Table 1. Percent mortality of adult papaya fruit flies caged on papaya fruit which had been dipped in permethrin and air dried. Figures are average of 4 replicates.

Permethrin lbs a.i./100 gal	% mortality[z] after 24 hrs	48 hrs	72 hrs
Check	0 a	8 a	18 a
0.1	18 b	48 a	55 a
0.2	45 c	50 a	68 a
0.4	65 d	73 b	83 b

[z]Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

The results of the replicated experiment are presented in Fig. 1. Initially the plots to be treated with permethrin (selected by chance) had a higher level of infestation than check plots. After permethrin applications were begun, numbers of infested fruit in treated plots declined steadily during November. Treated plots averaged 66% fewer infested fruit than the check plots from December 1 until the end of the experiment.

In the 2 experiments conducted in cooperation with Growers A and B, the number of larvae which emerged showed a large initial decline after 4 sprays after which the number remained low and relatively constant (Table 2). The larger number of maggots recovered in samples from Grower A's field on and after July 19 was probably due to a large planting of infested papayas about ¼ mile away. The field of Grower B was relatively isolated. Although untreated plots were not available for direct comparison, the figures in Table 2 are believed to reflect the effect of treatment of papaya fruit fly infestations since during the same period infestations in other plantings in the Homestead area remained high as they usually do as long as fruit is available.

Table 2. Control of papaya fruit fly with permethrin sprays in 2 commercial papaya plantings.

Date sample collected	No. emerged larvae Grower A	Grower B
June 5	1708	1604
July 19	89	0[z]
Aug 14	36	2
Sept 20	82	6
Oct 30	25	35

[z]Only 78 fruit in this sample. Other samples were 200 fruit.

Permethrin applications in the third field trial began before papaya fruit fly infestations were observed and were continued until the end of harvest. Under these conditions the papaya fruit fly never became established and not a single infested fruit was observed during the harvest period. Even though there was no unsprayed check for direct comparison, and because other plantings in the area were infested as usual, lack of infested fruit was the result of the treatment applied, in our opinion.

From the results of this work it appears that permethrin has real potential for control of the papaya fruit fly. Before a specific control program can be developed, however, more information is needed about minimum dosages and application schedules. Our results suggest that adults are most effectively killed by direct contact with the spray. Thus "space sprays" would be more effective than sprays directed only to the fruit. It appears that applications to a large area are more effective than to a small area—it is doubtful applications to the fruit on a few trees in the backyard would be helpful.

Permethrin is not labelled for use on papaya and it should not be used as a control for the papaya fruit fly until it is labelled for such usage. This report of experimental results is in no way to be considered as a suggestion of recommendation for its use as a control for the papaya fruit fly.

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GRAFTING ANNONAS IN SOUTHERN FLORIDA[1]

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Additional index words. Annonaceae, bud union, apical dominance, propagation, budwood preparation.

Abstract. **Spring is considered the best time of year for grafting Annonas (Annonaceae) in Southern Florida. Pregraft preparation of budwood on the tree and scion preparation off the tree, permitted grafting most of the year except when the trees were dormant during the winter months. Graft combinations tested showed higher rates of grafting success when using pregraft preparation for the budwood.**

Tropical fruits have less critical time periods during the year when they may be successfully grafted when contrasted with temperate fruits. However, many tropical fruit species do have an optimum time of year when higher percentage of graft take occurs (11). Weather conditions such as high temperatures, rainy or dry season, and fluctuations in humidity can have an influence on the condition of rootstocks and scions and subsequently the success of graft union (1, 6, 8). Also, the annual cycle of dormancy influences the success of the graft union in some species (11).

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Budwood preparation in some species is important (11): (a) carbohydrate accumulation to nourish the scion until a graft union is formed (7, 8, 12), or (b) removal of apical dominance that permits budbreak of the axillary buds (11). Although budwood may be girdled for carbohydrate accumulation in some of the *Annona* species, this is not a common practice because the wood is so brittle that a slight wind will cause the weakened branch to snap off. However, a long budstick, relatively large in diameter, will contain more food reserves that will nourish the scion for 2-3 weeks until the graft union is formed.

