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STUDIES ON FOLIAR APPLICATION OF BORON AND GA_3 ON PHYSICO-CHEMICAL COMPOSITION AND YIELD OF PHALSA (*Grewia subinaequalis* D.C.)

Mohd. Zeeshan[1] and J.P. Singh[2*]

Department of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology Kanpur-208002
**Corresponding Author's E-mail: drjspsingh647@gmail.com*

ABSTRACT : A field experiment was conducted to investigated the effect of foliar application of boron and GA_3 on the physico-chemical composition, yield and cost benefit ratio of phalsa. The trial was undertaken at the Horticulture Garden of Department of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur during 2015-16 and 2016-17. There were 4 levels each of boron and GA_3 i.e. 0, 30, 40, 50 ppm and 0, 10, 20, 30 ppm, respectively tried in a Factorial Randomized Block Design replicating thrice. First foliar application of the respective treatments was given when the flower buds were fully swollen and it was super imposed after three weeks. Observations were recorded on juice content, T.S.S., ascorbic acid, acidity and yield. Boron and GA_3 in increasing concentration increased all the attributes profoundly barring acidity content. Foliar application of boron at 50 ppm improved the above attributes significantly expressing 50.59, 49.87% juice, 19.58, 19.770 Brix T.S.S., 30.95, 31.33 mg/100g ascorbic acid and 56.72, 59.88q/ha fruit yield against the minimum of 44.89, 44.92%; 17.89, 18.06° Brix; 27.21, 27.53mg/100g and 46.76, 49.17 q/ha registered under control (B_0). GA_3 treatments also proved profoundly effective in increasing the above parameters and application of 30 ppm recorded 51.25, 51.28% juice, 19.94, 20.13° Brix T.S.S., 30.42, 30.81 mg/100g ascorbic acid and 59.88, 63.27 q/ha fruit yield against 44.78, 44.06%; 17.70, 17.87° Brix; 28.06, 28.38mg/100g and 39.35, 41.21 q/ha values respectively under control. 50 ppm Boron or 30 ppm GA_3 produced less acidic fruits recording 1.450, 1.540% and 1.375, 1.440% acidity content against phalsa bushes deprived of foliar sprays of boron or GA_3 (producing most acidic fruits) revealing 1.662, 1.160% and 1.830, 1.860% during corresponding years. It is obviously observed that cost benefit ratio increased progressively in increasing levels of boron and GA_3. The cost benefit ratio was calculated on average data of 2015-16 and 2016-17. In this regard the maximum levels of boron (50 ppm), GA_3 (30 ppm) and their interaction (B_3G_3) recorded 2.13, 2.34 and 2.63 cost benefit ratio and their control exhibited 1.68, 1.38 and 1.21 ratio, respectively.

Key words : *Phalsa, juice, T.S.S., acidity, ascorbic acid, yield.*

Phalsa (*Grewia subinaequalis* D.C.) is a sub-tropical fruit distributed in tropical and sub-tropical regions of the world. In India, it is grown in Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar and West Bengal (Zeeshan and Singh, 21). It produces fruits in clusters in the axil of leaves of the current season growth. Despite its hardy fruits, high nutritional and medicinal values. Phalsa has not received the deserving attention due to its uneven ripening, small fruits and high periciability creating a problem in marketing and storage. Phalsa a hardy fruit plant well suited for cultivation under adverse climatic conditions. The bushes rearly receive cultural practices, manuring and irrigation. However, no schedule base nutritional approach has yet been standardized neither for major or minor elements. Therefore, the conventional cultivation practices followed in the orcharding need to be improved or replaced by appropriate resource-conserving technologies to enhance fruit productivity and input use efficiency on a sustainable basis, improve growers income and livelihood and conserve the resource base and protect the environment as well. Boron though a trace element plays pivotal role in fruit production. It regulates carbohydrate metabolism and is involved in translocation of photosynthetis, cell wall development and RNA metabolism (Nijjar, 10). Its deficiency and sufficiency symptoms, however, vary with kind and age of the plants and conditions of growth.

Plant growth regulators are signal molecules produced within the plant and occur in extremely low concentrations. Hormones regulate cellular processes in targeted cells locally and when moved to other locations, in locations of the plant. Among the growth regulators GA_3 is reported to be very effective manipulating physiological events e.g. flowering, fruiting and yield of fruit crops. Its use has been exploited in cell alongation, formation of chlorophyll

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and photosynthetic activities thereby improving quality and yield of fruit plants (Choudhary *et al.,* 2) in mandarin.

