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Effect of Pre-planting Treatments and Cutting Date on Performance of Guava (*Psidium guajava* L.) Semi-Hard Wood Cuttings.

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ABSTRACT

The objective of this work was to reach the best treatment that caused the high rooting and survival percentages in guava semi-hard wood cuttings. Investigation was carried out at the Baramoon Experimental Farm, Horticulture Research Institute Dakahlia Governorate, Egypt during two seasons 2016-2017. The semi-hard wood cuttings were taken in May and July from 22 years old uniform trees of guava cv. Montakab El-Sabahia cv. immediately after collection, all cuttings were soaked in 15% activated charcoal (AC) for 3 hours. The experiment was laid out in complete randomized blocks design. Number of treatments were 9; (IBA 3000ppm T1, IBA 4500ppm T2, IBA 5000ppm T3, Ethephon 600ppm + Benzoic acid 100ppm + IBA 3000ppm T4, Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm T5, Ethephon 600ppm + Benzoic acid 100ppm + IBA 5000ppm T6, Ethephon 600ppm + Citric acid 100ppm + IBA 3000ppm T7, Ethephon 600ppm + Citric acid 100ppm + IBA 4500ppm T8 and Ethephon 600ppm + Citric acid 100ppm + IBA 5000ppm T9). Cuttings collected during May gave the better results. Among different treatments T5 could be recommended, as it was the best in teams of rooting percentage 70%, number of roots per cutting 4.3, length of roots 4.32 cm, root fresh weight per cutting 3.35g and survival percentage of rooted cuttings 50%.

KEYWORDS: Guava; Cuttings; Rooting; Benzoic Acid; Citric Acid; IBA; Activated Charcoal.

1. INTRODUCTION

Guava (*Psidium guajava* L.) can be propagated by seeds (Zamir *et al.,* 2003) as well as by vegetative (layering, budding, grafting and cuttings) (Chandra *et al.,* 2004). Propagation from seeds features trees that are genetically heterogeneous in yield and fruit quality, due to nearly 35% cross pollination (Yadava, 1996: Paull and Bittembender, 2006 and Mehmood *et al.,* 2013; 2014,). Hence, seed propagation is used in breeding programs to produce rootstock and it is not recommended in commercial orchards of high productivity (Giri *et al.,* 2004). Vegetative propagation of guava is a very efficient method to produce true-to-type plants with short juvenile phase and perpetuating cultivar characteristic (Singh, 2007). Cutting propagation is considered as the most effective vegetative method by major guava producers (Davies and Hartman, 1988: Abdullah *et al.,* 2006: Kareem *et al.,* 2013 and Shahzad *et al.,* 2019).

The rooting of guava cuttings is influenced by several internal and external factors, such as : age, health, nutritional status (carbohydrate reserves and nitrogen compounds), hormonal balance (auxin and cytokinin) of the mother tree, cutting age, type of cutting, presence or of leaves at cutting, cuttings time, environment conditions such as temperature and humidity, phenolic compound oxidation and treatment of cuttings with growth regulators (Evans, 1992: Hartmann, *et al.,* 2002: Sardoei, 2014: Sohnika *et al.,* 2015: Abdul *et al.,* 2016: Mitra and Pathak 2018 and Singh, 2018).

Guava has high content of phenolic compounds in branches and leaves which poses browning problem during in rooting process. It is a serious problem associated with the oxidation of phenolic substances leaches out from the basal ends of cuttings; resulting in browning of the basal cuttings. Polyphenol oxidase (PPO) is a nuclear-coded copper-containing enzyme, which catalyses the oxidation of phenols and quinones (Vaughn *et al.,* 1988, Kim *et al.,* 2001), it also plays an important role in cell division and root primordial development (Gonzalez *et al.,* 1991, Gaspar *et al.,* 1997), additionally, it act as catalyzer in the degradation of indole-3-butyric acid (IBA) (Vaughn *et al.,* 1988 and Kim *et al.,* 2001).

