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Studies on success of softwood grafts in different custard apple (*Annona squamosa* L.) cultivars

RS Pawar, GR Munde and AR Jadhav

Abstract

The present investigation entitled Studies on success of softwood grafts in different custard apple (*Annona squamosa* L.) cultivars was undertaken at Custard Apple Research Station, Ambajogai during 2016-2017, to evaluation of softwood grafts for success and survival of different cultivars. The experiment was laid out in a Randomized Block Design with 07 treatments viz. Dharur-6, Dharur-3, TP-7, Balanagar, Arka Sahan, Red Sitaphal and Purandar Local at nursery stage with three replications. The results indicated that, the minimum days required for sprouting (10.00), maximum number of graft sprouted (28.67), final survival (89.47 %), fresh weight of shoot (44.41 g), fresh weight of root (25.27 g), dry weight of shoot (13.67 g) and dry weight of root (9.25 g) were recorded in treatment T₅ (Arka Sahan). Therefore, treatment T₅ (Arka Sahan) have performed better for most of the traits under study.

Keywords: Softwood grafting, success rate, biomass study, custard apple

Introduction

Custard apple (*Annona squamosa* L.) is an important dry land fruit of India. It belongs to family Annonaceae. The genus includes more than 100 species of which five produce edible fruits. Among these *Annona squamosa* L. (Custard apple) *Annona reticulata* (Bullock heart, Ramphal) and *Annona cherimola* (Hanu-manphal) are commercially important. It is most favored monoecious fruit also known as a Sitaphal, Sugar apple, Sweet soap in India. *Annona squamosa* L. originated in Central America from there, it was distributed to Mexico and Tropical America (Popenoe, 1974) [10]. The total area under cultivation of custard apple in India is 37 thousand hectare and production is around 291 thousand MT according to NHB (Anonymous, 2017) [11]. Custard apple is suitable to cultivate in dry climate. It can withstand mild frost. The root system is confined to relatively shallow layers and therefore, these do not require deep soil. Annonaceous fruits are mainly propagated through seed and therefore, there exists a great variation in respect of growth, yield and fruit quality amongst the trees grown in the orchard. At present very few nurseries are producing grafts of custard apple through softwood grafting which is very easy to perform. There are several commercial varieties of custard apple like Arka Sahan, Balanagar, TP-7, Purandar Local, Red Sitaphal, Dharur-3 Dharur-6, Annona and Finger print which are grown in different parts of India.

Materials and methods

An experiment on custard apple cultivars were conducted at Custard Apple Research Station, Ambajogai during 2016-2017. The experiment was laid out in a Randomized Block Design with 07 treatments viz., Dharur-6, Dharur-3, TP-7, Balanagar, Arka Sahan, Red Sitaphal and Purandar Local at nursery stage with three replications. The softwood grafting was done on the healthy rootstock seedling with different cultivars. The observations on success of grafting were recorded at 15 days intervals to a period of three months. The statistical analysis of the data in respect of success of grafts and biomass study was done according to the standard procedure given by Panse and Sukhatme (1996) [9].

Result and discussion

Success of softwood grafting in different cultivars of custard apple: It is revealed from the data (Table 1 and Figure 1), the significantly minimum days required for sprouting (10.00), maximum number of graft sprouted (28.67) and final survival (89.47 %) were noted under the treatment T₅ (Arka Sahan) as compared to other cultivars. These variations could be attributed due to genetic makeup of scions which influences the histological as well as metabolic processes at graft union. The higher cell activity resulted in early sprouting of scion similar result was obtained by Kudmulwar *et al.* (2008) [6] in custard apple, Joshi *et al.* (2011) [4] in custard apple, Mulla *et al.* (2011) [8] in jamun,

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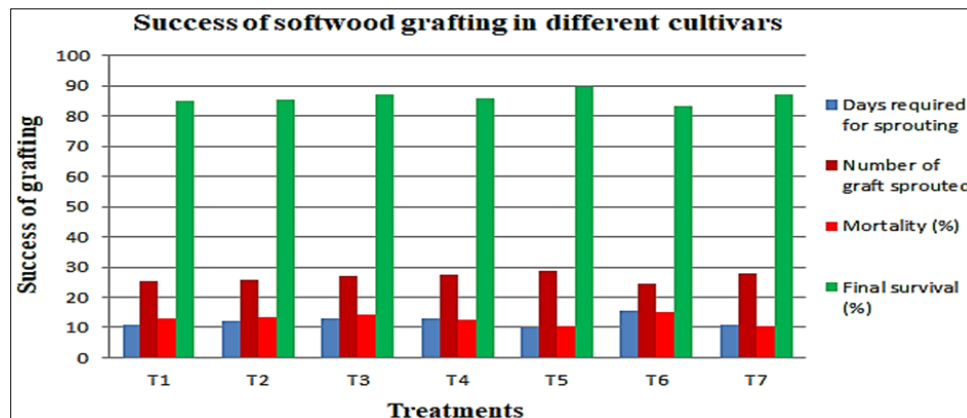
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Kumar and Shukla (2012) ^[7] in custard apple and Khopade and Jadhav (2013) ^[5] in custard apple. The minimum mortality percentage (10.33 %) was recorded in grafts of treatment T₇ (Purandar Local). The beneficial effects of growing conditions on survival percentage of grafts were reported by Mulla *et al.* (2011) ^[8] in jamun and Raghvendra *et al.* (2011)