MATERIALS AND METHODS

A field experiment was conducted at the Horticulture Garden of Department of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology Kanpur during 2015-16 and 16-17. The experiment comprised of 16 treatments viz. Boron- 0, 30, 40, 50 ppm and GA_3-0, 10, 20, 30 ppm replicating thrice in a Factorial Randomized Block Design. Pruning of the experimental phalsa bushes was done on December 20, during both the years. Organic manure @ 10 kg per bush alongwith R.D.F., irrigation, weeding hoeing, and plant protection measures were adopted timely. Other experimental details are the same as reported earlier by Zeeshan and Singh (21). Observations were recorded on juice content, T.S.S., ascorbic acid, acidity percentage, yield per hectare. Juice content was extracted by routine method. Total soluble solids was determined by hand refractometer and acidity content was estimated as per A.O.A.C.(1). Ascorbic acid was determined as suggested by Ranganna (14). The yield of subsequent harvests were summed up to obtain yield per hectare during both the years. For cost benefit ratio; cost incurred on each treatment and their gross and net income were calculated to infer cost benefit ratio.

RESULTS AND DISCUSSION

Juice content

The juice content an important parameter of phalsa in the present investigation improved favourably by foliar sprays of boron and GA_3 applied separately. Foliar application of both in increasing concentrations improved juice content during both the years of study. Boron at 50 ppm concentration revealed 50.52 and 49.87% juice followed by 40 ppm (49.80 and 49.86%). Both of these treatments, however, remained statistically at par when compared between themself. The plants in the control expressed significantly lowest *i.e.* 44.89 and 44.92% juice. Application of boron at 30, 40 and 50 ppm improved it to the tune of 4.43, 10.94, 7.52% and 5.50, 11.00, 7.68% in respective years (table-1). The present finding are in agreement with the reports of Topno *et al.,* (19) in litchi and Prabu and Singaram (11) in grapes. The beneficial role of boron may be ascribed to better vegetative growth causing better translocation of food material there by improving fruit quality in respect of fruit size and weight caused by optimal doses of boron nutrition which ultimately enhanced the juice content. Application of GA3 at 10, 20 and 30 ppm recorded juice content of 46.52, 46.70; 49.53, 59.58 and 51.25, 51.28% during 2015-16 and 16-17. However, the spray treatments caused improvement of the order of 3.88, 10.61, 14.45 and 5.99, 12.50, 16.39% over control which exhibited 44.78 and 44.06% juice respectively. The superiority obtained in this regard may be attributed to bigger and plump fruits harvested from the bushes treated with higher concentration. The results are in line with the reports of Kacha *et al.* (5) in phalsa and Ramteke *et al.* (13) in grapes. Foliar application of 50 ppm boron in association with 30 ppm GA_3 maximized (56.34 and 56.36%) the juice content significantly when compared with than the rest of interactive treatments during both the years of study.

Total Soluble Solids

The highest concentration of both boron (50 ppm) and GA_3 (30 ppm) individually proved significantly effective in enhancing the T.S.S. content of phalsa fruits when compared with rest of the treatments barring 40 ppm boron during both the years. The treatments of 50, 40 and 30 ppm boron revealed 19.58, 19.77; 19.13, 19.26 and 18.42, 18.60° Brix. Phalsa bushes deprived of boron and GA3 treatments recorded 17.89, 18.06 and 17.70, 17.870 Brix T.S.S.. Interactive treatment of 50 ppm boron in association with 30 ppm GA_3 revealed 20.88 and 21.080 Brix T.S.S. which showed maximum values against the all interactive treatments of boron and GA_3. The plants under deprived of boron and GA_3 (B_0G_0) gave minimum T.S.S. recording 16.75 and 16.910 Brix during corresponding years respectively. Foliar feeding of boron at 30, 40 and 50 ppm increased the T.S.S. content by 1.54, 5.46, 7.94% and 1.58, 5.19, 7.97% over control respectively. These findings are in line with the reports of Kundu and Mitra, (9) and Trivedi *et al.,* (20) in guava, Katiyar *et al.* (6) and Singh *et al.* (18) in aonla.

