SHORT COMMUNICATION

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# Influence of scion size on graft success in custard apple cv. Balanagar

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Custard apple (*Annona squamosa* L.) belongs to family Annonaceae and now gaining popularity on waste and dry lands. Custard apple is 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. However, it is a common experience to come across individual free plant exhibiting superior fruit quality and profile yield. If such promising trees are further perpetuated vegetatively the desirable types can be multiplied and orchards with uniform fruit quality can be established. Kudmulwar *et al* (2008) reported that softwood grafting was effective in terms of percentage success, percent of survival, shoot length and the number of functional leaves. However the studies in respect of standardization of scion size *viz.*, length and diameter for achieving maximum graft success through softwood grafting have yet not been carried out. Keeping the point under consideration the present study was therefore, undertaken to find out the most suitable size of scion shoot for obtaining maximum success for softwood grafting in custard apple cv. Balanagar.

The experiment was undertaken at Fruit Research Station, Himayat bagh, Aurangabad. during 30th January, 2014 to 31st July 2014. One year old custard apple seedlings of uniform in growth of local type were selected as rootstock. The scion wood of past season growth of known cultivar Balanagar was used for grafting purpose. The experiment was laid out in Factorial Randomized Block Design with eighteen treatments replicated thrice and in each treatment twenty seedlings were grafted. The treatment consisted of $T_1$ L-20 cm D-4 mm, $T_2$ L-20 cm D-5 mm, $T_3$ L-20 cm, D-6mm, $T_4$ L-18 cm D-4 mm, $T_5$ L-18cm, D-5mm, $T_6$ L-18cm D-6 mm, $T_7$ L-16 cm D-4 mm, $T_8$ L-16 cm D-5 mm, $T_9$ L-16 cm D-6 mm, $T_{10}$ L-14 cm D-4 mm, $T_{11}$ L-14 cm D-5 mm, $T_{12}$ L-14 cm D-6 mm, $T_{13}$ L-12 cm D-4 mm, $T_{14}$ L-12 cm D-5 mm, $T_{15}$ L-12 cm D-6 mm, $T_{16}$ L-10 cm D-4 mm, $T_{17}$ L-10 cm D-5 mm and $T_{18}$ L-10 cm D-6 mm. The data on days required for bud sprouting, success percent of grafts after 60 days, number of branches, number of leaves per graft after 180 days, survival percent after 180 days and sprout length (cm) after 180 days of grafting were recorded. The data collected were subjected to statistical analysis as suggested by Panse and Sukhatme (1967) and presented in Table 1 and 2.

Data pertaining to individual effect of scion length and diameter on sprout length and graft success is presented in Table 1. There was significant difference in all the scion length and diameter affectively the sprout length and success. Significantly minimum days were required for bud sprouting (8.77 days), more success percent of graft after 60 days (80.00%), number of branches (1.82), number of leaves per graft after 180 days (15.26), survival percent after 180 days (81.11) and sprout length (37.44) was recorded in scion length of 14 cm. While scion stick of 20 cm recorded more days bud sprouting (13.66 days) while less success percent of grafts after 60 days (16.66%), number of branches (0.96), number of leaves per graft after 180 days (5.51), survival percent after 180 days (16.6%) and sprout length after 180 days (17.77 cm). Regarding scion diameter of 6 mm recorded less number of days for bud sprouting (10.83 days), more success percent of grafts after 60 days (63.88%), number of branches (1.56), number of leaves per graft after 180 days (13.84), survival percentage after 180 days (64.44%) and sprout length after 180 days (28.44 cm), while more number of days required for bud sprouting (11.15 days), less success percent of grafts after 60 days (46.11%), number of branches (1.31), number of leaves per graft after 180 days (9.16), survival percent after 180 days (46.66%) and sprout length after 180 days (25.166) was recorded in scion stick of 4 mm in diameter.

