



RESEARCH ARTICLE

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Studies on survival percentage of softwood grafting in mahua (*Madhuca indica* Gmel.J.F.) by using khirni (*Manilkara hexandra* Roxb.) as a root stock

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ABSTRACT : *Maduca indica* Gmel.J.F. (Mahua) which belongs to family *Sapotaceae* is very important tree in Central and North India's forest and it plays significant role in livelihood of tribal economy of the country (Troup, 1921). The tree is slow growing and takes almost 08-10 years for flowering and fruiting. Mahua is ordinarily drought and frost hardy tree but it suffer under severe conditions. The viability of the seed for germination is very less, hence availability of viable seed of Mahua is always in question (Bhanja, 2000). Therefore, the experiment on softwood grafting in Mahua was tried by using at using Khirni (*Manilkara hexandra*) as root stock at Department of Forestry, Dr.P.D.K.V.Akola. The experiment was carried out in Randomized Block Design with different month as a treatments (from July to January) and in three replication. The data recorded in respect of all the parameters such as days required for graft take, per cent of graft take, days require for sprouting, percentage of sprouting, number of leaf per graft and survival percentage etc. was statistically analysed. The interpretation of result obtained in the present investigation revealed that in different months of mahua grafting, October (T_4) was significantly superior in days require for graft-take, per cent of graft-take, days require for sprouting, percentage of sprouting, number of sprout per graft, number of leaves per graft and survival percentage at 60 DAG as compare to other months of treatment and vegetative growth of mahua grafts was also observed maximum when the grafting was done in the month of October.

KEY WORDS : Mahua (*Madhuca indica*), Softwood grafting , Survival percentage

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INTRODUCTION

Maduca indica (Mahua) which belongs to family *Sapotaceae* is native to India. Mahua is ordinarily drought and frost hardy plant but it suffer under severe conditions. In its natural habitat the absolute maximum temperature varies from 40°C-45°C whereas the absolute minimum

temperature varies from 5°C to 12°C and annual rainfall 750 to 1750 mm Troup (1921) and Hocking (1993). Mahua is propagated by seed and propagated by vegetative method under favorable soil and climatic conditions, Mahua tree begin to bear fruit at the age of 8 -10 years. Fresh seed has a high percentage of fertility, but the seed quickly loses its vitality during storage and is much subject to insect and fungus attacks the vegetative propagation method for mahua multiplication have also been developed using soft wood, wedge grafting, veneer grafting and air layering with varying success. Recently vegetative method of softwood grafting with 70-80 per cent success (Singh and Ravishankar, 2010, Singh and Singh, 2015) and veneer grafting with 90 per cent success (Singh *et al.*, 1999) has been reported. Mahua grafting is important because its natural regeneration has become sparse and save economically important timber and minor forest produce yielding species and for protection of biodiversity. Both Government and public sector should resort to high density Mahua planting in wasteland and marginal land with clonal planting material. Therefore, the primary objective of the experiment was to study the effect of different months on softwood grafting in *Madhuca indica* and to find suitable months for higher success of softwood grafting in *Madhuca indica*. The softwood vegetative propagation will give us true to type of material in future (Hartmann and Kester, 1979).

EXPERIMENTAL METHODS

The vegetative propagation of Mahua by softwood grafting conducted with using following methodology. The seedling of Khirni (*Manilkara hexandra*) family *Sapotaceae* of one to two year old having thickness 6 to 8 mm and raised in polybags were used as rootstock for the experiment. The scions were collected from healthy, vigorous and high yielding Mahua trees. Scion sticks were defoliated before grafting operation of every treatment. Tree scion collected in the morning and should be wrapped in wet cloth immediately after separating and kept in polythene bag. The scion wood of past season's growth and about 15 cm in length with 8- 10 greenish buds with gray spots was used as the scion. Softwood grafting was carried out as reported in mango by Amin (1974) and by Desai (1987) in Jackfruit. After grafting the grafts in polybag were watered on alternate days. Weeds were removed from the polythene bags. Emerging sprouts of

rootstock were nipped off whenever they appeared. While watering the grafts, care was taken that tide strips were not damaged.

Experimental details :

Experimental design was Randomized Block Design with seven treatments and thrice replication. The data were analysed by the standard method for statistical analysis of variance (ANOVA). The standard error for the treatment and critical difference at 5 per cent level of significance was worked out as per Panse and Sukhatme (1967).