When efficacy of GA_3 at varying concentrations were examined, increasing levels of growth regulator enhanced the T.S.S. content during both the years. Foliar spray of 30 ppm GA_3 induced 19.94 and 20.130 Brix being significantly more effective than rest of GA_3 treatments during both the years. The treatment of 20 and 10 ppm though proved significantly effective than control but did not differ when compared in between. Application of 10, 20 and 30 ppm increased the T.S.S. containt to the 5.48, 5.76, 12.64% and 5.20, 5.71, 12.65% against its control (17.70, 17.87°Brix) during corresponding years respectively. The findings are in accordance with the reports of Katiyar *et al.*(6) in ber, Kacha *et al.*(4) in phalsa and Rajput *et al.*(12) in guava.

Ascorbic acid

Foliar application of boron and GA_3 increased the ascorbic acid content of phalsa fruits profoundly during 2015-16 and 16-17. Boron at 30, 40 and 50 ppm recorded 28.45, 30.32, 30.95 mg/100g and 28.80, 30.68, 31.33 mg/100g ascorbic acid against significantly lowest values of 27.21 and 27.53 mg/100g under control. The increase in this regards due to 50 ppm boron was noted of the order of 13.74 and 13.80%. These findings are in accordance with the observations of Katiyar *et al.* (6) in aonla and Khan *et al.* (7) in kinnow mandrin.

GA3 at 10, 20 and 30 ppm enhanced the ascorbic acid content and registered 28.81, 29.64, 30.42% and 29.14, 30.00, 30.81% values (Table-1). These treatments increased the vitamin 'C' content to the tune of 2.67, 5.77, 8.37% and 2.68, 5.71, 8.56% in respective years against control which showed the minimum content of 28.06 and 28.38 mg/100g during respective years. These results are in accordance with the reports of Kacha *et al.* (4 and 5) in phalsa and Kher *et al.* (8) in guava. Efficacy of the interactive treatment of 50 ppm boron and 30 ppm GA_3 contrary to acidity enhanced ascorbic acid content to the tune of of 32.07 and 32.51 mg/100g, respectively.

Acidity

The plants under boron control produced most acidic fruits exhibiting 1.662 and 1.660% acidity being significantly greater than the rest of boron treatments during both the years. The foliar treatments of 30, 40 and 50 ppm boron induced 1.547, 1.482, 1.450% and 1.595, 1.567, 1.540% acidity during respective years. The plants under control contained 6.95% and 7.23% more acidity in their fruits as compared to 50 ppm treatment. Deterioration in acidity might be due to optimal concentration of boron which being responsible for increased translocation of carbohydrates might have increased metabolism converting acid to sugar.As regards GA_3, the minimum acidic fruit containing 1.375 and 1.440% acidity were observed with 30 ppm GA_3 treatment during respective years. The phalsa bushes treated with 10, 20 and 30 ppm GA_3 caused 1.475, 1.462, 1.375% and 1.562, 1.550, 1.440% acidity (Table-1) showing a reduction of 19.40, 20.11, 24.86% and 16.02, 16.66, 22.58% over control (1.83 and 1.86%). The findings are in accordance with the reports of Kacha *et al.* (4 and 5) in phalsa and Singh and Singh (16) in Indian gooseberry.

Yield

The yield of phalsa fruit per hectare under the influence of foliar sprays of boron and GA_3 obviously enhanced owing to yield per plant (Zeeshan and Singh, 21). Boron at 30, 40 and 50 ppm yielded 51.12, 55.61, 56.72q and 53.56, 58.36, 59.88q during 2015-16 and 16-17. Phalsa bushes deprived of the boron treatment produced lowest yield of 46.76 and 49.17q (Table 1). Due to the beneficial role of boron in the present investigation yield per hectare enhanced by 9.32, 18.93, 21.30% and 8.93, 18.69, 21.78% against control respectively. The findings are in line with the reports of Trivedi *et al.* (20) in guava and Seedkolai *et al.* (15) in orange.

