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Short communication

Effect of methods and time of propagation in *bael* under different growing conditions

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ABSTRACT

An experiment was conducted on *bael* to find out the effect of methods and time of budding under different growing conditions. Patch budding (P_1) and shield budding (P_2) were tried in four months, *viz.*, June (M_1), July (M_2), August (M_3) and September (M_4) under two different conditions namely polyhouse and open field conditions. Patch budding with 84.20 per cent bud sprouting and 80.25 per cent bud survival proved superior to shield budding in polyhouse, however 72.50 per cent of bud sprouting and 69.20 per cent of bud survival recorded in open field conditions. Propagation methods gave better results during June. Polyhouse gave better response than open field conditions with respect to number of days taken to bud sprout (6.66 in July), per cent bud sprouting (85.50 in June), bud survival (91.25% in June) and sprouted shoot length (8.86 cm in July).

Key words: *Bael*, budding, propagation, polyhouse.

Bael (*Aegle marmelos* Correa) is an important indigenous fruit of India. It belongs to family Rutaceae. Due to its high medicinal value, cultivation of *bael* is gaining much importance throughout the India. Moreover, its commercial cultivation has not spread due to unavailability of quality planting material of superior varieties. Among the several methods of propagation patch, T, chip and forkert budding are commonly practiced for its multiplication with varying success. Keeping in view of the above mentioned facts, the present investigation was carried out to improve upon the per cent success in *bael* for getting superior planting material for its large scale cultivation.

The present investigation entitled was carried out during the year 2009 at the Horticultural Research Garden of the Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. Two methods of budding, *i.e.* patch (P_1) and shield budding (P_2) were performed on 15th of four months, *viz.* June (M_1), July (M_2), August (M_3) and September (M_4). The experiment was conducted under two different conditions namely polyhouse and open field, replicated four times in factorial randomized block design. The budding was done on 6 to 8 month-old seedlings having stem diameter of 0.5-1.0 cm. The scion bud was taken from NB-6 (Narendra Bael-6) mother plant. The scion shoots of 15 to 18 cm long of pencil thickness (0.5 to 1.0 cm) with 3 to 4 healthy buds were selected for budding. Selected scions were defoliated on the mother plant, about one week prior to detachment. After the selection of scion material, rootstock (seedling) was head back, leaving 15 to 18 cm long stem. Budding was performed in such a manner so that cambium tissue of rootstock and scion could come into contact with each other. The observations were recorded and analysed statistically.

The interaction between different condition and budding method was observed to be significant (Table 1) for bud sprouting. Minimum number of days taken for bud sprouting was observed in patch budding (13.35 days) under polyhouse conditions, while maximum number of days taken for bud sprouting was recorded in shield budding (18.66) in open field conditions. Bud sprouting was earlier in patch budding under polyhouse conditions. This may be better due to growing conditions like suitable temperature and high relative humidity. The interaction between different condition and budding method differed non-significantly with respect to per cent bud sprouting (Table 1). However, maximum success bud sprouting (80.25%) was recorded in patch budding under polyhouse conditions and the minimum success percentage (65.70%) in shield budding in open field conditions. These results are in close conformity with the findings of Tripathi and Kumar (24). The interaction between different condition and budding method differed significantly for per cent of bud survival and length of sprouted shoot. These observations were recorded highest in patch budding under polyhouse conditions.

The interaction between different conditions and budding again differ non-significantly with respect to number of leaves per shoot. This result is in

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Table 1. Interaction effect of budding methods and conditions on bud sprout and related characters of budded plant.

Treatment	No. of days taken to sprout		Bud sprouting (%)		Bud survival (%)		sprouted shoot length (cm)		No. of leaves per shoot	
	Poly house	Open field	Poly house	Open field	Poly house	Open field	Poly house	Open field	Poly house	Open field
P_1*	13. 35	18.14	84.20 (66.58)***	72.50 (58.18)	80.25 (63.58)	69.20 (56.29)	18.41	17.67	18.49	13.35
P_2*	13. 86	18.66	73.56 (59.02)	70.50 (57.10)	70.20 (56.91)	65.70 (54.15)	13.60	14.33	18.87	13.13
CD at 5%	0.56		NS		3.15		0.83		NS	

*Patch budding (P_1) and shield budding (P_2)

agreement with the results of Mishra and Jaiswal (1). The interaction between different conditions and months differed significantly with respect to number of days taken to sprout, percentage of bud sprouting and percentage of bud survival (Table 2). Minimum number of days (6.66) taken for bud sprouting were recorded during the month of July under polyhouse conditions and maximum number (9.33) of days were taken for bud sprouting in the month of September in open field conditions. It might be due to very low temperature in open field conditions after September onwards, which slows down the process of bud sprouting. The maximum bud sprouting (85.50%) and bud survival (91.25%) was recorded in the month of June under polyhouse conditions. Temperature plays an important role in photosynthetic activity of the leaves. Optimum temperature and water availability in month of June increases the rate of photosynthesis and leads to formation of more food materials that facilitate and improve the growth and development of the graft sprout. These results are in agreement with the finding of and Singh and Singh (3) who reported that patch budding on 15th June to be most ideal in *bael*.