Local environmental conditions are important in determining grafting technique for a particular species. Under Florida conditions, the veneer graft is used for most tropical fruits (3, 4, 5, 7, 10). Diameter of the stock relative to the scion affects the formation of the graft union, and also the rate of growth and time period from the nursery to the field (2, 4, 9, 13).

Budwood is collected for many of the *Annona* species in South Florida after the leaf drop in winter and just before budbreak in spring. This is considered the optimum time for grafting many species of *Annona*. Even though they may be grafted at other times of the year, the rate of success has been lower when using budwood from trees in full leaf. Maturity of the buds and whether they are blind, is often difficult to establish when the buds are dormant. However, they should be collected just as the buds are beginning to swell. Once the trees are in full foliage, the buds cannot be properly examined since they are interpetiolar (buds are completely surrounded by the petiole as in the sycamore) in most *Annona* species (Fig. 1).

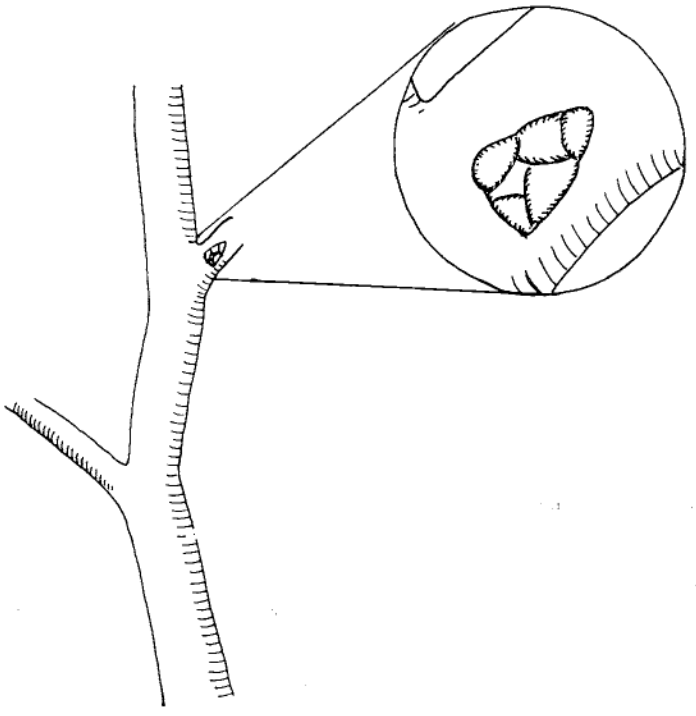

Fig. 1. Inter-petiolar bud.

The purpose of this study was to determine if on-tree and off-tree scion preparation enhances grafting success at times of the year other than spring.

Materials and Methods

Budwood was collected in South Florida in March when the trees were beginning to break dormancy, and May, June, July and August. Pre-graft preparation of budwood on trees in full leaf consisted of removing the terminal bud and leaf blades, leaving the petioles attached (Fig. 2). Budwood was collected as soon as the petioles abscissed and the buds were beginning to swell. The budsticks were immediately prepared for grafting (Fig. 2).

