Plant Archives Volume 20 No. 1, 2020 pp. 3011-3013 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

RESPONSE OF PLANT GROWTH REGULATORS ON ROOTING OF HARDWOOD CUTTINGS IN GUAVA (*PSIDIUM GUAJAVA*.L) CV. LUCKNOW-49

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Abstract

An experiment was carried out to study the response of plant growth regulators on rooting of hardwood cuttings in guava (*Psidium guajava*.L) *cv.* Lucknow-49. The treatments comprised of using three growth regulators like IBA, IAA and NAA with four different concentrations of 1000, 2000, 3000 and 4000 ppm. The guava cuttings were dipped in the growth regulators for twenty minutes and then planted in the poly bags were kept in the mist chamber. The results of the experiment revealed that the root parameters like rooting percentage (87.83%), number of roots per cutting (11.02), maximum root length (12.75 cm) and shoot parameters like days required for bud sprouting (13.50 days), number of sprouts per cutting (2.77) and survival percentage of rooted cuttings (90.59 %) were observed the highest in the treatment where IBA @ 3000 ppm was used. It was followed by the treatment tested with IBA @ 4000 ppm. The least parameters were observed in the control.

Key words: Guava, IBA, IAA, NAA, growth regulators

Introduction

Guava is called as Apple of the tropics and it belongs to the family Myrtaceae. Guava fruits are used for both fresh consumption and processing. It is one of the richest sources of vitamin C, containing 2 to 5 times more than that in oranges. Propagation through air layering in guava is a time consuming and hence necessitated a search for alternate but effective means of vegetative propagation. Of late, several woody perennials are successfully and rapidly propagated through use of cuttings. In this context, rapid method of propagation become very important when planting material is limited due to scarcity of a clone or varieties or due to sudden expansion in acreage. Thus it leads to an idea about the rapid propagation of guava by cuttings. To improve the rooting, different growth regulators at different concentrations was used. With this objective the present investigation was carried out to study the response of plant growth regulators parameters on rooting of hardwood cuttings in guava (*Psidium guajava*.L) *cv.* Lucknow-49.

Materials and Methods

An experiment was carried out in the University orchard, Department of Horticulture, Faculty of Agriculture, Annamalai University during 2017. Guava *cv.* Lucknow-49 was used for the experiment. The experiment was laid out in Randomized Block Design with thirteen treatments and three replications. The treatments comprised of using three growth regulators like IBA, IAA and NAA with four different concentrations of 1000, 2000, 3000 and 4000 ppm. The guava cuttings were dipped in the growth regulators for 20 minutes and then planted in the poly bags was kept in the mist chamber. The observations on rooting percentage, number of roots per cutting, root length, days required for bud sprouting, number of sprouts per cutting and survival percentage of rooted cuttings were recorded. The data were analysed statistically following the method suggested by Panse and Sukhatme (1985).

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Results and Discussion

Root and shoot parameters are considered to be the important factors to judge the rooting of a crop. The data on the root and shoot parameters are presented in the Table 1.

Among the treatments tested, the treatment IBA @ 3000 ppm increased the rooting percentage (87.83%).

Similar findings on increased rooting percentage due to the soaking of cuttings in IBA were reported by Husen and Pal, 2007. They reported that the increased percentage of rooting in cuttings treated with plant growth regulators over control has been considered to be due to the fact that hardwood cuttings contains more starch content which in turn bring about favourable conditions for root initiation and more rooting percentage coupled with positive response of combination of IBA and NAA attributed to their synergistic effect.

The treatment where IBA @ 3000 ppm used recorded the maximum number of roots per cutting (11.02). This was followed by the treatment where IBA @ 4000 ppm was used which recorded 10.93 number of roots per cutting. The reason for the better rooting and increase in root growth with various auxins treatment might be due to maximum utilization of sugar and starch after hydrolysis (Singh, 2001). The root length was recorded the highest (12.75 cm) in the treatment IBA @ 3000 ppm. This was followed by the treatment IBA @ 4000 ppm which recorded the root length of 12.23 cm. The increase in root length may also be due to the effect of growth regulator IBA on the metabolites translocation and carbohydrate metabolism which may be involved in the role of hormones on root length. Similar findings were reported by Haq (1992) and Trujillo (2002) in guava.

