Available online at **www.pelagiaresearchlibrary.com**

Pelagia Research Library

European Journal of Experimental Biology, 2014, 4(2):88-92

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Effect of different media of cuttings on rooting of guava *(Psidium guajava* L.*)*

Ali Salehi Sardoei

Young Researchers Club, Jiroft Islamic Azad University, Jiroft Branch, Iran

---

ABSTRACT

The guava, the most grown for high quality in Iran, is generally regarded as showing very good rooting ability. However, cuttings sometimes show moderate or even poor rooting performances, a problem likely related to the use of inappropriate rooting media. The aim of this work was to determine the most successful media among those traditionally used and to identify promising alternatives. march cuttings were planted in 8 different media in under mist propagation conditions. Substrates such as soil loam, Silt, sawdust, perlite, Sand, sand-coco peat, sand-perlite and silt-perlite were used pure or in mixtures. the results shown effect of different media (p<0.01) on root length, shoot length and shoot dry weight. Experimental results has shown that, high rooting percentage was achieved by semi-woody cuttings in sand with average of 20%, while the lowest percentage was obtained in loam and sawdust bed with average of 6.66%. The high and the lowest number of shoot number of shoot was achieved in soil loam, perlite and sand-perlite (1:1 v/v) 5.66, 2.66 and 3 respectively which show significant difference. Soil loam and sawdust, except for shoot number and root diameter, had the lowest positive effect on guava rooting. The highest rooting percentage, shoot length, dry and fresh weight of shoot was achieved in sand. coco peat-perlite (1:1 v/v) had no effect on rooting and their application had no positive effect on guava rooting.

Keywords: cuttings, guava, media, propagation.

INTRODUCTION

Psidium guajava L. commonly known as guava (Family Myrtaceae) is one of the most important fruit crop of alluvial plains of India. Guavas are now cultivated and naturalized throughout the tropics, and due to growing demand they are also grown in some subtropical regions. It occurs throughout the American tropics, Asia, Africa and Pacific Islands. It has great market potential due to its delicious taste, aroma, sweet flavor and a fine balance of acid, sugar and pectin. Guava (*Psidium guajava* L.) is considered to be one of the exquisite, nutritionally valuable and remunerative crops. Besides its high nutritional value, it bears heavy crop every year and gives good economic returns [24]. This has prompted several farmers to take up guava orcharding on a commercial scale. Extensive studies have been carried out on guava to investigate yield potential [23], effect of deblossoming on fruit size and quality [21] and its nutritional status on substandard soil sites [7, 20].

Rooting media should be considered an integral part of the propagation system [10]; percentage rooting and the quality of the roots produced are directly influenced by the medium. The appropriateness of the medium depends on the species, the cutting type, the season, the propagation system used, and the cost and availability of the medium components [11, 9]. Good water management is also crucial for success.

Perlite is by far the most used rooting substrate in guava producing countries. Mixtures such as perlite plus peat, coconut fiber or vermiculite have also given good results [5]. Mixtures of perlite and vermiculite have traditionally been used in Californian nurseries [25]. Despite its apparent disadvantages, coarse sand has recently become more popular in Iran for economic reasons.

In sand-perlite bed, treatments of 2000 and 4000 mgl^{-1} IBA and in peat-perlite bed, treatment of 4000 mgl^{-1} IBA had fast time of callus induction with 43 and 28 days, Respectively In sandperlite bed, 2000 mgl^{-1} IBA and peat-perlite bed, treatment of 4000 mgl^{-1} IBA had fast time of beginning rooting with 60 and 45 days, respectively. In sand-perlite and peat-perlite beds, 4000 mg l^{-1} of IBA treatment had maximum number of buds [22].

Certain organic and mineral components, such as pine bark, pumice, polystyrene beads and rockwool, which are fairly cheap and obtainable in Iran and probably in other guava-producing countries, might be used as alternatives to traditionally used rooting substrates. Synthetic rooting blocks (e.g., made of phenol formaldehyde foam or rockwool) are also used in the nurseries of some countries [9]. The demand for synthetic blocks in guava propagation is likely to increase.

The present study aims, To find out the effect of different media on root-initiation of guava cuttings.

MATERIALS AND METHODS

The research studies were carried out at greenhouse Research, University Azad Jiroft, during the year 2010.

Preparation of Cuttings

Semi hard wood cuttings of guava was taken from about 1 to 1 1/2 year old uniform guava branches in the month of march. The size of cuttings was 5 to 6 inches long, having 2 to 3 buds. The greenhouse was equipped with mist, heater and air conditioner. Temperature was kept at 24°c and relative humidity was maintained at 60-70 % during experiment period. Misting system was used for irrigation of cuttings.

