Journal of Crop and Weed, 18(2): 18-29 (2022)

ISSN- O : 2349 9400 ; P : 0974 6315

http://cwssbckv.org
www.cropandweed.com

Graft take and survival percentage in soft wood grafting of cashew nut (*Anacardium occidentale* L.) using various types of degradable grafting tapes

***R. PRAVEEN, A. BANDYOPADHYAY AND D. K. GHOSH**

Department of Plantation, Spices, Medicinal and Aromatic Crops, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya , Mohanpur, West Bengal, India.

Received : 28.09.2021 ; Revised : 23.04.2022 ; Accepted : 10.05.2022

DOI: https://doi.org/10.22271/09746315.2022.v18.i2.1568

ABSTRACT

Cashew is a commercially important plantation crop having high export potential. Softwood grafting was found to be the most suitable propagation method for large-scale multiplication of clonal plants of high yielding varieties. However, use of polythene tape for securing graft union is one of the reasons for less survival percentage of 65-70 per cent saleable grafts. In order to find out the cost effective and bio-degradable grafting tape to replace the polythene tape, an experiment was conducted with four grafting tapes. Maximum graft take percentage of 91.36% was recorded after 60 days after grafting (DAG) in the treatment buddy tape followed by natural rubber grafting tape (87.68%). Maximum grafts survival percentage of 82.10% at 180 DAG in buddy tape by natural rubber grafting tape 81.07%. Present study clearly indicated that, use of buddy tapes resulted in overall better performance with respect to graft take and survival percentage but cost is high and needs to be imported. Whereas, natural rubber grafting tapes show superior results over control in terms of graftake and survival with reduced graft care, readily and locally available at lower cost, reduced environmental pollution and could be recommended for complete replacement of single use polythene tape in grafting process.

Keywords: Cashew, grafting tapes, plantation crops, single use plastics and softwood grafting

Cashew nut (*Anacardium occidentale* L.), a native species of South America, was introduced by the European explorers in India during the second half of the 16th century for the purpose of afforestation and soil conservation. However, due to its commercial potential cashew crop has been emerged as a major plantation crop both in India and at global level. The area under cashew at the time of inception of National Horticulture Mission (NHM) (2005-06) was 7.99 lakh ha, with a total production of 5.44 lakh MT which has been increased to 10.62 lakh ha in 2017-18 (Hubbali, 2019). There has been a significant increase in the production of raw nut in India. It is evident from the fact that, 5.44 lakh MT of cashew was produced in 2005-06 and it has been increased to 8.17 lakh MT in 2017-18 with acumulative average growth rate (CAGR) of 3.18% against CAGR of 2.29% recorded at global level (Hubbali, 2019). Apart from its economic significance, the cashew sector in India provides employment to more than 5 lakh people in farm and factories of which 90% are woman (Sivasankaran and Sivanesan, 2013). The cashew sector plays a leading role in social, financial and livelihood security of the rural India.

Establishment of cashew plantations in India was mainly through the use of seedling progenies in the early part of its introduction. The softwood grafting techniques developed through concentrated research efforts became the milestone in the area expansion approach during the later stages. Across India, 42 nurseries are being operated by the Directorate of Cashew nut and Cocoa Board (DCCB) having a potential capacity to produce 15 million grafts per year (Hubbali, 2019). However, the requirement of cashew grafts at national level could not be fulfilled due to the less survival percentage (65-70 per cent) of saleable grafts (Nayak, 2015) which prompted to review on the techniques moderating the scion sticks growth and maintaining the physiological condition of the graft union. One of the reasons for lower grafting success is use of polythene tapes using for securing (Nayak, 2015). Owing to the labour shortage, majority of the farmers are not removing these polythene tapes which leads to poor grafting success due to girdling at graft joint. Moreover, use of each polythene tape and cover per graft consumes 2 grams of polythene. At a current production level of 15million grafts per year (Hubbali, 2019) it may accounts to addition of 30,000 tonnes of polythene in to the environment. Considering the environmental concerns on the use of single use plastics, there is an urgent need for identification of alternative for polythene usage in nursery practices.

