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Effect of Plant Growth Regulators Effect on Grape Cutting (*Vitis vinifera* L.) cv. Flame Seedless

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ABSTRACT

The present investigation was conducted at Guru Kashi University Research Farm during 2022-2023, Punjab on evaluating the effect of plant growth regulator on grape cv. Flame seedless cutting. These cutting was treated with different concentration of indole-3-butyric acid (T_1: 1000, T_2: 1500 and T_3: 2000 ppm) and gibberellic acid (T_4: 50, T_5: 100 and T_6:150 ppm) along with control (T_0) using prolonged dipping method. The result revealed that T_6: gibberellic acid @150 ppm (9.33) showed minimum numbers of days taken for first emergence of nodes whereas, T_2: indole-3-butyric acid @ 1500 ppm (8.67) showed minimum days of the first roots emergence. The maximum survival percentage was recorded in the cutting treated with T_3: indole-3-butyric acid 2000 ppm (80.00%). Hence, T_2: indole-3-butyric acid @ 1500 ppm was showed good vegetative and root growth in selected root cutting of grape (***Vitis*** *vinifera* L.) cv. Flame Seedless.

Key Word: Cutting, Grape, Growth regulators, Root growth, Survival.

INTRODUCTION

Grape (*Vitis vinifera* L.), belongs to family *Vitaceae* is important commercial fruit crops with extraordinary taste and flavor cultivated in temperate and topical regions of World (Gowda *et al,* 2008; Nowshehri *et al*, 2015). The major grape-growing states in India, are Maharashtra (70.67%), Karnataka (24.49%), Tamil Nadu (1.43%), Andhra Pradesh (1.34%), Madhya Pradesh (1.02%), and Mizoram (0.50%), collectively contributes to nearly (99%) of the total grape production (NHB, 2019).Out of total production of grapes (74.5%) is used as table purpose, (23.5%) used as resin, (15%) used as wine and (0.5%) used for juices according to Adsule *et al* (2012). It possesses high nutrient content (10.2%) carbohydrates, (0.8%) proteins, (0.1%) minerals and (85.5%) water, fiber (1.4 g), vitamin C (27%), vitamin K (28%), thiamine (7%), riboflavin (6%), vitamin B6 (6%), potassium (8%), copper (10%), manganese (5%) and flavonoids (flavonoids, anthocyanins, and flavonols) as an important source of antioxidants (Andjelkovic *et al*, 2013; Somkuwar *et al*, 2018). This nutrient content used in curing jaundice, asthma, joints pains, piles, diabetes, cancer and heart diseases (Kanagarla *et al,* 2013; Dohadwala *et al*, 2009).

Flame seedless cultivar is heavy bearing, crimson red colour, sweet flavour berries and most tolerant to pre monsoon rains as well as less susceptible to diseases according to Chanana *et al* (2008). The hard wood cutting is most common way of propagation of grape. In this method the treatment of cuttings with plant growth regulators play an important role in regeneration. Many scientists had already reported the role of these plant growth regulators in stem elongation, apical dominance, root initiation, increasing the root number and length (Ling *et al*, 2015) So, The present study was undertaken with objectives to evaluate the effect of Gibberellic Acid (GA_3) and Indole Butyric Acid (IBA) on the survival percentage and vegetative growth of grapes cutting (*Vitisv inifera* L.) cv. Flame seedless.

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MATERIALS AND METHODS

The experiment was conducted at agriculture field of Guru Kashi University Research Farm, Talwandi sabo, Punjab in 2022-2023. It is located at latitude 29°59'0" N and longitude 75°5'0" East, has semiarid climate with wide variations of summer and winter temperatures. 20-25cm long grape (*Vitis vinifera* L. cv. Flame seedless) healthy, well nourished, and mature wood was used for trial. Basal 3-4 cm portion of hard wood cuttings were dipped for 24 h in indole-3-butyric acid (T_1: 1000, T_2: 1500 and T_3: 2000 ppm) and gibberellic acid (T_4: 50, T_5: 100 and T_6:150 ppm) solution along with water as control (T_0). It was allowed to dry for 15 minutes and then transplanted in field. The research trail was laid out in Randomized Block Deigns (RBD). The treatments in experiment were replicated three times and each plot consisted of 30 cuttings. Further observations was recorded from parameters i.e. first emergence of node, first emergence of roots, survival percentage, average number of leaves, average number of roots from selected plants. All data from the experimental field were analyzed separately for each experiment for different growth characters and yield attributes with the help of OPSTAT (Statistical Software Package for Agricultural Research Workers) (Sheoran *et al*, 1998). The critical difference at 5% level of implication was calculated to equate the mean different treatments.

