The Pharma Innovation Journal 2020; 9(12): 79-83

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(12): 79-83

www.thepharmajournal.com
Received: 19-09-2020
Accepted: 29-10-2020

Neha Sharma
Department of Horticulture, CCS Haryana Agricultural University, Hisar, Haryana. India

Anil Godara
Department of Horticulture, CCS Haryana Agricultural University, Hisar, Haryana. India

Arvind Malik
Department of Horticulture, CCS Haryana Agricultural University, Hisar, Haryana. India

Amit Sharma
Department of Agronomy, CCS Haryana Agricultural University, Hisar, Haryana. India

Corresponding Author:
Neha Sharma
Department of Horticulture, CCS Haryana Agricultural University, Hisar, Haryana. India

Impact of protective condition and media on growth of seedling in *Guava cv.* L-49 in north western-Haryana, India

Neha Sharma, Anil Godara, Arvind Malik and Amit Sharma

Abstract
Plant material is the basic requirement for any fruit crop because it influences the ultimate yield in terms of quality and quantity. For rapid multiplication of guava through grafting there is a huge demand for superior rootstocks, but this demand is not fulfilled because of poor seed germination and growth. With this objective the present investigation was carried out at CCS Haryana Agricultural University, Hisar during the year 2016-2017 and 2018-2019. The experiment was laid out in CRD with five replications to find out the efficiency of germination and growth of guava cv. L-49 under growing conditions (greenhouse and open condition), on different dates of sowing (firstand second fortnight of August and first fortnight of September) using growing media (Cocopeat and sand). Under greenhouse + cocopeat media + first fortnight of August takes minimum days required for seed germination. While under greenhouse + cocopeat media + first fortnight of September obtain max. Germination, height of seedling, number of leaves and stem diameter were recorded. Cocopeat is a good growing media component with acceptable pH, EC, physical properties, highpore space, high water content and other chemical attributes. Greenhouse condition is better due to the better environmental conditions than compared to the open condition. September sowing is better due to its better adaptability to meteorological conditions existing at the time of germination. Present results suggest that highest to germination percentage, height, number of leaves and stem diameter of guava seedlings were found best under greenhouse condition in cocopeat media at first fortnight of September sowing.

Keywords: Greenhouse, rootstock, seedling, sowing time and germination

Introduction
Climate change is the greatest concern of mankind in 21st century. The established commercial varieties of fruits will perform poorly in an unpredictable manner due to aberration of climate. The negative environmental effects on agriculture, including loss of soil fertility, soil erosion, soil and water pollution and air pollution, must be brought under control by using an array of methods. The consequences of such rapid change are global warming, change of seasonal pattern, excessive rain, drought etc. leading to extremity of all kinds. Moreover, plantation of horticultural (perennials) plants that are at greater risk can also help in mitigating the climate change effects by absorbing more radiation than annual or seasonal crops. Among the all fruit crops, Guava (*Psidium guajava* L.), which belongs to the family Myrtaceae, is one of the most important commercial fruit crops of India. The fruit is a good source of vitamin C, pectin, calcium and phosphorus and other nutrients. In India, it is fifth most important fruit crop in area (261.7 thousand ha) and production (3648.2 thousand MT). In Haryana, it occupies 11.7 thousand hectares area with production of 163 thousand tones and productivity 15.44 MT/ha (*Saxena*, 2017) [11]. The plant is quite hardy, prolific bearer and highly remunerative, even without much care. Now a day, guava is getting popularity in international trade due to rich nutritional value and processed products.
These days Government of India has focused on establishing the model nurseries for providing planting material to Indian farmers in Mission for Integrated Development of Horticulture (MIDH) scheme. However, limited technical information support these production systems and more research is needed to provide recommendations for appropriate subtract. Guava is sexually propagated for a long time. Too hot or cold temperatures can impede germination.
To sustain the productivity, modification of present horticultural practices and greater use of greenhouse technology are some of the solutions to minimize the effect of climate change. Adoption of hi–tech horticulture and judicious management of natural resources will be the main strategies to meet this challenge.

The present investigation has been made to study the effect of growing media and condition aimed at assessing extends of potential use of knowledge by farmer towards adaptation to climate change.