Several studies were conducted on the alternate grafting materials in different crops and reported a various degree of success. In citrus, the effect of non degradable plastic tapes and biodegradable tapes on

Email: praveen.ramadugu@gmail.com

scion development and budding efficiency was studied by Oliveira *et al.* (2004). They reported that shoot development was sensibly higher with degradable tape than plastic tape. Crasweller (2005) observed that, when rubber strips are used to wrap graft union of fruit trees, no further attention usually needed but during the use of adhesive tapes care must be taken to split the tape vertically about 4 to 6 weeks after growth to prevent girdling. The effect of different wrapping materials on the success of budding was studied by Zenginbal *et al.* (2006) in kiwi fruit and reported the highest graft-take in soft rubbery plastic tapes. Zhang *et al.* (2015) studied the effect of two self-adhesive grafting tapes *i.e.,* buddy tape, a paraffinic tape that can be stretched over the whole bud after grafting and medical tape, a silky, breathable on grafting success in pecan seedlings and recorded higher grafting success with paraffinic tape than medical tape. In jamun, Husain *et al.* (2016) reported less number of days taken for sprouting of grafts using the degradable tapes. Considering these facts, the present investigation was designed to explore the possibility of replacing the use of polythene tape with degradable grafting tape in cashew nut softwood grafting.

MATERIALS AND METHODS

Healthy cashew nut seeds weighing 6-7gms were selected from single variety block. The nuts were pre soaked in water to raise the root stock. The healthy seedlings of 60 days were used for grafting as root stock. Scion sticks aged 2-3 months were selected from the cultivar BPP-8 collected from KVK, Amadalavalasa, Andhra Pradesh. The softwood grafting technique outlined by Amin (1978) was followed with minor modifications. The stock was prepared by decapitating up to the soft wood portion of the main stem and the leaves were removed from the stock plant except the lower most one or two pairs. The stem was split vertically in the form of cleft to a length of 4 - 6 cm downward with a sharp knife. Scion stick of about same thickness was used for grafting. Four different types of degradable grafting tapes T_1 (natural rubber grafting tape), T_2 (parafilm grafting tape) T_3 (buddy tape) T_4 (cotton grafting tape) were used in the present study along with the polythene tape (2 cm wide × 30 cm length and 100 guage thickness) (T_5). The materials used in the present study were procured from the e-commerce website Amazon.com. The characteristics of all the grafting tape materials used in the present study are given in Table 1. The grafting was practiced for two consecutive seasons during the third week of July 2018 -19 and 2019 - 20.

The field studies were conducted at the experimental plot, Faculty of Horticulture, BCKV, Mohanpur, Nadia, West Bengal for two consecutive years during 2018-19 and 2019-20 in a completely randomized design (CRD) with four replications. Graft take percentage was recorded as the number of grafts sprouted from total number of grafted plants per treatment at 15, 30, 45 and 60 DAG in percentage and was calculated by following the formula:

Graft take (%) =No of grafts sprouted/ Total no of grafted plants x 100.

Graft survival percentage was recorded as the number of healthy grafts from total number ofgrafted plants per treatment at 30, 60, 90, 120, 150 and 180 DAG in percentage and was calculated by following the formula:

Graft survival (%) = No of grafts healthy/Total no of grafted plants ×100

The prices of all the inputs, labour cost and sale price of graft were taken into consideration for calculating cost of production, net income and also calculated the benefit: cost ratio which is the ratio of gross income (Rs) to cost of production (Rs). The data obtained was analysed following the CRD and treatments mean were compared by means of critical differences at 5% probability (Panse and Sukhatme, 1967).

RESULTS AND DISCUSSION

The experimental results on effect of different types of waxe on graft take and survival percentage and the economics involved in this study are presented from Table 2 to 4.

Graft take percentage

Graft take indicates spouting of the scion material after grafting, which is early sign of graft success. Higher the grafts take higher the graft success. Earliness in graft take leads to better growth and development of grafts because of its good cambial connectivity. Different type of degradable grafting tapes have exhibited significant variations in graft take percentage at various growth stages both in years and pooled data (Table 2). The results showed that graft take percentage increased gradually up to 60 days after grafting (DAG) with maximum increase rate during 15-30 days period. Among different types of degradable grafting tapes treatment T_3 (buddy tape) recorded maximum graft take percentage at 15, 30, 45 and 60 DAG during both year and pooled data. At 60 DAG maximum graft take percentage (91.36%) was recorded in treatment T_3 followed by treatment T_1 (87.68%), treatment T_5 (79.06%) and the minimum graft take percentage (21.27%) was recorded in treatment T_4. Earlier graft take noticed with buddy tape T_3 and natural rubber grafting tape might be due to the prevention of loss of humidity. Quick drying of scion stick resulted in abundant callus and wound healing tissue formation on cut surfaces. All this resulted in improved cambial connectivity between stock and scion rapidly. This finding is in agreement with the results reported by

Plate 1A: Natural rubber grafting tape

Plate 1B: Para film grafting tape

Plate 1 C: Buddy Tape

Plate 1D: Cotton grafting tape

Plate1: Different types of degradable grafting tapes

Halandakar and Jadav (2001), Zenginbal *et al* .(2006), Wazarkar (2009) and Mulla *et al.* (2011). Minimum graft take in cotton grafting tape T_4 is due to loss of moisture around graft union due to porous nature of the tape.

