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# ROOTING OF HARDWOOD CUTTINGS OF GUAVA (*PSIDIUM GUAJAVA* L.) THROUGH BOTTOM HEAT

J. PRASAD, A. RABBANI AND R. A. RAM

*Department of Horticulture N. D. University of Agriculture and Technology Faizabad-224 229*

## SUMMARY

The present investigation on propagation of guava hard wood cuttings through bottom heat resulted that IBA (2500 and 5000 ppm) had shown pronounced effect on improving the rooting (98%), root number (40.80) and root length (2.40 cm). The combination of IBA and Benzoic acid also showed increasing trend on rooting (60.50%). root number (15) and root length (1.85 cm). The overall survival of rooted cuttings was poor due to immature and shorter roots and unfavourable environmental conditions. The principal tissues involved in root initiation were secondary phloem and cork cambium.

## INTRODUCTION

Guava is known as an important commercial fruit in India, which has potential to withstand high level of moisture and salt concentrations as well as moisture stress conditions. Most of the orchards are established with seedling plant materials. Among vegetative means of propagation, budding is being used as recent technique for multiplication of commercial cultivars. Rooting of cuttings under mist and glass house conditions, is difficult-to-maintain optimum temperature throughout the year due to seasonal variations, fluctuations in electricity and excessive expenditure, which would not be feasible to Indian conditions. In order to improve the rooting potentiality of guava hard wood cuttings with an aid of simple and economical technique, the present study has been undertaken with use of root promoting substances under bottom heat conditions.

## MATERIALS AND METHODS

The experiment was carried out with hard wood cuttings of guava, collected from hedge plants in the month of Nov-Dec. 1983, at MES (Horticulture) of Narendra Deva University of Agriculture and Technology, Faizabad. The cuttings were treated with different concentrations of IBA (2500 and 5000 ppm), Etherel (1000 and 2000 ppm), Benzoic acid, Catechol (1000 and 2000 ppm each) and with their possible combinations. These treated cuttings were placed under bottom heat bin filled with standard rooting media. Rooting media was prepared with equal part of sphagnum moss and grit + Sand (1: 1). The temperature of media was maintained at $30 \pm 2°C$ throughout the propagation duration during winter (Nov-Dec). The humid environment surrounding the cuttings was maintained by covering the bottom heat bin with polythene tent and moist blotting paper.

## RESULT AND DISCUSSION

*Rooting :*

Significant variations in rooting percentage were recorded due to treatment of

different concentrations of auxins, ethrel and phenolic compounds (Table-1). Maximum rooting (98%) was obtained with 2500 ppm IBA followed by 88.90 per cent with 5000 ppm IBA as compared to other treatments. Cuttings treated with ethrel and phenolic compounds (1000 and 2000 ppm) did not show beneficial effect on rooting. However, the combined effect of IBA and phenolic compounds i.e. Benzoic acid and catechol (2500 ppm and 1000 ppm) also showed stimulatory effect on rooting of cuttings (60 and 55.50%, respectively). It is evident from the Table-1 that both the concentrations of IBA i. e. 2500 and 5000 ppm proved optimal to induction of rooting. The present findings are in agreement to observation recorded by Pathak *et al.* (1982). It was further advocated by Prasad (1976) that lower concentration of IBA was found more effective and safer under bottom heat condition. Cuttings treated with higher concentrations of IBA showed basal rooting.

*Table 1: Effect of bottom heat and different concentrations of auxin, ethrel and phenolic compounds on rooting and survival of guava cuttings*