Treatments

The experiment was conducted in investigational greenhouse of ornamental plants in Azad university of Jiroft with a completely randomized design (CRD) including different rooting media as soil loam, Silt, sawdust, perlite, Sand, sand-coco peat, sand-perlite and silt-perlite with five replications and ten cuttings being investigated in each replication. All media either on their own or as mixtures [1:1 and v/v].

Data collection

Three months after rooting, Some traits are determined that they were including Rooting percentage, Shoot and root number, shoot and root length, shoot and root fresh weight and shoot and root dry weight.

Statistical Analysis

Analysis was performed on data using SPSS 16. Comparisons were made using one-way analysis of variance (ANOVA) and Duncan's multiple range tests. Differences were considered to be significant at $P < 0.05$.

RESULTS AND DISCUSSION

Rooting Percentage

According to ANOVA results Table [1], rooting percentage in affected by different levels of media [p<0.05]. As can be seen in [Table 2], the high rooting percentage was achieved by semi-woody cuttings in sand bed with average of 20%, while the lowest percentage was obtained in loam and sawdust bed with average of 6.66%. Results show that higher rooting percentages were obtained in beds with neutral pH [sand and perlite] which are used for improved drainage of the soil. Mean comparison results indicated that sand was significantly different from other media. Aeration in coco peat was poor due to its high capacity of water retention.

Results show that higher rooting percentages were obtained in media with neutral [sand and perlite] which are used for improved drainage of the soil. There was or non significant difference between sand and loam [18] . The high rooting percentage [85%] was achieved in perlite-silt (1:1 v/v), but there was or non significant difference among other treatments [13]. The number of roots produced in perlite-peat [1:1 v/v]bed was higher than that of sand bed

(16). Based on this, the best bed for rooting of pieces cuttings is perlite-peat (1:1 v/v) which hold low level of water. Pieces cuttings are sensitive to oxygen deficiency and go to rotting immediately. If the is highly humid, rooting process is delayed as a result of oxygen deficiency [4]. The best choice for rooting is a media with low capacity of water retention [8]. The lowest rooting percentage was observed in coco peat which can be due to high water retention capacity or presence of phytotoxic elements which inhibit plant growth. Low percentage of rooting in perlite bed which is sufficiently aerated can be poor capacity of this bed to maintain humidity and nutrition [17].
Sand media is the best one for rooting percentage, though sand-coco peat is classified at same group of sand [10]. It seems that coco peat hold more humidity which in turn reduces oxygen content and thereby rooting percentage of cuttings is declined.

Table 1- Analysis of variance for the effect of Media on Rooting Cuttings of Guava

S.O.V	Root percentage (%)	Root number	Shoot number	Root length (cm)	Shoot length (cm)	Root fresh weight (g)	Shoot fresh weight (g)	Root dry weight (g)	Shoot dry weight (g)
Media	105.18*	19.66*	10.59*	44.84**	10**	0.23*	1.98*	0.007*	0.51**
Error	40	12.56	5.21	3.02	2.45	0.1	0.77	0.003	0.1
total	145.18	32.22	15.8	47.78	12.45	0.33	2.75	0.01	0.61

*ns Non Significant at 0.05 probability level and *, ** Significant at 0.05 and 0.01 probability levels, respectively.*

Table 2- Effect of Media on Rooting Cuttings of Guava *(Psidium guajava* L.)

Media	Root percentage (%)	Root number	Shoot number	Root length (cm)	Shoot length (cm)	Root fresh weight (g)	Shoot fresh weight (g)	Root dry weight (g)	Shoot dry weight (g)
soil loam	6.66ab	1.33ab	5.66a	6.66ab	2.6abc	0.04b	0.69abc	0.01bc	0.12b
Silt	20a	5.61ab	4.83ab	9.31ab	5.59a	0.6ab	2.33abc	0.12ab	1.35a
sawdust	6.66ab	1b	4.66ab	5.31b	1.07bc	0.17ab	0.51bc	0.04abc	0.15b
perlite	13.33ab	4.33ab	2.66b	9.71ab	3.77abc	0.33ab	1.46abc	0.13a	0.46b
Sand	10ab	3.33ab	4.33ab	9.52ab	3.61abc	0.55ab	1.93bc	0.08abc	0.7ab
sand-coco peat	10ab	8a	3.33ab	7.96ab	3.52abc	0.51ab	1.71abc	0.05abc	0.48b
sand-perlite	10ab	2.33ab	4.66ab	6.83ab	4.58ab	0.78a	1.66abc	0.09abc	0.68ab
silt-perlite	10ab	3.33ab	3b	10.83a	2.88abc	0.27ab	1.14abc	0.04abc	0.33b

Means followed by same letter are not significantly different at P< 0.05 probability using Duncan's test.

