EFFECT OF TIME AND METHOD OF BUDDING IN BER (*ZIZYPHUS MAURITIANA* LAMK.)

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Abstract: Ring budding gave better response than patch and shield budding with respect to bud take, bud sprouting and vegetative growth followed by patch budding, while shield budding showed poor response. Budding performed on 15th June showed better response with respect to all the character studied followed by 30th June and budding done on 15th April showed poor response. On the basis of the above observation, it is concluded that there is tremendous possibilities of commercialization of asexual propagation in ber by adopting ring budding performed on 15th June followed by 30th June.

Keywords: Ring budding**,** patch budding, shield budding, bud sprouting

INTRODUCTION

Ber is botanically known as *Zizyphus mauritiana Lamk*. and belongs to the family Rhamnaecae or buckthorn family, which has about 50 genera and more than 600 species. The genus *Zizyphus* has been derived from Zizoof, which is the Arabic name of the fruits (Baily, 1947). Ber fruits are within the reach of poor people. It is, therefore, rightly known as "poor man's fruit". This fact assumes greater significance in view of our determination to fight the prevailing malnutrition among the masses. Ber fruits is very nutritious and rich source of Vitamin 'C' (76-117 mg/100 g pulp) next only to Aonla and guava and also contains fair quantity of vitamin 'A' (55.0 mg/100g pulp).

Ber is propagated both by sexual and asexual or vegetative means. In India, seedling tress comprise a large population in old orchards and the fruit thus produced are inferior in size and quality. Vegetative propagation is an important method to overcome these constraints and obtain fruits of desired cultivar. Different methods of vegetative propagation such as cutting, layering and budding have been found to be the best method for propagation. Different types of budding viz. Shield, patch, ring and flute have been tried. Among various method of budding, ring, patch and 'T' budding is commonly used in Ber.

In recent years demand for ber plant has increased manifold. This has necessitated standardization of technique for commercial propagation of ber plants. In the present investigation it was tried to improve upon the budding technique in ber in different time interval.

MATERIAL AND METHOD

Experimental site

The horticulture experimental garden is located in South- Eastern part of Varanasi city at 25^0 81' North longitude and 80^0 30' East longitude and about 128.93 meters above the mean sea level.

Preparation of nursery bed

To make the condition of field nearly uniform for seed germination, sufficient amount of FYM and sand were added to the nursery bed. The height of the raised bed was kept 15 cm above ground level.

Seed showing in nursery

Before sowing the seeds were soaked in water for the 24 hours. The seed sowing was done in accordance with time of sowing in nursery beds. The seeds were sown at a depth of 5 cm at a distance of 25x15cm.

Mulching

After seed sowing the nursery bed was mulched with layer of dry grasses and sprinkler irrigation was done daily till germination of seed. After seed germination, the grass- mulch was removed carefully.

Budding: The seedling which attained budding thickness (0.5cm) after 90,120 and 150 days were considered for budding. The patch and shield methods of budding were employed all the time of budding.

Observations: The following observations were noted for experiment:-

Number of days taken by bud to sprout

The days were counted from the date of bud-sprouting from each individual plant in each treatment and the average number of days required was recorded.

Per cent of bud sprouting

To observe the percentage sprouting of bud, each plant was observed carefully and number of plant showing bud take was recorded in each treatment.

Number of leaves per shoot

The number of leaves of sprouted shoot was recorded by counting fully expanded leaves at an interval of 30 days.

RESULT AND DISCUSSION

Budding method

Plant materials consisted of 9-12 month-old uniform jamun seedlings. Plants were grown in the raised nursery beds at the Horticulture experimental garden, Banaras Hindu University. Budding operation was performed immediately after arrival of the section – shoot at the site where the budding operation was to be performed. In patch budding a rectangular patch of bark was removed completely from the root stock and a patch of bark of the same size containing a bud of the desired variety was placed there. The procedure was completed by tying the patch with polythene strip leaving the bud open to grow.

The second method of budding was shield. The "T-bud" designation arises from the T- like appearance of the incision in the stock, whereas the "shield – bud" name is derived from the shield like appearance of the bud when it is ready for insertion into the stocks. The budding was performed at a height of 18 to 20 cm from the ground on rootstock. A straight cut of the similar length as bud had, was made into the bark of the rootstock with the help of a budding knife. The bark around the cut was slightly loosened from the wood and the bud was carefully inserted into the incision. As soon as the operation was become over, the bud was tied with the polythene stripes of 150 gauge thickness and about 25 mm width. The similar budding method was employed by Singh *et al.,* (1967) and Parik (1987).