The interaction among different conditions, budding methods and months were observed to be non-significant for number of days taken to bud sprouting (Table 3). However, minimum number of days (6.19) taken for bud sprouting were recorded in patch budding in July under polyhouse conditions. Whereas, the maximum number of days (10.47) taken for bud sprouting were in shield budding in September in open field conditions. Bud sprout per cent differ significantly among different treatment combinations. It was found to be highest in patch budding in the month of June under polyhouse conditions. The interaction among different conditions, budding and months were observed to be non-significant for per cent of bud survival, length of sprouted shoot and number of leaves per shoot. Maximum percentage

Table 2. Interaction effect of months of budding and conditions on bud sprout and related characters of budded plant.

Treatment	No. of days taken to sprout		Bud sprouting (%)		Bud survival (%)		Sprouted shoot length (cm)		No. of leaves per shoot	
	Poly house	Open field	Poly house	Open field	Poly house	Open field	Poly house	Open field	Poly house	Open field
M_1*	6.98	9.10	85.50 (67.62)	75.40 (60.27)	91.25 (72.74)	87.65 (69.38)	8.62	7.37	9.10	6.91
M_2*	6.66	9.32	78.40 (62.31)	70.20 (56.91)	84.45 (66.74)	87.50 (69.30)	8.86	7.14	9.14	6.86
M_3*	6.95	9.04	84.50 (66.82)	73.40 (58.95)	47.17 (43.34)	52.28 (46.26)	9.22	6.79	9.60	6.40
M_4*	6.68	9.33	76.36 (60.87)	70.60 (57.17)	27.50 (31.63)	32.45 (34.70)	9.62	6.38	9.60	6.40
CD at 5%	1.32		3.89		4.45		NS		NS	

*June (M_1), July (M_2), August (M_3) and September (M_4)

Table 3. Interaction effect of budding methods, months of budding and conditions on bud sprout and related characters of budded plant.

Character	Time Treatment	Polyhouse				Open field			
		M_1	M_2	M_3	M_4	M_1	M_2	M_3	M_4
No. of days taken to sprout	P_1	6.70	6.19	7.79	7.72	9.07	8.37	9.59	9.77
	P_2	6.90	7.07	7.74	6.70	9.33	9.59	10.47	9.07
	CD at 5%	NS							
Bud sprouting (%)	P_1	85.16 (67.29)*	74.15 (59.41)	82.40 (65.20)	80.20 (63.58)	80.16 (63.51)	70.15 (56.85)	80.20 (63.58)	70.60 (57.17)
	P_2	77.50 (61.68)	70.20 (56.91)	72.50 (57.73)	71.50 (57.73)	72.50 (57.73)	65.20 (53.85)	55.60 (48.22)	65.50 (54.03)
	CD at 5%	5.5							
Bud survival (%)	P_1	90.27 (71.76)	80.40 (36.72)	85.25 (67.37)	78.50 (62.38)	85.50 (67.62)	75.50 (60.33)	75.00 (60.00)	60.50 (51.06)
	P_2	85.50 (67.62)	75.30 (60.20)	80.25 (63.58)	65.30 (53.91)	80.50 (63.79)	45.50 (42.42)	40.25 (39.35)	30.50 (33.52)
	CD at 5%	NS							
Sprouted shoot length (cm)	P_1	8.84	8.20	7.66	6.09	10.99	10.64	9.93	7.89
	P_2	7.52	7.11	5.88	5.75	9.75	9.25	7.62	7.45
	CD at 5%	NS							
No. of leaves per shoot	P_1	9.44	10.26	9.03	9.21	8.18	8.89	7.82	7.11
	P_2	8.62	9.85	7.38	6.15	7.47	5.82	6.40	5.33
	CD at 5%	NS							

*Figures in the parenthesis are angular transformed values

of bud survival was recorded in patch budding in the month of June under polyhouse conditions. The maximum length of sprouted shoot was recorded with patch budding in the month of June in open field conditions. The maximum number of leaves per shoot was recorded in the month of July under polyhouse conditions and the minimum values were recorded in September in open field conditions. These results are in accordance with the results of Mishra and Jaiswal (1), and Rai *et al.* (2).

On the basis of results obtained from above experiment, it can be concluded that patch budding in month of June can be the best method for multiplication of *bael* under polyhouse conditions.

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