Graft survival percentage

Significant variations were observed in graft survival percentage at different growth stages in both years and pooled data with the application of different treatments (Table 3). Graft survival percentage increased up to 60 DAG and then decreased up to 180 DAG due to die back or wilt disease. Among different types of degradable grafting tapes during both years and pooled data at 30, 60, 90, 120 DAG shows treatment T_3 recorded maximum graft survival percentage which is on par with treatment T_1. At 180 DAG maximum graft survival percentage (82.10%) was recorded in treatment T_3 which is on par with treatment T_1 (81.07%) followed by treatment T_5

30 DAG

60 DAG

60 DAG

90 DAG

90 DAG

90 DAG

120 DAG

Plate 2: Performance of natural rubber grafting tape at different growth stages of cashew nut grafting

30 DAG

60 DAG

60 DAG

90 DAG

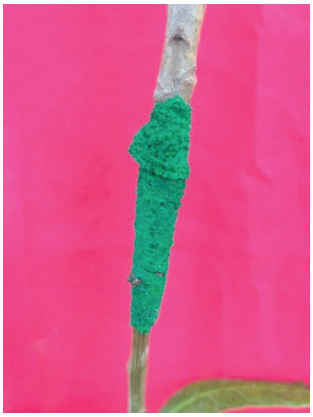
120 DAG

150 DAG

180 DAG

Plate 3: Performance of parafilm grafting tape at different growth stages of cashew nut grafting

Plate 4: Performance of Buddy tape at different growth stages of cashew nut grafting



30 DAG

60 DAG

90 DAG

120 DAG

150 DAG

180 DAG

Plate 5: Performance cotton grafting tape at different growth stages of cashew nut grafting

30 DAG

60 DAG

90 DAG

120 DAG-Constrictions at graft joint

150 DAG

150 DAG

Polythene tapes after removal–environmental pollution

Plate 6: Performance of polythene tape at different growth stages of cashew grafting

Table1: Characteristics of the grafting tapes used in the present study

Treatments	Type of the grafting type	Manufacturering Country	Technical specifications	Elasticnature	Permeability	Bio-degradability	Self-adhesion	Water-Proofing
T_1	Naturalrubbertape	India	Availableincolour Black, 0.38mm (thickness)×16mm (width) incutpieces	High	Selectivepermeability togases	Yes	No	Yes
T_2	Parafilm tape	United States of America	Availableinclear tapein1"widerolls with30Meters lengthrolls	High	Selective permeability togases	Yes	Yes	Yes
T_3	Buddytape	Japan	Tapes are available in 25mm (width) x 60 m (length) with50 mm perforations rolls	High	Selective permeability togases stretched	Yes	Self adhesive When	Yes
T_4	Cottongraftingtape	UnitedStates of America	Tape is available in 2 cm (Width) by 450 cm (Length) rolls	Low	Selective permeability togases	Yes	Yes	Yes
T_5	Polythene tape	India	Thetapeisavailablein100 gauge thickness white coloredsheet	Medium	No	No	No	Yes

Table 2: Effect of different types of degradable grafting tapes on graft take percentage in softwood grafting of cashew nut

