

## THE SUBTROPICAL APPLES SIX YEARS AFTER DISTRIBUTION

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**Abstract.** In 1971 the subtropical apple cultivars 'Anna' and 'Ein Shemer' were first offered for sale to the public by a single nursery in Central Florida. Since then over a dozen nurseries throughout the state have become involved in the propagation of substantial numbers of these trees. Production of trees in the nurseries and attendant horticultural practices are examined in detail. Emphasis is also given to pruning techniques and pollination requirements of adult trees, 2 areas where problems have arisen in the past. While the 'Anna' has yet to be proved as a commercial fruit crop for Florida, its use as a dooryard fruit in North and Central Florida is now well established.

The 'Anna' apple is a recently produced hybrid from Israel that was created by crossing the 'Golden Delicious' and a local Jordan Valley variety, the 'Adassia Red' (5). The 'Ein Shemer' is another Israeli-developed apple used chiefly as a pollinator of the 'Anna'. Currently Israel is producing 80,000 metric tons of apples a year (8), much of this from 'Anna' and 'Ein Shemer' stock.

In 1967, selections of 'Anna' and 'Ein Shemer' were obtained by Dr. R. J. Knight of the Subtropical Horticulture Research Station in Miami. Subsequently, Drs. W. B. Sherman and R. H. Sharpe of the University of Florida, using budwood from these trees and previously obtained seed from Israel, established an apple planting on the University of Florida campus at Gainesville (6). From this planting came the budwood for the first commercially-produced trees in the state.

Interest was slight at first. Only one of the nurserymen whom Dr. Sherman contacted in 1971 was willing to accept budwood and produce trees for sale. Since that time, both the number of nurseries and the number of trees have expanded dramatically (Table 1). Thirteen nurseries are now propagating the Israeli-bred apples and a total of 88,370 trees will be produced. At the retail level these trees are now offered at hundreds of nurseries and garden shops.

Table 1. Production of 'Anna' and 'Ein Shemer' apple trees.

Year	1971	1972	1973	1974	1975	1976	1977
Number of Nurseries	1	1	2	2	4	9	13
Total Trees Produced	200	3,000	4,100	10,500	19,000	34,350	88,370

These figures certainly merit a reassessment of the 'Anna' apple in Florida; how it is grown in nurseries, the pest and disease problems encountered so far in the state, and new

developments which may dramatically improve the performance of the 'Anna' as a producing fruit tree.

### Nursery Culture

Information on nursery practices was secured by interviews with the 13 apple-producing nurseries in the state. Currently, all of these nurseries are located in 6 counties—Lake, Marion, Alachua, Suwannee, Baker, and Jefferson. With one exception, all of them graft or bud the 'Anna' scion onto domestic apple seedlings obtained from nurseries in Oregon or Washington. These seedlings caliper at 3/16 to 3/8 inches<sup>1</sup> and cost 10 to 15 cents each when purchased in large lots. The exception to this practice is a large nursery in Lake County where seed are planted directly in the field and budding takes place the following year.

For those who obtain the seedlings from other nurseries, it is most common to bench graft in January or February using the whip and tongue graft. The grafted plants are then stored for several weeks in a cool environment while callousing takes place and then set out in the field. For retakes, T-budding is done out in the field, usually in late spring or summer when the bark is slipping. Other techniques were also observed—hang budding in March and April, chip budding, T-budding directly in the field in July, and root-grafting. All methods were successful in producing trees. The percentage of "take" ranged from 50 to 95 percent and seemed to be a matter of technique rather than of the method used.

Approximately 12% of the 'Anna' and 'Ein Shemer' apples are grown in containers. The rest is field-grown, but it should be noted that much of the field-grown material is potted before it is sold at retail outlets.

Generally the ratio of 'Anna' to 'Ein Shemer' was about 3 or 4 to 1. A few nurseries grew the 'Anna' exclusively.

Field-grown apples were generally planted in rows 4 to 6 ft apart to facilitate machine entry. Spacing within the rows varied from 2 to 15 inches. Greater spacing resulted in trees more fully branched.