Preplanting treatments of cuttings with antioxidants [ascorbic acid, citric acid, Polyvinylpyrrolidone (PVP)] and activated charcoal (AC) may prevent oxidation of phenols and enhances root formation (Chevre *et al.,* 1983: Tagelsir *et al.,* 2006: Rai *et al.,* 2008 and El-Sharony *et al.,* 2018).

Results of recent investigation indicate that cuttings can be alternative method to clone superior guava varieties (Nitin *et al.,* 2015: Akram *et al.,* 2017 and Shahzad *et al.,* 2019). As such, this study aimed at achieving the reach the best treatment that causes high rooting, survival percentages in guava semi-hard wood cuttings.

2. MATERIALS AND METHODS

2.1. Study Area and Plant Material Collection.

Ten healthy and mature trees (22 years old) of guava cv. Montakab El-Sabahia cv., grown at the Baramoon Experimental Farm of the Horticulture Research Institute Dakahlia Governorate, Egypt were used in the present study during 2016 and 2017. The trees were subjected to the common horticultural management practices.

2.2. Ethephon Treatment.

Half of the selected trees were sprayed with ethephon (2-Chloroethyl Phosphonic Acid) at 600 ppm in February of each year. The other half was left as a control without chemical spraying, instead they were sprayed with water.

The ethephon dose (600 ppm) was diluted according to the commercial recommendation for the product (240g/ L^{-1} of ethephon). A backpack sprayer type AGRICO 20L was used in spraying ethephone in trees canopy at 4L/tree.

2.3. Preparation of Cuttings.

Semi-hard wood cuttings were taken from current years shoots of the selected trees, after a flush growth took place and have attained some degree of maturity. The cuttings were collected early in the morning, immediately transferred to the propagation site. Average length of cuttings was 25cm with 4 to 6 leaves left neat the top end. Leaf blade area was reduced to 50% by a vertical cut across the leaf. Soon after preparation all cuttings were immediately dipped in 15% activated charcoal for 3 hours and were left to drain for few minutes similar to method used by (Tagelsir *et al.*, 2006). A fresh cut was made at the cutting base before treatment with IBA (3000, 4500 and 5000 ppm), Benzoic acid at 100ppm and Citric acid at 100 ppm.

2.4. Preparation of Benzoic Acid, Citric Acid and IBA Solutions.

A hydro solution of Benzoic acid was prepared by weighing 0.1 g of Benzoic acid and dissolving it in 1000ml of distilled water. Solution of Citric acid at 100 ppm was prepared according to the previous method.

A hydroalcoholic solution of indole-3-butyric acid (IBA) was prepared by weighing 3g of IBA and dissolving it in 50 ml of 96º alcohol, in a beaker. Once the IBA had completely dissolved, the volume was completed to 1000ml with distilled water, obtaining an IBA concentration of 3000ppm. The same procedure was repeated for the remaining doses Similar the procedures reported by (Hortman and Kester, 1960).

2.5. Planting of Cuttings.

Dipping time for the basal ends of cuttings (2.5-3cm) was 2 minutes in Benzoic acid, Citric acid and IBA solutions. After dipping the basal ends were allowed rinse, and then were planted in 30cm wide black polyethylene at a depth of 6-8cm. The bags contained a mixture of vermiculite and sand at ratio of 1:1 (v/v); bags were placed on the soil surface in field condition immediately after planting.

2.6. Experimental Design and Treatment Details.

Experiments were carried out during 2016-2017 seasons. The cuttings were prepared at two collecting dates (May and July). The root promoting hormones includes 9 treatments were achieved on every collecting dates in complete randomized blocks design, every treatment was replicated two times, 10 cuttings each and those treatments as follow:

Treatment 1 (T1): IBA 3000 ppm.
Treatment 2 (T2): IBA 4500ppm.
Treatment 3 (T3): IBA 5000ppm.
Treatment 4 (T4): Ethephon 600ppm + Benzoic acid 100ppm + IBA 3000ppm.
Treatment 5 (T5): Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm.
Treatment 6 (T6): Ethephon 600ppm + Benzoic acid 100ppm + IBA 5000ppm.
Treatment 7 (T7): Ethephon 600ppm + Citric acid 100ppm + IBA 3000ppm.
Treatment 8 (T8): Ethephon 600ppm + Citric acid 100ppm + IBA 4500ppm.
Treatment 9(T9): Ethephon 600ppm + Citric acid 100ppm + IBA 5000ppm.

