

Original Research Article

Effect of Different Potting Mixture on Sprouting, Survival and Growth of Softwood Grafts of Mango cv. Alphonso

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ABSTRACT

South Konkan has more than 250 nurseries supplying more than 10 lakh grafts every year. For production of good quality planting material, availability of good quality soil is a major limitation. It is also essential to give a substitute for present media which should be light in weight, natural and having good water holding capacity. Hence field experiment was carried out in Randomized Block Design with ten treatment combinations and replicated thrice to find the performance of mango cv. Alphonso softwood grafts in different potting mixture. The treatments comprised of ten different growing mixtures. The maximum sprouting percentage was recorded in T₁ (93.33%) i.e. soil + FYM (3:1) followed by T₉ (92.00%) i.e. cocopeat + leaf manure + compost (1:1:1), The treatment T₁₀ i.e. cocopeat + leaf manure + compost (1:1:2) recorded maximum increase in plant height (124.79%), number of node (2.27), number of leaf (17.87), root length (23.46 cm) and dry weight of root (8.92 g) whereas the highest survival percentage (82.67%), percent increase in girth of graft (39.89 %), number of shoot (1.67), leaf area (678.46 cm²) and relative growth rate (0.0237 cm/cm/day) was noted in T₉ i.e. cocopeat + leaf manure + compost (1:1:1). The maximum absolute growth rate (0.0747 cm/day) was found in treatment T₅ i.e. soil + leaf manure (1:1) at 180 day after grafting. The media containing cocopeat along with leaf manure and compost was the ideal soilless media for nursery for raising mango grafts.

Keywords

Alphonso, Mango,
Softwood grafts,
Cocopeat, Media

Introduction

Mango (*Mangifera indica* L.) is the oldest and choicest fruit of the world. It is considered as 'National fruit of India' and known as 'King of fruits' owing to its nutritional richness, unique taste, pleasant aroma and its religious and medicinal importance. Due to its good qualities and high medicinal values, it is enjoyed by masses and classes from all corner of the World. The area under mango in India is increasing rapidly particularly of Alphonso

variety and Konkan belt is considered as one of the major supplier of good quality diseased free planting material. Soil requirement as potting media is very huge and becoming scare with time. Annually for preparing 100000 grafts nursery man need 200 tones of soil. To run the viable business, nursery man need to be supported by doing research on use of other media in nursery which will spare large quantity of soil. Different growing media other than soil like coco peat, leaf manure and compost are light in weight and are having good porous structure so

easily transported from one place to other. Mango is ever green crop and need to be transferred intact with media along the root ball, otherwise it will cause defoliation leads to death of graft. Very less work has been found in use of other media and performance of Mango grafts in nursery. Hence considering future scope for soilless nursery, the present study was undertaken to evaluate influence of different potting mixture on growth performance and economics of mango softwood grafts.

Materials and Methods

The present investigation on effect of different potting media mixture on sprouting, survival and growth mango softwood graft was carried out at Department of Horticulture, College of Agriculture, Dr. B. S. K. K. V. Dapoli, Dist. Ratnagiri. The experiment was executed in randomized block design with ten treatments and three replications. The seedlings were raised in ten different media for six months and then wedge grafting is done on soft wood. The ten treatments consist of Control (i.e. Soil + FYM 3:1), Soil + SSP + Rice husk + Organic mill (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 sprouting, survival and morphological parameters influenced by different potting media were recorded at 15 days interval up to 180 days and were analyzed by standard method of analysis of variance as given by Panse and Sukhatme (1995).

Results and Discussions

At the end of the sixth month after softwood grafting, all the parameters i.e. sprouting,

survival and morphological parameters were significantly influenced by the different potting media treatments.

Effect of different potting mixture on sprouting and survival of softwood grafts

The data pertaining to the effect of different potting mixtures at 180 days after grafting on sprouting and survival are presented in the Table 1. The highest sprouting percentage (93.33%) was obtained in treatment T₁ which was which was at par with T₉ (92.00%). The lowest per cent spouting (78.67) was observed in T₄ at 43 day of grafting. The maximum sprouting noticed in media containing compost with or without soil. Temperature, atmospheric humidity, moisture, nutrient contain in media, quality of rootstock, scion wood status play important role in successful grafts union (Litz, 1997).