Fertilization and irrigation practices were fairly uniform. One nursery had no provision for watering of field-grown trees, yet with a slightly greater spacing, good growth was achieved. Periodic applications of a balanced fertilizer, usually every one to 2 months, was the standard practice.

Hand hoeing, machine cultivation between rows, and careful use of herbicides were used in combination to control weeds. Herbicides used included Paraquat, Surflan, and Simazine. There were no reports of any significant damage from improper use of herbicides.

Insect and disease control in the nurseries was, with a few exceptions that we shall touch upon subsequently, relatively successful. Only one nursery had a regular spray program. Most carried out spot spraying as problems arose. Several nurseries never had to spray anything on their trees. Powdery mildew, *Podosphaera leucotricha* (Ell. & Ev.) Salm., was the only widely-encountered disease and it was easily controlled with Benlate. Similarly, aphids and leafhoppers were controlled by Cygon, Malathion, or Diazinon.

Field-grown trees were generally dug in December. A tree bench-grafted the previous December would usually caliper at 1/2 to 7/8 inches and size at 4 to 6 feet. The selling season for bare-root stock is December to late March.

<sup>1</sup>For metric conversion see the table near the front of this Volume. Ed.

The large wholesale nurseries were queried as to their sales areas. Coastal South Carolina, southern Georgia, Alabama, Mississippi, and Louisiana were all mentioned as markets. Sales in Florida are still strong but several growers expressed the fear that retail saturation is not far off. Though the 'Anna' apple is now being sold from Miami to Atlanta, recommendations by the Institute of Food and Agricultural Sciences (IFAS) call for 300 to 400 hours below 45F. (2). Clearly, these chilling requirements are being exceeded at both ends of the scale. Eventually hard experience will determine the growing range for the 'Anna'.

So far, all trees produced in the state have been sold with little difficulty. Even this year, with tree production up 200 percent over last year, several nurserymen have accumulated orders in excess of their production. At the retail level, potted trees with fruit on them are very fast sellers.

Interestingly, over 99 percent of all the trees produced are utilized in backyards or in small plantings of an acre or less. Although the 'Anna' has proved itself in Israel as a commercially successful fruit tree, the authors were unable to find even a single planting of 5 acres or more. New endeavors are risky in agriculture so it is understandable that both IFAS and the nurserymen themselves have taken a cautious attitude toward large plantings of the 'Anna'.

### Diseases, Insects, and Rabbits

Though the apple, *Malus sylvestris* Mill., is a relative newcomer to the state, the records of the Division of Plant Industry reveal that many serious pest and disease problems of the apple are already present in the state. Southern blight, *Sclerotium rolfsii* Sacc., has been found infesting apples in 2 Florida counties. One nursery has been struck repeatedly and hundreds of young trees destroyed. Fire-blight, *Erwinia amylovora* (Burr.) Winslow, has recently been found on a small planting in Baker County where there was heavy damage to both 'Ein Shemer' and 'Anna'. Sherman et al. (6) reported little damage from fireblight at their Gainesville planting, but the disease may be a more serious problem in the northern counties of the state where conditions are more conducive for the spread of the fire-blight pathogen.

Crown gall, *Agrobacterium tumefaciens* (E. F. Sm. & Towns.) Conn, has been an occasional problem as has *Cercospora mali* Ell. & Ev., a common leafspot. Powdery mildew, *Podosphaera leucotricha* (Ell. & Ev.) Salm., is quite common on the 'Anna', but is easily controlled by Benlate. Apple scab, *Venturia inaequalis* (Cke.) Wint. apud Thuem., is a major problem in commercial apple-growing regions. Sherman et al. (6) observed it in Gainesville but it has not been reported in any Florida nurseries.

Over 40 insect pests have been reported on apples in Florida (entomology records, DPI<sup>2</sup>) but only a few are potentially serious. San Jose scale, *Quadraspidiotus perniciosus* Comst. is a world wide pest of apples that has already destroyed trees in nurseries and backyards in Florida. It infests the bark of both young and mature trees and commonly results in severe decline or death if unchecked. San Jose scale has been reported on 45 host plant species and is widely distributed throughout the state on these alternate host plants (4). The woolly apple aphid, *Erisoma lanigerum* Haus., is another important apple pest which has been reported widely in Florida. It is primarily a root-feeding aphid and thus difficult to control.

