J. Hortl. Sci.
Vol. 15(2) 233-237 : 2020

Short Communication

Influence of potting mixture on growth and economics of stone graft of mango cv. alphonso

Lad O.A., Kulkarni M.M. *, Ragaji S.G., Gavankar M.S., Burondkar M.M., Gokhale N.B., Pawar C.D., Khandekar R.G., Kshirsagar P.J. and Desai V.S.

Department of Horticulture, College of Agriculture, Dr. B. S. K. K. V. Dapoli,
Dist. Ratnagiri, Maharashtra, India.
*Corresponding author Email : maheshmkulkarni@rediffmail.com

ABSTRACT

Konkan is considered as an important mango belt of India. This belt is not only famous for production of king of mango 'Alphonso' but also for supply of quality planting material throughout the country. Soil is the basic medium used in nursery. Availability of quality soil for nursery is getting scared and it is need of the hour to find out light-weight, well aerated media for reducing transport cost and mortality. Hence field experiment was carried out to find the response of mango cv. Alphonso stone grafts in different potting mixture. The treatment cocopeat + leaf manure + compost (1:1:2) was recorded significant increase in plant height (129.40%), girth of grafts (38.08%), highest number of shoot (1.50), number of leaf (22.70), highest absolute growth rate (0.1483 cm/day) and relative growth rate (0.0237 cm/cm/day). Whereas, maximum leaf area (617.03 cm^2) was obtained in soil + leaf manure (1:1) followed by leaf manure + cocopeat (1:3) (610.17 cm^2) leaf manure + cocopeat (1:3). Maximum root length (21.97 cm) and dry weight of root (7.23g) was obtained in treatment cocopeat + leaf manure + compost (1:1:1). Economics involved for different treatments showed that cocopeat + leaf manure + compost (1:1:2) was recorded with highest B:C (1.39) followed by Soil + Cocopeat (1:1) in stone grafting. From the above investigation, it is concluded that potting mixture had significant effect on growth performance and economics of mango grafts. For raising of mango grafts, the media containing cocopeat along with leaf manure and compost was the ideal soilless media.

Key words: Alphonso, B:C ratio, Growth parameters, Mango and Soilless media

Mango (*Mangifera indica* L.) is highly demanded fruit of all class and masses occupy a unique place among the fruits in world. Due to rise in demand from all parts of world for mango and mango based products, area is increasing. Demand for quality planting material of mango has increased in recent years due to adoption of high density planting by farmers. Media play major role in quality production of grafts. Konkan region is not only supplying mango grafts but also supplying other fruits and spices grafts to various parts of India. Demand for basic media i.e. soil is very high in this region. The area is also blessed with large forest and coconut plantation through which leaf manure and cocopeat can be prepared which can be used as light weight media. Considering future opportunity for soilless nursery, the present study was undertaken to understand influence of different potting mixture on survival, growth performance and economics of mango stone grafts.

The present study on influence of different potting media on growth and economics of mango stone graft was carried out at Department of Horticulture, College of Agriculture Dr. B. S. K. K. V. Dapoli, Dist. Ratnagiri (M. S.), India. The experiment was conducted in randomized block design with ten treatments and three replications. The 10 treatments consist of control (Soil + FYM 3:1), Soil + Single Super Phosphate + Rice husk + Organic manure (55:15:15:15), leaf manure (100%), cocopeat (100%), Soil + Leaf manure (1:1), Soil +Cocopeat (1:1), Leaf manure + Cocopeat (1:1), Leaf manure + Cocopeat (1:3), Cocopeat + Leaf manure + Compost (1:1:1) and

Cocopeat + Leaf manure + Compost (1:1:2). In this experiment morphological parameters such as plant height (cm), girth of graft (mm), number of shoots, number of nodes, number of leaves, leaf area(cm^2), absolute growth rate on height basis (cm/day), relative growth rate on height basis (cm/cm/day), root length (cm) and dry weight of root (g) were recorded, influenced by different potting media. Statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1995). On the basis of survival and final sale of grafts at the end of experiment, net profit and B:C were calculated.