GA_3 at 10, 20 and 30 ppm produced significantly greater yield than control and revealed 53.09, 57.89, 59.88q and 55.61, 60.88, 63.27q produce per hectare respectively. Untreated plants of phalsa gave 39.35 and 41.21 q yield per hectare in respective years of study. The yield of phalsa per hectare obviously enhanced by 34.92, 47.11, 52.17% and 34.94, 47.73, 53.53% during corresponding years. These results are in close conformity with the reports of Kacha *et al.* (5) and Singh *et al.* (17) in phalsa and Gill and Ball (3) in Ber.

Cost benefit ratio

Systematic data regarding treatmentwise are presented in Table 2. Cost of production, Gross income, Net return and cost benefit ratio. It is obviously clear that increasing levels of boron gave increased cost benefit ratio. It was derived under control-1.68, 30 ppm-1.87, 40 ppm-2.05 and 50 ppm-2.13 with average data of 2015-16 and 16-17. Regarding GA_3, cost benefit ratio varied as control-1.38, 10 ppm-1.88; 20 ppm-2.13 and 30 ppm-2.34 respectively. The most remunerative treatment was found to be GA_3-30 ppm expressing gross return of ₹ 547544.50 followed by 20 ppm GA_3 giving 499628.75 (Table 2). Thus, it may be inferred that investing one rupee one may gain rupees 2.13 and 2.34 under 50 ppm boron and 30 ppm GA_3. The cost benefit ratio under the different interactive treatments particularly higher concentration each of boron and GA_3 was enhanced owing to increased yield and superior quality of berries. The intrective treatment B_3G_3 fetched the highest cost benefit ratio of 2.63 followed by B_2G_3 (2.49). These findings are in line with reports of Rajput *et al.* (12) in guava.

Table 1 : Effect of Boron, GA_3 and their interactions on the Juice, T.S.S., ascorbic acid, acidity content and yield/ha of phalsa.

	2015-16					Juice content(%) 2016-17				
G \ B	B_0 (Control)	B_1 (30ppm)	B_2 (40ppm)	B_3 (50ppm)	Mean	B_0 (Control)	B_1 (30ppm)	B_2 (40ppm)	B_3 (50ppm)	Mean
G_0 (Control)	41.50	43.95	46.35	47.33	44.78	41.53	43.98	46.38	44.35	44.06
G_1 (10ppm)	43.90	45.65	48.80	47.75	46.52	43.93	45.88	48.89	48.11	46.70
G_2 (20ppm)	46.70	48.82	51.95	50.65	49.53	46.74	48.86	52.04	50.67	49.58
G_3 (30ppm)	47.45	49.12	52.10	56.34	51.25	47.48	49.16	52.14	56.36	51.28
Mean	44.89	46.88	49.80	50.52		44.92	46.97	49.86	49.87	
	B	G	B × G			B	G	B×G		
C.D. (P = 0.05)	0.17	0.17	0.34			0.215	0.215	0.43		
T.S.S. Content (°B)										
G_0 (Control)	16.75	17.25	18.15	18.65	17.70	16.91	17.41	18.32	18.83	17.87
G_1 (10ppm)	16.95	18.65	19.33	19.75	18.67	17.12	18.83	19.31	19.94	18.80
G_2 (20ppm)	18.77	18.25	18.80	19.05	18.72	18.95	18.42	18.98	19.23	18.89
G_3 (30ppm)	19.10	19.55	20.25	20.88	19.94	19.28	19.74	20.44	21.08	20.13
Mean	17.89	18.42	19.13	19.58		18.06	18.60	19.26	19.77	
	B	G	B×G			B	G	B×G		
C.D. (P = 0.05)	0.57	0.57	N.S.			0.63	0.63	N.S.		
Ascorbic acid Content (mg/100g)										
G_0 (Control)	26.08	27.45	28.97	29.75	28.06	26.37	27.76	29.30	30.08	28.38
G_1 (10ppm)	26.75	27.95	29.90	30.65	28.81	27.05	28.27	30.25	31.01	29.14
G_2 (20ppm)	27.67	28.80	30.75	31.35	29.64	28.02	29.15	31.12	31.72	30.00
G_3 (30ppm)	28.33	29.60	31.67	32.07	30.42	28.67	30.03	32.05	32.51	30.81
Mean	27.21	28.45	30.32	30.95		27.53	28.80	30.68	31.33	
	B	G	B×G			B	G	B× G		
C.D. (P = 0.05)	0.55	0.55	N.S.			0.69	0.69	N.S.		
Acidity content										
G_0 (Control)	1.970	1.810	1.790	1.750	1.830	2.000	1.850	1.810	1.780	1.860
G_1 (10ppm)	1.700	1.420	1.400	1.380	1.475	1.610	1.570	1.550	1.520	1.562
G_2 (20ppm)	1.510	1.480	1.440	1.420	1.462	1.550	1.520	1.480	1.450	1.550
G_3 (30ppm)	1.470	1.480	1.300	1.250	1.375	1.480	1.440	1.430	1.410	1.440
Mean	1.662	1.547	1.482	1.450		1.660	1.595	1.567	1.540	
	B	G	B×G			B	G	B×G		
C.D. (P = 0.05)	0.044	0.044	N.S.			0.057	0.057	N.S.		