Treatments	Grafttake(%)											
	15 DAG			30 DAG			45 DAG			60DAG		
	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled
T1	48.89 (0.772)^{bc}	49.56 (0.781)^{bc}	49.23 (0.776)^{bc}	73.84 (1.034)^{b}	74.56 (1.042)^{b}	74.20 (1.038)^{b}	84.76 (1.171)^{b}	85.34 (1.179)^{b}	85.05 (1.175)^{b}	86.98 (1.203)^{b}	88.38 (1.224)^{b}	87.68 (1.213)^{b}
T2	29.54 (0.575)^{d}	28.33 (0.561)^{d}	28.94 (0.568)^{d}	56.78 (0.853)^{d}	55.54 (0.841)^{d}	56.16 (0.847)^{d}	62.85 (0.915)^{d}	61.49 (0.901)^{d}	62.17 (0.908)^{d}	65.57 (0.944)^{d}	64.15 (0.929)^{d}	64.86 (0.936)^{d}
T3	55.86 (0.844)^{a}	54.20 (0.827)^{a}	55.03 (0.836)^{a}	77.74 (1.080)^{a}	78.32 (1.087)^{a}	78.03 (1.083)^{a}	87.58 (1.212)^{a}	88.72 (1.230)^{a}	88.15 (1.221)^{a}	90.36 (1.257)^{a}	92.36 (1.293)^{a}	91.36 (1.275)^{a}
T4	6.78 (0.263)^{e}	5.78 (0.243)^{e}	6.28 (0.253)^{e}	15.83 (0.409)^{e}	16.42 (0.417)^{e}	16.13 (0.413)^{e}	18.92 (0.450)^{e}	19.58 (0.458)^{e}	19.25 (0.454)^{e}	20.61 (0.471)^{e}	21.93 (0.487)^{e}	21.27 (0.479)^{e}
T5	47.26 (0.758)^{c}	48.64 (0.772)^{c}	47.95 (0.765)^{c}	70.25 (0.994)^{c}	69.18 (0.982)^{c}	69.72 (0.988)^{c}	77.68 (1.079)^{c}	76.82 (1.069)^{c}	77.25 (1.074)^{c}	79.30 (1.099)^{c}	78.82 (1.093)^{c}	79.06 (1.096)^{c}
SEm(±)	0.006	0.006	0.004	0.010	0.010	0.007	0.013	0.013	0.009	0.014	0.015	0.011
LSD(0.05)	0.018	0.018	0.012	0.030	0.030	0.020	0.039	0.040	0.027	0.043	0.047	0.031

Table 3: Effect of different types of degradable grafting tapes on graft survival percentage in soft wood grafting of cashew nut

Treatments	Graft survival (%)																	
	30 DAG			60 DAG			90 DAG			120 DAG			150 DAG			180 DAG		
	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled	2018-19	2019-20	Pooled
T1	73.48 (1.030)^{b}	72.84 (1.023)^{b}	73.16 (1.026)^{b}	86.34 (1.193)^{b}	87.10 (1.204)^{b}	86.70 (1.199)^{b}	84.17 (1.159)^{b}	85.08 (1.171)^{b}	84.63 (1.169)^{b}	83.19 (1.141)^{b}	83.87 (1.154)^{b}	83.53 (1.147)^{b}	81.47 (1.126)^{b}	82.56 (1.137)^{b}	82.02 (1.122)^{b}	80.45 (1.113)^{b}	81.68 (1.129)^{b}	81.07 (1.121)^{b}
T2	55.44 (0.840)^{d}	54.24 (0.828)^{d}	54.84 (0.834)^{d}	61.20 (0.898)^{d}	62.40 (0.911)^{d}	61.82 (0.905)^{d}	58.32 (0.869)^{d}	59.10 (0.877)^{d}	58.71 (0.873)^{d}	54.16 (0.827)^{d}	56.24 (0.848)^{d}	55.20 (0.838)^{d}	48.64 (0.772)^{d}	51.67 (0.802)^{d}	50.16 (0.787)^{d}	44.12 (0.726)^{d}	43.84 (0.724)^{d}	43.98 (0.725)^{d}
T3	77.50 (1.077)^{a}	78.26 (1.086)^{a}	77.88 (1.081)^{a}	89.80 (1.247)^{a}	90.48 (1.259)^{a}	90.12 (1.253)^{a}	86.79 (1.200)^{a}	87.42 (1.212)^{a}	87.11 (1.205)^{a}	85.39 (1.179)^{a}	86.28 (1.192)^{a}	85.84 (1.186)^{a}	83.76 (1.157)^{ab}	84.25 (1.163)^{ab}	84.01 (1.160)^{a}	81.96 (1.333)^{ab}	82.23 (1.136)^{ab}	82.10 (1.134)^{ab}
T4	15.83 (0.409)^{e}	14.20 (0.386)^{e}	15.02 (0.397)^{e}	19.48 (0.457)^{e}	20.80 (0.474)^{e}	20.16 (0.465)^{e}	17.50 (0.432)^{e}	18.56 (0.445)^{e}	18.03 (0.438)^{e}	16.20 (0.414)^{e}	17.23 (0.428)^{e}	16.72 (0.421)^{e}	14.56 (0.391)^{e}	16.48 (0.418)^{e}	15.52 (0.405)^{e}	12.87 (0.367)^{e}	14.87 (0.396)^{e}	13.87 (0.381)^{e}
T5	67.68 (0.966)^{c}	68.74 (0.978)^{c}	68.21 (0.972)^{c}	76.78 (1.068)^{c}	78.34 (1.087)^{c}	77.56 (1.077)^{c}	74.68 (1.044)^{c}	75.37 (1.052)^{c}	75.03 (1.048)^{c}	73.32 (1.028)^{c}	74.25 (1.039)^{c}	73.79 (1.034)^{c}	71.02 (1.003)^{c}	72.36 (1.017)^{c}	71.69 (1.010)^{c}	68.64 (0.977)^{c}	69.76 (0.989)^{c}	69.20 (0.983)^{c}
SEm(±)	0.010	0.010	0.007	0.014	0.014	0.010	0.012	0.013	0.009	0.012	0.012	0.009	0.011	0.012	0.008	0.011	0.011	0.008
LSD(0.05)	0.029	0.029	0.020	0.042	0.043	0.029	0.038	0.039	0.026	0.036	0.037	0.025	0.034	0.035	0.023	0.032	0.033	0.022

