

# The effect of the time of untying of grafts on take and survival of shield-budded avocado pear cv. *Hawaii*

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## SUMMARY

Data from preliminary work done in the F.T.C.P. nursery at Kwadaso, Kumasi, suggest that untying avocado pear grafts between 21 and 28 days after grafting ensures better results than untying them later i.e. between 35 and 42 days. Percent take and budling survival are also better, though not statistically different, when the unwrapping exercise is done earlier rather than later.

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## Introduction

In developed countries, special budding strips of rubber are in commercial use for wrapping grafts. They lose their tension gradually and do not have to be cut away after the bud has been taken. However, due to the unavailability of these strips in Ghana, raffia has been adopted as the traditional budding material, but it is cut away as soon as it has become apparent that the bud is firmly anchored and callusing i.e. healing has taken place. Opinions differ as to when avocado grafts may be unwrapped. Much seems to depend on the scion cultivar used and local or climatic conditions. As far as citrus budgrafts are concerned, most researchers (Mendel, 1936; Hartmann & Kester, 1965; Pursglove, 1968b etc.) had observed that by the 10th day of T-budding, a completed band of cambial tissue extended over the face of the rootstock

## RÉSUMÉ

ADDÆ-KAGYAH, K. A.: L'effet du temps de dénouement de greffes sur la prise et la survivance de bourgeon-emballe de l'avocate cv Haawaii. De données obtenues du travail préliminaire entrepris dans la pépinière de FTCP à Kwadaso et à Kumasi donnent la suggestion que le dénouement de greffes de l'avocatier entre 21 et 28 jours après le greffage, ramène des meilleurs résultats par rapport au déballage tardif de greffes, c'est-à-dire entre 35 et 42 jours. La prise de pourcentage et la survivance du bourgeon sont également meilleurs malgré le fait que les résultats ne sont pas statistiquement différents lorsque l'action de déballage de greffe est faite précédemment plutôt que tardivement.

and was joined to the uninjured cambium on either side of the bud. Then there occurred differentiation in the callus of the bark flaps. Within 14 days, callus which had developed from the secondary xylem of the rootstock as well as from the immature secondary phloem of the bud completely filled the space between the rootstock and bud. For mango, the time was observed (Bharath, 1958; Hosein, 1958; Pursglove, 1968a) to be roughly 21 days after budding. Our own observation at Kwadaso with regard to avocado pear grafts was that routinely untying the bud-union between 14 and 21 days after budding showed that not enough cambial tissue had formed in most grafts, so that healing was incomplete and exposed grafts snapped off readily as a result of wind-induced desiccation. Whether or not better permanent take could be attained by prolonging the time of unwrapping

bud-unions necessitated this investigation.

### Materials and methods

In a field experiment in which poly-bag-grown rootstocks aged between 9 and 12 months were used, four 'waiting periods' i.e. periods to wait before untying grafts after budding i.e. 21, 28, 35 and 42 days were tested. The experimental design was a randomized complete block replicated three times with 10 poly-bag-grown rootstocks per replication per treatment. The total number of experimental plants used were 160. Shield-budding, as described by Garner (1958) and Hartmann & Kester (1965) was employed as the sole vegetative technique for the experiment. Budwood was taken from an exotic cultivar *Hawaii* from Department of Horticulture, University of Science and Technology,

TABLE 1

*Percent take at untying time*

<i>Time of untying grafts (days)</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>Total</i>	<i>Means</i>
21	80	40	70	90	280	70
28	100	50	50	50	250	62.5
35	40	60	70	50	220	55
42	60	20	40	20	140	35
Block totals	280	170	230	210	G=890	$\bar{x}=55.63$

TABLE 2

*Analysis of Variance*

<i>source</i>	<i>df</i>	<i>ss</i>	<i>ms</i>	<i>fcalc</i>	<i>ftab</i>
Treatments	3	2,718.75	906.25	2.46n.s.	3.86; 6.99
Replications	3	1,568.75	522.92	1.42	
Error	9	3,306.25	367.36		
Total	15	7,593.75			

TABLE 3

*Percent Budling Survival after 6 Weeks*

<i>Time of untying grafts (days)</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>Total</i>	<i>Means</i>
21	75	50	71.42	77.78	274.2	68.55
28	80	60	60	60	260	65
35	75	66.67	71.42	40	253.09	63.27
42	66.67	100	50	100	316.67	79.17
Block totals	206.67	276.67	252.84	277.78	G=1103.96	$\bar{x}=69$

TABLE 2

*Analysis of Variance*

<i>source</i>	<i>df</i>	<i>ss</i>	<i>ms</i>	<i>fcalc</i>	<i>ftab</i>
Treatments	3	609.54	203.18	0.58n.s.	3.86
Replications	3	241.81	80.60	0.23	
Error	9	3,169.31	352.14		
Total	15	4,020.66			

Kumasi. Untying of the grafts was done at weekly intervals after the 3rd week on 12, 19, 26 Feb and 4 Mar 1985 for treatment ('waiting periods') 21, 28, 35 and 42 days respectively and percent take was recorded in each case (Table 1). Six weeks after

untying i.e. on 25 Mar, 1, 8 and 15 Apr 1985, percent survival of budgrafts was recorded for treatments 21, 28, 35 and 42 respectively (Table 3).

### Results and discussion

Data on mean percent take and budling survival and presented in Tables 1 and 3 and the analysis of variance of the data is also shown in Tables 2 and 4.

#### *Take*

Mean percent take was highest for graft unions untied on the 21st day after budding and lowest for unions untied on the 42nd day. There was a downward trend from 21 days onwards. The per-

cent take was actually twice as high for untying in 21 days as for untying in 42 days (Table 1). This gradual decline in results from 21 days upwards seems to suggest that like mango, an avocado budgraft requires an optimum healing time of 21 days. Visual observation revealed that lignification of the callus was completed in the bark flaps of the dead specimens of grafts untied later than 21 days. A very likely explanation for the low take would be that the prolonged raffia-induced strangulation of the rootstock cells at the point of tying associated with longer 'waiting periods' deprived the uniting scion cells of sufficient nourishment, resulting in their death.

### Survival

The picture for survival is the same as for take, that is, more avocado pear budlings survived the first six weeks after untying when the exercise was done in 21 days than when done later. Even though higher percentages were recorded for longer treatment periods than for shorter periods (Table 3), the actual number of plants available for planting which resulted from each treatment was fewer as the time of untying increased. For example, in a treatment time of 21 days the mean percent take out of a total rootstock population of 40 was 70 (Table 1) and mean percent survival after 6 weeks for the same treatment was 68.55. The number of actual available budlings was, therefore, 68.55 percent of 70 percent of 40 = 19. Then, in the longest treatment period (42 days), the mean percent take was 35 whereas the mean percent survival was very high i.e. 79.17. But the actual number of budlings ready for planting was 79.17 percent of 35 percent of 40 = 11. For the differences in survival rates, it could be said that the bud-unions that were firmly established and overcame the stresses due to strangulation even over a prolonged period stood the chance of attaining higher rates of survival than

those subjected to shorter periods of strangulation-induced stress. Based on the findings of this investigation, it is recommended that avocado pear budgrafts be untied in 21 days after shield-budding, since healing of the wound injury incidental upon budding would have been completed by then. Untying grafts later is not only wasteful of time but also detrimental to the tender rind flap which may die from sheer strangulation under the pressure of the binding material. Similarly, prolonging untying time deprives the uniting cells of scion of essential nourishment and can cause death of scion.

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