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## Effect of Femigrow on fruit growth and quality of apple cv. Red Delicious

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#### Abstract

A field investigation was conducted at AARC - Shopian, to study about the effect of exogenous application of herbal formulation named Femi grow on fruit set, yield and quality of Apple (cv. Red Delicious) under temperate conditions of Kashmir. Among the distinctive treatments greatest number of flowers were recorded with T3 (73.89) and T2 (73.17) treatments. Most extreme fruit set of 33.56% was recorded with treatment T2 which was taken after by treatment T3 (31.60%). Most extreme fruit retention rate (80.21%) was gotten in T2. The most noteworthy fruit weight of 150.87 g and fruit yield of 74.37 kg/tree was recorded with treatment T3. The maximum fruit length of 68.27 mm and fruit breadth of 67.71 mm was recorded with T3. Maximum fruit firmness was too recorded in T3 (13.62lbs). The information uncovered that greatest TSS of 14.79 °B and 14.43°B were gotten with lower concentration of chemical. No phototoxic side effects were recorded amid the course of examination on fruit or plant. No significant differences were observed among the treatments with respect to colour. However, maximum fruit colour was observed with lower concentration of chemical.

**Keywords:** Femigrow, apple, fruit set, yield, quality

#### Introduction

Apple (*Malus domestica* Borkh.) is one of the foremost imperative tree fruits of the world has a place to the family Rosaceae and sub-family Pomoidae. Among the different varieties of apple developed within the valley "Red Delicious" involves major range under development and is considered as a great commercial assortment since of its in general quality, flavour and juice content. Orchard management hones especially the control of vegetative development (Gupta and Bist, 2005) [5], part of nutrition (Awasthi, 2001) [1] and part of plant bio-regulators (Forshey, 1981) having significant impact on yield are reasonable by the cultivators. Mineral nutrition influences crop production and fruit quality both directly and by implication (Bravdo *et al.*, 2000) [2] and a few components of fruit quality of rosaceous species (Habib *et al.*, 2000). Foliar nutrition of apple plantations with N, P, K, Ca, Mg, Zn and boron has been detailed to move forward tree efficiency (Doroshenko *et al.*, 2002) [3] and produce high quality fruits with higher yields (Stampar *et al.*, 2002) [11]. Foliar shower of CaCl<sub>2</sub> have appeared to extend fruit calcium concentration, decrease the rate of fruit disorders, increment cold hardness and yield of apple cultivars and especially in Delicious and Golden Delicious apples (Raese, 1996) [8]. Biostimulants are preparations of common beginning that support the pro-ecological development of vegetables and fruits. In spite of the fact that for a few a long time a positive effect of biostimulants has been broadly detailed, they are seldom presented into standard development technologies. Usually associated with the insufficient information of farmers on capacities and usage of biostimulants what comes about in a fear of an increment within the cost of cultivation and a decrease within the quality and amount of plants, which would affect the profitability of crops. The problem is additionally the huge number of preparations and have to be select appropriate biostimulant for a specific plant variety in arrange to get the most noteworthy and the most excellent quality yields. The market requires the improvement of preparations with a wide range of functionality, which is simple to apply and has the possibility of combination with other agents.

#### Materials and Methods

The experiment was carried out at AARC during 2017-18. The study was carried out on 20-22 years old apple plants cv. Red Delicious. Trees of uniform size, age and vigour were selected.

The selected plants were labeled and grouped into seven treatments having three replications under randomized block design. Plants were kept under uniform cultural operation including irrigation, fertilization, insect-pests and disease control during the entire period of investigation. Calculated dose of femigrow were applied as per the treatment details given in the table at different stages of crop growth. Fruits were harvested in the month of October.

Observations were recorded on different parameters of the vegetative, fruit physical and chemical characters. Total number of the fruits from an individual plant was counted at the time of harvesting. Yield from individual plants were calculated by weighing all the fruit of a single plant and

expressed in kg/plant. Five fruits from each replication were taken and weighed on the digital weighing balance and averaged value was worked out and expressed in grams. Same five fruits were taken for fruit length and breadth using a Vernier Caliper and averaged value was worked out and expressed in millimeters (mm). Total soluble solids ( $^{\circ}$ B) were measured with the help of refractometer. Fruit firmness was measured by penetrometer. Fruit colour was performed with visual estimation of ten fruits in a percentage form. Fruit set (%) was calculated as the ratio of total number of fruits per spur to the total number of flowers per spur (average of 50 blossoms) as follows

**Table 1:** The data generated from these investigations were appropriately computed, tabulated and were analyzed by applying Randomized Block Design Factorial (RBD)