Growth measurements of cuttings; at 90 days after planting, the cuttings were assessed to determine:

1- Average rooting percentage.
2- Average root number per cutting.
3- Average root length per cutting.
4- Average root fresh weight per cutting.
5- Average cuttings' survival percentage.

2.7. Statistical analysis; The data were statistically treated by analysis of variance (ANOVA) and means for various treatments were compared using "Duncans Multiple Range Test" (Duncan, 1955).

3. RESULTS AND DISCUSSION

Experiments were carried out in field condition relative humidity (%) and mean temperature (°C) were recorded during the period of experimentation (May to October) in 2016-2017 seasons. Figure 1 shows that temperature ranged between 23.7 and 30.5˚C, while relative humidity ranged between 39.7 and 57.6% during 2016 and 2017 seasons.

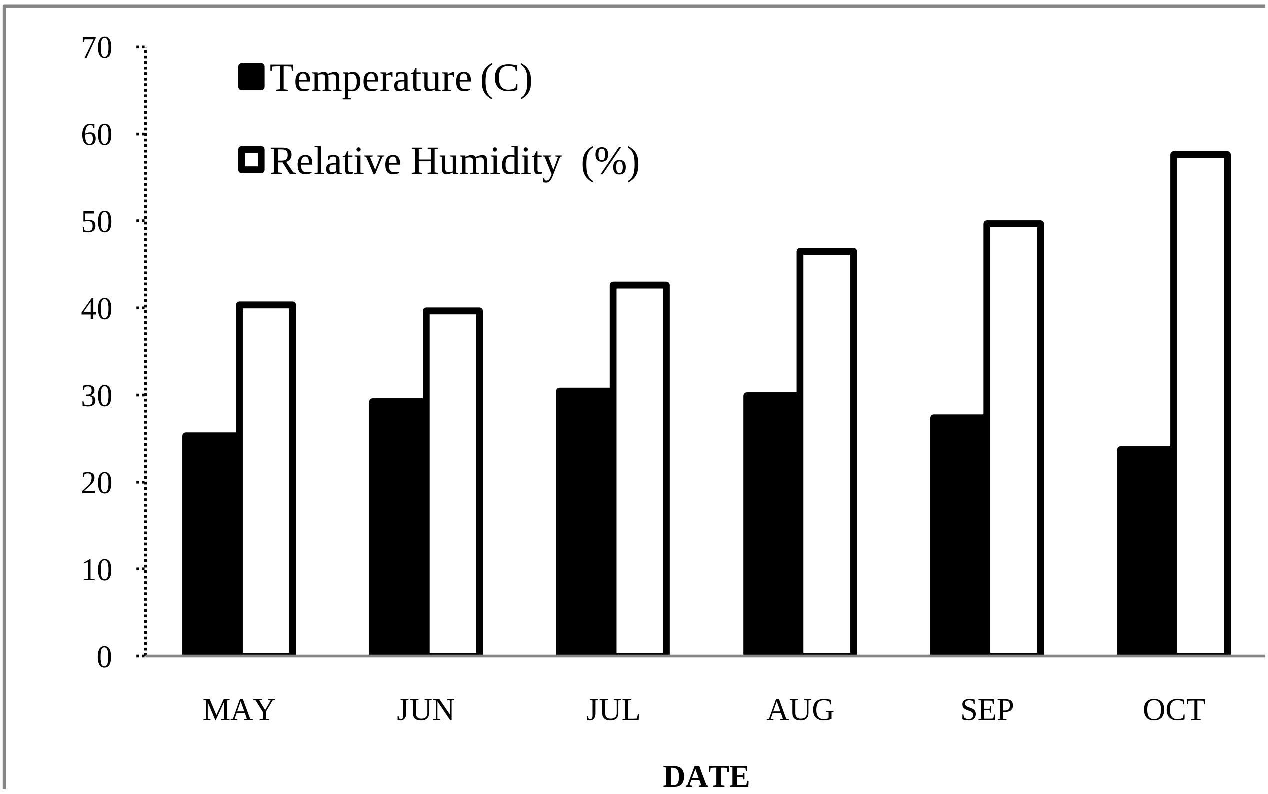

Fig 1. Averages monthly weather data of the experiment site at Dakahlia governorate, Egypt during the period of experimentation (May - October) in 2016-2017 seasons.