| Treatments | Establishment (%) | Cutting rooted (%) | Angular value | Average number of roots/cutting | | Average length of roots/cutting (cm) | Square root |
|---|---|---|---|---|---|---|---|
| | | | | Number | Square root | | |
| Control | 0.00 | 8.75 | 17.18 | 4.50 | 2.11 | 0.40 | 0.63 |
| 2500 ppm IBA | 25.00 | 98.00 | 82.00 | 40.80 | 6.38 | 2.40 | 1.55 |
| 5000 ppm IBA | 20.00 | 83.90 | 70.20 | 25.50 | 5.04 | 1.75 | 1.32 |
| 1000 ppm Ethrel | 6.25 | 35.25 | 36.41 | 8.25 | 2.87 | 0.50 | 0.70 |
| 2000 ppm Ethrel | 2.75 | 24.00 | 29.31 | 6.75 | 2.59 | 0.75 | 0.97 |
| 1000 ppm Benzoic acid | 6.38 | 30.75 | 33.61 | 5.25 | 2.28 | 0.55 | 0.76 |
| 2000 ppm Benzoic acid | 7.00 | 34.25 | 35.81 | 6.70 | 2.58 | 1.05 | 1.02 |
| 1000 ppm Catechol | 5.12 | 30.75 | 33.66 | 3.80 | 1.94 | 0.85 | 0.52 |
| 2000 ppm Catechol | 3.15 | 24.25 | 29.49 | 4.50 | 2.11 | 0.40 | 0.63 |
| 2500 ppm IBA + 1000 ppm Benzoic acid | 15.02 | 60.50 | 51.06 | 15.50 | 3.93 | 1.85 | 1.38 |
| 2500 ppm IBA + 1000 ppm Ethrel | 10.11 | 40.50 | 39.52 | 8.75 | 2.95 | 1.55 | 1.24 |
| 2500 ppm IBA + 1000 ppm Catechol | 12.00 | 55.50 | 47.87 | 10.25 | 3.19 | 1.15 | 1.07 |
| 1000 ppm Ethrel + 1000 ppm Catechol | 5.36 | 35.50 | 36.56 | 6.25 | 2.49 | 1.10 | 1.05 |
| S.Em ± | 0.68 | | 0.58 | | 0 06 | | 0.02 |
| C.D. at 5% | 1.94 | | 1.64 | | 0.18 | | 0.07 |

*Number of roots:*

Similar trend was observed in number of roots per cutting as in rooting influenced by different treatments. Maximum roots (40.80) were induced by 2500 ppm of IBA followed by 5000 ppm IBA (25.50). Among different treatment combinations, 2500 ppm IBA + 1000 ppm Benzoic acid induced maximum number of roots (15.50). Least number of roots were recorded with treatment of 1000 ppm of catechol and control (Table-1). It is in confirmity to results obtained by Chauhan and Reddy (1974). The reduction in root number with alone or combined application of Benzoic acid, Ethrel and catechol is might be due to antagonistic effect of these concentrations with basal temperature treatments.

*Root length:*

The average length of root was increased (2-4 cm) with 2500 ppm IBA as compared to other treatments. Ethrel in combination with IBA showed increasing effect on root length (0.75 cm). Among different treatment combinations IBA and phenolic compounds, 2500 ppm IBA + 1000 ppm Benzoic acid showed better root length (1.85 cm). It is similar to observations recorded by Singh and Kumar (1974).

*Root quality and establishment:*

Most of the cuttings produced less fibrous, white, thinner and less brittle roots which did not vary due to different treatments. Maximum survival (25%) was recorded with the treatment of 2500 ppm IBA followed by 20 per cent with 5000 ppm IBA. Whereas, other treatments did not show any percentage of establishment. However, the establishment of the rooted shoots was poor which might be due to unfavourable environmental condition i.e. lower temperature and exposure of roots at the time of observations taking out from the bottom heat. Since the bottom heat is very exhaustive process which accelerate the root initiation in very short period and there may be chances of more losses of stored food materials of shoots as well as inactive phase of growth during winter months (Chauhan and Reddy, 1974 and Prasad 1976). There may be possibilities to improve the establishment by providing suitable environmental conditions artically and retreatment of rooted shoot, with nutrients.

*Anatomical study:*

Anatomical structure of cuttings indicated that the principal tissues responsible for root initiation in guava were, secondary phloem and cork cambium. Callus formation did not observe during the regeneration of cuttings. The presence of sclerenchyma cells in guava cuttings were meagre. Pandey (1976) observed marked differences in anatomical structure and rooting ability of forced and unforced cuttings of apple root stocks. However, Fabbri (1980) observed wide variation in proportion of bark, xylem, pith and thickness of sclerenchymatus tissues which did not show variation in root initiation of olive cuttings.

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