but is also likely to be replaced. The older Florida cultivars ‘Flordasun’ and ‘Flordaqueen’ have been largely superceded, but ‘Sunred’ nectarine (released from Australian quarantine in 1972) is still recommended at 5 locations. ‘Sundowner’ (tested as Fla. 6-3) has replaced ‘Sunred’ in most low-chill locations and is likely to replace ‘Sunred’ in all areas because of superior fruit size.

‘Flordagold’ (325 cu) and ‘Sundowner’ (300 cu) were the most widely tested and recommended cultivars (Table 1) and appear to be adapted to a wide range of environments. ‘Flordagold’ was recommended because of its size, firmness and attractive skin color as a mid- to late-season peach in low-chill areas or an early- to mid-season cultivar in high-chill areas. ‘Flordagold’ obtained the highest firmness rating (4.5) averaged over all locations. ‘Sunlite’ nectarine was also recommended at both high- and low-chill locations as an early and late ripening cultivar, respectively. Its chilling requirement of 450 cu precluded its use in very low-chill areas, such as Carnarvon, Rockhampton and Evelyn.

‘Flordabelle’, ‘Flordared’ and ‘Flordaprince’ were recommended only at low-chill sites. ‘Flordared’ (100 cu) and ‘Flordabelle’ (150 cu) were recommended at Carnarvon and Rockhampton, but were of little value in other areas.

‘Flordaprince’ (150 cu) peach produces moderate size, attractively colored, early ripening fruit but is recommended only in low-chill areas because the fruit cracks and russets on the stylar end when it is grown at high-chill locations, such as Bathurst and Applethorpe.

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**PERFORMANCE OF NON-ASTRINGENT PERSIMMONS (Diospyros kaki L.) IN FLORIDA**

Persimmons are desirable for their beauty around the home, in the dooryard garden and in the fruit bowl as well as for consumption. The fruit are sweet and have an attractive, bright-orange color. Firm, non-astringent types have a crisp, pleasing texture and can be stored without refrigeration. Fruit are harvested in autumn along with chestnuts and pecans. They are prized in oriental societies. A small persimmon volume is marketed in Florida and because of limited availability they bring up to $1.00 per pound at the farm.

Persimmons are classified into non-astringent types, which can be eaten firm and soft or astringent types, which must be soft-ripe before the astringent tannins coagulate and the fruit are suitable for eating (4,6). Persimmons are also divided into pollination variant types, which are dark fleshed when seeded, and pollination constant types which are clear fleshed regardless of seed (6).

The non-astringent, pollination constant types have distinct advantages in marketing and consumer acceptance (6). Picked hard, they are easy to handle and will have at least a 5 to 15 day shelf life. Soluble solids vary between 13 and 24% from the early to late cultivars. The flesh is orange, crisp, and moderately juicy. The fruit do not have to be eaten in the “gooey-drippy” state which is objectional to many Americans. Further, and perhaps most important, is the lack of astringency which has adversely affected many people’s opinion of the fruit.

Performance is affected by a number of factors including cultivars (6), crop load (3), seed set (1,3), fungal diseases (2,4,6,8), insects (5,6), and freezing temperatures (7). This report discusses fruit quality in persimmons and factors that affect production.

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Materials and Methods

Information was gathered from 3 plantings representing the central and northern areas of Florida. Performance in south Florida was obtained through personal communication. In the University of Florida research orchard at Gainesville, 2 to 4 trees each of 15 non-astringent and 23 astringent cultivars were established from 1976 to 1988. Cultivar performance records were taken from 1980 to 1989. Studies were made from 1983 to 1989 in a 3-acre commercial planting at Chiefland. Records were also gathered from 1988 to 1989 from a replicated planting of non-astringent cultivars at the University of Florida Agricultural Research Center in Monticello. The studies included: 1) Foliation, flowering, and fruit ripening dates. 2) Fruit quality, color, weight, and yield. 3) Pollination and non-pollination effects on cropping, with and without hand thinning of fruit loads. 4) Fruit dropping and crop loads over multiple year periods in the presence of pollination. 5) Cercospora leaf spot infection periods and intensity with and without fungicide applications. 6) Presence of other fungal pathogens. 7) Persimmon psyllid adult emergence times, population density, and damage effects with and without insecticides. 8) White peach scale incidences and damage with and without chemical control. 9) Freeze damage intensity and recovery capability.