Length of Shoot and Root

According to analysed by ANOVA Table [1], media had significant effect on root and shoot length [p<0.01]. The high shoot length was obtained in sand [5.59 cm] whereas the lowest shoot length was observed in sawdust [1.07 cm]. There was a positive relationship between shoot length and rooting percentage so that by increased in rooting percentage, shoot length was also enhanced. Mean comparison showed that the high shoot length was obtained in sand and silt- perlite [1:1 v/v] treatments which are or non significant different from each other [Table 2]. The high root length was achieved by sand-perlite [1:1 v/v], perlite and silt 10.83, 9.71 and 9.52 cm which are or non significantly different from each other [Table 2]. The high root length of lavender was obtained by perlite [19]. There is or non significant difference between water and perlite [14], but these two treatments are significantly different from sand and coco peat beds [p<0.01]. Cuttings cultured in perlite-peat [1:1 v/v] produced longer root and shoot compared to sand [16]. Longer roots are produced in beds with lower capacity of water retention [16] which accords with the results obtained in this study.

The Number of Root and Shoot

According to analysed by ANOVA Table [1], media had significant effect on root and shoot number [p<0.05]. The high and the lowest number of shoot number was achieved in soil loam, perlite and sand-perlite [1:1 v/v] 5.66, 2.66 and 3 respectively which show significant difference. Nutrition-free beds with neutral pH had lower number of shoot. The high and lowest number of root was obtained in silt-coco peat [1:1 v/v] with mean 8 and sawdust respectively which showed significant difference from each other but are not different from other treatments [Table 2]. The high root number, average root length, dry and fresh weight was obtained in soil loam [18]. The high number of shoot was achieved by media coco peat-perlite [1:1 v/v] and application of 2500 mg L^{-1} indole butyric acid [17].

Root Diameter
According to analysed by ANOVA Table [1], root diameter was influenced by media [p<0.01]. The high diameter of root was observed in media sand and soil loam with mean 0.53 and 0.30 mm, the lowest root diameter was observed in media perlite and perlite-sand [1:1 v/v] with mean 0.11 and 0.11 mm [Table 2].

Shoot and Root Fresh Weight
According to analysed by ANOVA Table [1], media had significant effect on root and shoot fresh weight [p<0.05]. The high and lowest shoot fresh weight was observed in sand and sawdust 2.33 and 0.51 g respectively. Shows that there [Table 2] is a positive relationship between fresh and dry weight of shoot so that by increase in fresh weight, dry weight was also increased. According to [Tab 2], the high fresh weight of root was observed in silt-perlite [1:1 v/v] and sand 0.78 and 0.60 g, the lowest root fresh weight was obtained in media soil loam and sawdust 0.04 and 0.17 g. Mean comparison indicated that there was significant difference between silt-perlite [1:1 v/v] and soil loam but there was or non significant difference with other media. The high root fresh weight was obtained in lavender cuttings cultured in perlite bed but there was or non significant difference between perlite and sand-perlite [19]. The high root fresh weight was obtained in media perlite and silt-perlite [13], which is in accordance with the results obtained in the present study.

Root and Shoot Dry Weight
According to analysed by ANOVA Table [1], culture beds had significant effect on root [p<0.05] and shoot dry weight [p<0.01]. The high and the lowest dry weight of shoot was obtained in sand and soil loam 1.35 and 0.12 g respectively. Media soil loam and sawdust had the lowest dry weight. According to mean comparison results, sand was significantly different from silt-coco peat [1:1 v/v] but was or non significant different from silt-perlite [1:1 v/v]. The high root dry weight was achieved in perlite and sand 0.13 and 0.12 g, the lowest dry weight of root was observed in soil loam [0.01 g] and sawdust and sand-perlite [0.04 g]. According to mean comparison results, there was significant difference between perlite and soil loam but or non significant difference was observed among other media [Table 2]. In a study conducted by Saeidi Graghani et al. [2010], perlite bed with the highest root dry weight was significantly different from sand and sand-perlite and peat-perlite [1:1 v/v] media which is in agreement with our results. Indicates that there is a positive relationship between fresh and dry weight of shoot in sand, so that by increase in fresh weight, dry weight was also increased [Table 2]. The lowest root dry weight was observed in soil loam and sawdust. There was no significant between sand and sand-perlite [1:1 v/v] regarding rooting traits of cuttings of apple MM106; however sand was more effective than sand-perlite [1:1 v/v] concerning root dry weight [3].