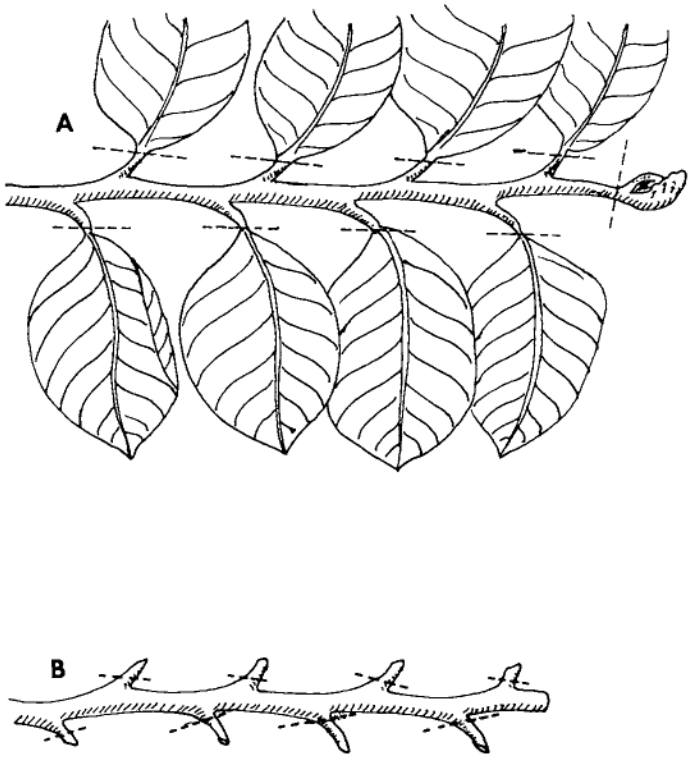

Fig. 2. On tree budwood preparation: A. Removal of leaf blades and terminal buds. B. Petiole abscissed.

Scions used for veneer grafts were prepared in the standard manner, but instead of cutting the budsticks in half longitudinally, only a superficial cut down to the cambium was made, removing the bark and some cortex, leaving 3/4 to 7/8 diameter of the budsticks intact (Fig. 3). An oblique cut was made on the front surface of the scion to match a corresponding notch on the prepared stock.

Rollinia (*Rollinia mucosa* L.), cherimoya (*Annona cherimola* Mill), soursop (*A. muricata* L.), surgar apple (*A. squamosa* L.) and atemoya (*A. squamosa* x *A. cherimola*) were veneer grafted to seedling rootstocks of pond apple (*A. glabra* L.) and wrapped with clear polyethylene tape.

There were preliminary tests of scions on pond apple to determine grafting technique with unprepared budwood during June and July, 1979 (using a chip bud). Chip buds were the same size as veneer grafts, but the internodes of the budwood were so long at this time of year, scions of the same size had only one bud. Tests were conducted during March, 1980 with unprepared budwood from dormant trees (Table 1).

Prepared scions from trees in full foliage were collected in August, 1979 and May, 1980. Cultivars of atemoya ('Bradley', 'Geffner', 'Page') were used in some experiments to make sure that cultivar difference did not influence the percentage of graft take (Table 2). Scions of the other species were collected from mature seedling trees (Table 2). Rollinia and cherimoya were not used in later experiments because budwood was scarce.

Results

Preliminary tests with unprepared budwood in June and July, 1978, had 60-100% initially and 30-50% survival