Fruit quality was measured as percent of soluble solids. This was determined with a hand-held refractometer. Colors were visually determined by estimating amounts of green, yellow, orange, and red. Fruit were harvested at various degrees of ripening and stored at 68°F until soft. Data were collected before and during the storage period.

Pollination data were gathered from flowers pollinated naturally by male trees mixed with the plantings and from hand-pollinated flowers caged to exclude insects. Non-pollinated fruit were formed when no pollinating trees were present and when flowers were bagged before they became receptive.

Plant tissues having fungal infections were collected, and the fungi were cultured and identified by the Bureau of Plant Pathology, Florida Department of Agriculture and Consumer Services. Freeze damage occurred naturally, and observations were made in test years. Minimum temperatures that caused damage ranged from 9° to 28°F during different times of the year and different stages of tree growth.

Performance Characteristics

Non-astringent persimmons are best adapted in central and north Florida. They will grow in south Florida but quality and yields are not as good.

In the orchards studied both seeded and seedless fruit were produced. Fully seeded crops were sometimes formed on trees close to pollinators. Completely seedless crops occurred only where pollinators did not bloom. Pollinating trees were supplied, but they were not planted in a uniform manner. Further, their ratio of 1 to every 15-25 trees is considered low (4). Trees generally contained crops with 2/3 - 3/4 of the fruit seeded with seed numbers from 1 to 3. Crop loads were sufficient and frequently were or should have been thinned to prevent excessive cropping and fruit clustering. It appears that this low-pollinator ratio is adequate to ensure good production. Limited pollination may be desirable because overcropping or heavy seed production tends to weaken trees (3).

Fruit drops were common at various times during the growing season. When both seeded and seedless fruit existed in the crop load, drops occurred at a higher rate in the seedless fruit. In cases where hand-thinning is necessary, pollination is desirable. If pollination does not occur, the fruit will be more likely to drop throughout the growing season making it impossible to know how severely to thin fruit just after bloom.

Several cultivars have been selected which are pollination variant, small fruited and have large amounts of annual male flower production (4). 'Akagaki', 'Gailey', 'Omima Wase', 'Turkey Town', and 'Zenjimaru' are of this type. 'Gailey' is the most common pollinator and will provide sufficient bloom overlap for all cultivars. It leafed late enough to escape freeze damage during the nine years of these observations.

Experience showed that tree yields should be regulated to from 100 to 300 fruit on mature trees (6). Early maturing cultivars have less fruit than mid-season cultivars, and older, larger trees are capable of producing higher yields. Fruit size depends more on crop loads than on cultivars and ranges from 6.2 to 8.8 ounces (6). Trees will produce for over 20 years if freeze damage and fungal problems are avoided. However, the orchards studied tended to decline after 10 years with freeze damage being the major factor (7).

Bud swell occurs in Gainesville around early April following winters with relatively consistent cool temperatures. This is comparatively late, as apples, peaches, pears, blueberries, and bunch grapes initiate growth a month earlier and pecans and muscadines usually initiate 2 weeks later. A long, consistent warm period during the winter appears to stimulate bud break even though small amounts of chilling have occurred (4). Once bud swell begins, freezing temperatures will kill twigs and may cause trunk damage (7). Generally, temperatures to 28°F produced only bud or tender leaf and shoot damage. At lower temperatures some permanent wood damage can be expected if the trees are not dormant.

Freeze damage occurred on certain cultivars studied in the orchards in 4 out of 9 years. Usually terminal and swollen axillary buds were killed, and the cambium layer in small scaffold limbs turned brown. After 3 weeks of warm temperatures following the freeze, dormant axillary buds initiated growth, some tissue with internal browning would recover, and reduced flower and fruit production would occur. In earlier leafing cultivars, major scaffold damage resulted twice in the 9 study years. Adventitious buds pushed from the trunk structure, but good production did not occur for 2 years or longer.