Table 4: B:C ratio analysis of degradable grafting tapes in soft wood grafting of cashew nut.

Treatments	Cost of grafting tape/piece (Rs) (A)	Cost of Graft *(Rs) (B)	Number of plants grafted (C)	Success (%) (D)	Number grafts ready for sale (E =CXD)	Cost of production (Rs)/ treatment (F =CXB)	Gross income (Rs)/ treatment (G=E X40/-*)	Net income (Rs)/ treatment (H=G-F)	B:C ratio (I=G/F)
T1	0.85	25.85	30	81.07	24	776	973	197	1.25
T2	2.25	27.25	30	43.98	13	818	528	(-)290	0.65
T3	2.50	27.5	30	82.1	25	825	985	160	1.19
T4	3.50	28.5	30	13.87	04	855	166	(-)689	0.19
T5	0.20	25.2	30	69.2	21	756	830	74	1.10

*Basic cost of softwood grafts@25/-+degradable tape price.

*Basic cost per graft (Poly bag Rs.1/-,Seed Rs.2/-, potting mixture and filling Rs.3/-, cost of scion and precuring charges Rs.4/-, grafting charges Rs.3/-, labour cost for weeding, irrigation, removals prouts from root stock Rs7/- and insecticides Rs 5/-).

Price of saleable graftis Rs 40/-. Above data calculated on the basis of pooled data.

(69.20%) and the minimum graft survival percentage (13.87%) was recorded in treatment T_4. Tying is essential for promoting healing and preventing drying of scion and union (Hartman *et al.,* 1990). Higher graft survival in degradable grafting tapes buddy tape (T_3) and natural rubber grafting tapes (T_1) may be due to earliest and good wound tissue formation on cut surfaces, cambial connectivity between stock and scion set rapidly. Enabling water and mineral nutrients could be supplied easily via rootstocks (Skene *et al.,* 1983; Hartmann *et al.,* 1990). These findings are also in conformity to the results reported by Zenginbal *et al*. (2006).

Number of tapes self-released

Grafting tapes self-releasing percentage was recorded under treatment T1 (natural rubber grafting tape) only which is possible by degradation of rubber polymers under the influence of ultra violet radiations. This avoids the removal of grafting tape after union formation results in reduced labour cost, reduced graft care and which is considered as environmental friendly treatment. At 30 DAG, self-releasing character in treatment T1 was recorded as 12% (2018-19) and as 14% (2019-20), respectively. At 60 DAG, during 2018-19 self releasing character in T1 was recorded as 64%, during 2019-20 it was 72%. At 90 DAG during 2018-19 treatment T1 self-releasing character was recorded as 92%, during 2019-20 as 94% and pooled analysis shows 93%. At 120, 150 and 180 DAG during 2018-19, 2019-20 and pooled analysis shows treatment T1 recorded self-releasing character as 100%.

Number of constrictions over graft union

Number of constrictions over graft union was noticed only in treatment T5 (polythene grafting tape). In treatment T5, up to 90 days after grafting no constrictions were noticed. At 120, 150 and 180 DAG during 2018-19, 2019-20 and pooled analysis of number of constrictions over graft union in T5 were 2 nos. per graft joint. Constrictions over graft union recorded only in T5, as the polythene tape is not allowing the growth of girth at graftunion because of its no elastic nature after grafting. Removal of tape is labour intensive and if not removed on time resulted in constrictions leads to breakage at point of constrictions during high winds and irregular orientation of cashew grafts.

