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EFFECT OF DIFFERENT TIME AND METHODS OF BUDDING ON THE BUD TAKE SUCCESS OF NECTARINE ON PEACH (*PRUNUS PERSICA* L.) SEEDLING ROOTSTOCK"

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ABSTRACT

Two factors of different budding time i.e. 20th August, 5th September and 20th September with three different methods i.e. shield, chip and patch budding, were tried to investigate their effects on the bud take success of Nectarine on Peach seedling rootstocks, at Fruit Nursery, department of Fruit science, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal, Uttarakhand, India. The results showed significant effects on number of days to first sprout, longest sprout length, diameter of thickest sprout, number of branches, total survival of budded plants (%) and total saleable plants (%). Minimum number of days to sprouting (161.12 days), maximum sprout length(84.68cm), diameter of thickest sprout(0.93 cm), number of branches(34.18), no. of leaves(134.82), leaf area(24.20 cm^2) survival of budded plants(62.50%) and total saleable plants(91.97%) were observed on 20th August with shield budded plants. Shield budding showed significant results among most of the parameters observed. Hence for better bud take success of Nectarine (Red June) budded through shield budding on 20th August is recommended.

KEYWORDS: Peach, Shield Budding, Chip Budding, Patch Budding, Bud Take Success

INTRODUCTION

Peach (*Prunus persica* L.) is a member of family Rosaceae. It was originated in China, where its culture dates back at least to 3000 years. Three wild species are still commonly found there *Prunus davidiana* is an ornamental tree growing wild in northern China and is used as rootstock. The Romans were cultivating the peach since time of Christ and spread it throughout their empire in Europe; from there it was disseminated over the world into all countries of the temperate zones. Peach is now commercially grown around the world between 250 and 450 latitudes above and below equator (Childers, 1975). Peach is an important stone fruit grown in warm temperature zones of the world. Two horticultural races are also grown in sub-tropical regions. However, the peaches produced in the sub-tropics are of inferior quality. The attractive colour of the fruit with excellent quality and taste make peach a most popular fruit in the world. It is commercially cultivated in countries like- USA, Italy, France, Japan, Argentina, Australia, Mexico, Koria, USSR, West Germany, Portugal, New Zeeland, Spain, Greece, South Africa, Turkey, Canada, Yugoslavia, Chile, India and Austria with an area of about 44,000 milion hectares with production of 6, 20,000 metric tons. India having an area of about 18.10 million hectare and production of 93.52 metric tons (National Horticulture Board, 2015). Now-a-days, it is grown in

mid- hill zone of Himalayas extending from Jammu and Kashmir to Khasi hill at an altitude of 1000-2000 meter above mean sea level. Low chilling Peaches are grown in sub-tropical region of Uttarakhand, Punjab, Haryana, Himanchal Pradesh and in limited area with hill of South India. Rajgarh area of Sirmour district of Himanchal Pradesh and Ramgarh area of Nainital, Uttarakhand are known for quality peach production. In Uttarakhand major growing districts - Pauri, Almora, Nainital, Uttarkashi and Udham Singh Nagar having an area of 9022 hectare with annual production of 49682 metric tons per hectare (Jyoti and Kumar S, 2015).

Nectarine (*Prunus persica var. nucipersica* L.) this is a stone fruit in warm temperate climate also grown in sub-tropical regions. It is most popular because of its attractive colour, excellent quality and taste, grown in warm temperate zone of Europe, North America, South Africa, Asia and Australia. Nectarines are smooth skin mutants, with fuzziness allied to peach; it is non-pubescent peach of smaller size. Nectarine kernel contains minerals 39-55 percent Fat, 23-30 percent Proteins, 14.8 percent Crude fiber, 2.7 percent Minerals.

Budding makes very efficient use of a bud stick, as only a single bud is needed to propagate a new tree this reduces both the number of trees required to supply bud stick and the labor to maintain the tree and bud sticks. Budding also makes efficient use of plant material in cases when a bud stick of a particular rootstock is limited. Budding may also result in a stronger union. The simplicity and speed of budding especially the T-budding and chip budding techniques, makes these useful for amateur horticulturists. A single, well learned method can be used in a wide variety of applications.

