The Pharma Innovation Journal 2022; 11(6): 1114-1116

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(6): 1114-1116

www.thepharmajournal.com
Received: 18-03-2022
Accepted: 31-04-2022

ZA Bhat
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

TR Rather
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

Kounser Javeed
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

HU Itoo
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

Sheikh Khursheed
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

GH Rather
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

Shemoo Nisar
Division of Fruit Science, FOH, SKUAST, Kashmir, Jammu and Kashmir, India

Shahzad Ahmad Bhat
Division of Fruit science, FOH, SKUAST, Kashmir,

Qudsiya Ayaz
Division of Food Science and Technology, SKUAST, Kashmir, Jammu and Kashmir, India

Corresponding Author:
ZA Bhat
Ambri Apple Research Centre, Pahnoo, Shopian, SKUAST, Kashmir, Jammu and Kashmir, India

Effect of Promalin on physical attributes of apple cv. Red Delicious

ZA Bhat, TR Rather, Kounser Javeed, HU Itoo, Sheikh Khursheed, GH Rather, Shemoo Nisar, Shahzad Ahmad Bhat and Qudsiya Ayaz

Abstract
The present study was conducted at AARC to determine the response of the Promalin on the growth of apple (*Malus domestica* Borkh) cv. Red Delicious. The study shows that the growth of apple fruit was significantly influenced by Promalin (GA4+7 and 6 BA). Among the different treatments, maximum fruit set of 15.89% was recorded with treatment T5 which was at par with treatment T4, however, minimum fruit set of 3.34% was obtained in higher dose (phytotoxic). The longest fruit of 71.06 mm was recorded with T4 which was at par with T3, T5 and T7 whereas the control (Water spray) had fruit of length 60.52 mm and was significantly different from all the treatments. During the investigation, fruit breadth of 70.70 mm was obtained with treatment T5 which was at par with T4, whereas the control (Water spray) had fruit of least breadth 61.34 mm. Maximum fruit colour was observed with lower concentrations of chemical and untreated fruits as compared to high concentration. With higher concentration of chemical, the fruits developed long conical shape (a market driven factor). The data revealed that the chemical sprays did not cause russetting except the phytotoxic concentration which resulted in about 12.67% russetting in treated fruits. No phototoxic symptoms were observed during the course of investigation on fruit or plant.

Keywords: Promalin, russetting, phototoxic, symptoms, fruit set

Introduction
In the commercial production of apple various fruit growth regulators (PGR) are used. These PGR are used for the purpose to increase fruit size and to change fruit shape in some cases. Few examples of those PGR are Cytokinins and Gibberellins. Application of Cytokinins and Gibberellins on the fruit increases the cell division during early stage of the fruit growth and also changes the shape of the fruit. Promalin is a mixture of PGR which contains 6-Benzyl adenine and GibberellinAcid4+7 and it is used commercially in apple production. Application of Promalin during early stage of flowering and fruit development alter the shape of the fruit from oblate to elongate as it enhances the cell division in calyx region. Clearly showing, the use of PGRs increases the fruit growth rate or the surface expansion rate and final fruit size. The quality of fruit of an apple is adamant by its taste, aroma, color and shape, which is attained by each particular variety of apples. According to Marcelle (1995) [11], the ration of fruit height/diameter (H/D) comprises a factor of fruit quality. The lack of typical shape was considered a marketing disadvantage. Before the harvest diverse range of manipulations and treatments can reduce such deformities. Promalin which is a mixture of GA4+7 and Benzyl adenine improves the shape of the fruit as it did chemical thinning at the end of the flowering Period (William, 1978, Burak and Buyukyilmaz 1997) [15, 3].

Materials and Methods
The experiment was carried out at AARC for two consecutive years i.e., 2017 and 2018. 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 product (Code-347) was 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 fruit physical 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). The data generated from these investigations were appropriately computed, tabulated and were analyzed by applying Randomized Block Design Factorial (RBD).