^[11] in wood apple. The highest stionic ratio (0.97) was recorded in grafts of treatment T₂ (Dharur-3). The good stock-scion compatibility helps in better transfer of food material from leaf to other plant parts like stem and roots. Similar result was observed by Roshan *et al.* (2013) ^[12] in aonla.

Table 1: Success of softwood grafting in different cultivars of custard apple

Treatments	Days required for sprouting	Number of graft sprouted	Mortality (%)	Final survival (%)	Stionic ratio
T ₁	11.00	25.33	13.00	84.93	0.93
T ₂	12.00	25.67	13.33	85.40	0.97
T ₃	13.00	27.00	14.39	87.20	0.86
T ₄	13.00	27.33	12.51	86.00	0.91
T ₅	10.00	28.67	10.35	89.47	0.88
T ₆	15.33	24.67	15.27	83.22	0.94
T ₇	10.67	27.67	10.33	87.00	0.93
S.E.±	0.78	0.80	1.62	1.30	--
C.D at 5%	2.41	2.47	5.0	4.03	--

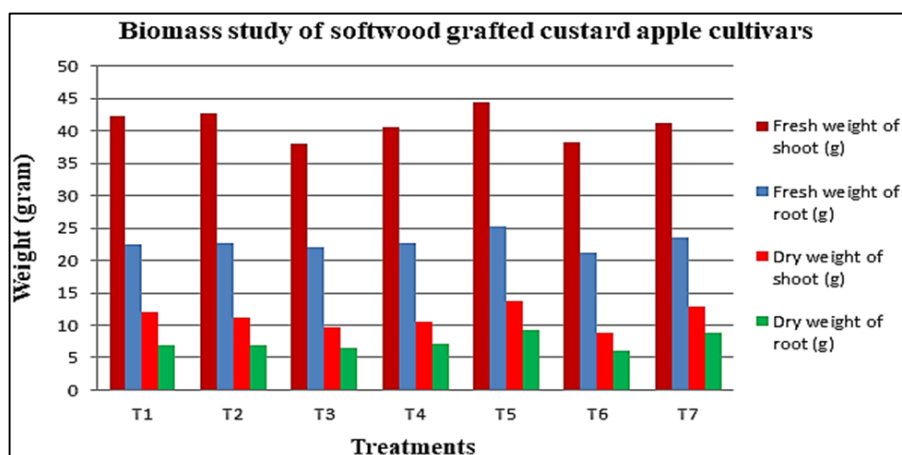


Biomass study of softwood grafted custard apple cultivars: It is revealed from the data (Table 2 and Figure 2), the higher fresh weight of shoot (44.41 g), fresh weight of root (25.27 g), dry weight of shoot (13.67 g) and dry weight of root (9.25 g) were recorded in treatment T₅ (Arka Sahan). It might be effect of more production of carbohydrate

required for vegetative growth of plant, resulting in more shoot and root weight. Similar result regarding fresh weight of shoots and root has been reported by Hussain and Bukhari (1997) ^[3] in sapota and regarding to dry weight of shoot and root reported by Chaudhary *et al.* (2016) ^[2] in aonla and Roshan *et al.* (2013) ^[12] in aonla.

Table 2: Biomass study of softwood grafted custard apple cultivars

Treatments	Fresh weight of shoot (g)	Fresh weight of root (g)	Dry weight of shoot (g)	Dry weight of root (g)
T ₁	42.36	22.55	11.95	6.94
T ₂	42.64	22.63	11.07	6.94
T ₃	38.07	22.05	9.78	6.53
T ₄	40.58	22.63	10.43	7.08
T ₅	44.41	25.27	13.67	9.25
T ₆	38.31	21.27	8.93	6.03
T ₇	41.26	23.55	12.93	8.74
S.E.±	1.65	0.11	0.04	0.03
C.D at 5%	5.09	5.09	0.13	0.12



Conclusion

The critical evaluation of results of the present study indicated that, considering the overall performance of success of different custard apple cultivars studied, treatment T₅ (Arka Sahan) have performed better for most of the traits under study. Arka Sahan showed significantly superior results in terms of success of softwood grafting like days required for sprouting, number of graft sprouted, survival percentage, stionic ratio, less mortality and biomass characters like fresh and dry weight of shoot and roots.

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