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Effect of gibberellic acid on sensory parameters of different varieties of grape under Northern dry zone of Karnataka

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Abstract

The field experiment was conducted to study the effect of gibberellic acid on different grape varieties under Northern dry zone of Karnataka during October 2017 to March 2018. Two different schedules of gibberellic acid treatment viz., schedule-1 [10 ppm GA₃ at parrot green stage as spray+ 20 ppm GA₃ during 1 week of 1st spray as spray + 30 ppm GA₃ at 3-4 mm berry size stage as bunch dipping + 40 ppm GA₃ at 8-10 mm berry size stage as bunch dipping + 50 ppm GA₃ as bunch dipping during 1 week after 4th treatment] and schedule-2 [20 ppm GA₃ at anthesis stage as dipping + 50 ppm GA₃ at berry set stage as dipping] were applied to four different varieties of grape viz., Thompson seedless, Manik Chaman, KR White and 2-A Clone to determine the effect of gibberellic acid on bunch, yield and to evaluate sensory qualities in different varieties of grape. The analysis of score given by organoleptic evaluation panelist for different sensory parameters showed that, maximum score for berry colour appearance (1.45), flavour (4.05), texture (4.19), taste (1.48) and overall acceptability (4.17) was obtained by the grapes treated with schedule-1 set of gibberellic acid treatment compared to that of schedule-2 set of gibberellic acid treatment.

Keywords: grape, gibberellic acid, dipping, schedule-1, schedule-2

Introduction

Grape (*Vitis vinifera*) is basically a sub-tropical crop. However, in India, grapes are cultivated for their excellence also under tropical conditions. In India, Grapes are cultivated in an area of 1.19 lakh ha with a production of 25.85 lakh tons and productivity of 21.1 tons/ha. Because of special arbour training systems provided for grape cultivation in India, productivity is highest among the grape growing countries of the world. In Karnataka, it is being cultivated in an area 19,000 ha and with the production 3, 20,000 MT (Anon., 2017) [1] and mainly growing in Northern dry zone of Karnataka especially in Vijayapur and Bagalkot area.

Various horticultural methods are being practiced in grape cultivation to improve production and quality, which includes nipping, to avoid staggered growth of grape berries. NAA is used to reduce post harvest berry drop, uniform ripening can be achieved through ethrel treatment at berry set stage. Amongst all the growth regulators being used in grape production, gibberellins are much popular and attaining great importance because of its remarked effect. The response of grapes to gibberellin are influenced by many factors like variety, dosage, time, method of application, age of the plant, physiological condition of the plant and prevailing weather conditions during its application. Therefore, it enables to standardize the hormonal schedule for grape varieties in general and the varieties gaining much commercial significance such as Thompson Seedless, Manik Chaman, K R White, 2-A Clone in particular. This study will also standardize hormonal schedule under Northern dry zone of Karnataka as the effect of hormones depends on varieties, environmental parameters and physiological state of the plants.

Materials and Methods

The field experiment was carried out at Main Horticultural Research and Extension Centre, College of Horticulture, University of Horticultural sciences, Bagalkot., during October 2017 to March 2018 by employing four different varieties viz., Thompson seedless, Manik Chaman, KR White and 2-A Clone.

All the vines are five years old, fairly uniform in their growth and vigour. They were planted at a distance of 3 x 1.5 meters and trained on Y-system of training. The experiment was set up in a 4 x 2 Factorial randomized block design, (Factor-1 with 4 different varieties and factor-2 is 2 schedules of gibberellic acid treatment), with 4 replications so which comprises 8 Treatment combinations. Hence, the number of plots were 32 (factors interaction that is treatment combination x replication) and 3 vines were selected from each plot (factors interaction), so number of vines selected for this experiment was 96. The two schedules of gibberellic acid treatment was applied for the selected vines in all four

varieties. Spray material was applied in full coverage with hand sprayer and bunch dipping and number of bunches per vine was counted in each variety and in each treatment. At the ideal stage of ripening (120 days after pruning).