	2015-16			Yield/ha(q)			2016-17			
G_0 (Control)	34.96	38.29	41.62	42.51	39.35	36.63	40.07	43.62	44.51	41.21
G_1 (10ppm)	47.17	51.62	56.17	57.39	53.09	49.39	54.06	58.83	60.16	55.61
G_2 (20ppm)	51.61	56.39	61.38	62.16	57.89	54.06	59.05	64.38	66.04	60.88
G_3 (30ppm)	53.28	58.16	63.27	64.82	59.88	56.61	61.05	66.60	68.82	63.27
Mean	46.76	51.12	55.61	56.72		49.17	53.56	58.36	59.88	
	B	G	B×G			**B**	G	B×**G**		
C.D. (P = 0.05)	1.68	1.68	N.S.			2.33	2.33	N.S.		

Table 2 : Effect of Boron, GA3 and their interactions on Cost of production, Gross income, Net return and Cost Benefit Ratio (Average for 2015-16 & 2016-17)

B GA$_3$	B_0 (Water spray)	B_1 (30 ppm)	B_2 (40 ppm)	B_3 (50 ppm)	Mean
Cost of production (₹)					
G_0 (water spray)	230319	233523	233525	233527	232723.50
G_1 (10ppm)	233686	233692	233694	233696	233692.00
G_2 (20ppm)	233852	233854	233857	233859	233855.50
G_3 (30ppm)	234018	234022	234024	234027	234022.75
Mean	232968.75	233772.75	233775	233777.25	
Gross income (₹)					
G_0 (water spray)	279680	313978	341284	352833	321943.75
G_1 (10ppm)	382077	428446	466211	482076	439702.50
G_2 (20ppm)	438685	484954	527868	547008	499628.75
G_3 (30ppm)	468864	523440	582084	615790	547544.50
Mean	392326.50	437704.50	479361.75	499426.75	
Net return (₹)					
G_0 (water spray)	49361	80455	107759	119306	89220.25
G_1 (10ppm)	148391	194754	232517	248380	206010.50
G_2 (20ppm)	204833	251100	294011	313119	265765.75
G_3 (30ppm)	234846	289418	348060	381763	313521.75
Mean	159357.75	203931.75	245586.75	265642	
Cost Benefit Ratio					
G_0 (water spray)	1.21	1.34	1.46	1.51	1.38
G_1 (10ppm)	1.63	1.83	1.99	2.06	1.88
G_2 (20ppm)	1.87	2.07	2.26	2.34	2.13
G_3 (30ppm)	2.00	2.24	2.49	2.63	2.34
Mean	1.68	1.87	2.05	2.13	

REFERENCES

1. A.O.A.C. (1980). *Official Methods of Analysis.* Association of Official Analytical Chemists, Washington, D.C., U.S.A.
2. Choudhary H.D., Jain M.C., Sharma, M.K. and Bhatnagar P. (2013). Effect of plant growth regulators on growth and yield of Nagpur mandarin (*Citrus reticulata Blanco.*). *Asian J. Hort.,* **8** (2) :746-750.