The data presented in Table 2 indicated significant differences among different treatments as influenced by scion length and diameter on graft success in custard apple cv. Balanagar. It was observed that the treatment $T_{12}$ sprouted early (7.33) followed by $T_{11}$ (8.33) and treatment $T_{13}$ (10.00). This treatment was at par with treatment $T_6$ and $T_{17}$ (10.00) respectively. The maximum number of days (14.33) required for bud sprouting was recorded in treatment $T_3$. This was statistically at par with treatment $T_1$ (14.00). Early sprouting in thick scion may be attributed to greater amount of reserve food material (Carbohydrates) in the scion shoot and early union is owing to the more surface contact between scion and rootstock. The results are on lines of Hartman and Kester (1986), Pathak (1990) and Joshi *et al* (2011) in custard apple. The highest percent graft success at 60 days after grafting was noticed in $T_{12}$ (93.33%) followed by $T_{13}$ (83.33%) and $T_{14}$ (80.00). It was at par with treatment ($T_{11}$, $T_{15}$, and

Table 1. Influence of scion length and diameter on growth and success of graft in custard apple cv. Balanagar under nursery condition.

| Treatments | Days required for bud sprouting | Success per cent of grafts after 60 days (%) | Number of branches | Number of leaves/graft after 180 days | Survival per cent after 180 days | Sprout length after 180 days (cm) |
|---|---|---|---|---|---|---|
| Scion length (L) | | | | | | |
| $L_1$- 20 cm | 13.666 | 16.66 | 0.96 | 5.511 | 16.66 | 17.777 |
| $L_2$- 18 cm | 11.111 | 31.11 | 1.17 | 9.200 | 33.33 | 19.333 |
| $L_3$- 16 cm | 11.333 | 55.55 | 1.60 | 11.755 | 54.44 | 23.111 |
| $L_4$- 14 cm | 8.777 | 78.88 | 1.82 | 15.266 | 78.88 | 31.111 |
| $L_5$- 12 cm | 11.000 | 80.00 | 1.66 | 14.466 | 81.11 | 37.444 |
| $L_6$- 10 cm | 10.777 | 71.11 | 1.50 | 14.622 | 71.11 | 29.777 |
| SE+ | 0.46 | 1.88 | 0.6 | 0.55 | 2.11 | 0.93 |
| CD at 5% | 1.40 | 5.66 | 0.18 | 1.65 | 6.33 | 2.79 |
| Scion diameter (D) | | | | | | |
| $D_1$- 4 mm | 11.555 | 46.11 | 1.31 | 9.166 | 46.66 | 25.166 |
| $D_2$ - 5 mm | 10.944 | 56.66 | 1.48 | 12.400 | 56.66 | 25.666 |
| $D_3$- 6 mm | 10.833 | 63.88 | 1.56 | 13.844 | 64.44 | 28.444 |
| SE+ | 0.32 | 1.33 | 0.04 | 0.38 | 1.49 | 0.65 |
| CD at 5% | 0.99 | 4.00 | 0.14 | 1.16 | 4.47 | 1.97 |

Table 2. Interaction effect of scion length and diameter on growth and success of graft in custard apple cv. Balanagar.