3.1. Effect of date collecting of semi-hard wood Guava cuttings on growth measurements:

Date of collecting cuttings (May and July) had a significant influence on rooting and survival percentage, roots number, roots length and roots fresh weight P<0.0001. These results are comparable with the results obtained by (Sinha, *et al.*, 1962: Sharma, 1975 and Rathore, *et al.*, 1984) in guava cuttings.

The obtained data shows that cuttings collected during May performed better, it could be referred to the temperature degree, relative humidity and lower phenolic compound content in this period. These results are in agreement with those of (Evans, 1992: El-Iraqy, 1994: Hartmann *et al.*, 1997 and Singh, 2018), they found that cuttings collected in early May gave higher rooting and survival percentage, roots number, roots length and roots dry weight than those collected in July and September.

Table 1. Rooting characteristic and survival % of cuttings collected during May, values shows in the table represent the average of two seasons (2016- 2017).

*Cutting Treatments	Rooting percentage (%)	Number of roots	Root length (cm)	Root fresh weight (g)	Survival (%)
T1	15.0d	1.7c	2.0c	1.2c	7.0d
T2	27.0c	2.4c	2.4c	1.6c	13.0d
T3	22.0c	2.0d	2.1c	1.4c	10.0d
T4	57.0b	3.6b	3.6b	2.0bc	37.0b
T5	70.0 a	4.3 a	4.32a	3.35a	50.0a
T6	65.0b	3.8b	3.9b	2.8b	39.0b
T7	33.0bc	2.7b	2.3c	1.5c	25.0c
T8	45.0bc	3.5b	3.0bc	1.9c	34.0b
T9	40.0bc	3.0bc	2.8c	1.7c	31.0b

* T1= IBA 3000ppm, T2= IBA4500ppm, T3= 5000ppm, T4= Ethephon 600ppm + Benzoic acid 100ppm + IBA 3000ppm, T5= Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm, T6= Ethephon 600ppm + Benzoic acid 100ppm + IBA 5000ppm, T7= Ethephon 600ppm + Citric acid 100ppm + IBA 3000ppm, T8= Ethephon 600ppm + Citric acid 100ppm + IBA 4500ppm and T9= Ethephon 600ppm + Citric acid 100ppm + IBA 5000ppm.Values followed by the same letter (s) within the same column are not significantly different at (0.05 % level) using Duncan's Multiple Range Test.

Table 2. Rooting characteristic and survival % of cuttings collected during July, values shows in this table represent the average of two seasons (2016- 2017).

*Cutting Treatments	Rooting percentage (%)	Number of roots	Root length (cm)	Root fresh weight (g)	Survival (%)
T1	10.0d	1.0c	1.5c	0.9c	3.0d
T2	21.0c	2.0c	2.0c	1.3c	9.0d
T3	16.0c	1.9d	1.8c	1.0 c	6.0d
T4	45.0b	3.0b	3.0b	1.7bc	30.0b
T5	63.0 a	4.0 a	4.0a	3.1[a]	44.0a
T6	55.0b	3.5b	3.2b	2.3b	37.0b
T7	22.0bc	2.3b	2.0c	1.0c	18.0c
T8	32.0bc	3.1b	2.8bc	1.7c	27.0b
T9	28.0bc	2.7bc	2.4c	1.3c	20.0b

* T1= IBA 3000ppm, T2= IBA4500ppm, T3= 5000ppm, T4= Ethephon 600ppm + Benzoic acid 100ppm + IBA 3000ppm, T5= Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm, T6= Ethephon 600ppm + Benzoic acid 100ppm + IBA 5000ppm, T7= Ethephon 600ppm + Citric acid 100ppm + IBA 3000ppm, T8= Ethephon 600ppm + Citric acid 100ppm + IBA 4500ppm and T9= Ethephon 600ppm + Citric acid 100ppm + IBA 5000ppm.values followed by the same letter (s) within the same column are not significantly different at (0.05 % level) using Duncan's Multiple Range Test.