Effect of budding method and time on days required for sprouting of buds in Ber

Data pertaining to effect of budding method and time on days required for sprouting of buds in ber have been presented in Table1 clearly indicate that there was a considerable variation in main plot treatment. The budding methods were found statistically significant in affecting this character. The minimum number of 22.37 days was recorded for bud to sprout with ring budding followed by 24.33 and 26.50 days with patch and shield budding respectively. Thus, ring budding gave 1.96 days earlier bud sprouting than patch and 4.13 days earlier than shield budding was recorded. Difference between the mean values of ring, patch and shield budding was statistically significant. Time of budding also showed significant variations, which varied from 21.07 to 27.23 days. Budding performed on 15th June took minimum number of days (21.07) for sprouting followed by 30th June (22.65), 30th May (24.08). 15th May (25.10 days), 30th April (22.23 days). In all the cases significant variations were recorded. The similar results were observed by Joolka and Rindhe (2000).

The interaction effect between method of budding and different time taken in the experiment is statistically non- significant (Table 2)

Per cent bud sprouted at different methods and times of budding in ber

The data per cent bud sprouted at different methods and times of budding in ber have been presented in Table 3. The data recorded clearly indicate that maximum bud sprouting of 77.22 per cent was recorded in ring budding, followed by 66.67 and 49.94 per cent in patch and shield budding respectively. Analysed data showed significant differences in all the three cases. Time of budding varied from 36.67 to 84.44 per cent. The budding done on 15th June exhibited maximum sprouting (84.44 %), which significant differ with 30th June (80%), 30th May (70%), 15th May (63.64%), 30th April (52.22%) and 15th April (36.67%).

Interaction of method and time of budding showed significant influence on per cent bud sprouting as shown in Table 4. The ring method of budding gave maximum sprouting of 93.33 per cent which was done on 15th June as compared to other method and time ob budding. The minimum (20%) bud sprouting was observed with shield budding done on 15th April, which significantly differed with other treatments. Among the three method of budding, ring and patch budding showed significantly better response as compared to shield budding with all the timing of operations. Similar results have also been by Kaundal and Deol (1990) where 71.89 to 75.85 per cent budding success was obtained with modified ring budding method compared to 63.39 to 64.22 per cent with patch budding in guava.

Effect of methods and time of budding on number of leaves of sprouted shoot at successive stage of growth

Data pertaining to number of leaves as influenced by time and method of budding are presented in Table 5 and clearly show that ring budding produced significantly maximum number of leaves as compare to patch and shield budding at 30, 60, 90 and 120 days after budding. The time of budding also showed significant response in this respect. Significantly maximum numbers of leaves were counted, when budding was performed on 15th June followed by 30th June at all the four stages of observations. The minimum numbers of leaves were recorded in 15th April budding. The interaction on both the factors also exhibited significant response at 30,60, 90 and 120 days after budding It was found that maximum number of leaves shoot was found with ring budding, when it was done on 15th June. The similar result was observed by Mawani and Singh (1992) in ber, also reported that maximum number of leaves per shoot was found when ring, patch and shield budding was carried out on 15th June.

Table 1: Effect of budding method and time on days required for sprouting of buds in Ber.

S.no	Method of Budding	Sprouting of buds (days)
1.	Ring Budding	22.37
2.	Patch Budding	24.33
3.	Shield Budding	26.50
	SEm± CD at 5%	0.15 0.60
S.no	**Time of Budding**	**Sprouting of buds (days)**
1.	15th April	27.23
2.	30th April	26.28
3.	15th May	25.10
4.	30th May	24.08
5.	15th June	21.07
6.	30th June	22.65
	SEm± CD at 5%	0.18 0.51

Table 2: Interaction effect between method and time of budding on days required for sprouting of buds in ber

S.no	Time of budding	Ring	Patch	Shield	Mean
1.	15th April	25.26	27.31	29.12	27.23
2.	30th April	24.19	26.22	28.42	26.28
3.	15th May	23.29	24.69	27.32	25.10
4.	30th May	21.59	23.93	26.73	24.08
5.	15th June	19.10	20.89	23.23	21.07
6.	30th June	20.81	22.94	24.19	22.65
	Mean	22.37	24.33	26.50	
	SEm± CD at 5% (M x T)	0.31 N.S.			
	SEm± CD at 5% (T x M)	0.30 N.S.			