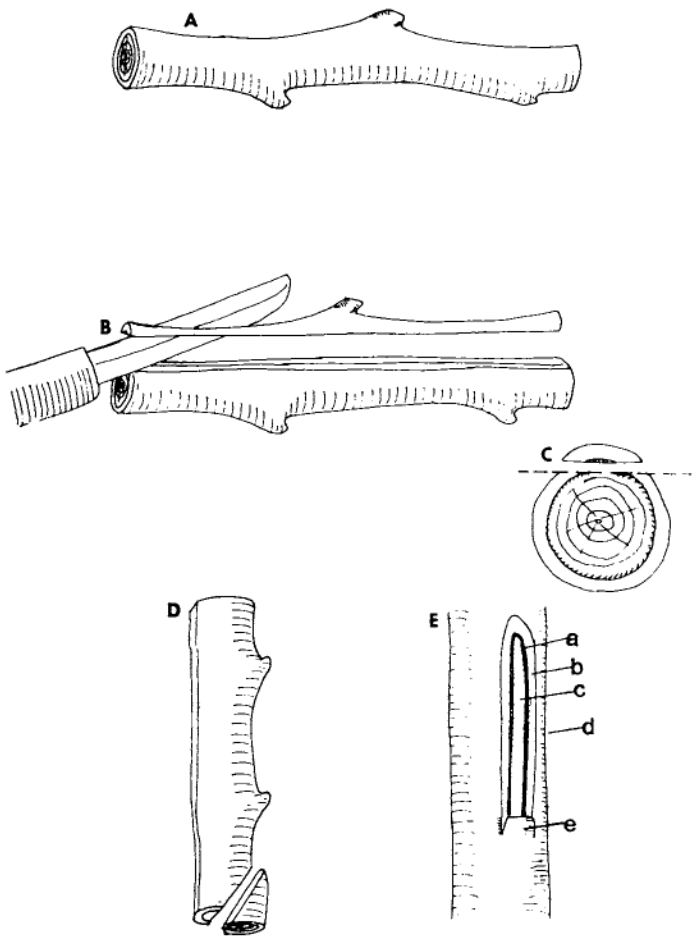

Fig. 3. A. Budwood, B. longitudinal cut, removing 1/8-1/4 diameter, C. cambium layer exposed, D. oblique cut, E. prepared stock showing: a. cambium, b. phloem, c. xylem, d. dark. e. flap.

after 2 months. Dormant budwood grafted in March, 1980 showed 50-100% take, but all died later. Small stock size prohibited using the large scions during this experiment and the combination of small stocks and small scions did not produce vigorous plants (Table 1). Budwood that had been prepared on the tree during May and August, 1980 had 90-100% take depending on the species tested (Table 2).

Discussion

The method of pregraft preparation of budwood on the trees and scion preparation off the tree permits grafting of the tested *Annona* species during most of the year, except when the trees are dormant in winter. The technique of scion preparation with shallow cuts is easier to manipulate since so little wood is removed from the scion, leaving a smoother surface for better contact with the stock plant.

The combination of on-tree budwood preparation and off-tree scion preparation can benefit both the commercial nurseryman and other horticulturists by extending the time of year that *Annona* species can be more successfully grafted.

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Table 1. Grafting trials with unprepared budwood of *Rollinia* and *Annona* species in South Florida.

Exp.	Scion	Date	Reps	Graft	Comments 1 month	2 months	Later observations
1.	*Rollinia mucosa* L.	6/28/79	8	chip	8 alive	4 pushing	Rest dormant but alive
	Annona squamosa L.	7/1/79	10	"	6 "	3 "	"
	A. cherimola Mill.	7/5/79	10	"	10 "	5 "	"
	A. muricata L.	7/2/79	10	"	10 "	3 "	"
2.	*A. (squamosa* x *cherimola*	3/27/80	10	veneer	10 pushing	all died	
	A. muricata	3/27/80	10	"	5 pushing	"	
	A. squamosa	3/27/80	10	"	10 pushing	"	

Table 2. Grafting trials with *Annona* species, "on" and "off" the tree budwood preparation.

Exp.	Scion	Date	Reps	Graft	Comments 1 month	2 months	Later observations
1.	*Annona* (squamosa L. x *cherimola* Mill.)	8/16/79	10	Veneer	10 alive	10 pushing	all alive
	A. muricata L.	8/16/79	10	"	10 "	6 "	slow initial start
	A. squamosa	8/16/79	10	"	10 "	6 "	much less vigorous
2.	*A. (squamosa* x *cherimola)*						
	cv. 'Bradley'	5/7/80	10	"	9 "	9 "	vigorous
	cv. 'Geffner'	5/7/80	10	"	10 "	10 "	vigorous
	cv. 'Page'	5/7/80	10	"	10 "	10 "	most vigorous
	A. muricata	5/7/80	10	"	10 "	10 "	pushed last but later grew fastest
	A. squamosa	5/7/80	10	"	10 "	10 "	least vigorous

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STORAGE AND MARKETING POTENTIAL OF FLORIDA APPLES AND PEARS[1]

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Additional index words. Malus, Pyrus, maturity, harvest date, cultivar improvement.