EXPERIMENTAL RESULTS AND ANALYSIS

The present investigation shows that the less number of days require for graft take in treatment is T₄ (22.19) (October) which was at par with T₃ (23.3) (September) and T₂ (24.19) (August), whereas more number of days require for graft take was observed in treatment T₆ (26.43) (December). These findings were supposed to be similar with those of Joolka *et al.* (2001) in pecan. The maximum percentage of graft take in mahua was recorded in treatment T₄ (79.57) (October) which was at par with treatment T₅ (November) and T₃ (September) (72.56) and (72.27), respectively. Less significant treatment was observed in treatment T₁ (51.86) in the month of July. These observations were similar with findings reported by Desai (1987); Jose and Valasalakumari (1991) and Gaonkar (1998) in jack fruit. The days taken for sprout initiation differed significantly among different months. Significantly less (34.47) number of days were taken for initiation of sprout in treatment T₄ (October) which was at par with T₃ (36.49) (September) and T₅ (37.21) (November). While significantly more (44.41) Number of days were taken for initiation of sprout in T₇ (January). These results were in line with the finding of Nair *et al.* (2002) in mango. The Sprouting percentage differs significantly among different months of treatments. Significantly maximum percentage of sprouting were recorded in treatment T₄ (80.94) (October) which was at par with T₃ (77.33) (September) and T₅ (75.97) (November). The minimum (51.95) percentage was observed in treatment T₁ (July). This observation were finding in Pampanna and Sulikeri (1994) and Sulikeri *et al.* (1997) in sapota and Swamy *et al.* (1990) in cashewnut Number of sprout per graft

Table 1 : Effect of different months on success and survival of softwood grafting in Mahua

Treatments	Days require for graft take	Percentage of graft take	Days require for sprouting	Percentage of sprouting	Number of sprout per graft	Number of leaves per graft	Survival percentage
T ₁ (July)	25.44	51.86 (46.06)	40.18	51.95 (46.11)	4.51	4.67	51.98 (46.13)
T ₂ (Aug.)	24.19	55.33 (48.63)	38.18	57.59 (49.36)	5.77	5.47	55.17 (47.96)
T ₃ (Sept.)	23.37	72.27 (58.22)	36.49	77.33 (61.56)	6.13	6.22	77.61 (61.75)
T ₄ (Oct.)	22.19	79.57 (63.12)	34.47	80.94 (64.11)	7.19	7.21	87.12 (68.96)
T ₅ (Nov.)	25.31	72.56 (58.41)	37.21	75.97 (60.64)	6.85	6.87	80.43 (63.74)
T ₆ (Dec.)	26.43	61.99 (51.93)	41.81	61.19 (51.46)	5.69	5.01	62.59 (52.29)
T ₇ (Jan.)	25.61	56.39(48.67)	44.41	53.35 (46.92)	4.63	4.63	55.98 (48.43)
F-test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.66	2.39	0.79	2.94	0.26	0.21	2.33
C.D. (P=0.05)	2.04	7.75	3.5	9.07	0.82	0.65	7.19

Figures in parenthesis are arcsine values



Plate 1 : Survival percentage of graft at 60 DAG

success was highest in treatment T₄ (7.19) (October), followed by T₅ and T₃ *i.e.* (6.85) and (6.13) (November) and (September) respectively. Numbers of sprout per graft were minimum in treatment T₁ (4.51) (July). These results were finding with Padma and Reddy (1995) in mango and Madalageri *et al.* (1991) in Jamun. On 60 day after graft success highest numbers of leaves were recorded in treatment T₄ (7.21) (October) followed by T₅ and T₃ observed (6.87) and (6.22) in month of (November) and (September), respectively. The less

number of leaves per graft exhibited in treatment T₇ (4.63) during the month of January. These lines were similar with finding of the Haldankar (1985) in Kokam. Significantly maximum survival percentage of grafts (87.12%) was recorded in treatment T₄ (October) followed by T₅ (November) and T₃ (September) (80.43%) and (77.61%). However, significantly minimum success percentage of grafts at 60 DAG (51.98%) was recorded in treatment T₁ (July). This were similar findings of Amin (1974) in Mango under Anand condition (Gujarat). The

similar findings were also reported by Kedareshwar (2012) and Singh and Singh (2015) concluded that 80 per cent survival could be achieved in Mahua grafting. The conclusion emerge from present studies also stated that significant results obtained during the month of October is related to the effect of prevailing optimum temperature. Maximum and minimum temperature with least disparity coupled with higher humidity favours the grafting in Mahua. Another reason for better success during October is that the scions collected during this month had received sufficient auxin and carbohydrate accumulative winter promoted the success of graft take quality the preceding months (August and September) also favouring better growth of the new flushes consequently changing the endogenous hormonal level, particularly higher auxin level favourably as reported by Raghavendra *et al.* (2011). It helps for the grafting success in Mahua during October months.

Conclusion :

The present investigation it could be concluded that significant results were obtained during the different month's treatment of October in relation to various parameters like days require for graft-take and days days require for sprouting observed early in October months. Highest in percent of graft-take, percentage of sprouting, number of sprout per graft, number of leaves per graft and survival percentage at 60 DAG was maximum during October.

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