

Full Length Research Paper

# Effect of bud wood age, budding height and stock looping, on bud take in sweet orange (*Citrus Sinensis* L.) Var. pine apple

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This research was carried out in order to study the effect of budding height, bud wood age and stock looping at different dates, on the success of sprouting. The work was performed at the fruit plant nursery, department of Horticulture, University of Agriculture, Faisal Abad. The experiment material comprised of Rough lemon root stock and sweet orange var. Pine apple Scion as bud wood, which was obtained from the PARS (Pakistan Agriculture Research Station). T-budding was done by using scion bud wood of three different ages, (green, green with white streaks and white bud wood with green streaks) at three different height of rough lemon root stock (6", 12", 18" respectively). The result shows that bud wood age and budding height have no mark effect on the success of bud take. So, we are not bound to use green bud wood and rootstock of six inches, which is commonly being used by the commercial citrus procedures. If there is shortage of green bud woods then other bud wood can be used because this will not affect the success of sprouting. Similarly if there is pathogen problems like *Coller rot* in the field this can be controlled by high budding. Although it will take more time but will not effect the sprouting success as well as it will save the plant from fungus attack and other pathogens.

**Keywords:** Bud wood age; Budding height; Sprouting success; Sweet orange var. Pine apple; Pakistan.

## INTRODUCTION

Citrus fruit rank on the second position after grapes in the world fruit production. Pakistan stands top ten of the world citrus producing countries. Citrus is a prized fruit of Pakistan and hold number one position in both areas and production. In Pakistan citrus covers an area of 193.2 thousand hectares with yearly production of 1472.4 thousand tons. Punjab Province contributes 95% of the

total citrus production of the country. Punjab covers an area of about 183.3 thousand hectares, with yearly production of 1400.7 thousand tons (Agricultural Statistics of Pakistan 2006-2007).

Now a day citrus production is decreasing due to many problems which are being transferred from the nursery to the field due to mismanagement of the orchards. The degree of congeniality shown between scion and rootstock in Citrus has been reported by W ebber (W ebber 1926). Newman (Newman 1926), and others. Budding is commercial method of propagation in citrus. Low budding

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is common practice by the commercial nursery growers (Hartman and Kester 1968). Although, it saves time but at the same time, it invites some pathogens too. For example collar rot is common problem in low budding. So different heights (6", 12" and 18") of root stock are used to check weather budding height has impact on the bud take or not. As regard bud wood, green bud is being used by the commercial nursery growers because according to them it is more successful. Due to its more demand, it sometime becomes short in supply. So in this research bud wood of different ages have been used to confirm weather green bud wood has more success or not as compared to green bud wood with white streaks and white bud wood with green streaks.

## MATERIAL AND METHODS

The investigation carried out in this write up, were conducted in the fruit plant nursery of the department of Horticulture, University of Agriculture Faisal Abad. Rough lemon (*Citrus jamberi*) was used as root stock whereas pine-apple variety of sweet-orange (*Citrus cinensis*) was selected as scion. Scion wood was obtained from PARS. The experiment was laid out in RCBD with three treatments and three replications. Treatments were following.

- I. White bud wood with green streaks (B<sub>1</sub>)
- II. Green bud wood with white streaks (B<sub>2</sub>)
- III. Green bud wood (B<sub>3</sub>)

These bud woods were budded at three different heights (Reuthe 1973) which are 18", 12" and 6", designated as H<sub>1</sub>, H<sub>2</sub> and H<sub>3</sub>. Each treatment has 10 plants having total number of 270 plants. The experiment was planted in 3 replications. T-budding (Reuthe 1973) method was used, in which the T-shaped cut was made at the required height above the ground level in bark of stock plant. In making T-cut first a vertical incision about 1½ inches long was given in the bark of stock, followed by a horizontal cut, so as to make a T-shaped incision, on the northern side of the seedling. The bud was removed from the scion wood in the form of shield. For doing so, the bud stick was held inverted in the left hand and then placing the knife about ½ inches above the bud. It was recovered by shallow slicing movement through the bark into the wood cutting downward the bud, without cutting deeply and again coming out about ½ inch below the bud. This was accomplished by holding the severed portion between the knife blade and thumb and detaching the bark from the shoot. The prepared bud was then inserted in the T-shaped cut and pushed down for fitting it into the incision. The bud-union wrapped tightly with the jute string and covered with polythene. When the buds started sprouting, half number of stocks, from each treatment, was headed

back ½ inch above the union after 15 days. After 28 days of budding, remaining five seedling stocks were also headed back ½" above the bud union in each treatment (Hartman and Kester 1968). 1<sup>st</sup>. observation was made after 48 days and 2<sup>nd</sup> after 58 days. Following factors were studied regarding the scion growth.

1. Success (number of sprouted buds).
2. Dead bud wood.
3. Green bud which are not sprouted but still green.

Analysis of variance was performed and Duncan's multiple range tests were used for the comparison.

## RESULTS AND DISCUSSION

In the experiment, investigations were done about the budding height, bud wood age and lopping of root-stock, half inch above the bud union at different dates, explanation is following.