Abstract. **Cultivar selection and breeding of deciduous fruits adapted to a mild winter climate has resulted in apples and pears that perform well in dooryard plantings of northcentral Florida. They mature before fruit grown in northern states and thus have good potential for acceptance by local markets. This paper reports on the fruit shelf life of 'Anna', 'M-60-39', and 'Dorsett Golden' apples. It also illustrates the effect of harvest date and storage on subsequent fruit quality of 'Flordahome' pear.**

Although Florida's moderate climate is suited to many crops, apples and pears have been traditionally excluded by their winter chilling requirement. In recent years, low-chilling requirement cultivars have become available. Several selections of apples and pears are presently productive in University of Florida field trials and in dooryard plantings across northcentral Florida and as far south as Winter Haven (2, 7, 10). Fruit generally matures from mid-June through July, which is 4 to 8 weeks ahead of volume shipping from major production areas north of Florida (9). This increases the prospect for marketing all of the crop locally because they are virtually the only new-crop apples and pears in the country at harvest time. Being climacteric fruit, they must be picked exactly when mature and cannot be stored on the tree like citrus. Postharvest cold storage offers a means of metering them onto the market, thus extending the marketing period until the northern crop arrives.

The first objective of this study was to determine the refrigerated shelf life of 'Anna', 'M-60-39', and 'Dorsett Golden' apples. 'Anna' was obtained from Israel in 1967 and has been described in previous literature (4, 11). 'M-60-39' is one of the firmest-fleshed selections made in the Florida apple breeding program. 'Dorsett Golden' is reported to have originated from a 'Golden Delicious' seedling planted in Nassau, Bahamas in 1953 (10) but may have originated elsewhere (7). Our second objective was to evaluate the relationship between harvest date and subsequent quality of 'Flordahome' pears when ripened in postharvest storage. 'Flordahome', which was recently released, was described in previous literature as numbered selection Fla. 41-116 (1).

Materials and Methods

Apples. Approximately 180 liters of 'Anna' and 'M-60-39' apples were harvested randomly from trees at the University of Florida Horticultural Unit north of Gainesville in the afternoon of June 26, 1980 during light rain with ambient temperature at ca. 27°C. 'Dorsett Golden' produced such a light crop in the 1980 season that it was not included in this initial study. Decayed and damaged fruit were graded out and the remaining sound fruit stored overnight at 2°C. The following morning they were further randomized and divided into lots of 100 fruit per carton for storage trials. Two cartons of 'Anna' and 2 cartons of 'M-60-39' received a fungicidal dip for 30 seconds using Difolatan at 2.5 ml/liter water. One carton of 'M-60-39' was stored without fungicidal treatment. Firmness was measured for each cultivar using a Magness-Taylor pressure tester with a 5/16" tip (6). A small portion of peel was removed from 4 locations around the equator on each of 10 fruit. Firmness was determined at each location by applying enough pressure to plunge the tip into the flesh. This procedure was repeated as often as weekly intervals throughout the storage period of 24 weeks at 2°C, at which time decay was also recorded.

Approximately 150 liters each of 'Anna' and 'M-60-39' apples were harvested the morning of June 23, 1981 from the same trees used in the 1980 harvest. Fifty liters of 'Dorsett Golden' were picked from a single tree located in the same block. All samples were graded, randomized, measured for firmness, and packed into cartons with 120 fruit per container. Three cartons each of 'Anna' and 'M-60-39' and one carton of 'Dorsett Golden' were stored without fungicidal treatment at 2°C from June 24 to August 28. No firmness measurements were made during the course of storage in order to maximize the count for decay scores. At the end of this period all lots were carefully examined for fungal decay, scald, and firmness.

Pears. Pear quality is significantly affected by harvest date and storage temperature. If harvested too green they may wilt and develop scald in low temperature storage, but if harvested when overmature, core breakdown can occur within a few days (5). Furthermore, most cultivars do not fully ripen at low temperature, but require a brief storage period at 16°C or above to allow ripening without full development of stone cells that cause gritty texture (3). This study was designed to evaluate as many of these variables as possible with the limited amount of fruit available. Two harvest dates, July 15 (I) and July 22 (II), were selected based on field observation of color and firmness during the pre-maturation period. Approximately ½ of the pears on 6 trees of 'Flordahome' were randomly picked on each harvest date at about 9:00 A.M. on warm, humid days. Each lot was carefully graded and randomized into 3 samples of 60 fruit each. The storage schedule, consisted

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