CD at 5% (M x T) = N.S. (Difference between methods of budding at same level of time of budding)
CD at 5% (T x M) = N.S. (Difference between times of budding at same level of method of budding)

Table 3: Per cent bud sprouted at different methods and times of budding in ber

S.no	Method of Budding	Per cent bud Sprouting
1.	Ring Budding	77.22 (61.48)
2.	Patch Budding	66.67 (54.76)
3.	Shield Budding	49.94 (44.94)
	SEm± CD at 5%	0.45 1.75
S.no	**Time of Budding**	**Per cent bud Sprouting**
1.	15th April	36.67 (37.29)
2.	30th April	52.22 (46.26)
3.	15th May	63.34 (52.71)
4.	30th May	70.00 (56.71)
5.	15th June	84.44 (66.74)
6.	30th June	80.00 (63.44)
	SEm± CD at 5%	0.35 1.00

Table 4: Interaction effect between method and duration of budding on per cent sprouting in ber.

S.no	Time budding	Method of budding			Mean
		Ring	Patch	Shield	
		Per cent of sprouting	Per cent of sprouting	Per cent of sprouting	
1.	15th April	53.33 (46.89)	36.67 (37.29)	20.00 (26.56)	36.91
2.	30th April	66.67 (54.76)	53.33 (46.89)	36.67 (37.29)	46.31
3.	15th May	76.67 (61.14)	66.67 (54.76)	46.67 (43.11)	53.00
4.	30th May	83.33 (65.88)	73.33 (58.89)	53.33 (46.89)	57.22
5.	15th June	93.33 (75.00)	86.67 (68.61)	73.33 (58.89)	67.50
6.	30th June	90.00 (71.56)	83.33 (65.88)	66.67 (54.76)	64.07
	SEm± CD at 5% (M x T)	0.70 2.28			
	SEm± CD at 5% (T x M)	0.60 1.73			

CD at 5% (M x T) = (Difference between methods of budding at same level of time of budding)
CD at 5% (T x M) = (Difference between times of budding at same level of method of budding)

Table 5: Effect of methods and time of budding on number of leaves of sprouted shoot at successive stage of growth.

S.no	Period of observation		T_1	T_2	T_3	T_4	T_5	T_6	Mean		SEm±	CD at 5%
1.	30 days after budding	M_1	3.67	4.12	4.42	5.10	5.87	5.31	4.75	M	0.09	0.37
		M_2	2.59	3.00	3.43	3.77	4.54	3.98	3.55	T	0.08	0.24
		M_3	2.27	2.77	3.11	3.59	4.11	3.96	3.30	M x T	0.16	N.S.
		Mean	2.84	3.30	3.65	4.15	4.84	4.42		T x M	0.14	N.S.
2.	60 days after budding	M_1	17.49	17.66	21.50	21.97	24.55	23.22	21.07	M	0.19	0.73
		M_2	16.09	16.52	19.84	21.01	23.38	21.80	19.77	T	0.08	0.24
		M_3	12.32	13.67	18.68	19.70	22.54	21.53	18.07	M x T	0.23	0.80
		Mean	15.30	15.95	20.01	20.89	23.49	22.18		T x M	0.14	0.42
3.	90 days after budding	M_1	36.12	36.86	41.19	42.01	44.59	43.32	40.68	M	0.09	0.35
		M_2	31.66	32.84	38.21	39.95	42.40	41.36	37.74	T	0.07	0.20
		M_3	27.95	29.40	35.65	37.07	39.71	38.91	34.78	M x T	0.14	0.45
		Mean	31.91	33.03	38.35	39.68	42.23	41.20		T x M	0.12	0.34
4.	120 days after budding	M_1	47.69	48.87	63.64	55.16	57.77	56.38	53.25	M	0.10	0.40
		M_2	43.65	45.31	50.15	51.68	54.94	53.67	49.90	T	0.05	0.15
		M_3	38.59	40.89	46.43	49.15	52.29	51.09	46.41	M x T	0.13	0.45
		Mean	43.31	45.02	50.07	52.00	55.00	53.71		T x M	0.09	0.25

M= Method of budding, M x T = Difference between methods of budding at same level of time of budding
T= Time of budding, T x M = Difference between times of budding at same level of method of budding
N.S. = Non significant

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