GUAVA A FRUIT CROP: A REVIEW ON ITS BIOLOGY AND PROPAGATION METHOD -AIR LAYERING

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Abstract

Guava plants can be propagated through seed, cuttings, layering, cuttings, budding and grafting. However, air layering together with exogenous application of auxin has a stimulating effect on the formation of longer roots and is still the best propagation method. Growth regulators such as IBA have been used to stimulate plant growth and promote rooting with more force, especially in cuttings. However, the effectiveness of auxins is greatly influenced by environmental conditions, time of day and the rooting medium used. Therefore, this study was mainly conducted to investigate the effect of IBA concentration, time and concentration of rooting medium on the response and rooting efficiency of guava in air stratification. In general, growth regulators *viz.*,IBA alone and in combination with rooting media *viz.*, Moss grass, Coco peat, and Moss grass + Coco peat is used in different time of layering *viz.*, June, July favoured rooting in air-layers.It was found that a high percentage of rooting and rooting signs of guava aerial cuttings could be successfully achieved with exogenous application of IBA in June and July.

Key word- Guava, IBA, Air layering, Propagation, Time

Introduction

Guava is the fourth most important fruit crop in India in terms of area and production, after mango, banana and citrus. It is also called "tropical apple" because of its cheap price. It is cultivated in tropical and subtropical regions. Known botanically as Psidium guajava L., guava belongs to the myrtaceae family.It originated in tropical America. Most cultivars are diploid (2n = 22), but some are natural and artificial triploids (3n = 33), which often produce seedless fruit. Guava fruit is rich in vitamin C.Guava fruit can be used in jam, jelly, juice, preserves, cheese, jam, etc. It can be prepared in many products. Guavas are usually propagated by seed as it is an easy route, but seed propagation plants can affect fruit quality, early ripening and yield. To get early harvest, good value, really good fruit plants, air layer is one of the most used, inexpensive and easy propagation methods for guava.There are many factors that affect the behavior of the air layer, such as the stem

of the mother plant, nutrition of the plant and the soil, cover material, girdling, etiolation, formation time of the air layer, exogenous hormones used for rooting and growth.The genus *Psidium* has about 150 shrubs and *P. guajava* is well-known and grown worldwide. Guava is successfully propagated through sexual method and asexual methods such as cutting, grafting, budding and air layering. Early seed propagation is currently limited to rootstock planting. Vegetative propagation in the air layer is becoming more and more popular due to its low cost and easy method. They have also been more successful. However, a greater variation in the percentage of success was observed in the stratification of air. It was observed that one of the reasons for the change was the age of the buds/trees used in air stratification.The basic ability of air-layered shoots depends on many factors, which vary with the biochemical composition, variety and clone of the crop (eg carbohydrates, nitrogen, sugar, starch, phenolics, auxin level, etc.) the climatic conditions prevailing in the season (temperature, relative humidity, rain, etc.) of air layering. All these conditions must be at a good level for the guava layer to root well.The growth parameters of the layers depend on the pre- condition shoots on mother plant, the speed and number of roots formation on layer and post separation environment to which the layer is exposed (Sharma *et al*., 1975). Due to the durability of guava, it grows well even in harsh conditions. However, the main limitation of guava promotion is the importance of seeds, as the seedlings do not maintain selection traits, especially when compared to vegetatively produced fruits. Guava can be successfully reproduced asexually by layering (Manna *et al*. 2004)

Botany

Most of the cultivars of guava belong to *Psidium guajava* L.Apart from cultivated guava, some other species with edible fruits are there.The genus Psidium belong to family Myrtaceae and contains about 150 species.

1. *Psidium guajava* L. - It is a small tree, sometimes growing to 8 or 9 meters. The trunk is slender with greenish brown scaly bark,the young brachlets are quadrangular. The calyx splits into irregular segments.Ovary is inferior.

2. *Psidium cattleianum*- It is bushy shrub, sometimes becomes a small tree up to 7 meters high. The bark is smooth, grey brown in colour and the young branchlets are cylindrical. The fruit is obovate to round in form 2-3 cm in diameter, purplish red in color with a thin skin.

Climate and soil

It is successfully grown under tropical and sub-tropical climate. The optimum temperature

requirement of guava ranges between 23^0C-28^0C.The areas having distinct winter season, is considered best for increasing yield and improving quality.Guava can be grown on poor wasteland soil.it is sensitive to waterlogged conditions. It can grow in soil having pH 6.5-8.5.Maximum concentration of root is between 0-20 cm soil depths.

Air Layering

Guava propagates on seedling, raised from open pollinated seeds results in considerable variation in the shape, size, form and quality of fruits (Zamir *et al.*, 2003 and Mishra *et al.*, 2007) and evidently takes longer time to reach to bearing stage when compared to vegetative propagated materials.

There are many vegetative methods for propagating good fruit trees.