Materials and Methods

The experiment was conducted during august 2016-2017 & 2018-2019 in research area of Department of Horticulture, CCS Haryana Agricultural University, and Hisar (29º 10′ N latitude, 75º 46′ E longitudes, 215.2 m altitude) Haryana. The experiment was laid out in CRD with five replications to find out the efficiency of germination and growth of guava seedling *cv.* L-49 under different growing conditions (greenhouse and open condition), on different dates of sowing (first and second fortnight of August and first fortnight of September) using two growing media (Cocopeat and sand). The following treatments were maintained in completely randomized design: T_1: Open condition+ Sand+ first fortnight of August, T_2: Open condition+ Sand+ second fortnight of August, T_3: Open condition+ Sand+ first fortnight of September, T_4: Greenhouse + Sand+ first fortnight of August, T_5: Greenhouse + Sand+ second fortnight of August, T_6: Greenhouse + Sand+ first fortnight of September, T_7: Greenhouse + Cocopeat+ first fortnight of August, T_8: Greenhouse + Cocopeat + second fortnight of August, T_9: Greenhouse + Cocopeat + first fortnight of September. Fully mature fruits of guava *cv.* L-49 were collected from Experimental Orchard of the Department of Horticulture, washed and cleaned thoroughly. Then, the fruits were mashed and mixed with water to extract the seeds by removing the pulpy material. The extracted seeds were dried under shade for one day and were ready for sowing. In this experiment, the seeds were sown in protrays and nursery beds. Before sowing, the trays were filled with cocopeat medium, while nursery beds were prepared with soil, sand and farmyard manure in 3: 1: 1 ratio for the sowing of seeds in open and greenhouse conditions. The nursery beds were covered with straw to induce heat and create conducive environment for rapid germination, and light irrigation was provided in the morning and evening every day until the germination started. The straw was removed after germination of seeds and watered regularly with rose can. Weeding was done manually at regular interval. Final data were analyzed using online statistical analysis package (OPSTAT, CCSHAU) and treatments means were compared by C.D. at 5% level of significance

Result and Discussion

Days taken for germination

Days taken for germination (Table 1) reveals that it was significantly influenced by growing conditions, date of sowing and media. The minimum days taken for germination in guava seedling during 2016-2017, respectively during 2018-2019 were observed under greenhouse condition. However, it was significantly delayed in under open condition. This may possibly due to greenhouse reduce water stress by watering the roots and providing a humid environment allows each plant to concentrate its energy on plant growth.

Furthermore, between the date of sowing and media treatment, minimum days taken for germination of guava seedling was recorded in sowing at first of fortnight August when cocopeat was used as medium. This may possibly due to prevalence of high temperature (35±5) during the month of August as temperature has tremendous influence on the germination and higher water holding capacity and better aeration in cocopeat. Similar observations were reported by Kulwal and Tayde (1989), Kohli and Reddy (1989), Syed and Rao (1989), Sawke (1992), Bhardwaj (2014) and Nayan *et al.*, (2018) [6, 5, 13, 10, 3, 9].

Table 1: Effect of growing conditions and time of sowing on days taken for germination of guava seeds

Sr. No.	Conditions and media	Time of sowing	Days taken for germination 2016-2017	Days taken for germination 2018-2019
1.	Open condition in sand	First fortnight of August	36.9	33.10
		Second fortnight of August	41.2	40.67
		First fortnight of September	50.9	49.00
2.	Greenhouse in sand	First fortnight of August	31.7	31.47
		Second fortnight of August	36.2	36.20
		First fortnight of September	44.8	40.90
3.	Greenhouse in cocopeat	First fortnight of August	27.6	27.50
		Second fortnight of August	32.2	33.03
		First fortnight of September	40.9	46.57
C.D. at 5% level of significance			1.38	2.82

Germination percentage

Germination percentage (Table 2) reveals that it was significantly influenced by growing conditions, date of sowing and growing media. The maximum (64.8 & 58.4) germination percentage in guava seedlings during 2016-2017, respectively during 2018-2019 were observed under greenhouse condition. However, it was significantly delayed in under open condition. This may possibly due to greenhouse allows air to press closer to the foliage for peak photosynthesis, concentrated carbon dioxide. Similar results were also reported by Carrijo *et al.*, (2004) [4]. Furthermore, between the date of sowing and media treatment, maximum germination percentage of guava seedlings were recorded in sowing at first fortnight of September (Sunshine hours 9±1) when cocopeat was used as medium. This may possibly due to its better adaptability to meteorological conditions existing at the time of germination on better physiological conditions and higher water holding capacity and better aeration in cocopeat. Similar results were also reported by Bhardwaj (2014), Mazahreh *et al.*, (2015) and Nayan *et al.*, (2018) [3, 8, 9].