Organoleptic evaluation

Treatments wise, berries were tested by ten panelists for different characters viz., berry colour appearance, flavour, texture, taste and overall acceptability of the fruit. The average score given by panelist was taken into account and the mean score was considered.

Table: The following table was used for recording organoleptic evaluation by the panelists.

Score	Berry Colour and Appearance	Flavour	Texture	Taste	Overall acceptability
4-5	Green	Excellent	Excellent	Excellent	Excellent
3-4	Moderately green	Good	Good	Good	Good
2-3	Light green	Fair	Fair	Fair	Fair
1-2	Greenish yellow	acceptable	acceptable	acceptable	acceptable
0-1	Yellow	Unacceptable	Unacceptable	Unacceptable	Unacceptable

(Habibi *et al.*, 2009) [3].

The data obtained from the experiment were statistically analyzed by using excel sheet and compared the means with critical difference (C.D. at 5 %) using Fischer's method of analysis of variance as suggested by Cochran and Cox (1957) [2].

Results and Discussions

Berry colour appearance

Significant differences were observed in the scores given by the panelists with respect to berry colour appearance, (table-1). Among the varieties, the maximum score for berry colour appearance is obtained by Thompson Seedless (4.35), which was on par with Manik Chaman (4.22) followed by 2-A Clone (3.85) and it was on par with K R White (3.82) which obtained the minimum score with respect to berry colour appearance over other varieties. As maximum score is given to the grapes treated with schedule-1 treatment of gibberellic acid compared to that of the grapes treated with schedule-2 treatment of gibberellic acid.

Flavour

Among the varieties, significant differences were observed with respect to flavour of berries (table-1). The maximum score for flavour was obtained by Manik Chaman (4.33), which was on par with Thompson Seedless (4.05) and Thompson Seedless variety was on par with K R White and 2-A Clone varieties (3.78) and these two varieties obtained the minimum score with respect to flavour over the other varieties. But Manik Chama variety differed significantly from K R White and 2-A Clone varieties. But, between two schedules of gibberellic acid treatment, score given by the panelists for flavour did not vary significantly. However, the maximum score was obtained by grapes treated with schedule-1 treatment of gibberellic acid (4.05) compared to that of in the grapes treated with schedule-2 treatment of gibberellic acid (3.91).

Texture

Among the varieties, significant differences were observed with respect to texture of berries (table-1). K R White obtained the maximum score for texture (4.42), which was on par with Thompson Seedless (4.16) and Thompson Seedless is on par with 2-A Clone variety (3.99). But, K R White and

2-A Clone varieties varied significantly. While, the minimum score was obtained by Manik Chaman variety (3.8) over other varieties, which was on par with 2-A Clone variety. In two different schedules of gibberellic acid treatment, significantly, the maximum score for berry texture was given to grapes treated with schedule-1 set of gibberellic acid treatment (4.19) compared to that of in the varieties treated with schedule-2 treatment of gibberellic acid (3.98).

Taste

Significant differences were observed in the scores of panelists with respect to the taste of the berries of different varieties of grapes (table-1). Among the varieties, Manik Chaman obtained the maximum score for taste (4.4), which was on par with Thompson Seedless (4.2). However, K R White variety obtained the score of 3.95 and it was on par with 2-A Clone variety (3.85), which obtained minimum score over other varieties with respect to taste. In two different schedules of gibberellic acid treatment, significantly, the maximum score for taste was given to grapes treated with schedule-1 set of gibberellic acid treatment (4.18) compared to that of in the grapes treated with schedule-2 treatment of gibberellic acid (4.01).

Overall acceptability

Among the varieties, significant differences were observed in the scores given by the panelists with respect to overall acceptability (table-1). Manik Chaman obtained the maximum score (4.33), which was on par with Thompson Seedless (4.20). However, K R White obtained the score of 3.98 and it was on par with 2-A Clone variety (3.88) variety, which was found inferior over other varieties with respect to overall acceptability. In two different schedules of gibberellic acid treatment, significantly the maximum score with respect to overall acceptability was given to grapes treated with schedule-1 set of gibberellic acid treatment (4.17) compared to that of in the grape treated with schedule-2 treatment of gibberellic acid (4.01).

