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Studies on effect of different age of rootstocks on softwood grafting in Aonla (*Phyllanthus Emblica* L.)

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Abstract

Investigations were undertaken in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu, India during 2015- 2017 to “studies on effect of different age of rootstocks on softwood grafting in Aonla (*Phyllanthus emblica* L.) Softwood grafts were prepared from different age of rootstock from three months to twelve months old rootstock. There were ten treatments replicated thrice in a completely randomized block design. Among the different age rootstocks tried in this experiment, the grafts prepared from eight months old rootstock had registered highest values for days taken for graft union, graft success percentage, shoot length, number of leaves total biomass and graft survival percentage.

Keywords: rootstocks on softwood grafting, Horticulture, Faculty of Agriculture

Introduction

The area under aonla is increasing day by day due to its popularization as a medicinal plant and its potential for better adaptation to diversified soil and climatic conditions. The fruit is highly nutritious and is the richest source of vitamin C (400-1300 mg/100g) among the fruits next only to Barbados cherry. It is also the richest source of pectin which is mostly useful in making jam and jellies. Aonla is known for its medicinal and therapeutic properties from the ancient time in India and considered as a wonder fruit for health conscious population (Chopra *et al.*, 1958; Khanna and Bansal, 1974). It is one of the three ingredients of the famous ayurvedic preparation, Triphala, which is prescribed in many digestive disorders (Chopra *et al.* 1958). Aonla fruits are astringent, cooling anodine, carminative, digestive, stomechic, laxatic, altrant, aphordisac, diuretic antipyretic, and trichogenous (Nadkarni and Nadkarni, 1999; Treadway, 1994). Aonla fruit is acidic, acrid, cooling, diuretic and laxative (Gopalan and Mohanram, 1996). Aonla is a rare example of an edible material, which is rich in tannins as well as ascorbic acid (Kalra, 1988). It is also used in making pickles, candy, jelly, jam and preserves (Karla, 1988) shampoo, oil and dye (Singh *et al.* 1993). Beside fruits, leaves, bark and even seeds are being used for various purposes.

There is great demand for genuine true-to-type planting material in order to optimize production of quality fruits. But for its poor germination, slow growth of rootstock seedlings, lack of information on age of rootstocks for grafting has rendered the rapid multiplication process more difficult to produce large scale planting material to meet the growing demand. Hence, the present investigation was undertaken to find out the optimum age of rootstocks on softwood grafting in Aonla (*Phyllanthus emblica* L.)

Materials and Methods

The experiment was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu, India during 2015- 2017. This trail was conducted on the rootstocks of different ages from three months old to twelve months old were maintained in the polythene bags. The softwood grafting was done with procured scions at one time during 1st fortnight of January. The observations *viz.*, Days taken for union (Days), Percentage of graft success (%), Shoot length (cm), Number of leaves (Nos.), Total biomass (g) and Percentage of graft survivability (%) were recorded and subjected for statistical analysis (Panse and Sukhatme, 1967)

Results and Discussion

This experiment was conducted to find out the optimum age of the rootstock to get maximum success in softwood grafting. The age of rootstock has relationship with regenerating ability of a plant part which is found to be higher in younger root stocks and this is because of higher activity of meristematic cells resulting in faster formation of callus and quick healing of graft

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union. In general the lower graft union success could be attributed to the lack of intimate contact of cambial region of both stock and scion and to interference of exudation of latex (Hartmann and Kester, 1997). The rate of graft union success recorded for 30th, 45th, 60th and 90th DAG has revealed significant differences among the rootstocks of different age groups.

In the present investigations the maximum graft union was reported in case of eight months old rootstocks. Swamy and Melanta (1994) [10] opined that graft union success varies with age of the rootstocks in jack. Further, Sathish Kumar (2001) in tamarind had reported highest graft union success in eight months old rootstocks under Dharwad conditions. He attributed that the effect may be due to the physiological maturity of rootstock which plays important role in the success and growth of grafts. On the contrary Muniswami (1979) [4] opined that younger rootstocks are better amenable than older for soft wood grafting. Dambal (1999) [2] in sapota reported the highest graft union success with eight months old rootstocks followed by nine months old rootstocks. Similar results were obtained by Sulikeri and Rao (1999) [9] when grafting was done with eight to ten months old aged rootstock in mango.