Table 2: Effect of growing conditions and time of sowing on germination percentage of guava seeds

Sr. No.	Conditions and media	Time of sowing	Germination percentage 2016-2017	Germination percentage 2018-2019
1.	Open condition in sand	First fortnight of August	11.4	11.8
		Second fortnight of August	14.6	13.2
		First fortnight of September	18.6	18.4
2.	Greenhouse in sand	First fortnight of August	21.8	21.8
		Second fortnight of August	23.6	25.8
		First fortnight of September	36.2	32.4
3.	Greenhouse in cocopeat	First fortnight of August	48.8	51
		Second fortnight of August	53.8	54.6
		First fortnight of September	64.8	58.4
C.D. at 5% level of significance			3.32	3.77

Height of seedling (cm)

Height of seedlings (Table 3) reveals that it was significantly influenced by growing conditions, date of sowing and growing media. These were significantly increase height of seedlings (cm) recorded at fortnight interval, maximum height of seedlings were found after 125 days after sowing. The maximum height of guava seedlings (4.96 & 5.31) was observed under greenhouse during 2016-2017, respectively during 2018-2019 whereas, however, significantly minimum was noticed under open conditions. Similar observations were reported by Berghage (1998) and Carrijo *et al.*, (2004) [2, 4].

Furthermore, between the date of sowing and media treatment, maximum height of guava seedling was recorded in sowing at first fortnight September when cocopeat was used as medium. This may possibly due to the cell multiplication and elongation in the cambium tissue of the intermodal region, physiological conditions, and higher water holding capacity and better aeration and increased absorption of nutrients from the growing media. Similar observations were reported by Bhardwaj (2014), Mazahreh *et al.*, (2015), Singh *et al.*, (2014) and Nayan *et al.*, (2018) [3, 8, 12, 9]. The interaction between growing conditions and period after sowing was found significant.

Table 3: Effect of growing conditions and time of sowing on height of guava seedlings at fortnightly interval

Sr. No.	Conditions and media	Time of sowing	2016-17 Seedling diameter in mm (Days after sowing)						Mean	2018-19 Height of seedlingin cm (Days after sowing)						Mean
			50	65	80	95	110	125		50	65	80	95	110	125	
1.	Open condition in sand	First fortnight of August	0.88	2.54	4.17	5.72	6.25	6.90	4.41	0.91	2.71	4.44	5.87	6.56	7.05	4.59
		Second fortnight of August	1.10	2.92	4.63	5.87	6.34	6.68	4.59	1.25	3.07	4.76	6.13	6.58	7.09	4.81
		First fortnight of September	1.13	3.09	4.98	6.12	6.56	6.94	4.80	1.34	3.11	5.20	6.18	6.68	7.09	4.94
2.	Greenhouse in sand	First fortnight of August	0.90	2.66	4.38	5.68	6.34	6.92	4.48	1.03	2.74	4.51	5.75	6.40	7.01	4.58
		Second fortnight of August	1.05	2.91	4.61	5.86	6.36	7.26	4.68	1.09	2.97	4.67	5.94	6.45	7.03	4.69
		First fortnight of September	1.26	3.05	4.88	6.12	6.74	7.05	4.85	1.49	3.16	5.01	6.28	6.66	7.07	4.95
3.	Greenhouse in cocopeat	First fortnight of August	1.12	2.90	4.43	5.86	6.37	6.89	4.59	1.25	3.12	4.47	6.02	6.50	7.08	4.74
		Second fortnight of August	1.07	2.89	4.65	5.82	6.36	6.88	4.61	1.14	3.00	4.93	6.09	6.77	7.03	4.83
		First fortnight of September	1.26	3.08	4.91	6.18	6.94	7.41	4.96	1.45	3.52	5.18	6.47	7.04	8.24	5.31
Mean			1.08	2.89	4.63	5.92	6.47	6.99		1.22	3.05	4.80	6.08	6.63	7.19	6.63
C.D. at 5% level of significance			Treatment=0.08 Time=0.06 Treatment× Time=1.83							Treatment=0.11 Time =0.09 Treatment × Time=0.26						

Stem diameter (mm) at fortnightly interval

Stem diameter (Table 4) reveal that it was significantly influenced by growing conditions, date of sowing and growing media. These were significantly increase in stem diameter was recorded in guava seedlings at fortnight intervals, where the maximum stem diameter of guava seedlings was found after 125 days of seed sowing. The stem diameter of guava seedlings observed under greenhouse conditions was found at par with other conditions.