Crop		Apple		
Variety	:	Red Delicious		
Year	:	2017/18		
Replications	:	3		
Treatments	:	4		
Age of plants	:	25 years		
Stage of crop at the time of application	:	1. 2 weeks before flowering (2WBF) 2. 2 weeks after flowering (2WAF)		
Method of application	:	Foliar spray		
Treatment details	:	S. No.	Treatment/stage of crop	Conc.
		T-1	2WBF 2WAF	1ml/l 1ml/l
		T-2	2WBF 2WAF	2ml/l 2ml/l
		T-3	2WBF 2WAF	3ml/l 3ml/l
		T4	Control	---
Observations recorded	:	1. Fruit Set 2. Fruit retention 3. Yield 4. Fruit Weight 5. Fruit Size 6. Fruit color 7. Firmness 8.TSS and 9. Phtotoxicity		

## Experimental Results

### No. of flowers/ branch length

Maximum number of flowers were observed with 3ml/l (73.89) and 2ml/l (73.17) of chemical sprays. However, they were at par with each other. Significantly low number of flowers were recorded in control (62.15). A similar trend was followed during the second year of investigation also with highest number of flowers in T2 and T3 treatments while lowest in control.

### Fruit set (%)

The perusal of data revealed significant difference in fruit set percentage among the different treatments. During course of testing, maximum fruit set of 33.56% was recorded with treatment T2 which was followed by treatment T3 (31.60%). T1, T2 and T3 were at par with each other, however, minimum fruit set of 23.51% was obtained in control. During 2018, the data revealed that maximum fruit set (32.17%) was recorded in T3 which was at par with T2 (31.08%), however

minimum fruit set of 21.11% was recorded in control and was significantly different from all other treatments.

### Fruit retention (%)

Maximum fruit retention percentage (80.21%) was obtained in T2 which was at par with T3 but highly significant than control. It was followed by T1. Minimum fruit retention of 70.15% was obtained in control. During second year of investigation (2018) the perusal of data revealed that T2 had maximum fruit retention (73.41%) and was at par with that of T3. Control had lowest fruit retention of 59.03% only.

### Fruit Weight (g)

The highest fruit weight of 150.87 g was recorded with treatment T3 and was at par with T1 and T2. However, all the treatments were significantly different from that of control which recorded least fruit weight of 138.50g. A similar trend as followed during the first year was followed during second year as well with respect to fruit weight.

**Table 2:** Effect of Femigrow on No. of flowers, fruit set, fruit retention, fruit weight and yield of Apple cv. Red Delicious

Treatments	No. of flowers		Fruit Set (%)		Fruit retention (%)		Fruit Weight (g)		Yield/plant (kg)	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
T <sub>1</sub> (1ml/l)	66.23	64.18	31.22	27.43	73.13	62.55	146.63	142.09	72.86	68.08
T <sub>2</sub> (2ml/l)	73.17	71.56	33.56	31.08	80.21	73.41	149.44	144.10	73.61	70.12
T <sub>3</sub> (3ml/l)	73.89	72.69	31.60	32.17	79.87	71.57	150.87	145.21	74.37	72.11
T <sub>4</sub> (control)	62.15	63.82	23.51	21.11	70.15	59.03	138.50	141.14	64.82	60.49
CD <sub>0.05</sub>	3.07	2.97	3.21	2.69	2.43	2.09	3.04	NS	3.53	2.47

**Yield (kg/tree):**

During the period of investigation, highest fruit yield of 74.37 kg/tree was obtained with the treatment T3, followed by treatment T2 and T1 which recorded fruit yield of 73.61 kg/tree and 72.86 kg/tree respectively. All these treatments

were at par with each other, however differed significantly from that of control (64.82 kg/tree). During 2018 maximum yield was obtained in T3 treatment (72.11 kg) which was at par with T2 (70.12kg). Control had least yield of 68.08kg/tree.

**Table 3:** Effect of Femigrow on fruit size, colour, firmness and TSS (<sup>0</sup>B) of Apple cv. Red Delicious

Treatments	Fruit Size (mm)				Fruit Colour (%)		Fruit firmness (lbs)		TSS ( <sup>0</sup> B)	
	L		B		2017	2018	2017	2018	2017	2018
	2017	2018	2017	2018						
T <sub>1</sub>	65.61	63.58	65.59	63.29	90.21	86.79	13.41	13.08	14.43	13.78
T <sub>2</sub>	68.00	66.83	66.48	64.25	88.18	85.23	13.57	13.23	14.79	14.02
T <sub>3</sub>	68.27	67.59	67.71	66.09	86.32	84.10	13.84	13.62	12.00	12.31
T <sub>4</sub>	60.15	61.30	60.84	61.06	87.01	84.00	10.59	11.67	13.97	13.52
CD (0.05)	2.07	1.89	1.94	1.68	NS	NS	1.07	1.13	0.54	0.63

**Fruit length (mm)**

The maximum fruit length of 68.27 mm was recorded with T3 which was at par with T2, whereas the control (Water spray) had fruit of length 60.15 mm. The data presented in table revealed that there is significant increase in fruit length with the chemical treatments in comparison with control. Similar trend was observed during second year of investigation as well with maximum fruit length in T3 (67.59 mm) which was at par with T2, whereas control had minimum fruit length (60.30mm) and was significantly different from all other treatments.