3.2. Effect of IBA concentrations (3000, 4500 and 5000 ppm) on growth measurements of cuttings.

Showed that IBA concentration has significant effects ($P<0.0001$) on rooting percentage, root number, root length, root fresh weight, and survival percentage in semi-hard wood guava cuttings. The highest impact was recorded for 4500ppm in comparison with the different concentrations of IBA 3000 and 5000ppm (Table 3 and 4). Among all the IBA concentration, IBA (4500 ppm) showed the highest results in terms of, rooting percentage (24.0%), root number (2.2), root length (2.2 cm), root fresh weight (1.5 g), and survival percentage (11.0%) in semi-hard wood guava cuttings, respectively. However, treatment IBA (3000 ppm) led to the lowest values, rooting percentage (12.5%), root number (1.4), root length (1.8 cm), root fresh weight (1.1g), and survival percentage (5.0%) in semi-hard wood guava cuttings respectively (Table 4). The results of present findings are in good agreement with the results reported by (Marco *et al.*, 1998: Bhagat *et al.*, 1999 and Rymbai and Sathyanarayana, 2010) in guava.

Table 3. Effect of different concentrations of IBA on rooting characteristic and survival % of guava semi-hard wood cuttings, values shows in this table represent the average of two seasons (2016- 2017).

*Cutting Treatments	Rooting percentage (%)	Number of roots	Root length (cm)	Root fresh weight (g)	Survival (%)
T1	12.5 c	1.4 c	1.8 c	1.1 c	5.0 c
T2	24.0 a	2.2 a	2.2 a	1.5 a	11.0 a
T3	19.0 b	1.9 b	1.9 b	1.2 b	8.0 b

* T1= IBA 3000ppm, T2= IBA4500ppm and T3= 5000ppm. Values followed by the same letter (s) within the same column are not significantly different at (0.05 % level) using Duncan's Multiple Range Test.

3.3. Effects of Ethephon, Benzoic Acid, Citric Acid and IBA on growth measurements of cuttings.

Table 4 shows the positive effect of the combination of Ethephon, Benzoic acid, Citric acid and IBA on rooting percentage, root number per cutting, root length per cutting, root fresh weight per cutting and survival percentage in semi-hard wood guava cuttings. These results are in agreement with the finding of (Prasada *et al.*, 1988 and Marco *et al.*, 1998). T5 (Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm) recorded the best values in percentage of rooted cuttings 66.5 %, number of roots per cutting 4.2, length of roots 4. 2 cm, root fresh weight per cutting 3.2g and survival percentage of rooted cuttings 47.0%. Similar results were reported by (Prasad *et al.*, 1988: Marco *et al.*, 1998 and El-Sharony *et al.*, 2018), they found that the application of IBA accompanied with antioxidant significantly increased rooting percent, root length, and number in guava. Application of IBA accompanied with antioxidant may be effective in controlling browning of cuttings caused by the oxidation of tannin and poly phenols.

Table 4. Effects of Ethephon, Benzoic Acid, Citric Acid and IBA on rooting characteristic and survival % of guava semi-hard wood cuttings, values shows in this table represent the average of two seasons (2016- 2017).