One year old seedling of rough lemon was used as rootstock and budded at three different heights which are following.

H1	=	18"
H2	=	12"
H3	=	6"

Analysis of variance shows that the results are non significant. However, H1 appears more successful because its mean is 29 which are greater than H2 and H3 where means are 24.3 and 24.4 respectively.

Three consecutive flushes of scion tree (sweet orange), were used as bud wood. Which are the following.

B1	=	White wood with green streaks = 1 year old.
B2	=	Green-wood with white streaks: 6 month old.
B3	=	Green-wood =3 months old.

According to analysis of variance it shows that results are not significant. But according to average the mean of B1 is 26.6 which is white B3, B2 are second and third having 25.3 and 26 means respectively.

In case of cutting dates the result are again non significant. But means show that there is more success in the first cutting as compared to second cutting which was performed after thirteen days. Means of 1st and 2nd cutting dates are 4.48 and 4.18 respectively.

## TREATMENTS

	H <sub>1</sub> B <sub>1</sub>	H <sub>1</sub> B <sub>2</sub>	H <sub>1</sub> B <sub>3</sub>	H <sub>2</sub> B <sub>1</sub>	H <sub>2</sub> B <sub>2</sub>	H <sub>2</sub> B <sub>3</sub>	H <sub>3</sub> B <sub>1</sub>	H <sub>3</sub> B <sub>2</sub>	H <sub>3</sub> B <sub>3</sub>
R <sub>1</sub>	10	10	10	10	10	10	10	10	10
R <sub>2</sub>	10	10	10	10	10	10	10	10	10
R <sub>3</sub>	10	10	10	10	10	10	10	10	10

**Table 1.** Effect of budding height on the bud take in sweet orange var. Pine apple

	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>
R <sub>1</sub>	29	24	25
R <sub>2</sub>	29	26	29
R <sub>3</sub>	29	23	20

Mean 29    24.3    24.4

N.S = 77.7

**Table 2.** Effect of age of bud wood on the bud-take sweet orange var. Pine apple

	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
R <sub>1</sub>	29	24	25
R <sub>2</sub>	29	26	29
R <sub>3</sub>	29	23	20

Mean 26.6    25.3    26

N.S = 77.9

**Table 3.** Effect of root stock height and age of bud wood on bud take in Sweet orange var. Pine apple

	H <sub>1</sub> B <sub>1</sub>	H <sub>1</sub> B <sub>2</sub>	H <sub>1</sub> B <sub>3</sub>	H <sub>2</sub> B <sub>1</sub>	H <sub>2</sub> B <sub>2</sub>	H <sub>2</sub> B <sub>3</sub>	H <sub>3</sub> B <sub>1</sub>	H <sub>3</sub> B <sub>2</sub>	H <sub>3</sub> B <sub>3</sub>
R <sub>1</sub>	10	10	9	9	8	7	10	8	7
R <sub>2</sub>	10	10	10	8	9	9	10	9	10
R <sub>3</sub>	10	10	10	10	5	8	4	8	8
Mean	9.6	9.6	9.6	9	7.3	8	8	8.3	8.3

N. S = 77.7

**Table 4.** Effect of time of top pruning of the root stock on bud take = Mean comparison.

	H <sub>1</sub> B <sub>1</sub>	H <sub>1</sub> B <sub>2</sub>	H <sub>1</sub> B <sub>3</sub>	H <sub>2</sub> B <sub>1</sub>	H <sub>2</sub> B <sub>2</sub>	H <sub>2</sub> B <sub>3</sub>	H <sub>3</sub> B <sub>1</sub>	H <sub>3</sub> B <sub>2</sub>	H <sub>3</sub> B <sub>3</sub>	Net Mean
1 <sup>st</sup> Cutting	5	4.6	4.6	5	4.3	4	4.3	3.6	4.6	4.4
2 <sup>nd</sup> cutting	4.6	5	5	4	2.6	4	3.6	4.6	3.6	4.1

THREE WAY ANOVA RANDOMIZED COMPLETE BLOCKS

Source	S.S	d.f	M.S	F. value	P
Blocks	4	2	2	1.6721311475	.2029ns
Main effect					
Hiet	0.444444444	2	0.222222222	0.1857923497	.8313ns
B. W	6.777777778	2	3.388888889	2.833333333	0.1728ns
Date	1.1851852	1	1.185185185	0.990892555319	.3266ns
Interaction					
Hiet x B.W	1.777777778	4	0.444444444	0.3715846995	.8272ns
Hiet x Date	1.037037037	2	0.5185185185	0.4335154827	.6518ns
B.W x Date	1.8148148148	2	0.9074074074	0.7586520947	.4761ns
Hiet x B.W x Date	4.296296	4	1.0740741	0.897996357	.4759ns
Error	40.66666667	34	1.1960784314		
Total	62	53			

**CONCLUSION**

The study concludes that we can use all three kinds (green, green with white streaks and white bud wood with green streaks) of bud wood, which would save us from the shortage of bud wood materials in propagation season and T-budding is successful at height of 12” as well as at low height of 6” but at the height of 12”, we can save it from Pathogens attack which is more at lower height.

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