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

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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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of either 2 (A), 4 (B), or 8 (C) weeks at 2°C followed by a ripening period at 21°C. Firmness measurements were made immediately after harvest and upon transfer to 21°C. using the same technique and sample size described for apples. No fungicide was used on pear samples. Fruit from storage at 2°C were held at 21°C until they became unpalatable or were lost to decay. This study was repeated in 1981 with a single harvest date on July 16.

Results and Discussion

Apples. 'M-60-39' was significantly (z-test) firmer than 'Anna' throughout the storage period for the 1980 tests (Fig. 1). Each point represents the mean of 40 firmness

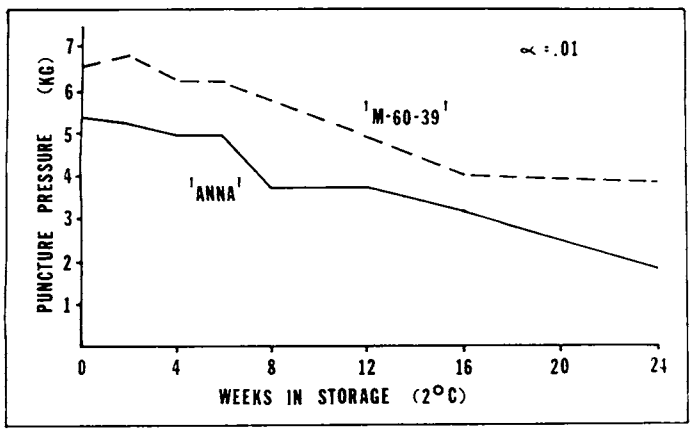

Fig. 1. Firmness of 'Anna' and 'M-60-39' apples during a 24 week storage period. Each point represents the mean of 4 firmness measurements on each of 10 fruit.

measurements. Accurate assessment of decay was not possible in samples that received fungicide because of the substantial number of fruit removed for firmness measurements. However, the single samples stored without fungicide had less than 1% decay after 8 weeks in storage, and after 24 weeks less than 30% showed noticeable decay. Bitter rot appeared to be the predominate form of decay (4, 8). Scald was first visible on 'Anna' after 12 weeks at 2°C, but 'M-60-39' had no noticeable scald until the end of the 24-week storage period.

Apples harvested during the 1981 season survived over 2 months at 2°C with minimal damage. Any fruit with fungal decay spots as large as 5 mm in diameter or with any symptoms of scald was counted as unmarketable. 'Anna' had 7% decay and no symptoms of scald, 'Dorsett Golden' had less than 2% decay and only a trace of scald, and 'M-60-39' was in poorest condition with 13% decay and about 3% scald. These data indicate that the shelf life of these 3 apple cultivars can extend beyond the arrival of northern shipments provided that proper picking, handling, and grading practices are employed.

Pears. Eating quality of samples IA and IIA was excellent after 2 weeks at 2°C plus 1 week at 21°C. An additional week at 21°C resulted in rapid physiological core breakdown in both samples, but only IIA showed signs of decay as well. This may indicate that Harvest II was conducted when fruit were overmature, which is substantiated by the significant difference in firmness measurements taken on each harvest date (Fig. 2). Samples IB and IIB tolerated 4 weeks of storage at 2°C very well and had fair flavor and texture after 1 week of ripening at 21°C. How-

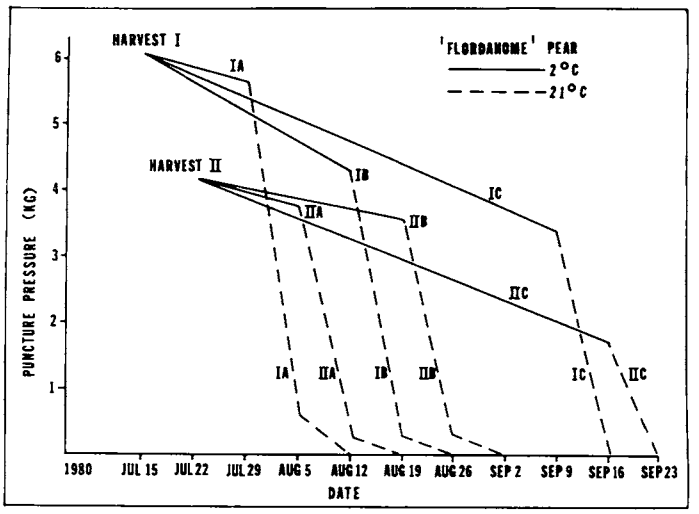

Fig. 2. Firmness of 'Flordahome' pears in postharvest storage. Each point represents the mean of 4 firmness measurements on each of 10 fruit.

ever, both samples were a total loss to overmaturity and decay after an additional week at 21°C. Samples IC and IIC were barely edible after 8 weeks at 2°C and were inedible after about 3 subsequent days at 21°C. These results indicate that 'Flordahome' pears may be stored safely at 2°C for 2 to 4 weeks if harvested before they are overmature. Once removed from cold storage, they should be marketed within 1 week to assure reasonable quality for the consumer.

The study repeated in 1981 had similar results which confirmed the 1 month storage life of 'Flordahome'.

Current University of Florida recommendations are to pick pears 6 to 10 days to before fully ripe, then store at 16 to 21°C for 6 to 7 days to allow ripening (3). The problem remains of how to identify precisely this stage of maturity on a yearly basis. A decrease in firmness appears to be closely correlated with the onset of maturity and may serve as a useful tool in determining the correct time for harvest.

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