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Effect of pre-harvest spray of growth regulators on growth, quality and yield of seedless grape genotypes

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ABSTRACT

The present study was carried out to know the response of seedless grape genotypes to growth regulators in New orchard Department of Horticulture, University of Agricultural Sciences, Dharwad during 2002-2003. Three genotype with two growth regulators were tried. Application of GA_3 50 ppm + BR1 ppm twice after fruitset stage was more effective in increasing. The berry diameter, bunch weight, 100-berry weight and yield per vine in Arka Neelamani. Among the quality parameters Thompson seedless recorded the maximum TSS, reducing sugars and total sugars content.

Key words : Growth regulator, Genotype, GA3, Grapes, Brassionsteroid Br

Grape (*Vitis vinifera* L.) belonging to family vitaceae; perhaps the most widely cultivated fruit crop of the world in varying climatic zones extending from the temperate to the tropics. It is one of the most delicious, refreshing and nourishing subtropical fruits. The berries are good source of minerals and vitamins (B1, B2 and C). The fruits are consumed in fresh form as a table fruit and in the processed form as wine, raisin and fresh juice. Plant growths play an important role in viticulture. The growth regulators like gibberellic acid and brassinosteroid found to have profound effect on improving berry size, bunch weight, yield and quality of the produce (Prasad and Prasad, 1973 and Hayatt *et al.*, 1994).

MATERIALS AND METHODS

The investigation was carried out on four year old seedless grape genotypes from November, 2002 to March 2003 using uniform vines. The vines planted 1.8 x 1.20 meters were used for this study. A set of three uniform bunches were randomly selected in each genotypes and considered as one treatment with three replications. Totally 108 bunches were selected and labelled before imposing the treatments. The experiment was laid out in a split plot design with three genotypes in main plot and two growth regulators or growth regulator like substances in sub plot treatment.

Main treatments (genotypes)

G_1 – Thompson seedless

G_2 – Sharad seedless

G_3 – Arka Neelamani

Sub-treatments (growth regulators)

T_1 – Gibberellic acid (GA3) – 50 ppm

T_2 – Brassinosteroid (BR) – 1 ppm

T_3 – Gibberellic acid (GA3) – 50 ppm + Brassinosteroid (BR) 1 ppm

T_4 – Untreated (control)

The vines were sprayed with growth regulators at the time of fruit set stage and repeated the same spray after one week.

RESULTS AND DISCUSSION

The result obtained from the present investigation have been discussed under following heads.

Berry diameter:

Pre-harvest spraying with GA_3 50 ppm + BR1 ppm has recorded significantly maximum (1.81 cm) diameter in Arka Neelamani (Table 1) when compared to Thompson seedless and Sharad seedless over control. This difference in berry diameter may be attributed to differential characters of the genotype and also cell division and cell elongation at different stages of growth and development of berry. These results are in confirmation with findings of Hayatt *et al.* (1994).

Bunch weight:

Significant differences in bunch weight were noticed among the genotypes (Table 2). Maximum (298.75 g) bunch weight was recorded in Arka Neelamani upon spraying of GA_3 50 ppm + BR1 ppm when compared to Thompson seedless and Sharad seedless over control. Increased bunch weight may be due to increase in number

Table 1 : Effect of pre-harvest spray of growth regulators on berry diameter (cm) of seedless grape genotypes

Treatments	Days after treatment (DAT)															
	15 DAT				30 DAT				45 DAT				60 DAT			
	Genotypes				Genotypes				Genotypes				Genotypes			
	G_1	G_2	G_3	Mean	G_1	G_2	G_3	Mean	G_1	G_2	G_3	Mean	G_1	G_2	G_3	Mean
T_1	1.05	1.09	1.25	1.13	1.26	1.29	1.46	1.34	1.35	1.39	1.55	1.43	1.63	1.64	1.80	1.69
T_2	1.01	1.04	1.28	1.11	1.23	1.25	1.47	1.32	1.31	1.34	1.58	1.41	1.56	1.59	1.83	1.66
T_3	1.10	1.12	1.38	1.20	1.33	1.35	1.62	1.43	1.39	1.42	1.68	1.50	1.69	1.72	1.98	1.80
T_4	0.95	0.98	1.13	1.02	1.15	1.16	1.32	1.21	1.25	1.28	1.43	1.32	1.45	1.48	1.63	1.52
Mean	1.02	1.06	1.26	1.11	1.24	1.26	1.47	1.32	1.32	1.36	1.56	1.41	1.58	1.61	1.81	1.68
			S.E.±	C.D. (P=0.05)			S.E.±	C.D. (P=0.05)			S.E.±	C.D. (P=0.05)			S.E.±	C.D. (P=0.05)
Genotypes (G)			0.005	0.09			0.04	0.02			0.005	0.02			0.01	0.04
Treatments (T)			0.02	0.06			0.02	0.07			0.02	0.06			0.03	0.09
G x T – between two genotypes means at same growth regulators			0.03	NS			0.03	NS			0.03	NS			0.04	NS
T x G – between two growth regulators means at same genotypes			0.04	NS			0.04	NS			0.04	NS			0.05	NS