After 180 DAG, all the treatment showed significant effect on survival percentage of grafts. The highest survival percentage (82.67%) was obtained in treatment T₉ which was which was at par with T₁ (80.00%) and T₁₀ (79.33%). Treatments T₃ i.e. leaf manure (100%) and T₄ i.e. cocopeat (100%) recorded little less survival i.e. 57.33 per cent and 62.67 per cent respectively. The higher percent survival was observed in media having compost with or without soil. Availability of nutrients and moisture in this media stimulated photosynthesis at higher rate in leaves of grafts. Similar finding were reported by Panicker (1986) in soil + FYM media for mango, Parasana (2012) in soil + sand + FYM (2:1:1) for mango.

Effect of different potting mixture morphological characters

The data pertaining to the effect of different potting mixtures at 180 days after grafting on morphological characters are presented in the

Table 2. The plant height and per cent increase in plant height gradually going on increasing throughout the experiment. The height was influenced by different potting mixture. The highest per cent increase obtained in T₁₀ (124.79) whereas T₄ showed (94.09) increase over initial plant height particularly at 180 days after grafting. This may be attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*1994). Similarly, the plant girth is continuously increasing in all treatments throughout the growth period. At 180 days after grafting the highest per cent increase in plant girth observed in T₉ (39.89). It showed (39.89) increase in girth up to 180 DAG over initial. The minimum per cent increase in plant girth

was observed in treatment T₅ (22.15). It may be due to better nutrient availability leading to higher production of photo synthetically functional leaves due to growing media (Borah *et al.*, 2008).

Similarly, the number of nodes progressively increased with the advancement in age. At 180 DAG, maximum number of nodes was found in T₁₀ (2.27) which was at par with T₅ and T₉ (2.20). After 180 DAG, the statistically maximum number of shoot was observed in T₉ (1.67) which was at par with T₈ (1.60). The minimum number of shoot was observed in T₆ (1.27) followed by T₃ (1.45). T₁₀ also recorded the highest number of leaves (17.87) and T₃ recorded the lowest number of leaves (15.27) per grafts.

Table.1 Effect of different potting mixture on per cent sprouting and per cent survival

Treatments	Per cent sprouting at 43 DAG	Per cent survival at 180 DAG
T ₁	93.33 (75.05)	80.00 (63.51)
T ₂	89.33 (70.94)	75.00 (60.00)
T ₃	80.00 (63.43)	57.33 (49.22)
T ₄	78.67 (62.51)	62.67 (52.34)
T ₅	88.00 (69.73)	74.67 (59.85)
T ₆	81.33 (64.40)	66.67 (54.74)
T ₇	86.67 (68.60)	74.67 (59.85)
T ₈	88.00 (69.73)	72.00 (58.05)
T ₉	92.00 (73.57)	82.67 (65.61)
T ₁₀	90.67 (72.23)	79.33 (63.00)
Mean	86.80	72.50
S.E.±	0.44	1.36
C.D. at 5 %	1.31	4.04

(Figures in parenthesis indicate arcsine transformed values)

Table.2 Effect of different potting mixture on morphological character of softwood grafts at end of experiment at 180 DAG