Furthermore, between the date of sowing and media treatment, stem diameter of guava seedlings was recorded in first fortnight of September sowing when cocopeat was used as medium. This may possibly due to the cell multiplication and elongation in the cambium tissue of the intermodal region, physiological conditions, higher water holding capacity and better aeration, increased absorption of nutrients from the growing media and better adaptability to meteorological conditions at that time of growing period. Similar results were also reported by Yau and Murphy (2000), Tzortzakis and Economakis (2008) [15, 14]. The interaction between growing conditions and period after sowing was found significant.

Table 4: Effect of growing conditions and time of sowing on stem diameter of guava seedling at fortnightly interval

Sr. No.	Conditions and media	Time of sowing	2016-17 Seedling diameter in mm (Days after sowing)						Mean	2018-19 Seedling diameter in mm (Days after sowing)						Mean
			50	65	80	95	110	125		50	65	80	95	110	125	
1.	Open condition in sand	First fortnight of August	0.62	0.73	0.86	0.91	0.99	1.02	0.85	0.62	0.74	0.86	0.92	1.01	1.02	0.86
		Second fortnight of August	0.64	0.73	0.82	0.93	0.99	1.6	0.95	0.65	0.75	0.82	0.93	0.99	1.64	0.96
		First fortnight of September	0.65	0.79	0.86	0.92	0.99	1.54	0.96	0.68	0.80	0.87	0.94	1.00	1.58	0.98
2.	Greenhouse in sand	First fortnight of August	0.65	0.76	0.86	0.95	1.0	1.08	0.88	0.67	0.77	0.87	0.95	1.02	1.13	0.90
		Second fortnight of August	0.64	0.79	0.85	0.92	1.0	1.57	0.96	0.66	0.77	0.86	0.93	1.02	1.64	0.98
		First fortnight of September	0.65	0.79	0.87	0.93	1.0	1.58	0.97	0.68	0.81	0.88	0.94	1.00	1.62	0.99

3.	Greenhouse in cocopeat	First fortnight of August	0.65	0.77	0.85	0.95	1.05	1.11	0.90	0.67	0.80	0.88	0.96	1.13	1.25	0.95
		Second fortnight of August	0.65	0.79	0.87	0.93	1.0	1.46	0.95	0.63	0.79	0.88	0.93	1.03	1.48	0.96
		First fortnight of September	0.65	0.79	0.87	0.93	0.99	1.58	0.97	0.77	0.79	0.91	1.02	1.22	1.60	1.05
Mean			0.65	0.77	0.86	0.93	1.00	1.39		0.669	0.781	0.87	0.947	1.045	1.44	
C.D. at 5% level of significance			Treatment=0.03Time =0.03Treatment× Time=0.82							Treatment=0.04 Time =0.03Treatment × Time=0.89						

Number of leaves at fortnightly interval

Number of leaves (Table 5) reveals that it was significantly influenced by growing conditions, date of sowing and growing media. These were significantly increase number of seedling was recorded at fortnight interval, where the maximum number of leaves in guava seedlings was found at 125 days after sowing. The maximum (9.84 & 8.76) number of leaves in guava seedling was observed under greenhouse and significantly minimum under open conditions. Similar observations were reported by Berghage (1998), Carrijo *et al.*, (2004) [2, 4].

Furthermore, between the date of sowing and media treatment, number of leaves of guava seedling was recorded in sowing at first fortnight September when cocopeat was used as medium. It might be due to its activity at apical meristem resulting in more synthesis of nucleoprotein responsible for increasing and temperature plays an important role in photosynthetic activity of leaves and physiological conditions and higher water holding capacity and high lignin–cellulose content of cocopeat. Similar results were also reported by, Bhardwaj (2014) [3] in papaya cv. Red lady and Alifar *et al.*, (2010) [1]. The interaction between growing conditions and period after sowing was found significant.

Table 5: Effect of growing conditions and time of sowing on diameter of guava seedling at fortnightly interval