The most common pest reported on the 'Anna' apple has been the spirea aphid, *Aphis spiraeicola* Patch. It is

easily controlled. Other frequently reported infestations have included various species of armored scales, wax scales, webworms, maggots, caterpillars, stinkbugs, leafhoppers, thrips, and mites.

One problem of unexpected proportions has been rabbits. Both in nurseries and in small plantings around the state, scores of trees have been destroyed by rabbits eating the bark. Basic texts on apple growing (1, 7) treat the dangers of rabbits, mice, and deer quite seriously. The period of greatest danger is in the winter when natural forage is sparse. Plastic tree guards or a thick layer of latex paint may be used where effective fencing is impractical.

### New Developments

Under North Florida conditions the bloom periods of the 'Anna' and 'Ein Shemer' have not overlapped as expected. Poor pollination and fruit set have been the result. In Israeli orchards potassium nitrate and thiourea are sprayed on commercial plantings to produce early and uniform bud break (5). A good overlap in bloom also results. No trials with these chemicals have been attempted under Florida conditions, but their application would in any case be impractical for backyard level horticulture.

When the difficulties with fruit set became apparent, studies were undertaken by Crocker and Sherman (3) to ascertain the actual pollination requirements of the 'Anna'. It was determined that the 'Anna' is self-unfruitful. Unless pollinated by another variety, it will not produce fruit. Two clones, the 'Dorsett Golden' and the 'Fla. 1-W-22' were tested as potential pollinators. Both produced good fruit set but the 'Dorsett Golden' was judged superior. It has identical chilling requirements and good overlap in bloom with the 'Anna'.

The 'Dorsett Golden', reported to be a chance seedling of the 'Golden Delicious', originated in the Bahamas and was brought to the United States in 1961. 'Dorsett Golden' budwood from the University planting has already been obtained by several nurseries in the state. A word of caution is needed here. Several different clones called 'Dorsett Golden' are being marketed in the state. The most commonly available clone sold under this name is totally inappropriate as a pollinator for the 'Anna'. Serious growers should make sure they obtain the correct clone.

Poor pruning practices have been an additional cause of light bearing. Pruning and training are vital elements in apple horticulture. Only the short spurs and terminals on the tree produce fruit buds and the number of spurs is directly related to proper shaping of the tree. The 'Anna' particularly needs care because of its strongly upright growth habit.

Recently, Mr. Arieh Zerem of the Israeli Extension Service visited a small planting of 'Anna' apples in Alachua County and demonstrated the commercial training methods used in Israel (personal communication). Immediately after field-planting, trees are topped at 30 inches to stimulate branching. When the trunk diameter is sufficient a nail is driven into the main stem 12 inches above the ground. A single strand of #9-gauge galvanized wire is laid on the nails protruding from each tree. The heavy wire is fastened to the nails with fishing line or thin copper wire. Using stout twine and the #9-gauge wire as a base, the branches of each tree are tied down to create a modified 'fan' shape. The lowest branches should have a crotch angle of 90 degrees (Fig. 1). Each branch off the central stem should have 4 to 6 inches of vertical distance between its neighbors. No sharply angled crotches should be permitted.

For the homeowner with just two or three trees, the

<sup>2</sup>Division of Plant Industry, Gainesville 32602. Ed.