NS – Non significant

Table 2 : Effect of pre-harvest spray of growth regulators on the bunch weight (g) of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	289.00	195.00	320.00	268.00
T_2	243.80	162.00	278.00	227.93
T_3	340.00	225.00	362.00	309.00
T_4	220.20	146.20	235.00	200.47
Mean	273.25	182.05	298.75	251.35
			S.E.±	C.D. (P=0.05)
Genotypes (G)			2.54	9.99
Treatments (T)			4.59	13.63
G x T – between two genotypes means at same growth regulators			7.34	NS
T x G – between two growth regulators means at same genotypes			7.95	NS

NS – Non significant

of berries and superior size of the berry (Phadnis and Mogal, 1972). These findigns are in line with findings of Lamikanara and Leong (1995).

100 berry weight:

Pre-harvest spraying with GA_3 50 ppm + BR1 ppm has recorded significantly higher (251.05 g) 100-berry weight (Table 3) in Arka Neelamani when compared to Thompson seedless and Sharad seedless over control. An increase in 100-berry weight was mainly due to stimulation of berry size and weight (Funt and Tukey, 1977). These findings are in line with the findings of (Yamane *et al.*, 1993).

Table 3 : Effect of pre-harvest spray of growth regulators on the 100 berry weight (g) of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	210.95	152.34	268.89	210.73
T_2	176.67	126.56	233.62	178.95
T_3	246.38	175.78	304.21	242.12
T_4	159.43	114.12	197.48	157.01
Mean	198.36	142.20	251.05	197.20
			S.E.±	C.D. (P=0.05)
Genotypes (G)			3.82	14.99
Treatments (T)			5.96	17.69
G x T – between two genotypes means at same growth regulators			9.72	NS
T x G – between two growth regulators means at same genotypes			10.32	NS

NS – Non significant

Yield per vine:

Pre-harvest spray of GA_3 50 ppm + BR1 ppm was found have significant influence on yield of all the genotypes (Table 4). Among which Arka Neelamani recorded maximum (7.19 kg/vine) yield when compared to Thompson seedless and Sharad seedless. Increase in yield per vine may be due to an increase in carbohydrate metabolism and accumulation of carbohydrates. Similar increase in yield were recorded by El-Hadairi *et al.* (1995) and Fallahi *et al.* (1995) in Thompson seedless grape.

Table 4 : Effect of pre-harvest spray of growth regulators on the yield per vine (kg) of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	3.61	1.63	7.95	4.40
T_2	3.44	1.38	6.20	3.67
T_3	4.24	2.28	9.97	5.49
T_4	2.74	0.77	4.66	2.72
Mean	3.51	1.51	7.19	4.07
			S.E.±	C.D. (P=0.05)
Genotypes (G)			0.06	0.26
Treatments (T)			0.04	0.12
G x T – between two genotypes means at same growth regulators			0.09	0.26
T x G – between two growth regulators means at same genotypes			0.07	0.21

NS – Non significant

Total soluble solids:

The pre-harvest treatments of growth regulators showed significant difference in TSS content of genotypes (Table 5). Spraying of GA_3 50 ppm + BR1 ppm recorded significantly higher (22.28^0B) TSS content in Thompson seedless when compared to Arka Neelamani and Sharad seedless over control. Increased TSS content might be due to mobilization of metabolites from source to sink (Singh *et al.*, 1993). The results of the present findings are in agreement with results of Vivency (1995) and Mohammad Farooq and Hulamani (2001) in Arkavati grape.

Table 5 : Effect of pre-harvest spray of growth regulators on total soluble solids (°Brix) content of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	22.89	20.22	19.35	20.82
T_2	21.63	19.17	18.12	19.64
T_3	23.78	21.12	20.02	21.64
T_4	20.82	18.38	17.19	18.80
Mean	22.28	19.72	18.67	20.22
			S.E.±	C.D. (P=0.05)
Genotypes (G)			0.16	0.62
Treatments (T)			0.29	0.87
G x T – between two genotypes means at same growth regulators			0.47	NS
T x G – between two growth regulators means at same genotypes			0.51	NS

NS – Non significant

Reducing sugars content:

Thompson seedless has recorded significantly the highest (15.41%) reducing sugar content (Table 6) upon preharvest application of GA_3 50 ppm + BR1 ppm when compared to control. This could be attributed to their genotypic characters (Negi and Randhawa, 1980) and also conversion of starch and acid into sugars in addition to continuous mobilization of sugar from leaves to fruits. The results are in confirmation with findings of Anitha (1993); Vivency (1995) and Josan *et al.* (2001) in pearlette grape.