*Cutting Treatments	Rooting percentage (%)	Number of roots	Root length (cm)	Root fresh weight (g)	Survival (%)
T4	51.0 c	3.3 c	3.3 c	1.9 c	33.5 c
T5	66.5 a	4.2 a	4.2 a	3.2 a	47.0 a
T6	60.0 b	3.7 b	3.6 b	2.6 b	38.0 b
T7	27.5 f	2.5 f	2.2 f	1.3 f	21.5 f
T8	38.5 d	3.3 c	2.9 d	1.8 cd	30.5 cd
T9	34.0 e	2.9 e	2.6 e	1.5 e	25.5 e

* T4= Ethephon 600ppm + Benzoic acid 100ppm + IBA 3000ppm, T5= Ethephon 600ppm + Benzoic acid 100ppm + IBA 4500ppm, T6= Ethephon 600ppm + Benzoic acid 100ppm + IBA 5000ppm, T7= Ethephon 600ppm + Citric acid 100ppm + IBA 3000ppm, T8= Ethephon 600ppm + Citric acid 100ppm + IBA 4500ppm and T9= Ethephon 600ppm + Citric acid 100ppm + IBA 5000ppm. Values followed by the same letter (s) within the same column are not significantly different at (0.05 % level) using Duncan's Multiple Range Test

4. CONCLUSION

The best time for collecting semi-hard wood guava cuttings was May. Treatment 5 (Ethephon 600ppm+ Benzoic acid 100ppm + IBA 4500ppm) found the most effective for rooting percentage, growth attributes and survival percentage in guava cuttings, that treatment is the most recommended for the propagation of guava via semi-hard wood cutting under our experimental conditions.

5. REFERENCE

Abdullah ATM, Hossain MA, MK Bhuiyan (2006). Clonal propagation of guava (*Psidium guajava* L.) by stem cuttings from mature stock plants", J. Forestry Res.,17, 301-304.

Abdul K, Abdul M, Shafqat S, Shoaib UR, Umbreen S,Muhammad N (2016). Effect of different concentrations of IBA on rooting of Guava *Psidium guajava* L. in low tunnel under shady situation. Journal of Agriculture and Environment for International Development - JAEID, 110 (2), 197-203.

Akram MT, Khan Qadri RW, Khan I, Bashir M, Jahangir MM, Nisar N, Khan MM (2017). Clonal Multiplication of Guava (*Psidium guajava*) through Soft Wood Cuttings using IBA under Low-plastic Tunnel. International Journal of Agriculture & Biology.19(3):417–422.

Bhagat BK, Jain BP, Singh C, Chowdhary BM (1999). Success and survival of intergeneric grafts in guava (*Psidium guajava* L.). J. Res. Birsa Agric. Univ., 11 (1), 79-81.

Chandra R, Mishra M, Bajpai A, Kishun R, Mishra AK, Singh G, Chandra R (2004). Biotechnological interventions for improvement of guava (*Psidium guajava* L.). Proceeding of 1st International Guava Symposium, pp: 19–25. CISH, Lucknow, India.

Chevre AM, Gill SS, Mouras A, Salesses G(1983). In vitro vegetative multiplication of chestnut. Journal of Horticultural Sciences, 58,(1), 23-29.

Davies FTJr, Hartman HT(1988). The physiological basis of adventitious root formation. Acta Hort., 227: 113–120.

Duncan BD (1955). Multiple range and multiple tests. Biometrics, 11: 1-42.

El-Iraqy MAEA (1994). Physiological studies on the propagation of guava. MSc thesis, Benha University, pp 115.

El-Sharony TF, Rashedy AA, Abd Allatif AM, Hassan SAM (2018). Stimulating rooting of guava cuttings by chemical and physical treatments. Acta Hortic. 1216, 91-98.

Evans J (1992). Plantation Forestry in the Tropics. 2nd (Eds). Pergamon Press, Oxford – London, N.Y., Paris, pp236.

Gaspar T, Penel C, Greppi H (1997). Do rooting induction and flowering evocation involve a similar interplay between indoleacetic acid, putrescine and peroxidases? In: Travelling Shot on Plant Development, Greppin, H., Penel, C. & Simon, P., (Eds), pp 35-49. University of Geneva, Geneva.

Giri C, Shyamkumar B, Anjaneyulu C (2004). Progress in tissue culture, genetic transformation and applications of biotechnology to trees. Trees, 18: 115-35.

Gonzalez A, Tames RS, Rodriguez R (1991). Ethylene in relation to protein, peroxidase and polyphenol oxidase activities during rooting in hazelnut cotyledons. Physiol. Plant. 83,611-620.