This highest scores given by panelist for many organoleptic parameters viz., berry colour appearance, flavor, texture, taste and overall acceptability of the grapes treated with schedule-1 set of gibberellic acid treatment is might be due to favorable effect of gibberellic acid in thinning of the flower clusters,

reducing fruit set and helps in increase of size, shape, colour and taste of berries (Habibi *et al.*, 2009) [3]. Similar results as

that of present investigation are also reported by Kashyap *et al.* (1989) [4] in Khalili grapes.

Table 1: Organoleptic evaluation of different varieties of grapes as influenced by different Schedules of gibberellic acid treatment

Varieties (V)	Berry colour appearance			Flavour			Texture		
	S ₁	S ₂	Mean	S ₁	S ₂	Mean	S ₁	S ₂	Mean
V ₁	4.50	4.20	4.35	4.10	4.00	4.05	4.28	4.05	4.16
V ₂	4.30	4.15	4.22	4.40	4.25	4.33	3.90	3.70	3.8
V ₃	3.90	3.75	3.82	3.85	3.70	3.78	4.53	4.30	4.42
V ₄	3.90	3.80	3.85	3.85	3.70	3.78	4.08	3.90	3.99
Mean	4.15	3.97		4.05	3.91		4.19	3.98	
For comparing means of	S.Em ±		C.D. at 5 %	S.Em ±		C.D. at 5 %	S.Em ±		C.D. at 5 %
Varieties	0.07		0.20	0.11		0.32	0.09		0.28
Schedules	0.05		0.14	0.08		0.23	0.07		0.20
Vx S	0.10		NS	0.16		NS	0.13		NS

NS- Non Significant

Factor-I: Varieties

V₁-Thompson Seedless. V₂- Manik Chaman. V₃- K R White. V₄- 2-A Clone.

Factor-II: Two different Schedules of gibberellic acid treatment

S₁- 10 ppm GA₃ at parrot green stage + 20 ppm GA₃ 1 week of 1st spray + 30 ppm GA₃ at 3-4 mm berry size stage + 40ppm GA₃ at 8-10 mm berry size stage + 50 ppm GA₃ 1 week after 4th spray.

S₂- 20 ppm GA₃ at anthesis stage + 50 ppm GA₃ at berry set stage

Table 1: Contd.....

Varieties (V)	Taste			Overall acceptability		
	S ₁	S ₂	Mean	S ₁	S ₂	Mean
V ₁	4.30	4.10	4.20	4.25	4.15	4.20
V ₂	4.55	4.25	4.40	4.46	4.20	4.33
V ₃	4.00	3.90	3.95	4.05	3.90	3.98
V ₄	3.90	3.80	3.85	3.95	3.80	3.88
Mean	4.18	4.01		4.17	4.01	
For comparing means of	S.Em ±		C.D. at 5 %	S.Em ±		C.D. at 5 %
Varieties (V)	0.08		0.23	0.06		0.18
Schedules (S)	0.06		0.16	0.04		0.13
Vx S	0.11		NS	0.09		NS

NS- Non Significant

Factor-I: Varieties

V₁-Thompson Seedless. V₂- Manik Chaman. V₃- K R White. V₄- 2-A Clone.

Factor-II: Two different Schedules of gibberellic acid treatment

S₁- 10 ppm GA₃ at parrot green stage + 20 ppm GA₃ 1 week of 1st spray + 30 ppm GA₃ at 3-4 mm berry size stage + 40ppm GA₃ at 8-10 mm berry size stage + 50 ppm GA₃ 1 week after 4th spray.

S₂- 20 ppm GA₃ at anthesis stage + 50 ppm GA₃ at berry set stage

Conclusion

Organoleptic test of berries for berry colour and appearance, flavour, texture, taste and overall acceptability, maximum score was given for Manik Chaman variety, while minimum score was obtained by 2 -A Clone variety. In two different schedules of gibberellic acid treatment, maximum score for organoleptic parameters was given for the grapes treated with schedule-1 set of gibberellic acid treatment compared to that of the grapes treated with schedule-2 treatment of gibberellic acid.

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