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EFFECT OF PLANT GROWTH REGULATORS IN ADVENTITIOUS ROOTING OF CUTTING IN SOURSOP (*Annona muricata* L.)

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ABSTRACT

Soursop is mainly propagated through seeds and by budding. The soursop has been propagated through seed which leads to the highly heterogeneous plant and hence to minimize this problem, the clonal method of stem cuttings is being tried. Rooting cuttings is an important method of vegetative propagation of plants that provide a large number clones from few elite plants on relatively small space. The formation of roots in cuttings is affected by many factors, to minimize this, the plant growth regulators are used to stimulate the rooting of cuttings. Thus, the present work aimed to study the effect of Indole butyric acid (IAA) and Naphthalene Acetic Acid (NAA) on the induction of rooting of soursop by stem cuttings. There were 9 treatments including control with 3 replications and the experiment was conducted under RBD. The treatments were T_1-IBA @500PPM, T_2-IBA@1000PPM, T_3-IBA@1500PPM, T_4-IBA@2000PPM, T_5-NAA@500PPM, T_6-NAA@1000PPM, T_7-NAA@1500PPM, T_8-NAA@2000PPM and T_9-Control. Observations were recorded for the traits like maximum number of survival percentage, average number of roots/shoots, number of sprouts/shoot, root length and leaf length. The results revealed that treatment, T_6-NAA @1000ppm followed by T_2 - IBA@1000 ppm reduced the days taken for sprouting, enhanced the number of roots, length of roots, number of sprouts, number of leaves and length of leaves.

Keywords: Soursop, NAA, IBA, Cutting

Introduction

Soursop (*Annona muricata* L.) belongs to the family annonaceae which is a evergreen tree. It is native to central America. Soursop is a tropical fruit, the plant is known for its anticancerous property due to the the presence of annonaceous acetogenin content in the parts of leaves and fruits. It can be grown in well drained loamy soil and also in semi-dry soil. The suitable temperature is between 21°-30° C and the elevation of about 3000 MSL. The optimal range of latitude is between 27°N and 22.5°S (Nakosone and Paull, 1998). However good productive orchards are found at altitudes of upto 1100 m. Soursop is mainly propagated through seeds and by budding. The soursop has been propagated through seed which leads to the highly heterogeneous plant and hence to minimize this problem, the clonal method of stem cuttings is being tried. Rooting cuttings is an important method of vegetative propagation of plants that provide a large number clones from few elite plants on relatively small space. The ideal length of a stem cutting varies according to the species and consistency of the branch. Most woody cuttings vary from 20 to 30cm, but herbaceous cutting can be smaller (Fachinello *et al.,* 2005). The formation of roots in cuttings is affected by many factors, to minimize this, the plant growth regulators are used to stimulate the rooting of cuttings. Thus, the present work aimed to study the effect of Indole butyric acid (IAA) and Naphthalene Acetic Acid (NAA) on the induction of rooting of soursop by stem cuttings.

Materials and Methods

The experiment was carried out in soursop (*Annona muricata* L.) with Randomized Block Design (RBD) at Orchard, Department of Horticulture, Faculty of Agriculture, Annamalai University, Chidambaram. The cuttings were collected from young branches of soursop trees of 5 years old. Softwood cuttings measuring 15cm long with 2 to 4 nodes and having 4 to 6 leaves were prepared. The lower portion of these cuttings were cut with slanting cut then immersed with IBA for 30 minutes and NAA for 5 minutes for root induction. The treated cuttings were inserted into the polybag containing sand + coir pith+ Fym(3:1:1) under mist chamber condition. There were 9 treatments with 3 replication including control and the experiment was conducted in RBD. The treatments were T_1-IBA @500PPM, T_2-IBA@1000PPM, T_3- IBA@1500PPM, T_4-IBA@ 2000PPM, T_5-NAA@500PPM, T_6-NAA@1000PPM, T_7-NAA@1500PPM, T_8-NAA@2000PPM and T_9-Control.

Observations were recorded for the traits like maximum number of survival percentage, average number of roots/ shoots, number of sprouts/shoot, root length and leaf length.