Results and Discussion

Fruit set (%)

Significant differences were recorded in fruit set percentage among the different treatments. During course of testing maximum fruit set of 15.89% was recorded with treatment T5 which was at par with treatment T4, however, minimum fruit set of 3.34% was obtained in higher dose (phytotoxic). The Data depicted in table 1, revealed that the agro-chemical under testing had positive impact on fruit set. The comes about show that there's positive relationship between the chemical and fruit set as with increment within the concentration of chemical there was comparing increment within the fruit set upto a concentration of 90 ppm. A part of data has risen with respect to the impacts of gibberellins and cytokinins on fruit development and growth (Argenta *et al*., 1991; Argenta *et al*., 1993) [1, 2].

Fruit length (mm)

The longest fruit of 71.06 mm was recorded with T4 which was at par with T3, T5 and T7 whereas the control (Water spray) had fruit of length 60.52 mm and was significantly different from all the treatments. The data presented in table revealed that there is significant increase in fruit length with the chemical treatments in comparison with control. GA4+7 + BA applied at blossoming have been appeared to extend fruit size and the fruit L/D proportion, and decrease russeting (Jindal *et al*., 2004 and Greene, 2003) [9, 8]. The fruit size increment may be a result of the acceptance of cell division and elongation, and the increment in fruit length (Burac and Buyukylmaz, 1997; Looney, 1996) [3, 10].

Fruit breadth (mm)

During the investigation, fruit breadth of 70.70 mm was obtained with treatment T5 which was at par with T4, whereas the control (Water spray) had fruit of least breadth 61.34 mm. The data presented in table 1, revealed that that there is significant increase in fruit breadth with the chemical treatments during course of testing in comparison with control. Taylor and Knight (1986) [14], looking at the impacts of gibberellins, watched that they increased the size of the epidermis cells, giving 25% more plasticity when the cuticle was submitted to a stress.

Fruit Colour (%)

Maximum fruit colour was observed with lower concentrations of chemical and untreated fruits as compared to high concentration. T2 All the treatments had at par colour percentage, however the phytotoxic dose had least colour development. Our results are in conformity with McGuire, 1992 who demonstrated that GA4+7 furthermore 6-BA treated fruit had a lighter and somewhat more yellow become flushed colour with marginally greener foundation colour. Our comes about are in assention with Cline, 2006 who detailed a straight increments in blush colour ‘b’ values (P=0.013) and hue angle values (P=0.024), both with expanding rates of GA4+7 additionally 6-BA.

Fruit shape

The perusal of data (table-1) clearly indicates that the chemical treatments had significantly affected the fruit shape. With higher concentration of chemical, the fruits developed long conical shape (a market driven factor). T3, T4, T5 and T7 had long conical fruits as compared to other treatments that produced conical fruits only. In mild climate regions, where fruit shape is risky, growth regulators may adjust this issue (Looney, 1996) [10]. Promalin is utilized for fruit elongation at 1.17 to 2.34 L ha-1 when the central (king) flower opens, expanding its impact and its thinning capacity if a surfactant is included (Greene, 2003) [8]. The fruit shape was prolonged when treated with promalin (Demetrios *et al*., 2004) [5].

Table 1: Effect of Promalin on physical parameters of Apple cv. Red Delicious

Treatment	Fruit set (%)	Length (mm)	Breadth (mm)	Fruit Color (%)	Fruit Shape	Fruit Russetting
Control (TI)	5.58	60.52	61.34	84.21	C	Nil
10 ppm (T2)	12.74	65.84	66.53	84.10	C	Nil
30 ppm (T3)	14.51	69.11	67.26	83.61	LC	Nil
60 ppm (T4)	15.08	71.05	69.57	83.08	LC	Nil
90 ppm (T5)	15.89	69.98	70.70	82.83	LC	Nil
180 ppm (T6) (Phytotoxic conc)	3.34	61.10	62.56	78.86	C	12.67%
100 ppm (T7)	12.96	68.54	66.37	83.93	LC	Nil
CD	1.67	1.87	2.09	1.97	-	

Fruit russetting

The data revealed that the chemical sprays had did not cause russetting except the phytotoxic concentration which resulted in about 12.67% russetting in treated fruits. The mode of action in russeting reduction is related to the control of the epidermis cell elongation, resulting in a fruit cuticle less prone to cracks (Eccher, 1978) [6]. For russeting control, the Promalin dose may be split into two or more applications, which must be made up to two weeks after petal fall.