Results obtained as influenced by different age of rootstocks on success percentage of grafts. The data indicated that there were significant differences among the treatments with respect to success percentage. The highest percentage of success was recorded in 8 months old rootstock. The results of the present investigation on the effect of age of rootstock on success of softwood grafting revealed that the age of rootstock influenced the success of softwood grafting. Sawke (1992) opined that the success percentage varies with age at which the rootstocks were grafted. It is also known that the physiological maturity of rootstocks play an important role in the success and growth of grafts in different crops as reported by Vishnuvardhan, 2002 [11]. Swamy and Melanta (1994) [10] opined that graft union success varies with age of the rootstock in jack. Aralikatti *et al.* (2011) [1] indicate that 210 days old rootstocks gave highest graft union in jack.

Hartmann and Kester (1979) [3] opined that, the age of rootstock has relationship with regenerating ability of a plant part which is found to be higher in younger rootstocks and this is because of higher activity of meristematic cells resulting in faster formation of callus and quick healing of graft union. It was evident from the present investigation that the shoot length was maximum in 8 months old stocks. The

lower number of leaves and shoot length were observed in case of 12 months old rootstocks. Better growth of grafts in the present study with young rootstock may be attributed to the higher meristematic activity and juvenility of younger scion, which in turn helped for early sprout initiation. Perhaps early sprouting followed by optimum temperature and humidity might be responsible for production of more number of leaves and higher shoot length. This may be due to synthesis of more photosynthates. Patel and Amin (1981) [6] opined that age of rootstocks did not influence vegetative growth of grafts and it may be the environmental conditions that influence the growth of grafts.

The present studies also revealed that the number of leaves and shoot length were significantly influenced by rootstocks of different age. The number of leaves produced on grafts was higher in 8 month old rootstock which is significantly superior over other ages of rootstocks. Similar results were obtained by Singh and Srivastava (1980) [8], in softwood grafting recording better results in success as well as extension of growth of shoots at early stage in mango and Aralikatti *et al.* (2011) [1] in jack.

Results obtained as influenced by different age of rootstocks on survival percentage of grafts. The data indicated that there were significant differences among the treatments with respect to graft survival percentage. The highest percentage of success was recorded in 8 months old rootstock. Similar results were obtained by Aralikatti *et al.* (2011) [1] in jack. The results of present investigation revealed that the highest total biomass was recorded from eight month old rootstock.

Summary

The grafts prepared from eight months old rootstock had registered highest values for days taken for graft union, graft success percentage, shoot length, number of leaves, total biomass and graft survival percentage. This may be attributed to the higher meristematic activity and juvenility of younger scion, which in turn helped for early sprout initiation. Perhaps early sprouting followed by optimum temperature and humidity might be responsible for production of more number of leaves and higher shoot length. This may be due to synthesis of more photosynthates

Thus, it could be seen that grafts prepared on eight month old rootstock is the optimum age of rootstock for success of soft wood grafting and maximizing the growth and development of seedling in aonla.

Table 1: Effect of different age of rootstocks on softwood grafting in Aonla (*Phyllanthus emblica* L.)

T. No	Treatment	Days taken for union (Days)	Percentage of graft success (%)	Shoot length (cm)	Number of leaves (Nos.)	Total biomass (g)	Percentage of graft survivability (%)
T ₁	3 month old	40.63	64.31 (53.32)	5.62	12.06	64.36	60.43 (51.02)
T ₂	4 month old	29.78	82.51 (65.28)	6.31	14.42	80.04	76.67 (61.12)
T ₃	5 month old	29.96	82.11 (64.98)	6.07	14.16	79.83	74.71 (59.81)
T ₄	6 month old	54.73	40.74 (39.66)	5.17	9.47	52.58	52.62 (46.50)
T ₅	7 month old	62.46	36.52 (37.18)	4.72	8.93	52.37	39.86 (39.15)
T ₆	8 month old	15.21	93.74 (75.51)	6.98	16.82	91.14	96.32 (78.94)
T ₇	9 month old	29.58	83.87 (66.32)	6.52	14.96	80.26	78.66 (62.49)
T ₈	10 month old	74.52	24.83 (29.89)	4.26	6.99	34.26	28.93 (32.54)
T ₉	11 month old	82.63	19.99 (26.56)	3.81	5.90	21.26	03.39 (10.61)
T ₁₀	12 month old	82.81	19.43 (26.15)	3.66	5.39	21.06	01.41 (6.82)
	S.Ed. CD (P=0.05)	0.10 0.21	0.29 0.62	0.23 0.44	0.28 0.55	0.11 0.23	0.99 2.01

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