Hartmann HT, Kester DE, Davies Júnior FT, Geneve RL(2002). Plant propagation: principles and practices. 7th (eds). New Jersey: Prentice Hall, pp880.

Hartmann HT, Kester DE, Davies FT, Geneve RL (1997) Plant propagation principles and practices. Prentice hall ENG. Cliffs, New Jersey, pp 276-391.

Hartmann HT, Kester DE (1960). Plant propagation principles and practice. Hall Inc. New York, pp: 481.

Kareem A, Jaskani MJ, Fatima B, Sadia B (2013). Clonal multiplication of guava through softwood cuttings under mist conditions. Pak. J. Agric. Sci., 50: 23–27.

Kim JY, Seo SY, Kim SK, Sung SK, Song KJ, An G, Kim WT(2001). Two polyphenol oxidases are differentially expressed during vegetative and reproductive development and in response to wounding of Fuji apple. Plant Sci. 161, 1145–1152.

Marco AC, Kersten E, Silva JGC (1998). Influence of ethephon and of indolbutyric acid on rooting of guava branch cuttings (*Psidium guajava* L.). Ciência Rural, Santa Maria 28, 221-224.

Mitra SK, Pathak PK (2018). Recent development in the propagation of tropical and subtropical fruit crops by cutting. Acta Hortic. 1205 (89), 721-726.

Mehmood A, Jaskani MJ, Ahmad S, Ahmad R (2013). Evaluation of genetic diversity in open pollinated guava by IPBS primers.Pak. J. Agri. Sci., 50: 591-597.

Mehmood A, Jaskani MJ, Khan IA, Ahmad S, Ahmad R, Luo S, Ahmad NM (2014). Genetic diversity of Pakistani guava (*Psidium guajava L.)* germplasm and its implications for conservation and breeding. Sci. Hortic., 172: 221-232.

Nitin S, Pandey SK, Singh SS, Singh SRK, Mishra A, Baghel SS, Kaurav (2015). Production of true to type guava plants through clonal propagation. International Journal of Applied and Pure Science and Agriculture (IJAPSA). 1 (12), 131-136.

Paull RE, Bittenbender HC (2006). *Psidium guajava* guava. In: The encyclopedia of fruit & nuts. Janick, J.; Paull, R.E. (Eds), pp 541-549. Cambridge University Press, Cambridge.

Prasad J, Rabbani A, Ram RA (1988). Rooting of hardwood cuttings of guava (*Psidium guajava* L.) through bottom heat. Prog. Hort. 20, (1-2), 20-23.

Rai MK, Jaiswal VS, Jaiswal U (2008). Encapsulation of shoot tips of guava (*Psidium guajava* L.) for short-term storage and germplasm exchange. Sci. Hort. 118(1): 33–38.

Rathore HS, Slngh SM, Chhabra AD (1984). Effect of plant regulators and their concentration on the performance of softwood cuttings of guava. Haryana Agricultural Journal of Research. 5 (2), 146-157.

Rymbai H, Sathyanarayana RG (2010). Effect of IBA, time of layering and rooting media on air-layers and plantlets survival under different growing nursery. Indian J. Hort., 67 (4), 99-104.

Sardoei AS (2014). Effect of different media of cuttings on rooting of guava (*Psidium guajava* L.). European Journal of Experimental Biology. 4 (2), 88-92.

Sharma KK (1975). Effect of IBA on rooting of cuttings of guava (*Psidium guajava* L.). Punjab Horticultural Journal. 15, (1-2), 46-47.

Shahzad U, Kareem A, Altaf K, Zaman S, Ditta A, Yousafi Q (2019). Effects of Auxin and Media Additives on the Clonal Propagation of Guava Cuttings (*Psidium guajava* L.) Var. Chinese Gola. Journal of Agricultural Science and Food Research 10 (3), 1-8.

Sinha RB, Mallik PC, Chhonkar VS (1962). Effect of plant regulators on rootage guava (*Psidium guajava* L.) cuttings. Indian Journal of Hortculture. 19, (3-4), 120-127.