At the end of experiment the per cent increase in plant height was found higher in treatment T_{10}: cocopeat + leaf manure+ compost 1:1:2 (129.40%), at par with T_9: cocopeat + leaf manure+ compost 1:1:2 (120.64%) which found superior over rest of the treatments. The lower per cent increase in plant height was recorded in treatment T_1 control: soil+ FYM 1:3 (105.03%). Similar findings were reported by Parasana *et al.* (2013) in growing media containing soil + sand + FYM (2:1:1) for khirni, Kurava (2015) in soil, FYM and fertilizer media in mango and Ragaji (2017) in media containing soil + cocopeat (1:1) followed by soil + leaf manure + cocopeat (1:1:1). Similarly, significantly highest per cent increase in plant girth was found in treatment T_{10} (38.08%) which was at par with T_6: soil + cocopeat 1:1 (37.19%). The lowest per cent increase in plant girth was found in treatment T_5: soil+ leaf manure 1:1 (23.83%). Grafts containing media mixture with proper aeration, moisture and substantial amount of nutrients, facilitate root absorption for formation of photosynthesis. It helped in cell division, cell elongation and adequate water supply resulted in increase in per cent of girth of grafted plants. Similar findings were reported by Bachubhai (2005) for mango seedling in soil (40%): sand (40%): FYM (20%) and Ragaji (2017) in soil + cocopeat (1:1) for mango.

At 180 days after grafting (DAG), the statistically maximum number of shoot was recorded in treatment cocopeat + leaf manure+ compost 1:1:2(1.50). The minimum number of shoot was recorded in cocopeat 100% (1.27). This was due to availability of moisture and nutrient through media (Ikram *et al.* 2012) resulted in increasing morphological characters like height, girth and number of shoots. The treatment cocopeat + leaf manure + compost 1:1:1 was recorded maximum number of nodes (2.20) which was found superior over rest of the treatments at the end of experiment. The minimum number of nodes was recorded in treatment T_1 (soil + FYM 3:1) (1.45). Similarly, the leaf area was recorded maximum in treatment soil + FYM 1:1 (617.03 cm^2) the minimum leaf area recorded in treatment soil + FYM 3:1 (538.55 cm^2). Soilless media is light in weight and porous (Wilson, 1983) with low salt content, good water holding capacity and ion exchange capacity with optimum pH produced maximum number of nodes. Similar findings were reported by Kurava (2015) in media containing soil, FYM and fertilizer for mango and Kelkar (2016) in top soil + FYM + Vermiphos media for mango cv. Alphonso. At the end of experiment, highest number of leaves was observed in treatment T_{10} which consists of cocopeat + leaf manure+ compost (1:1:2) (22.70) while the lowest number of leaves was observed in control treatment Soil + FYM (1:3) (15.22) followed by T_8 (16.17). Similar findings were also reported by Waseem *et al.* (2013) in soil + leaf mold+ coconut husk (33:33:33) and Ragaji (2017) in media containing leaf manure.

At 180 DAG, absolute growth rate (AGR) on height basis was highest in treatment (T10). cocopeat + leaf manure+ compost 1:1:2(0.1483 cm/day) while lowest AGR was recorded in treatment (T9) cocopeat + leaf manure+ compost 1:1:1 (0.0048 cm/day). The highest relative growth rate (RGR) on height basis was obtained in treatment (T10) cocopeat + leaf manure+ compost 1:1:2 (0.0237 cm/cm/day) whereas lowest RGR was obtained in treatment (T1) soil + FYM (0.0208 cm/cm/day). Similar finding was reported by Kelkar (2016) in top soil + FYM + Vermiphose media for mango and Ragaji (2017) for mango stone grafting in soil + leaf manure (1:1).

At the end of the sixth month, the root length was significantly influenced by the different treatments. The highest root length was recorded in the treatment T_9 (21.97) cocopeat + leaf manure + compost 1:1:1 which was at par with T_2 (20.20 cm) soil + SSP + rice husk + cocopeat (55:15:15:15). The lowest root length was recorded in T_5 (14.57) soil + leaf manure (1:1) which was at par with T_8 (16.37) i.e. leaf manure + cocopeat (1:3). Similar findings were reported by Khot (2017) for bullock's heart in soil + FYM (2:1) and Ragaji (2017) for mango stone grafting in soil + cocopeat (1:1) and leaf manure + cocopeat (1:3) media.