Although peach is a very popular fruit crop, yet its cultivation in our country has remained in state of neglect. The non-availability of the quality planting materials (rootstock and bud-wood) and lack of efficient propagation techniques and other information on the performance of cultivars under different agro-climatic condition of temperate region are the major constraints in the expansion of peach cultivation in India. In peach no systematic work has so far been done on their survivability and morphological performance in relation to propagation method (budding) with suitable time of propagation under hilly conditions of Garhwal. Therefore, keeping in view the above points into consideration, the present investigation have been under taken on **"Effect of different time and methods of budding on the bud take success of Nectarine on Peach (*Prunus persica* L.) Seedling rootstocks"**

MATERIALS AND METHODS

The materials used in this experiment were uniform sized rootstock of peach seedling rootstocks and scion buds from nectarine cv. Red June. The seedlings were budded at height of 10 cm from soil level. 24 buds per treatment combinations were inserted in peach rootstocks with replicated three times thus total 216 buds were inserted for three different budding times and three budding methods. The experiment was carried out in Randomized Complete Block Design (RCBD) with two factors (budding times and different budding method), factorial arrangement replicated three times. There were nine treatment combinations in each replication. Experiment was based upon following two factors i.e. budding time and budding methods.

Table 1

Factor- A	Factor-B
Budding Times	**Budding Methods**
a: 20th August	**a:** Shield budding
b: 5th September	**b:** Chip budding
c: 20th September	**c:** Patch budding

OBSERVATIONS

Data was recorded on different parameters and subjected to the statistical procedure given below i.e. days to sprouting, shoot length(cm) shoot diameter(mm), number of branch, number of leaves and leaf area(cm2) while survival of budded plants(%) and total saleable plants(%) was determined using the following procedure.

- % Survival = Number of plants survived/ total number of bud take success x 100
- % Saleable = Total number of saleable plants/total number of survived plants x 100

STATISTICAL PROCEDURE

All the data noted on plant growth parameters was subjected to analysis of variance (ANOVA) techniques to confirm differences among different treatments as wel as interactions. Least Significant Difference (LSD) test was used for mean differences where the results were significant. Computer statistical software OPSTAT and STPR and GRAPH PAD were applied for calculating both ANOVA and LSD (Steel and Torrie, 1980).

RESULTS AND DISCUSSIONS

Data recorded on the above parameters is presented in Table 1. The results are briefly described as under-

Days to Spouting (No of Days)

The statistical analysis of data showed a significance variation of different budding time and their interaction for days taken to sprouting (Table. 1) with least (161.12 days) days taken to first bud sprout in 20th August + shield budding (T_1M_1 treatment combination). Due to, when maximum saps flow in rainy season for suitable time and method of budding. In accordance to our present investigation, Ahmad *et al.* (2012) observed that the significant effect of budding method and time on number of days to sprouting showed that maximum number of days to sprouting (199.14) were observed in plants produced through T-budding with September while minimum number of days to sprouting (194.29) were recorded for chip budding with August in Guava.

Table 1: Effect of Different Time and Methods of Budding on Various Characters

Treatment Combination	Days Taken (No. of Days)	Shoot Length (cm)	Shoot Diameter (cm)	No. of Branch	No. of Leaves	Leaf Area (cm^2)	Survival %	Saleable %
T_1M_1	161.12	84.68	0.93	34.18	134.82	24.20	62.50	91.97
T_2M_1	169.15	82.51	0.87	29.89	122.45	20.43	37.50	75.00
T_3M_1	170.94	71.42	0.73	26.43	115.95	21.71	45.83	88.67
T_1M_2	169.97	79.67	0.89	27.55	121.98	20.48	20.83	88.67
T_2M_2	177.94	77.45	0.83	23.27	109.61	16.71	20.83	88.67
T_3M_2	179.79	66.36	0.69	19.81	103.11	17.99	50.00	83.00
T_1M_3	171.36	68.20	0.74	25.19	108.68	22.35	8.33	50.00
T_2M_3	179.33	66.03	0.70	20.90	102.47	18.58	8.33	33.33
T3M3	181.18	54.94	0.54	17.44	95.97	19.86	20.83	16.67
C.D $_{0.05}$	0.37	0.43	0.03	0.31	NS	NS	1.63	1.90

T_1=20th August, T_2=5th September, T_3=20th September, M_1=shield budding, M_2 = chip budding, M_3=patch budding

Length of Shoot (cm)

Data presented in Table.1 indicated that the effect of different time and methods and their interactions among different time and methods of budding were also found significant with respect to length of longest bud sprout (84.68 cm) which was recorded maximum from 20th August with shield budding (T_1M_1 treatment combination). The increase average length of bud sprout is due to, favorable climatic conditions, presence of greater number of leaves, that elevated the rate of photosynthesis and hence carbohydrate formation increased. These results confirm the results drawn by Dwivedi *et al.* (2000) indicate that the 14 and 21 August have given the best results in terms of linear growth (24.70 cm) in apricot under cold arid condition of Ladakh.