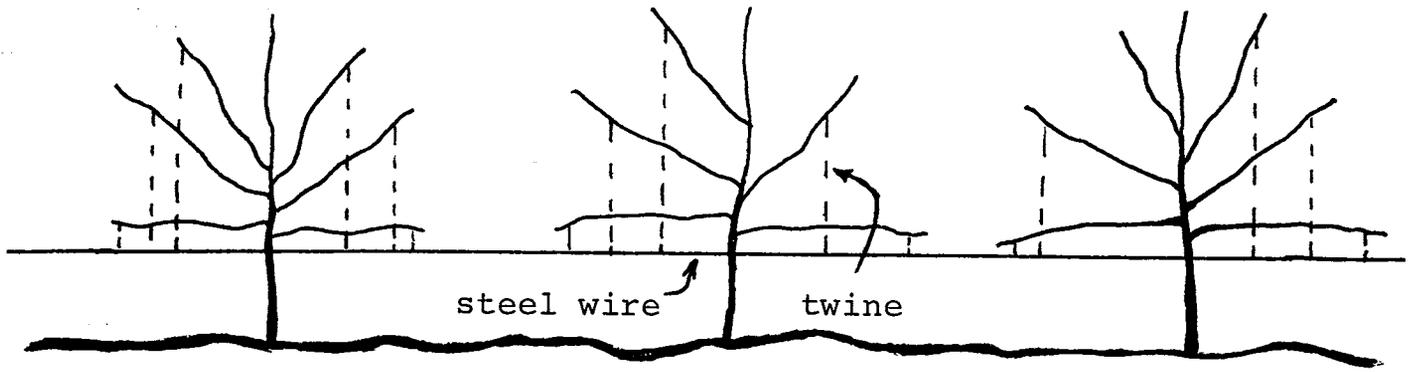


Fig. 1. Commercial pruning method employed in Israel on 'Anna' and 'Ein Shemer' apple trees.

branches may be similarly trained by hanging weights from them or by anchoring them to stakes driven into the ground.

### Conclusions

Clearly, much has been learned since the 'Anna' and 'Ein Shemer' were first offered to the public. Production of trees has increased greatly. Serious pests and disease problems have been shown to exist, but with an effective pollinator and proper training, the 'Anna' may well become a common fixture in North Florida backyards. On a commercial scale much more experience with the tree is needed before large plantings are undertaken.

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## MARKETING FLORIDA BUNCH GRAPES AS FRESH FRUIT<sup>1</sup>

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**Abstract.** Tests of marketing Florida bunch grapes through central Florida retail outlets were conducted in 1973, 1975, and 1976. The predominant variety in these tests was 'Stover' (light green to golden color), but limited amounts of blue- and red-skinned grapes were also sold. Grapes were marketed through one large retail chain and several smaller local stores, over a period of 3 weeks, usually prior to the availability of full-ripe 'Thompson Seedless' grapes from Arizona and California. Retail price ranged from 39 to 49 cents per pound (lb)<sup>2</sup> in packaged cartons of about one pound. Wholesale price varied from year to year and with packaging; in 1976 grapes were sold to the stores at 31 cents per pound in 15-pound cartons. The stores were pleased to get the grapes as offered and had good success in selling them. Blue and red grapes were more popular than golden ones.

Culture of grapes in Florida for commercial uses has never been extensive. Although early French, Spanish, and

English colonists imported European varieties of *Vitis vinifera* L. with the idea of establishing them here, none of these attempts were successful. In the latter part of the nineteenth century immigrants to Florida from the northern parts of the United States brought with them varieties of *Vitis labrusca* L. and were successful in establishing small commercial plantings, the most extensive in Orange County. But many of these plantings were dead by 1900 and commercial efforts were ended by 1907. The most successful efforts at commercial production of grapes in Florida occurred in the period 1920-30. This industry was founded on the use of the Texas post-oak hybrids ('Extra' [also known as 'Florida Beacon'], 'Carman,' 'Armalaga,' R. W. Munson, and others) developed by T. V. Munson. About 4,000 acres of vineyard (mostly in the central Florida counties of Lake, Orange, and Putnam) were under cultivation at the peak of this development (6). Failure of these attempts to establish commercial vineyards in Florida was caused by degeneration and eventual death of the vines that was attributed to various causes. Not until 1951 was Pierce's disease suspected as a major factor in the death of grapevines previously described as degeneration or decline (4). Subsequent work corroborated this finding (1, 5). The grape research program at the Agricultural Research Center, Leesburg was directed in the early 1940s to the collection of specimens of native grape species that were used as sources of resistance for the development of the Pierce's disease-resistant varieties 'Lake Emerald', 'Blue Lake', 'Norris', 'Stover', and 'Liberty'

<sup>1</sup>Florida Agricultural Experiment Stations Journal Series No. 846.

<sup>2</sup>For metric conversions, see the table near the front of this Volume. Ed.