Traditional asexual propagation techniques have been hampered due to juvenile phase of longer duration, season reliance, long life span, and increased plant propagation material (Jaiswal and Amin 1992, Usman *et al.*, 2014). The method of propagation by air layers with growth regulators during the rainy season is used.Air layering has been successful in guava,litchi and many other fruits, so it's an easy and inexpensive way to propagate vegetatively. Aerial stratification is successful in plant propagation because the stratified shoot does not separate from the main stem, so it receives a constant supply of water and mineral nutrients from the xylem and is still beneficial (Hartmann *et al*., 2010), and intact shoots (and leaves) contain some unknown substances that cause root degradation. (Singh *et al.*, 2004).This is a fast, efficient and easy way to clone guava plants and is probably the least expensive method available. Success in layering depends on early initiation of roots and the formation of adequate root fibers. Some workers have reported good results using growth regulators to promote root primordia in the aerial layer of guava crops (Bhagat *et al.*, 1999; Singh and Bhuj, 2000. Tyagi and Patel, 2004; Sarkar and Ghosh, 2006; Singh *et al.*, 2007).

This is an easy, fast and good method of cloning guava trees and is probably the most expensive. This quality and stated that with this method in Florida, seeds can be grown with 100% success in 4-5 months. In Venezuela, air layer formation has been studied in root-knot nematode resistant guava tree genotypes where a 50% rooting percentage was observed when AgroLUZ-42 was selected, although it may not be essential for ringing or growth regulators (Vilchez*et al.*, 2011.).Physiological condition of the branch, application, concentration of growth regulators, type of auxin, and substrate used are important considerations when propagating guava trees by air

layering (URDANETA *et al*., 2009). However, the downside to the aerial layer is that it is lower than a mother tree compared to bud cuttings or grafting.

Effect of Time on air layering

The climate of the region plays a crucial and significant role in realizing better success rates with this method (Rymbai and Satyanarayana Reddy, 2010). In the present investigation results was found significantly highest in layers prepared August month treated with IBA- 4000 ppm concentration, vigrous growth was reflected in number of sprouts, number of leaves, shoot length and survival percentage during hardening in shade house. Similar findings obtain by Tyagi and Patel (2004), Karunakara (1997) and Rymbai and Reddy (2011) in guava.

Kamleshkar Singh and Jain (1996) reported that in guava (cv. Allahabad safeda), the highest (78.75%) percent of rooting, number of primary and secondary roots, length of the longest root were obtained when the etiolated shoots were treated with IBA @ 6000 ppm during the month of July. Chaudhari *et al.*, (1994) studied the effects of combinations of IBA (3000-4500 ppm) and NAA (400-750 ppm) in lanolin on stooling in guava under semi-arid conditions in August and found that the highest rooting percentage (100% after 60 days) was obtained with 4500 ppm IBA + 400 ppm NAA. This combination also resulted in the highest rate of survival in nursery beds (80.34% after 90 days).

Effect of Auxins on air layering

Several workers have reported successful results using plant growth regulators to stimulate root primordia in the air layering of guava crops (Tyagi and Patel, 2004; Sarkar and Ghosh, 2006; Singh *et al*, 2004). Athani et al. (2001) studied the effects of girdling, growth regulators and etiolation on aerial rooting of guava cultivars Sardar. Among the different treatments, the amount of roots (90%), number of roots (18.23) and the longest root (9.56 cm) were obsereved upon treatment with 30 days advance girding +eliolation +IBA, while the values for these parameters were minimum (20%,6,25 and 4.87 cm) upon treatment with the control. Rahman et al. (2000) reported that the maximum number of roots (9.94) and root length (10.94 cm) per air layer were recorded in the litchi air layer treated with 2500 ppm IBA. Singh (2002) studied the effect of different concentrations of IAA, IBA and NAA combined with a white or black polyethylene film on air layered guava varieties Allahabad Safeda. He found that among plant growth regulators, IBA is best for plant growth, development, survival and growth in the air layer. Tyagi and Patel (2004) reported that the combination of IBA and NAA in air layering guava (cv. Sardar) plants was more effective

than IBA or NAA alone, and that higher concentrations worked better on the development of roots than lower and lower concentrations. Therefore, maximum rooting (90.0% and its commercial value (76.58%) was obtained with IBA + NAA at 10 000 ppm. Kumar and Syamal (2005) found that treatment with IBA 3,000 ppm resulted in the highest root growth followed by NAA 2,000 ppm. More roots were recorded using IBA + NAA (1:1) at 2,000 ppm each. Etiolation and application of exogenous auxins have a stimulating effect on the production of long roots.Sarkar and Ghosh (2006) found the effect of 1000 and 2000 ppm IBA on the performance of guava varieties. L-49, West Bengal, India. IBA at 2000 ppm was the best interms of primary and secondary root count, rooting success and survival. Kakon *et al.* (2008) examined the effect of different variables and growth regulators on guava pile stratification and found that different growth regulators had significant effects on almost all parameters.1200 ppm IBA gives the best result in treatment. Lal *et al.* (2007) reported that application of IBA (7500 ppm) resulted in the largest root size (96.67%), average root number per shoot (46.93) and root length (8.8).45 cm) Size. They also noted that treatment with IBA (7500 ppm) increased guava ambulatory survival (75%) after transplanting into the field. Desale (2011) showed an increase in root volume (6.20 ml) in the air layer of Karonda air layers treated with IBA Vegetative Propagation of Guava (*Psidium guajava* L.) Through Air layering: A Review 1183 5000 ppm, whereas minimum root volume was recorded in treatment control.

Conclusion

The effect of time,IBA, different rooting media and combination of these are being studied on the air layering of the plant .Rooting media, Rainy season and IBA treatments seems to have influence the activation of root primordia and provide carbohydrates, cause considerable increase in the success in promoting roots and improved root characters like number of roots, root length and root weight.

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