Shoot Diameter (cm)

Data of Table.1 indicate that the interaction between different time and methods of budding were significant on the average diameter of thickest sprout. 20th August + shield budding (T_1M_1 treatment combination) were obtained thickest sprout (0.93 cm), might be due to the maximum budding growth in those plants budded under T_1 treatment (20th August). It is clear from the mean data that plants budded through shield budding have maximum budding growth which results in maximum stem thickness due to having more photosynthetic. Ahmad *et al.* (2012) Statistical analysis of the data revealed that budding dates, methods and their interaction had significant effect on stem thickness in guava budding. Maximum stem thickness (584.25 mm) was recorded on plants budded on September with shield budding, while minimum stem thickness (531.50mm) was observed in plants budded on August+ chip budding.

Number of Leaves per Budded Plants

The data obtained for the number of leaves per budded plants showed that different time and methods had significant effect while interaction had not found gave any significant effect. Higher number of leaves (134.82) was observed under T_1M_1 treatment combination (20th August+shield budding). The higher number of leaves with optimum time and methods might be due to better bud growth and more number of branches. This augmented absorption and translocation of nutrients from soil which take active part in various plant metabolic processes. These results matched the result drawn by Akhtar *et al.* (2000) they observed that maximum number of leaves (292.54) occurred on peach plants budded on 28th August with chip budded, it's may be due to maximum number of branches and maximum budding growth.

Number of Branches per Budded Plants

The data recorded for the number of branches per budded plants showed that different budding time and methods and their interaction had significant effect. Maximum numbers of branches (34.18) were recorded under T_1M_1 treatment combination (20th August on shield budding). The better number of branches with optimum time and methods might be due to better bud growth which augmented absorption and translocation of nutrients from soil which take active part in various plant metabolic processes (Singh, 2001). The results are in parallel with Nitransky *et al.* (1987) Peach cv. Red haven was budded on Lovell peach root stocks at different intervals in mid-August (late summer). It had significant effect on the average number of branches.

Leaf Area (cm^2)

The interactions among different time and methods of budding were also not found any significant with respect to

leaf area. Maximum leaf area (24.20 cm^2) was taken from 20th August with shield budding (T_1M_1 treatment combination). It might be due to the fact that shield budded plants early sprouting under this time, leaf emergence and rapidly vegetative growth as compared to chip and patch budded plants. The results are in parallel with in apple by Kumar and Ananda (2004) reported that the leaf area was maximum with chip budded on August; leaf area is directly related to the maximum number of leaves.

Total Survival (%)

Data regarding percent plant survival showed that different time and methods of budding had significant effect. Maximum plant survival (62.50 %) was recorded from 20th August practiced on shield budding (T_1M_1 treatment combination). It is due to the fact that budding in August produce favorable environmental conditions for the healing process of bud wounds and resulted in the development of normal vascular tissues at the bud union which result in maximum plant survival. Similarly, budding late in the growing season contributed to unfavorable conditions for healing process which results in the poor development of normal vascular tissue at the bud union. The findings of the study conducted by, Khattak *et al.*(2001) observed in case of propagation methods (chip budding) of peach gave better survival of budded plants (80.00%).

Total Saleable Plants (%)

Statically data for the effect of interaction between different time and methods of budding on the saleable plant was found significant effect. Maximum (91.97%) were taken under T_1M_1 (Shield budding practiced on 20th August). Higher percentage of such plant obtained 20th August on shield budding practice is attributed to proper and quick union formation, early bud sprout and longer period time available for growth. Similarly results by, Joolka and Rindhe (2000) obtained the highest proportion of saleable plants (98.32%) in chip budding, followed by T-budding (98.32%) in pecan nut.

Conclusions Based on Experimental Results are as,

- In case of budding time interval most of the growth parameters showed good results with maximum survivility when the plants are budded on 20th August as compared to 5st September and 20th September.
- Nectarine cv. Red June budded on to Peach seedlings rootstock through shield budding showed good results with respect to survivility and most of the plant growth parameters as compared to chip budding and patch budding.

RECOMMENDATIONS

Based on the above conclusion, the following recommendation is made:

- Shield budding on 20th august is the best for better growth of Nectarine cv. Red June.

CONCLUSIONS

The results of present study showed that shield budding practiced on 20th August gave maximum plant growth and highest rate of bud take success and maximum percentage of sealable plants. Therefore from the present investigation it is recommended that Shield budding practiced during August would be the best method for highest bud take success in Nectarine (Red June).

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