CONCLUSION

Data were analysed by ANOVA are presented in Table [2] As can be seen, all the traits were affected by investigated factors. Soil loam and sawdust, except for shoot number and root diameter, had the lowest positive effect on guava rooting. The high rooting percentage, shoot length, dry and fresh weight of shoot was achieved in sand. coco peat-perlite [1:1 v/v] had no effect on rooting and their application had no positive effect on guava tooting. The lowest root fresh weight and shoot dry weight was obtained in soil loam.

REFERENCES

[1] Amin HA, Shekafande A, Khoram abadi M, 5th Iranian congress of horticulture. 12-15 September, University of Shiraz, Iran, **2008,** pp. 680.
[2] Barbosa E, Silva k, Silva E, Silva A, Barbosa e Silva PI, *Revista Brasileira de Horticulture Ornitaminal*, **2005,** 11(1), 74-78
[3] Badrzad D, Imani A, piri S, Massomi SH, 7th Iranian congress of horticulture, 14-17 September, University of Isfahan, **2012,** pp. 509-511.
[4] Erstad JFL, Gislerod HR, *Scientia Hort*, **1993,** pp. 95.
[5]Fbbri A, Bartolini G, Ambardim L, Kailis S, **2004,** pp. 141,
[6] Garillass, S, Lucas M, Bardopoulou E, Sarafopouios S, Voulgari M, *Acta. Hort*, **2001,** 434, 103-112.
[7] Garg VK, Khanduja SD, (Ed. T.N. Khoshoo), Publication Information Directorate, New Delhi, **1987,** Pp. 112-114.
[8] Gislerodc HR, Plant & Soil, **1983,** 75, 1-14.
[9] Hartmann HT, Kester DE, Davies FT, Geneve RL, 7th ed., Prentice Hall, NJ, **2002,** pp. 880.

[10] Loach K, Dioscorides Press, Portland, Oregon, **1988,** pp. 248-279.
[11] Macdonald B, Vol, I, fourth printing, Timber Press, Portland, Oregon, **1986,** pp: 669.
[12] Marin M, **2005,** pp. 378-382.
[13] Mighani H, Soleimani A, askari N, 6th Iranian congress of horticulture. 22-25 May, University of Guilan. **2010,** Pp. 952-954.
[14] Nemati SH, Tehranifar A, Bidokhti N, 5th Iranian congress of horticulture, 12-15 September, University of Shiraz, **2008,** Pp. 52.
[15] Perry F, Vines HM, Comb.*Proc, int. plant prop, soc*, **1992,** 21, 374-380.
[16] Ramtin A, Khalighi A, Hadavi A, Hekmati J, 6th Iranian congress of horticulture, 12-15 May. University of Guilan, **2010,** Pp, 938-939.
[17] Rahimi S, ganji moghaddam A, 7th Iranian congress of horticulture, 14-17 September, University of Isfahan, **2012,** Pp. 459-460
[18] Salehi Sardoei A, Moghbeli E, Shahdadneghad M, **2012,** pp. 546.
[19] Saeidi Graghani B. **2010,** MS.c thesis, Azad university of Jiroft.
[20] Sanyal D, Mitra SK, *Ind. J. Hort*, **1990,** 47(2), 154-158.
[21] Sardar PK, Rahman MS, Quasem A, *Ind. J. Hort*, **1996,** 53(2), 89-92.
[22] Shadparvar V, Mohammadi Torkashvand A, Mohammadi Torkashvand A, Alinejad Alamshiri, H, *European Journal of Experimental Biology*, **2011,** 1 (4),142-146
[23] Srivastava R, Chandra R, More DK, *Indian J. Plant Genet. Resource*, **2002,** 15(1), 33-35.
[24] Singh G, Singh AK, Verma A, *Indian J. agric. Sci*, **2000,** 70, 226-30.
[25] Sutter e G, 2nd ed, Univ California, *Agriculture and Natural Resources*, Publ. 3353, **2005,** pp: 19-25.
[26] Weaver RJ, **2002,** W.H. Freeman and Company London.
[27] Wright RD, Rein WH, Virginia JRS, SNA Research Conference, **1992,** pp. 37