Cultivars

Five cultivars were chosen as best during their particular ripening season. They are ‘Izu’, either ‘Matsumoto Wase Fuyu’ or ‘Ichikikei Jiro’, ‘Fuyu’ and ‘Suruga’, ‘Hanafuyu’, ‘Hanagosho’, ‘Jiro’, ‘Midia’, ‘Shogatsu’ and FL 11-72 were judged inferior. Records on five other non-astringent cultivars were insufficient because of young tree age.

‘Izu’ is the earliest ripening non-astringent cultivar. Its fruit averages about 7 ounces and can be picked from mid-
September to mid-October. Soluble solids of early fruit is about 13% and increases to 16% as the season progresses. At early picking stages non-astringent persimmons typically color 25% green, 55% yellow, and 20% orange. As the ripening season progresses, green fades to increasing shades of yellow and orange. Color development continues somewhat after picking. Bud break in ‘Izu’ occurs 5 to 7 days later than for ‘Fuyu’ and trees have not suffered freeze damage. The tree is not as vigorous, precocious, or heavy cropping as ‘Fuyu’. Production begins about 5 years from planting.

‘Matsumoto Wase Fuyu’ ripens the last of September through October. It is a bud sport of ‘Fuyu’ discovered by Mr. Matsumoto, and as the word Wase translates, it is earlier. Soluble solids vary from 16 to 21%. Bud swell begins about 4 days after ‘Fuyu’. Like its parent, many flowers set and crop loads are usually heavy and clustered. The flesh often contains dark specks which are characteristic of ‘Fuyu’ and ‘Izu’. Fruit separation from the calyx occurs in a higher than normal percentage of fruit. This reduces quality and causes rapid, uneven ripening.

‘Ichikikei Jiro’ is also recommended for the same harvest season as ‘Matsumoto Wase Fuyu’. It leafs with ‘Fuyu’, but the tree is smaller, less vigorous, and sets fewer flowers. A high incidence of distal end splitting occurs if fruit are harvested late in the ripening period.

‘Fuyu’ is the standard cultivar ripening from mid-October through November. It averages 20% soluble solids. Fruit thinning is often necessary to size crops and prevent clustering. Heavy production will limit the following year’s yields. Fruit size varies between 6 and 8.8 oz. with recommended crop loads of 300 to 150 fruit. This translates to 85 to 125 lbs. per tree with 145 trees per acre spaced at 15 x 20 feet. ‘Fuyu’ is the most common non-astringent persimmon sold in Florida, and is the main cultivar throughout the world (4). Incidence of fruit imperfections are low, yields are good, and the tree is generally well adapted. Freeze damage has been severe enough to hurt major portions of older trees twice in the last 9 years; however, younger trees suffered only minor twig damage without severely reducing crop load.

‘Sugura’ ripens in the same season as ‘Fuyu’. It crops consistently and regulates loads well through fruit dropping. Soluble solids range between 18 and 24%. A red blush often develops on one side of the fruit and fruit imperfections are infrequent. Buds swell at about the same time as ‘Fuyu’.

The other persimmons had more problems with disease, fruit quality and/or crop loads. A few of the common ones are described. ‘Izu’ ripens 2 weeks later than its bud sport ‘Ichikikei Jiro’, with inconsistent cropping, heavy fruit shedding, and distal splits in the fruit. ‘Midia’ is large-fruited, ranging from 12.3 to 14 oz. Crop loads are sporadic and trees can be unthrifty. ‘Hanafuyu’, often called ‘Giant Fuyu’, loses astringency very late and ripens 2 weeks before ‘Fuyu’. ‘Hanagosho’ is a large tree with upright scaffolding. It regulates crop loads well and has small amounts of male flowering. It is a good homeowner tree.

**Fungal and Insect Problems**

The most significant fungal pathogen limiting performance is *Cercospora* spp. leaf spot (6). It is a major cause of defoliation which starts in late August as the fruit begin to ripen and continues through September and October. Problems related to defoliation include cessation of fruit sugar accumulations and fruit ripening, biennial bearing tendencies with low overall yields, and increased susceptibility to freeze damage (4,6). Experience has shown that a fungicide cover spray during full bloom, and again 3 to 4 weeks later, will greatly improve fall leaf retention. Apparently inoculation of *Cercospora* begins at shoot expansion, leaf formation and flowering.