**Fruit breadth (mm)**

During the investigation, fruit breadth of 67.71 mm was obtained with treatment T3 and 66.48 mm with treatment T2, whereas the control (Water spray) had fruit of least breadth 60.84 mm. The data presented in table 3, revealed that there is significant increase in fruit breadth with the chemical treatments during course of testing in comparison with control. In second year of investigation T3 again had maximum fruit breadth of 66.09mm followed by T2 (64.25mm). Untreated fruits had minimum breadth of 61.06mm.

**Fruit Colour (%)**

No significant differences were observed among the treatments w.r.t. colour. However maximum fruit colour was observed with lower concentration of chemical. T1 recorded 90.21% while as least colour development was recorded with higher concentration of chemical (T3). Differences w.r.t fruit colour were non-significant among the treatments during the second year of investigation.

**Fruit Firmness (lbs.)**

The data revealed that the chemical sprays resulted in increased fruit firmness of 13.84, 13.5 lbs. and 13.41 with T3, T2 and T1 respectively, whereas, control had significantly low fruit firmness of 10.59lbs. The pooled data presented in table 3, revealed that treated fruits had maximum fruit firmness than untreated fruits indicating a positive impact of chemical in enhancing the fruit firmness. During 2018 maximum fruit firmness was observed in T3 (13.62lbs) and was at par with T1 and T2. However, control had least fruit firmness (11.67lbs).

**TSS (<sup>0</sup>B)**

The perusal of data revealed that maximum TSS of 14.79 0B

and 14.43 <sup>0</sup>B were obtained with lower conc. of chemical. However higher concentration reduced the TSS (12.00 <sup>0</sup>B) which was lower than that obtained in control (13.97<sup>0</sup>B). Second year observations revealed that TSS was significantly maximum in T2(14.02) while least TSS was observed in T3 (12.31).

**Phytotoxicity:** No phototoxic symptoms were observed during the course of investigation on fruit or plant.

**Discussion**

The application of a phytochemical specifically Femigrow expanded the flowering, fruit physical and quality parameters in apple cv. Red Delicious. Our comes about are in assention with those of Singh *et al.*, 2017 [10] who detailed that exogenous application of Femi-grow altogether expanded the overall number of blooms per inflorescence and diminished the male to female blossoms ratio. It moreover improved the rate fruit set, fruit weight, fruit length and seed as well oil yield. Roussos *et al.*, 2009 [9] detailed that the exogenous application of seaweed extracts additionally other plant development stimulators such as mixture of nitrophenolates, an auxin (phenothiol), gibberellic acid increment attractive yield and fruit estimate in Strawberry. Makwana *et al.*, 2010 [7] appeared that low measurements of GA3 diminished the male to female blooms proportion but higher dosage of GA3 expanded the male to female blossom proportion. Biostimulants can affect a number of the chemical properties of fruits and vegetables, including dry mass, acidity or vitamin content. The chemical composition of the fruit straight forwardly affects their palatability. It is accepted that fruits with a content of dissolved solids (SSC) over 12°Brix are characterized by a great taste (Grajkowski *et al.*, 2007) [4]. Bio stimulants too have an influence on mechanical properties, i.e., the firmness of fruits or vegetables. Depending on the type, bio stimulants may cause the stiffening of cell walls, thereby decreasing their extensibility. Bio stimulants that increase the flexibility of cell walls at the same time amplify the shelf-life of fruits and vegetables for consumption and facilitate their capacity. Bio stimulants based on carboxylic, humic, and fulvic acids additionally the biopolymers of polysaccharides expanded the mechanical quality of apricot fruits amid two a long time of bio stimulant utilize (Tarantino *et al.*, 2018) [12].

**Conclusion**

The chemical had significant impact on fruit set, fruit size,

fruit weight and firmness. The chemical sprayed at concentration 2 ml/l had significant impact on fruit quality characteristics. At 2ml/l concentration the results are encouraging and hence 2ml/l shall be economical to use to the farming community to harvest the benefits of the above tested chemical.

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