3. Gill, K.S. and Bal J.S. (2013). Impact of application of growth regulators on Indian jujube. *Acta Hort.* **993** :119-124.
4. Kacha H.L., Viradia R.R., Leua H.N., Jat G. and Tank A.K. (2012). Effect of NAA, GA_3 and Ethrel on yield and quality of phalsa (*Grewia asiatica* L.). *Asian J. Hort.,* **7** (2) : 242-245.
5. Kacha H.L., Jat G. and Patel S.K. (2014). Performance of various plant growth regulators on yield and quality of phalsa (*Grewia asiatica* L.). *Hort Flora Res. Spect.,* **3** (3) : 292-294.
6. Katiyar P.N.; Yadav V. and Singh J.P. (2010). Effect of pre-harvest sprays of NAA, GA_3 and urea on fruiting, fruit quality and yield of ber (*Zyzyphus mauritiana* Lamk.) cv. Banarasi Karaka. *Ann. Hort.,* **3** (1) : 92-94.
7. Khan A.S., Nasir M., Malik, A.U.. Basra, S.M.A. and Jaskani M. J. (2015). Combined application of boron and zinc influence the leaf mineral status, growth, productivity and fruit quality of 'Kinnow' mandarin (*Citrus nobilis Lour* × *Citrus deliciosa Tenora*). *J. Plant Nutri.,* **38** (6) :821-838.
8. Kher R.; Bhat S. and Wali V.K. (2005). Effect of foliar application of GA_3 and NAA on physio-chemical characteristics of guava cv. Sardar. *Haryana J. Hort.,***34** (1/2) : 31-42.
9. Kundu S. and Mitra S.K. (1999). Response of guava to foliar spray of copper, boron and zinc. *Indian Agriculturist,* **43** (1/2) : 49-54.
10. Nijjar G.S. (1985). A Book on *"Nutrition of fruit trees."Kalyani Publishers*, New Delhi.,pp. 206-236.
11. Prabu P.C. and Singaram P. (2001). Effect of foliar and soil application of zinc and boron on yield and quality of grapes cv. Muscat. *Madras Agri. J.*, **88** (7/9) : 505-507.
12. Rajput R.P., Senjaliya H.J.; Vala G.S. and Mangroliya G.S. (2015). Effect of boron and various plant growth regulators on yield and quality of guava (*Psidium guajava* L.) cv. L-49. Int. *J. Agri. Sci.,* **11** (1) :179-182.
13. Ramteke S.D., Khot A.P. and Ashtekar N.D. (2015). Impact of GA_3 and CPPU on gas exchange, quality and yield parameters of Crimson Seedless grapes. *Ann. Plant Physiol.* **29** (2) :11-14.
14. Ranganna S. (1986). Hand book of *Analysis and quality control for fruit and vegetable products.* Second edition, *Tata McGraw Hill Publishing company*, New Delhi.
15. Seedkolai F., Sadeghi H. and Moradi H. (2015). Effects of foliar applications of nitrogen, boron and zinc on auxin contents, fruit set and fruit drop in orange (*Citrus sinensis*) cv. Thompson Navel. *Iranian J., Hortic. Sci.*,**46** (3) : 367-378.
16. Singh A. and Singh H.K. (2015). Application of plant growth regulators to improve fruit yield and quality in Indian Gooseberry. *J. Agri. Res.,* **2** (1) : 20-23.
17. Singh B.; Yadav A.L. and Meena A.K. (2017). A Study on Foliar Feeding of GA_3 and NAA on vegetative growth and yield of phalsa (*Grewia subinaequalis* D.C.) *Int. J. Curr. Microbiol. App. Sci,* **6** (6) : 768-775.
18. Singh P.C.; Gangwar R.S. and Singh V.K. (2012). Response of boron zinc and copper on quality of aonla fruits fruits cv. Banarasi. *HortFlora Res. Spectrum,* **1** (1) : 89-91.
19. Topno A.T.P., Ray R.N., Bauri M.K. and Sengupta S. (2006). Effect of nutrients on fruit cracking and physio-chemical composition of litchi (*Litchi chinensis* sonn.) cv. Purbi. *J. Res. Birsa Agric. Univ.,***18** (1) :141-144.
20. Trivedi N., Singh, D., Bahadur, V., Prasad V.M. and Collis J.P. (2012). Effect of foliar application of zinc and boron on yield and fruit quality of guava (*Psidium guajava* L.). *HortFlora Res. Spectrum,* **1** (3) : 281-283.
21. Zeeshan Mohd. and Singh J.P. (2017). Studies on effect of foliar application of Boron and GA_3 on growth, fruiting and yield of phalsa (*Grewia subinaequalis* D.C.). *HortFlora Res. Spectrum,* **6** (4) : 273-277.

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