Table No.1: Effect of different potting mixture on morphological characters and B:C

Treat-ments	Plant height (cm)	Girth of graft (mm)	Number of shoot	Number of Node	Number of leaves	Leaf area (cm^2)	Absolute growth rate (cm/day)	Relative growth rate (cm/day)	Root length (cm)	Dry weight of root (g)	Survival (%)	Net profit (Rs)	B:C
T_1	25.68 (105.03)	7.90 (29.78)	1.45	1.45	15.52	538.55	0.0496	0.0208	18.20	4.73	37.33 (37.66)	3.5	1.00
T_2	26.38 (115.90)	8.46 (32.37)	1.33	1.70	18.07	585.58	0.0648	0.0223	20.20	6.12	50.67 (45.38)	334.8	1.17
T_3	27.43 (106.08)	7.69 (26.07)	1.30	1.78	16.92	565.62	0.1089	0.0209	16.80	2.69	36.00 (36.87)	225.5	1.16
T_4	26.61 (107.46)	7.73 (27.14)	1.27	1.67	17.33	564.02	0.0849	0.0212	19.20	3.74	49.33 (44.62)	278.7	1.14
T_5	28.25 (115.90)	8.27 (23.83)	1.37	1.60	18.32	617.03	0.1383	0.0223	14.57	5.68	46.67 (43.09)	388.5	1.23
T_6	26.39 (116.48)	7.88 (37.19)	1.47	1.73	18.13	570.03	0.0658	0.0225	18.53	5.69	52.00 (46.15)	509.8	1.28
T_7	25.95 (111.03)	8.09 (26.61)	1.42	1.53	16.53	608.58	0.0082	0.0216	18.03	5.17	37.33 (37.66)	47.3	1.03
T_8	27.89 (116.86)	8.57 (33.38)	1.48	2.02	16.17	610.17	0.1253	0.0222	16.37	4.69	41.33 (40.01)	48.6	1.03
T_9	28.15 (120.64)	8.23 (29.29)	1.38	2.20	17.98	576.59	0.0048	0.0228	21.97	7.23	42.67 (40.78)	273.5	1.17
T_{10}	29.77 (129.40)	8.69 (38.08)	1.50	1.95	22.70	595.61	0.1483	0.0237	19.53	6.85	50.67 (45.38)	634.7	1.39
Mean	**114.58**	**30.38**	**1.390**	**1.763**	**17.77**	**583.18**	**0.0799**	**0.0220**	**18.34**	**5.29**	**44.40**	-	-
S.E.±	**3.33**	**1.28**	**0.011**	**0.024**	**0.20**	**12.31**	**0.00**	**0.00**	**0.64**	**0.42**	**0.68**	-	-
C.D. at 5%	**9.89**	**3.81**	**0.034**	**0.072**	**0.59**	**36.57**	**0.00**	**0.00**	**1.92**	**1.25**	**2.04**	-	-

(Value in parenthesis indicates per cent increase in plant height and girth and arcsine in survival)

The maximum dry weight of root was obtained in the treatment T_9 (7.23) cocopeat + leaf manure + compost (1:1:1) which was at par with T_{10} (6.85) cocopeat + leaf manure + compost (1:1:2) and T_2 (6.12) soil + SSP + rice husk + cocopeat (55:15:15:15). The lowest root length was obtained in T_3 (2.69) leaf manure 100% which was at par with T_4 (3.74) cocopeat 100%. Similar findings were reported by Panchal *et al*. (2014) for khirni seedlings in soil + cocopeat + FYM (1:1:1) and Ragaji (2017) for mango graft in soil + cocopeat (1:1) media.