RESULTS AND DISCUSSION

The result revealed that in T_6: GA_3@150 ppm (9.33) least numbers of days taken for first emergence of nodes followed by T_5: GA_3@100 ppm (11.33) and T_4: GA_3@ 50 ppm (14.33) and T_0: control (20.67) maximum number of days was taken for first emergence of nodes. The result also revealed that T_2: IBA @ 1500 ppm (8.67) least numbers of days taken for first emergence of roots followed by T_3: IBA @ 2000 ppm (11.67), T_1: IBA @1000 ppm (14.33), T_6: GA_3@150 ppm (19.33), T_4: GA_3@ 50 ppm (18.67) and maximum number of days was taken for first emergence of roots in T_0: control (21.33). The maximum survival percentage was recorded in the cutting treated with T_3 IBA @ 2000 ppm (80.00%) followed by T_2 IBA @ 1500 ppm (78.33%), T_1: IBA @1000 ppm (73.33%), T_6: GA3@150 ppm (72.33%), T_5: GA_3 @ 100 ppm (71.33%) and T_4: GA_3 @ 50 ppm (69.00%) and whereas, the minimum survival percentage was recorded in T_0: Control (58.33%). However, Patil *et al* (2000) reported the cuttings for 6 hours either in IBA (100 ppm) recorded maximum survival percentage (86.33 and 76.00) in the cutltivars Tas-A-Ganesh and Kismish Chorny.

The maximum average number of leaves at 60 and 90 DAP was observed in T_2: IBA @ 1500 ppm (20.67 & 25.33), followed by T_1: IBA @1000 ppm (13.67 & 22.33), T_3: IBA @ 2000 ppm (10.67 & 18.33), T_5: GA_3 @ 100 ppm (10.00 & 15.67), T_6: GA_3@150 ppm (9.33 & 13.67), T_4: GA_3@50 ppm (9.33 & 12.67), Whereas, the minimum average number of leaves was recorded in T_0: Control (8.67 & 9. 67) at 60 DAP and at 90 DAP. Many researchers work on the effect of plant growth regulators on the grapes cutting growth. Chalapathi *et al* (2001) who reported superior result in shoot length, number of branches, number of leaves and root length, survival percentage and sprouting percentage after cuttings treated with IBA.

The maximum average number of roots was recorded in the cutting treated with T_2: IBA @ 1500 ppm (31.67), followed by T_3: IBA @ 2000 ppm (30.00), T_1: IBA @1000 ppm (27.33), T_6: GA_3@150 ppm (23.33), T_5: GA_3 @ 100 ppm (22.33), and T_4: GA_3 @ 50 ppm (20.33). Whereas, the minimum average number of roots was recorded in T_0: Control (9. 67). Patil *et al* (2001) also reported the better survival percentage and higher number of primary roots with IBA treatments. Similarly, Song *et al* (2001) reported good rooting when the base of the cuttings was soaked in a solution of 150 ppm IBA for 24 hours. Rao (2004) reported IBA, 2000 ppm for hardwood cuttings was good for highest percentage of rooting and number of roots and longest root length per cutting in Dogridge and 1613C rootstocks. The maximum numbers of roots were obtained in grapes (V. *vinifera*) with 4000 mg/l IBA. The study showed the significant positive effect of both IBA and GA_3 plant growth regulator on growth and survival of grapes cutting cv. Flame seedless. The IBA @ 1500 ppm has shown good

Table I. Effect of plant growth regulators on total numbers of days taken for first emergence of node and roots (Days), survival percentage (%), average number of leaves / cutting (No.) and average number of roots/ cutting (No.) on grapes cutting (*Vitis vinifera*L.) cv. Flame Seedless.

Treatment	Number of days taken for first emergence of node (Days)	Numbers of days taken for first emergence of roots (Days)	Survival percentage (%)	Average Number of leaves / cutting (No.)		Average Number of roots/ cutting (No.)
				60 DAP	90 DAP	
T0	20.67	21.33	58.33	8.67	9.67	15.33
T1	19	14.33	73.33	13.67	22.33	27.33
T2	16.33	8.67	78.33	20.67	25.33	31.67
T3	18.33	11.67	80	10.67	18.33	30
T4	14.33	18.67	69	9.33	12.67	20.33
T5	11.33	16.67	71.33	10	15.67	22.33
T6	9.33	19.33	72.33	9.33	13.67	24.33
CV%	6.82%	3.44%	3.77%	9.59%	4.34%	2.95%
SE±	0.62	0.35	1.61	0.52	0.32	0.41

vegetative growth, less number of days taken for first emergence, average number leaves and root growth in root cutting of grape (*Vitis vinifera* L.) cv. Flame seedless.

CONCLUSION

It was concluded that the maximum data observed of cutting survival percentage in IBA 2000 ppm treatments. Moreover both plant growth regulators IBA and GA_3 showed significant effect on the growth and development of grapes as compared to control.

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