Sr. No.	Conditions and media	Time of sowing	2016-17 Number of leaves (Days after sowing)					Mean	2018-19 Number of leaves (Days after sowing)					Mean
			65	80	95	110	125		65	80	95	110	125	
1.	Open condition in sand	First fortnight of August	2.81	4.50	5.65	7.46	8.76	5.84	2.81	4.52	5.65	7.46	8.76	5.20
		Second fortnight of August	2.92	4.75	5.82	7.56	8.84	5.98	2.69	4.71	5.65	6.64	7.79	4.91
		First fortnight of September	2.96	4.82	6.60	8.78	11.14	6.86	2.72	4.72	6.60	8.78	11.1	5.99
2.	Greenhouse in sand	First fortnight of August	2.92	4.76	5.91	7.66	8.99	6.05	3.39	5.56	7.31	9.56	11.7	6.58
		Second fortnight of August	3.05	5.05	5.91	7.59	10.30	6.38	3.71	5.65	7.73	9.71	11.7	6.75
		First fortnight of September	3.53	6.52	8.73	10.68	11.20	8.13	4.25	6.81	8.73	10.7	12.8	7.55
3.	Greenhouse in cocopeat	First fortnight of August	3.01	6.99	8.74	11.33	13.30	8.68	4.67	6.83	8.84	11.6	14.6	8.09
		Second fortnight of August	3.43	7.07	9.84	11.67	13.71	9.14	3.90	7.10	8.05	11.7	13.7	7.74
		First fortnight of September	4.17	7.35	10.51	12.23	14.96	9.84	5.58	7.21	11	12.0	14.7	8.76
Mean			3.20	5.76	7.52	9.44	11.25		3.75	5.90	7.73	9.79	11.9	
C.D. at 5% level of significance			Treatment=0.15 Time =0.11 Treatment× Time=0.34						Treatment=0.30 Time =0.25 Treatment× Time=0.75					

Conclusion

The results obtained with respect to germination percentage, height, number of leaves and stem diameter of guava seedlings were found best under greenhouse in cocopeat at first fortnight of September sowing. The finding of studies about use of artificial medium like cocopeat and protected conditions for guava propagation can be utilized for further improvement in technique.Greater use of greenhouse technology are some of the solutions to minimize the effect of climate and play a significant role in the climate change scenario and proper strategies have to be envisaged for saving horticulture. As adoption of hi-tech horticulture and judicious management of land use resources will be the main strategies to meet these challenge.

References

1. Alifar N, Mohammadi GA, Honarjoo N. The Effect of growth media on cucumber yield and its uptake of some nutrient elements in soilless culture. Journal of Science and Technology of Greenhouse Culture 2010;1:19-25.
2. Berghage R. Controlling height with temperature. Horti Technology 1998;8(4):537-539.
3. Bhardwaj RL. Effect of growing media on seed germination and seedling growth of papaya cv. Red lady. African journal of plant science 2014;8(4):178-184.
4. Carrijo OA, Vidal MC, Reis NVB, Souza RB, Makishima N. Tomato crop production under different substrates and greenhouse models. Horticultura Brasileira 2004;22(1):5-9.
5. Kohli PR, Reddy YTN. Influence of rootstocks on the growth, yield and leaf nutrient composition of Alphanso mango. Acta Horticulture 1989;231:225-231.
6. Kulwal LV, Tayade GS. Studies propagation of mango varieties by softwood grafting under Akola condition. Acta Horticulturae 1989;231:256-258.
7. Mastalerz JW. The greenhouse environment. John Wiley & Sons 1977,629.
8. Mazahreh N, Nejatian A, Mousa M. Effect of different growing Medias on cucumber production and water productivity in soilless culture under UAE conditions. Merit research journal of agricultural science and soil sciences 2015;3(9):131-138.
9. Nayan D, Jeevan GU, Singh C, Priyanka HL, Jaganath S. Stone Characterization, Media Analysis and its Influence on Polyembryonic Rootstocks Germination of Mango (*Mangifera indica* L.). International Journal of Current Microbiology and Applied Sciences. 2018;7(1):1728-1736.
10. Sawke DP. Standardization of soft wood grafting technique in cashewnut, Ph.D. Thesis submitted to University of Agricultural Science, Dharwad, 1990.
11. Saxena M. Horticulture Statistics at a Glance 2017. National Horticulture Board, Ministry of Agriculture, Government of India, New Delhi 2017.
12. Singh S, Singh DR, Kumar K, Birah A. Eco-friendly management modules for bacterial wilt (*Ralstonia*

solanacearum) of tomato for protected cultivation in a tropical island ecosystem. Biological Agriculture & Horticulture 2014;30(4):219-227.
13. Syed I, Rao SN. Studies on propagation time and method of operation for mango. cv Banginapally. Acta Horticulture 1989;231:203-206.
14. Tzortzakis NG, Economakis CD. Impacts of the substrate medium on tomato yield and fruit quality in soil less cultivation. Horticultural Science 2008;35:83-89.
15. Yau PY, Murphy RJ. Biodegraded cocopeat as a horticultural substrate. Acta Horticulture 2000;517:275-278.