Phytotoxicity

No, phytotoxic symptoms were observed during the course of investigation on fruit or plant. No chemical treatment except the phytotoxic dose showed any phytotoxic symptom.

Table 2: Phytotoxicity

Treatment		Wilting				Vein Clearing				Necrosis				Epinasty				Hyponasty			
		0 --10				0 to 10				0 to 10				0 to 10				0 to 10			
T_1	Control	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_2	10 ppm	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_3	30 ppm	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_4	60 ppm	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5	90 ppm	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6	180 ppm	-	-	-	-	-		-	-			3			2.8				3.0		
T_7	100 ppm	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Conclusion

The chemical had significant impact on fruit set, size and shape. The chemical sprayed at concentration 60ppm/l had significant impact on fruit quality characteristics. At 30ppm/l concentration the results are also significant, however at 60ppm/l the results are more encouraging so that farming community can harvest the benefits of the above tested chemical.

References

1. Argenta LC, Petri JL, Mondardo M.Efeito de Reguladores de Crescimento sobre o crescimento de maçãs Cultivar Gala. Rev. Bras. Fruticultura, Cruz das Almas. 1991;13:193-197.
2. Argenta LC, Petri JL, Suzuki A. Efeito de Piridilureias e GA3+4 + BA sobre o crescimento de maçãs Cvs. Gala e Fuji. Rev. Bras. Fruticultura, Cruz das Almas. 1993;15(1):111-116.
3. Burak M, Buyukyilmaz M. Effect of promalin on fruit shape and quality of Starking Delicious apple cultivar. Acta horticulturae. 1997;463:365-369.
4. Cline, John. Interactive effects of 6-BA, GA4+7 and prohexadione-calcium on 'Gala' apples. University of Guelph Ontario Agricultural College, Plant Agriculture, 2016.
5. Demetrios Stylianidis K, Thomas Sotiropoulos E, Magdalene Koukourikou A, Demetrios Vouiatzis G, Ioannis Therios N. The effect of growth regulators on fruit shape and inorganic nutrient concentration in leaves and fruit of Red Delicious apples. Journal of Biological Research.2004;1:75-80.
6. Eccher T. Russeting of 'Golden Delicious' apples as related to endogenous and exogenous gibberellins. *Acta Hort*. 1978;80:381-385.
7. Eccher T, Boffelli G. Effect of dose and time of application of GA4+7 on russeting, fruit set and shape of Golden Delicious apples. Scientia Horticulture. 1981;14:307-314.
8. Greene DW. Endogenous hormones and Bioregulator use on apples. In: Apples botany, production and uses. Edited by Ferree, D.C. and Warrington, J.J. CABI publishing, Wallingford, UK, 2003, p. 437-457
9. Jindal KK, Pal S, Chauhan PS, Mankotia MS, Webster AD. Effect of Promalin and Mixtatol on fruit growth, yield efficiency and quality of 'Starking Delicious' apple. Acta Hort. 2004;636:533-536.
10. Looney NE. Effects of gibberellin-based plant bio regulators on fruit quality, In: The Fruit Physiology: Growth and Development. Published by Good Fruit Grower. Yakima, Washington, 1996, 137-147.
11. Marcelle RD. Mineral nutrition and fruit quality. Acta horticulture. 1995;383:219- 225.
12. McGuire R. Reporting of objective color measurements. *HortScience*1992;27:1254-1255.
13. Petri JL. Efeito do uso de Promalin na cultura da macieira. Encontro Nacional de Fruticultura de Clima Temperado, 6, 2003, Fraiburgo, SC. Anais, Caçador, SC. Epagri, 2003, 271 p.
14. Taylor DR, Knight JN. Russeting and cracking of apple fruit and their control with plant growth regulators. *Acta Hort*. 1986;179:819-820.
15. Williams MW. Suggested commercial use of promalin to improve delicious apple shape and size. Proceedings of the Washington State Horticultural Association, 1978, p. 36, 38, 40.