Treat ments	Plant height	Girth of graft	Number of shoot	Number of Node	Number of leaves	Leaf area	Absolute growth rate	Relative growth rate	Root length	Dry weight of root
T₁	26.03 (104.80)	8.22 (34.24)	1.48	2.07	17.33	592.20	0.0218	0.0207	23.03	8.27
T₂	24.84 (99.96)	8.49 (31.56)	1.47	1.93	16.60	416.55	0.0361	0.0200	21.23	7.33
T₃	23.13 (103.66)	7.79 (27.70)	1.45	2.13	15.27	479.30	0.0116	0.0206	20.47	4.47
T₄	24.88 (94.05)	7.89 (29.87)	1.47	2.08	16.92	631.55	0.0253	0.0191	22.57	6.53
T₅	25.92 (114.48)	8.20 (22.15)	1.53	2.20	17.13	545.81	0.0747	0.0219	22.33	7.07
T₆	24.97 (104.74)	7.93 (37.67)	1.27	2.13	16.37	544.93	0.0502	0.0206	19.90	5.67
T₇	25.90 (121.92)	8.20 (28.28)	1.47	2.13	17.83	672.54	0.0484	0.0235	20.57	7.20
T₈	25.52 (102.16)	8.62 (35.77)	1.60	2.15	16.33	575.06	0.0018	0.0203	23.30	4.53
T₉	26.65 (123.08)	8.48 (39.89)	1.67	2.20	17.57	678.46	0.0578	0.0237	20.73	7.67
T₁₀	27.23 (124.79)	8.82 (39.77)	1.53	2.27	17.87	661.14	0.0409	0.0234	24.17	8.67
Mean	109.36	32.69	1.49	2.130	16.92	579.75	0.0369	0.0214	21.83	6.74
S.E.±	3.23	1.15	0.036	0.039	0.19	22.88	0.00	0.00	0.26	0.41
C.D. at 5 %	9.62	3.42	0.108	0.117	0.58	67.98	0.00	0.00	0.76	1.24

(Value in parenthesis indicates per cent increase)

The maximum leaf area (678.46 cm²) was found in treatment T₉ whereas, minimum leaf area (479.30 cm²) was observed in T₃. Physiological activity in successful grafts produces new shoot and leaves. More number of shoots and leaves triggered the process of photosynthesis which resulted in accumulation of energy. Simultaneously availability of moisture, nutrient through media (Ikram *et al.* 2012) resulted in more sprouting followed by increasing morphological character like height, girth and number of shoot.

Significantly highest absolute growth rate was recorded in T₅ (0.0747cm/day) at 180 DAG which was found superior over rest of the treatments while lowest absolute growth rate on height basis was recorded in treatment T₈ (0.0018 cm/day). The highest RGR on height basis was obtained in treatment T₉ (0.0237 cm/cm/day) whereas lowest RGR on height basis was obtained in treatment T₄ (0.0191 cm/cm/day).

At the end of the experiment, the highest root length (24.17 cm) and maximum root dry weight (8.67 g) was recorded in the treatment T₁₀ which was significantly superior over all the other treatments while lowest root length (19.90 cm) was noticed in T₆ whereas lowest root dry weight was recorded in T₃ (4.47 g). Easy availability of nutrient, aeration leads to proper gas exchange by maintaining sufficient oxygen supply to the root. Simultaneously removal of respiratory CO₂ helped in root elongation (Heikonen, 1993).

In conclusion, potting mixture had significant effect on sprouting, survival and growth parameters of mango softwood grafts. Leaf manure, cocopeat, compost can be prepared locally in Konkan region and can be utilized as alternative media for soil in near future. Soilless media being light in

weight reduced weight of bag to one fourth of weight of bags filled with soil and compost. It will not only reduce the transport cost to the farmer but also reduce mortality after transport. The media containing cocopeat along with leaf manure and compost (1:1:2) was the ideal soilless media for nursery for raising softwood mango grafts of cv. Alphonso.

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References

- Borah, A. S., Nath, A., Ray, A. K., Bhat, R., Maheswarappa, H. P., Subramanian, P. and Krishnakumar, V. 2008. Evolution of potting mixture for raising arecanut seedling in polybags. *J. Plantation Crops*. 36 (2): 137-139.
- Dileep, M., Sudhakara, K., Santoshkumar, A. V., Nazeema, K. K., Nazeema, K. K. and Ashokan, P. K. 1994. Effect of seed size, rooting medium and fertilizers on the growth of seedling of silk cotton (*Ceiba pentandra* Linn.). *Indian J. Forestry*, 17(4): 293-297.
- Heiskanen, J. 1993. Favorable water and aeration conditions for growth media used in containerized tree seedling production: a review. *Scand. J. Forest Res.*, 8: 337-358.
- 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.
- Litz, R. A. 1997. Propagation in: The Mango- Botany Production and Uses (Ed.). Cab International. pp: 363-400

Panicker, P. 1986. Studies on softwood grafting in mango var. (*Mangifera indica* L.) Alphonso. M.Sc. (Agri.) Thesis Submitted to Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra.

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

Parasana, J. S., Leua, H. N. and Ray, N. R. 2013. Effect of different growing medias 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.