The benefit cost ratio (B:C) for mango stone grafts raised in different potting media was shown in Table No. 1. Net profit was calculated on the basis of expenditure incurred and income received from total number of mango grafts survived and sold at the end of experiment. Media mixture Soil: cocopeat (1:1) recorded significantly maximum 52 % survival with 1.29 B:C with net profit of Rs. 509.80 followed by 50.67 % survival in T_{10} (cocopeat + leaf manure+ compost 1:1:2) and T_2 (soil + SSP + rice husk + organic mill (55:15:15:15)). The highest B:C (1.39) was recorded in T_{10} in which net profit received after selling of mango graft was Rs.634.70. Treatment which was used as regular nursery practice T_2 (soil + SSP + rice husk + organic mill (55:15:15:15)) recorded net profit of Rs. 334.80 and B:C 1.17. Lowest B: C (1.00) was reported in T_1 control i.e. Soil + FYM 3:1 with net profit of Rs. 3.50 followed by T_7 Leaf manure + Cocopeat (1:1) and T_8 Leaf manure + Cocopeat (1:03) with net profit of Rs. 47.30 and Rs. 48.60, respectively.

Fig. 1. Comparison of mango stone grafts raised in different potting media at 180 DAG

Conclusion

From the above investigation, it was concluded that potting media had significant effect on growth performance and B:C of mango grafts. Locally available leaf manure, cocopeat, compost can be used as media which serves as alternative to soil in near future. Grafts filled with soilless media reduced weight of bag and helps in easy transportation. The media containing cocopeat along with leaf manure and compost (1:1:2) was the ideal soilless media for raising mango grafts.

ACKNOWLEDGEMENT

We thank Head, Department of Horticulture and staff of College of Agriculture, Dr. B. S. K. K. Vidyapeeth, Dapoli (M. S. India) for providing valuable insight and expertise that greatly assisted the research.

REFERENCES

Bachubhai, V. M. 2005. Influence of media and container on growth of mango (*Mangifera indica* L) seedling. (M.Sc. (Agri.) *Thesis* submitted to Junagadh Agricultural University, Junagadh.

Ikram, S., Habib, U. and Khalid, N. 2012. Effect of different potting media combinations on growth and vase life of tuberose (*Polianthus tuberosa* L.). *Pak. J. Agri. Sci.,* **49** (2):121-125.

Kelkar, K. D. 2016. Effect of different agro-chemicals on morpho-physiological attributes of mango grafts (*Mangifera indica* L.) cv. Alphonso under rainy season of Konkan agro-climatic conditions' M.Sc. (Agri.) *Thesis* submitted to Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra.

Khot, A. A. 2017. Effect of different potting media on success and growth of bullock's heart (*Annona reticulata* L.). M.Sc. (Agri.) Thesis Submitted to Dr. B. S. Konkan KrishiVidyapeeth, Dapoli, Maharashtra.

Kurava, M., 2015.Effect of polyamines and tricontannol on morphological behavior of mango cv. Alphonso under rainy season of Konkan agro-climatic condition. M.Sc. (Agri.) Thesis submitted to Dr. B. S. Konkan KrishiVidyapeeth, Dapoli, Maharashtra.

Panchal, G. P., Parasana, J. S., Patel, S.R. and Patel, M. V. 2014. Effect of different growing media and levels of IBA on growth and development of khirni (*Manilkara hexandra* Roxb) seedlings cv. Local. *Global J. Biosci.and Biotech*., **3** (4):379-383.

Panse V. G. and Sukhatme, P. V. 1995.Statistical methods for agricultural workers. ICAR Rev. Ed. p. 97-156.

Parasana, J. S., Leua, H. N. and Ray, N. R. 2013. Effect of different growing media mixture on germination and seedlings growth of mango (*Mangifera indica* L.) cultivars under net house conditions. *The Bioscan, Intern. Quarterly J. Life Sci*., **8** (3):897-900.

Ragaji, S. G. 2017. Effect of different potting media on survival and growth of mango (*Mangifera indica* L.) stone grafts cv. Alphonso. M.Sc. (Agri.) Thesis submitted to Dr. B. S. Konkan KrishiVidyapeeth, Dapoli, Maharashtra.

Waseem, K., Hameed, A., Jilani, M. S., Kiran, M., Rasheed, M. U., Ghazanfarullah, Javeria, S. and Jilani, T. A. 2013. Effect of different growing media on the growth and flowering of stock (*Matthiola incana*) under the agro climatic condition of Dera Ismail Khan. *Pak. J. Agri. Sci*., **50** (3):523-527.

Wilson, G. C. S. 1983. The physico-chemical and physical properties of some -horticultural substrates. *Acta Horti*., 150: 19-32.

(Received on and 26.09.2020Accepted on 22.12.2020)