Among the treatments tested, the treatment IBA @ 3000 ppm recorded the minimum number of days for bud sprouting (13.50 days). It was followed by the treatment where IBA @ 4000 ppm was used which recorded 14.00 days for sprouting. Earliness in sprouting and increase in number of sprouts may be due to better utilization of stored carbohydrate, nitrogen and other hormones. The present findings were conformity with the report of Bacarin *et al*., (1994) and Giri *et al*., 2004 in guava.

The treatment where IBA @ 3000 ppm used recorded the highest number of sprouts per cutting (2.77). It was followed by the treatment where IBA @ 4000 ppm was used which recorded (2.38) number of sprouts per cutting. The development of dormant bud into sprout is directly associated the breakdown of reverse food and its mobilization in the growing region and auxin involved in the process. The auxins activated shoot growth which have resulted in elongation of stems and length of sprout through cell division accounting in higher number of sprouts (Mukhtar *et al.,* 1998) in guava. The rooted cuttings obtained by the treatment with IBA @ 3000 ppm recorded the highest survival in the field (90.59%) followed by the treatment IBA @ 4000 ppm which recorded 86.30%. The survival percentage of rooted cuttings was recorded the least (30.09%) in control. Noor Rahman *et al.,* (2004) in guava reported that higher concentration of auxin included maximum number of roots which has direct relationship with the survival percentage. Fachinello *et al.,* (2005) reported that hardwood cuttings for presenting regions show constant metabolic activity

Table 1: Response of plant growth regulators on root and shoot parameters in guava.

Treatment Details	Root parameters			Shoot parameters		
	Rooting Percentage (%)	Number ofroots cutting^{-1}	Root Length (cm)	Days requ-ired for bud sprouting	Number of sprouts cutting^{-1}	Survival percen--tage of rooted cuttings (%)
T_{1}- IBA @ 1000 ppm	73.69	10.59	11.11	15.00	2.30	83.41
T_{2}- IBA @ 2000 ppm	70.29	10.02	10.69	15.69	2.17	68.01
T_{3}- IBA @ 3000 ppm	87.83	11.02	12.75	13.50	2.77	90.59
T_{4}- IBA @ 4000 ppm	83.08	10.93	12.23	14.00	2.38	86.30
T_{5}- IAA @ 1000 ppm	72.64	10.32	10.92	15.22	2.28	73.49
T_{6}- IAA @ 2000 ppm	62.25	9.81	10.07	16.82	2.00	51.38
T_{7}- IAA @ 3000 ppm	75.29	10.65	11.79	14.75	2.32	85.20
T_{8}- IAA @ 4000 ppm	57.84	9.77	9.82	17.02	1.95	50.41
T_{9}- NAA @ 1000 ppm	53.62	9.59	9.68	17.23	1.68	46.90
T_{10}- NAA @ 2000 ppm	42.01	8.65	8.38	18.01	1.23	40.17
T_{11}- NAA @ 3000 ppm	65.05	9.93	10.32	16.34	2.09	55.49
T_{12}- NAA @ 4000 ppm	44.86	9.02	9.01	17.85	1.43	43.30
T_{13}- Control						
(Distilled water)	37.67	6.23	7.22	25.07	0.87	30.09
S.Ed	2.02	0.19	0.32	0.46	0.07	2.44
CD(p=0.05)	4.18	0.39	0.67	0.96	0.15	5.00

IBA- Indole-3- Butryic acid, IAA- Indole-3- Acetic acid, NAA- Naphthalene Acetic acid Soaking time of growth regulators is 20 minutes uniformly for all the treatments except control.

and continuous development are the stakes that generally have greater survival percentage to hardwood cuttings, when using growth regulators.

Hence, the results of the experiment revealed that the root parameters *viz.*, rooting percentage, number of roots per cutting, root length and shoot parameters *viz*., days required for bud sprouting, number of sprouts per cutting and survival percentage of rooted cuttings were recorded the highest when IBA @ 3000 ppm was used.

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