fruit yield/plant and per hectare, TSS, Ascorbic acid, titrable acidity and Juice content

Symbol	Treatment	No. of Flowers	Fruit set %	Fruit drop %	Fruit retention %	Fruit weight (g)	Fruit Yield/plant (kg)	Fruit yield / ha (Qt).	TSS (⁰ Brix).	Vitamin C (mg/100g)	Titrable Acidity %	Juice content %
T ₀	Control	198.68	19.35	80.65	10.35	128.24	39.46	15.71	11.21	24.65	1.05	36.26
T ₁	2,4-D 10 ppm	238.46	21.81	73.49	11.49	137.00	41.38	16.5	11.62	26.15	1.01	40.35
T ₂	2,4-D 15 ppm	219.67	25.81	74.19	12.65	136.50	42.19	16.87	11.49	27.35	1.03	42.16
T ₃	2,4D 20 ppm	265.98	27.35	72.65	14.35	149.50	44.35	17.74	12.35	27.95	1.00	46.35
T ₄	GA ₃ 5 ppm	260.49	23.72	76.28	13.59	143.00	42.65	17.06	12.15	25.31	1.04	43.61
T ₅	GA ₃ 10 ppm	270.76	29.62	70.38	15.68	160.83	45.65	18.26	12.41	28.64	0.95	49.85
T ₆	K ₂ SO ₄ 1%	245.91	22.09	77.91	12.95	141.83	43.29	17.31	12.26	26.45	1.02	45.32
T ₇	K ₂ SO ₄ 2%	251.65	26.51	78.19	12.09	139.65	43.91	17.56	12.09	27.19	1.03	44.28
	F Test	S	S	S	S	S	S	S	S	S	S	S
	C.D. @5%	5.691	2.354	3.591	2.651	4.06	2.389	1.452	0.952	1.465	0.06	2.654
	S.Ed	2.756	1.152	1.628	1.325	2.03	1.165	0.726	0.421	0.7268	0.021	1.295

Conclusion

On the basis of experimental finding it was concluded that the treatment T₅ (GA₃ 10 ppm) was found to be the best in the terms of Highest Number of flowers, Maximum Fruit set %, Minimum Fruit Drop %, Fruit Retention %, weight of fruit, Yield of fruit per plant and per hectare and quality parameters like TSS, Ascorbic acid, Titrable acidity and juice content.

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