Table 6 : Effect of pre-harvest spray of growth regulators on reducing sugar content (%) of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	15.71	14.71	13.42	14.61
T_2	15.41	14.40	12.92	14.24
T_3	16.47	15.42	14.30	15.40
T_4	14.07	13.55	11.84	13.15
Mean	15.41	14.52	13.12	14.35
			S.E.±	C.D. (P=0.05)
Genotypes (G)			0.19	0.74
Treatments (T)			0.24	0.71
G x T – between two genotypes means at same growth regulators			0.40	NS
T x G – between two growth regulators means at same genotypes			0.41	NS

NS – Non significant

Total sugars content:

Significant difference in total sugar content was noticed between the genotypes (Table 7). The highest (17.28%) total sugars content was recorded in Thompson seedless upon preharvest spraying of GA_3 50 ppm + BR 1 ppm when compared to control. Increase in total sugar content might be due to varying response of genotypes to growth regulators (Negi and Randhawa, 1980) and also conversion of the starch and acid into sugars. The results are in confirmation with results of Anitha (1993) and Mohammad Farooq and Hulamani (2001) in Arkavati

Table 7 : Effect of pre-harvest spray of growth regulators on total sugar (%) content of seedless grape genotypes

Treatments	Genotypes			
	G_1	G_2	G_3	Mean
T_1	17.51	16.42	14.85	16.26
T_2	17.07	15.87	14.52	15.82
T_3	18.22	17.07	15.61	16.97
T_4	16.32	15.27	13.73	15.11
Mean	17.28	16.16	14.68	16.04
			S.E.±	C.D. (P=0.05)
Genotypes (G)			0.16	0.65
Treatments (T)			0.21	0.63
G x T – between two genotypes means at same growth regulators			0.36	NS
T X G – between two growth regulators means at same genotypes			0.37	NS

NS – Non significant

grape.

Therefore, it may be concluded that the application of GA_3 50 ppm + BR 1 ppm twice after fruit set stage was more effective in increasing the berry diameter, bunch weight, 100-berry weight and yield per vine in Arka Neelamani. Among the quality parameters Thompson seedless recorded the maximum TSS, reducing sugars and total sugars content.

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REFERENCES

Anitha, N. (1993). Synthetic Brassinosteroids : Its role in a few plant growth processes. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore (Karnataka).

El-Hodairi, M.H., Ibrahim, S.B. and Shaltout, A.D. (1995). Effect of gibberellic acid on Sultanina seedless grape variety. *Acta Hort.*, **409** (16) : 93-97.

Fallahi, E., Heydari, H. and Kilby, M.W. (1995). Maturity, quality and production of Thompson Seedless grape as affected by frequency of gibberellic acid spray. *J. Small Fruit & Viticulture*, **3** (1) : 49-61.

Funt, R.C. and Tukey, L.D. (1977). Influence of exogenous daminozide and gibberellic acid and cluster development and yield of the concord grapes. *J. American Society Hort.*, **102** (4) : 509-514.

Hayatt, R., Singh, C. and Dhawan, S.S. (1994). Effect of gibberellic acid on the production of grapevine cv. 'PERLETTE'. *Haryana J. Hort. Sci.*, **23** : 185-189.

Josan, J.S., Mehrotra, N.K., Tatai, S.K., Harishkumar, Grewal, I.S. and Sharma, J.N. (2001). Effect of girdling, brushing and GA_3 on maturity and fruit quality of grape cv. PERLETTE. *Indian J. Hort.*, **53** : 250-253.

Lamikanara, O. and Leong, S. (1995). Effect of gibberellic acid on muscadine grape production. Proceedings of the Florida State Horticultural Society, pp. 360-361.

Mohammad Farooq and Hulmani, N.C. (2001). Effect of growth regulators and boric acid and their stage of treatments on berry quality of Arkavati grapes. *Karnataka J.Agric. Sci.*, **14** (3) : 849-852.

Negi, S.S. and Randhawa, G.S. (1980). Some promising new hybrids. *Indian J. Hort.*, **37** : 1-2.

Phadnis, N.A. and Mogal, D.B. (1972). Improvement of fruit quality and yield in Thompson seedless grapes. 3rd International Symposium on Subtropical and Tropical Horticulture, Bangalore, Abstracts, p. 194.

Prasad, A. and Prasad, S. (1973). Foliar feeding of growth regulators in grape. *Indian J. Hort.*, **30** : 384-387.

Singh, S., Singh, I.S. and Singh, D.N. (1993). Physico-chemical changes during development of seedless grapes (*Vitis vinifera* L.). *Orissa J. Hort.*, **21** : 43-46.

Vivency, A.J. (1995). Influence of Brassinosteroids and its combination with other growth regulators on productivity in grapes, French bean and tomato. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore (Karnataka).

Yamane, H., Kurihara, A., Nagata, K. and Sato, A. (1993). New grape cultivar 'Honey seedless'. Bulletin of the Fruit Tree Research Station, **25** : 45-56.

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