Results and Discussion

The results revealed that treatment, T_6 - NAA @1000ppm followed by T_2 - IBA@1000 ppm reduced the days taken for sprouting, enhanced the number of roots, length of roots, number of sprouts, number of leaves and length of leaves. Auxin is the essential for rooting of cuttings in several plant species. The acid form of NAA was most effective in current study. Teklehaimont *et al.* (1996) reported that 100 $mg.L^{-1}$ of NAA was more effective than IBA at the same concentration in promoting root formation on stem cutting of *Parika biglobosa.* In a study with kiwi fruit (*Actinidia delicosa)*, NAA was the most effective auxin in promote rooting on stem cutting when compared to IBA (Testolin and Vitagliono, 1987). Today, IBA and NAA are still the most widely used auxins for rooting stem cuttings and for rooting tissue-culture produced microcuttings. It has been repeatedly confirmed that auxin is required for initiation of adventitious roots on stems, and indeed, it has been shown that divisions of the first root initial cells are dependent upon either applied or endogenous auxins (Gaspar and Hofinger, 1988). Auxin application has been found to enhance the histological features like formation of callus and tissue and differentiation of vascular tissue (Satpal Manju *et al.,* 2014).

Adventitious rooting system is a high energy requiring process that requires more reserve of food material for root initiation. Because, this system involves cell division, in which predetermined cells turn to mother cells for the root primordia by following morphogenetic pathways (Aeschbacher, 1994). Besides reserve food material, plant growth regulators such as auxin (i.e., IBA, IAA, and NAA) play an important role in adventitious rooting as well as growth and morphological diversity in plants (Eun *et al.,* 2006). Although the endogenous auxin level has great influence on root induction, application of plant growth regulators significantly increases either low or high concentration of auxin. The applied auxin increases the concentration of endogenous auxin and accumulates itself in the basal region of the cuttings, which act as a metabolizing agent that induces signal for rooting (Husen, 2008). As reported by Yan *et al.* (2014) lower level of NAA significantly increased the adventitious rooting in *Hemarthria compressa*; however, in our study we observed that NAA @ 1000 ppm resulted in an increased number of adventitious rooting per cutting. Hence, the present study concluded that NAA @1000ppm resulted in better rooting of cutting followed by application of IBA@ 1000 ppm in soursop.

Table 1. Effect of iba and naa in rooting of cuttings of soursop

Treatment Details	Days Taken For Sprouting	Number of Roots	Length of Roots (cm)
T_1-IBA 500PPM	30.01	2.21	2.52
T_2-IBA 1000PPM	22.02	8.01	4.51
T_3-IBA 1500PPM	37.11	3.11	3.01
T_4-IBA 2000PPM	31.07	4.01	2.25
T_5-NAA 500PPM	28.21	3.03	2.32
T_6-NAA 1000PPM	20.22	9.12	6.11
T_7-NAA 1500PPM	26.12	3.21	2.30
T_8-NAA 2000PPM	25.21	4.11	2.11
T_9-Control	29.11	3.50	2.40
S Ed	0.76	0.51	0.33
CD(p=0.05)	1.52	1.01	0.65

Table 2 : Effect of IBA and NAA in rooting of cuttings of soursop

Treatment Details	Number of Sprouts/Shoots	Number of Leaves	Length of Leaves (cm)
T_1-IBA 500PPM	1.02	1.02	2.50
T_2-IBA 1000PPM	4.12	5.22	5.50
T_3-IBA 1500PPM	2.06	2.12	4.21
T_4-IBA 2000PPM	2.12	2.42	3.50
T_5-NAA 500PPM	3.22	3.12	2.02
T_6-NAA 1000PPM	5.11	6.02	6.51
T_7-NAA 1500PPM	2.23	3.13	3.52
T_8-NAA 2000PPM	3.11	4.22	4.22
T_9-Control	2.03	3.12	3.01
S Ed	0.28	0.23	0.27
CD(p=0.05)	0.56	0.55	0.54

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