| Treatments | Days required for bud sprouting | Success per cent of grafts after 60 days (%) | Number of branches | Number of leaves/graft after 180 days | Survival per cent after 180 days | Sprout length after 180 days (cm) |
|---|---|---|---|---|---|---|
| $T_1$ - L 20 cm, D 4 mm | 14.000 | 13.33 | 1.13 | 3.333 | 13.33 | 14.666 |
| $T_2$ - L 20 cm, D 5 mm | 12.666 | 10.00 | 0.76 | 2.933 | 10.00 | 17.000 |
| $T_3$ - L 20 cm, D 6 mm | 14.333 | 26.66 | 1.0 | 10.266 | 26.66 | 21.666 |
| $T_4$ - L 18 cm, D 4 mm | 11.333 | 13.33 | 0.53 | 1.533 | 16.66 | 19.000 |
| $T_5$ -L 18 cm, D 5 mm | 12.000 | 36.66 | 1.4 | 14.000 | 43.33 | 20.000 |
| $T_6$ - L 18 cm, D 6 mm | 10.000 | 43.33 | 1.6 | 12.066 | 40.00 | 19.000 |
| $T_7$ - L 16 cm, D 4 mm | 11.333 | 33.33 | 1.33 | 6.866 | 30.00 | 20.666 |
| $T_8$ - L 16 cm, D 5 mm | 10.333 | 60.00 | 1.8 | 13.333 | 60.00 | 19.000 |
| $T_9$ - L 16 cm, D 6 mm | 12.333 | 73.33 | 1.66 | 15.066 | 73.33 | 29.666 |
| $T_{10}$- L 14cm, D 4 mm | 10.666 | 66.66 | 1.66 | 13.133 | 70.00 | 29.333 |
| $T_{11}$- L 14 cm, D 5 mm | 8.333 | 76.66 | 1.8 | 15.333 | 73.33 | 22.000 |
| $T_{12}$- L 14 cm, D 6 mm | 7.333 | 93.33 | 2.0 | 17.333 | 93.33 | 42.000 |
| $T_{13}$- L 12 cm, D 4 mm | 10.000 | 83.33 | 1.8 | 16.066 | 83.33 | 39.666 |
| $T_{14}$- L 12 cm, D 5 mm | 12.333 | 80.00 | 1.4 | 13.133 | 76.66 | 41.000 |
| $T_{15}$- L 12 cm, D 6 mm | 10.666 | 76.66 | 1.73 | 14.200 | 83.33 | 31.666 |
| $T_{16}$- L 10 cm, D 4 mm | 12.000 | 66.66 | 1.44 | 14.066 | 66.66 | 27.666 |
| $T_{17}$- L 10 cm, D 5 mm | 10.000 | 76.66 | 1.66 | 15.666 | 76.66 | 35.000 |
| $T_{18}$- L 10 cm, D 6 mm | 10.333 | 70.00 | 1.4 | 14.133 | 70.00 | 26.666 |
| SE+ | 0.81 | 3.27 | 0.10 | 0.95 | 3.65 | 1.61 |
| (L X D) CD at 5% | 2.43 | 9.81 | 0.32 | 2.86 | 10.96 | 4.83 |
| CV % | 7.65 | 10.64 | 13.25 | 14.16 | 11.81 | 11.03 |

Figure 1 Plate showing the length of scion grafted on rootstock

Figure 2 Plates showing an entire view of the experiment

$T_{17}$).The minimum percentage success was noticed in treatment $T_2$ (10.00). The maximum number of branches per graft were recorded in treatment $T_{12}$ (2.0) followed by treatment $T_{13}$ (1.8) which was at par with treatment $T_8$ and $T_{11}$. The minimum number of branches per graft was observed in treatment $T_4$ (0.53). The data regarding number of leaves per graft recorded after 180 days of grafting revealed significant differences among the treatments. The maximum number of leaves (17.33) was recorded in the treatment $T_{12}$ where scion length was 14 cm while 6 mm diameter followed by treatment $T_{13}$ (16.06) and $T_{17}$ (15.66) which were at par with treatments $T_8$ and $T_{11}$. The minimum numbers of leaves (1.53) were produced by the grafts where scion length was 18 cm and thickness 4 mm in diameter ($T_4$). The maximum sprout length (42.00 cm) after 180 days of grafting was recorded when the scion length was 14 cm and 6 mm thickness ($T_{12}$). The next best treatment in respect of sprout length (41.00 cm) was $T_{14}$ scion length 12 cm and thickness 5 mm which was at par with $T_{13}$ (39.66 cm) and $T_{17}$ (35.00 cm). The minimum sprout length (14.66 cm) was observed in treatment $T_1$ where scion was used 20 cm length and having 4 mm thickness. It might be due to same thickness of rootstock and scion performed at optimum time makes a congenial union resulted better growth of grafts. The results are in conformity with findings of Tewari *et al* (2005). The maximum survival percentage (93.33 %) was recorded when the scion length was 14 cm and thickness 6 mm in diameter ($T_{12}$) followed by treatment $T_{13}$ and $T_{15}$ (88.33 %) respectively which was at par with treatment $T_{14}$ and $T_{17}$ (76.66) respectively. The minimum success percentage (10.00%) was recorded when the scion length 20 cm and thickness 5 mm in diameter ($T_2$) which was at par with treatment $T_1$ (13.33%). This might be due to better callusing and proper union of stock and scion as reported by Tewari *et al* (2007) in ber which confirms present findings.

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