Singh G (2007). Recent development in production of guava. Acta Horticulturae, The Hague, 735,161-176.

Singh KK (2018). Propagation of citrus species through cutting: A review. Journal of Medicinal Plants Studies. 6(1): 167-172.

Sohnika R, Akash Sharma VKW, Parshantbakshi, Mohdillyas K (2015). Standardization of best soil media and time of guava propagation through cuttings under Jammu subtropics. The Bioscan, 10(3), 991-1001.

Tagelsir IMI, El Fatih MM, Abdelghaffar ES(2006). Enhancement of growth and control of browning of tissue cultures of guava (*Psidium guajava L.*). Journal of Science Technology.7 (1), 74-83.

Vaughn KC, Lax AR, Duke SO (1988). Polyphenoloxidase: the chloroplast oxidase with no established function. Physiologia Plantarum 72, 659-665.

Yadava UL (1996). Guava (*Psidium guajava* L.): an exotic tree fruit with potential in the Southeastern United States. HortScience, Alexandria, 31(5), 789-794.

Zamir R, Khattak GSS, Mohammad T, Ali N(2003). In vitro mutagenesis in guava (*Psidium guajava* L.). Pak. J. Bot., 35: 825–828.

الملخص العربى

تأثير معاملات ما قبل الزراعة و ميعاد أخذ العقل على التجذير فى العقل الساقية النصف خشبية للجوافة.

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استهدفت هذه الدراسة الوصول إلى أفضل المعاملات التى ترفع نسبة التجذير و نسبة نجاح التجذير فى العقل النصف خشبية للجوافة. اجريت الدراسة الحقلية بمزرعة البرامون التجريبية ، معهد بحوث البساتين ، محافظة الدقهلية ، مصر خلال موسمي ٢٠١٦ و ٢٠١٧. أخذت العقل النصف خشبية في مايو ويوليو من اشجار متماثلة عمرها ٢٢ سنة لصنف منتخب الصباحية. اخذت العينات ثم نُقعت في الفحم النشط بتركيز ١٥% لمدة ٣ ساعات ثم صُممت التجربة كقطاعات هشوائية و كانت المعاملات.T1= اندول حمض البيوتريك بتركيز ٣٠٠٠ جزء فى المليون، T2= اندول حمض البيوتريك بتركيز ٤٥٠٠ جزء فى المليون،T3 = اندول حمض البيوتريك بتركيز 5000 جزء فى المليون، T4 =اثيفون بتركيز ٦٠٠ جزء فى المليون + حمض بنزويك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز ٣٠٠٠ جزء فى المليون، T5 =اثيفون بتركيز ٦٠٠ جزء فى المليون+ حمض بنزويك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز ٤٥٠٠ جزء فى المليون، T6 =اثيفون بتركيز ٦٠٠ جزء فى المليون+ حمض بنزويك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز 5000 جزء فى المليون،T7 =اثيفون بتركيز ٦٠٠ جزء فى المليون + حمض الستريك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز ٣٠٠٠جزء فى المليون، T8 =اثيفون بتركيز ٦٠٠ جزء فى المليون + حمض الستريك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز ٤٥٠٠ جزء فى المليون وT9 = اثيفون بتركيز ٦٠٠ جزء فى المليون + حمض الستريك بتركيز ١٠٠ جزء فى المليون + اندول حمض البيوتريك بتركيز 5000 جزء فى المليون. أظهرت النتائج ان افضل موعد لأخذ العقل هو شهرمايو و افضل المعاملات كانت المعاملة الخامسة حيث سجلت أفضل القيم في نسبة التجذير ٧٠٪ ، عدد الجذور في العقلة ٤,٣ ، طول الجذور ٤,٣٢ سم ، وزن الجذور الطازج لكل عقلة ٣,٣٥ جم ونسبة نجاح التجذير فى العقل التى تم تجذيرها ٥٠ ٪.

كلمات مفتاحية: الجوافة، العقل، التجذير ،حمض الستريك، حمض البنزويك، اندول حمض البيوتريك، الفحم النشط.

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