Benefit: Cost Ratio

Among the different graft tapes used in the present study, treatment T3 had recorded the highest gross income per treatment (Rs 985/-) followed by treatment T1 (Rs 973/-) mainlyon account of higher graft survival percentage and healthy graft growth (Table 4). Whereas, the highest net income (Rs197/-) was recorded with T1 owing to lower cost of cultivation followed by treatment T3 (Rs160/-). Negative net income recorded with treatment T4 and T2 is due to the lower graft survival percentage coupled with poor growth of grafts and increased cost of production. Further, the treatment, T1 has recorded highest B:C ratio of 1.25 followed by treatment T3 with 1.19.

CONCLUSION

Present study clearly indicated that, use of buddy tapes in soft wood grafting of cashew resulted in overall better performance with respect to graft take and survival percentage followed by natural rubber grafting tape. However, natural rubber grafting tape showed better reduced graft care, readily and locally available at lower

cost to nursery man and reduced environmental pollution. For substitution of polythene tapes, the natural rubber grafting tapes can be recommended. Further, large scale evaluation of natural rubber grafting tapes under different agro-climatic conditions will be required for commercial application in cashew nurseries.

REFERENCES

Crasweller, R.M. 2005. Wrapping and waxing. *In. Grafting and propagating fruit trees*. The Pennsylvania State University Publisher., pp. 4-5.

Hubbali, V.N. 2019. Cashew nut productivity enhancement and value addition for doubling farmer's income. In: *Proceedings of National conference on Cashew* Organized by Directorate of Cahsew Nut and Cocoa Development pp.17-26.

Husain, S., Patel, M.J., Sanjay, K.N. and Patel, A.D. 2016. Influence of different propagation methods and wrapping material on bud and graft success in Jamun. *Bioscan,* **11**(3): 1729-1731.

Halandakar, P.M. and Jadav, B.B. 2001. Softwood grafting of clove (*Syzygium aromaticum*) on jamun (*Syzygium cumini*) rootstock. *J. Plantation Crops,* **29**(3): 46-49.

Hartman, H., Kester, D. and Davies, F.T. 1990. *Plant Propagation Principles and Practices*. Prentice Hall Carrer and Technology Publisher, New jersey, pp.221-223.

Mulla, B.R., Angadi, S.G., Mathad, J.C., Patil,V.S. and Mummigatti, U.P. 2011.Studies on soft wood grafting in jamun. *Karnataka J. Agric. Sci.,* **24**(3): 366-368.

Nayak, M.G. 2015. Propagation and nursery management in Cashew nut. *E manualon Advances in Cashew Production Technology* by ICAR – Directorate of Cashew Research pp. 32-40.

Oliveira, R.P., Scivittaro, W.B. and Vargas, J.R. 2004. Plastic and degradable tape on citrus budding. *Brazilian J. Fruticulture,* **26**(3): 564-566.

Panse, V.G. and Sukhatme, P.V. 1967. *Statistical Methods for Agriculture Workers*. ICAR, New Delhi, pp. 240-241.

Skene, D.S., Shepart, H.R. and Howard, B.H. 1983. Characteristic anatomy of union formation in T and chip budded fruit and ornamental trees. *J. Hort. Sci*., **58**: 295-299.

Sivasankaan, S. and Sivanesan, R. 2013. A study about wages and incentives of cashew industries in Kanyakumari distict. *Int. J. Business and Managmt Invention,* **2**(2): 01-11.

Waqar, A., Khan, M.M., Muhammad, J.J. and Ahmad, I. 1993. Effect of different types of bandage materials on the success percentage of Veneer and T Grafting in Mango. *Pakisthan J. Agric. Sci.*, **30**(2):199.

Zhang, R., Fang, R.P., Dong, L.L., Zhuang, Z.L., Hai, Y.H., Pengp, T., Ming, Z.H. and Yong, R.L. 2015. Evaluation of epicotyl grafting on 25 to 55-day-old Pecan Seedlings. *Hort. Tech.*, **25**(3): 392-396.

Zenginbal, H., Celik, H. and Ozcan, M. 2006. The Effect of Tying and Wrapping Materials and their colour on Budding Success in Kiwifruit. *Turk. J. Agric.*, **30**: 119-124.