In August and on through the ripening period fruit rottin fungi, which also cause leaf spots, can become prevalent. For control, a fungicide cover spray is applied to all cultivars in late August, and to mid- and late-season cultivars in late September. Anthracnose, *Gloeosporium diospyri* Ell. and Ev., and other fungi are associated with these problems (8).

The 2 insects most often encountered on persimmons are controlled using an insecticide in combination with the early fungicide applications. White peach scale *Pseudaulacaspis pentagona* Targioni, if established will cause major problems of limb and even whole tree death (6). Infestations become highly visible in late September and October as the males emerge causing a snowy-white appearance on limbs or trunks. This is an important time for observations which should continue through the winter as the lack of leaves and vegetation also make spotting easy. If winter buildup of scale becomes apparent, dormant oil spray may be applied at or just before bud break. Caution should be used as the oil will speed up foliation and increase chances of freeze damage. Generally, the insecticide in the cover sprays will prevent infestation of scale.

Persimmon psylla, *Trissos diospyri* Ashmead (5), is a minor insect on the native *D. virginiana* L. and is usually only a problem on young trees of *D. kaki*. The first and second cover sprays coincide with the emergence of mating adults and usually control the problem for the growing season. The small black-bodied flies with large transparent wings can be seen on the leaves beginning with the flowering period. This generation lays eggs at the margin on the underside of the leaf. The nymphs feed upon hatching and inject toxins which cause the leaves to curl around them making control more difficult. Shoot stunting and reduced terminal growth result when populations increase. Psylla do not severely hurt the overall growth of mature trees, but can greatly limit establishment of young trees.

**Other Pathogenic Problems**

Trees with small leaves and fruit, leafless terminal twigs and/or flaking of the bark at limb joints, with general tree unthriftness can occur. Pruning an infected tree and then a healthy one appears to spread the disease. Budding trees with infected scion wood may transmit the symptoms in nursery stock. No one cause of this disease is known. Symptoms are more pronounced under stress such as heavy fruiting, and tree vigor normally declines with age. These symptoms may be partially attributed to *Cephalosporium diospyri* Crandall (2,4), *Verticillium albo-atrum* Reinke and Berth. (8), *Phomopsis* spp. (4,8), and *Botryosphaeria dothidea* Mongeot and Fries (4,8). *Phomopsis* spp. have been cultured from xylem tissue taken from trees in orchards at Chiefland and Gainesville. Infections of *B. dothidea* on peach trees in Gainesville could have been a source of inoculum for persimmons although no attempt was made at

Acidity is low, making this a good fruit for the fresh market. The pulp is red and sweet, with excellent flavor and texture. It is also desirable for processing into guava shells and other products.

Conclusions

The demand for persimmon fruit is currently greater than production. Non-astringent types could be easily introduced into the marketplace creating a greater demand. The cultivars 'Izu', 'Matsumoto Wase Fuyu', 'Ichikikei Jiro', 'Fuyu' and 'Suruga' could be used to supply a market from late September to mid-November. Freeze damage may limit the life of orchard production to 10 years. Three to 4 cover sprays with a fungicide/insecticide timed at full bloom, 1 month later, in late August and frequently in late September will improve performance and tree life.

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‘HOMESTEAD’, A SUPERIOR GUAVA FOR FRESH MARKET AND FOR PROCESSING

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Abstract. In 1945 G. D. Ruehle made crosses between the ‘Ruby’ and ‘Supreme’ cultivars of guava. The progeny were grown in the field at the Tropical Research and Education Center, Homestead. Two trees bearing red-fleshed fruit were selected for their superior characteristics of production and fruit quality. The selections were similar in all respects except that one had more ascorbic acid than the other. Both were selected for their superior characteristics of production and fruit quality. The selections were similar in all respects except that one had more ascorbic acid than the other. Both were selected for their superior characteristics of production and fruit quality. The selections were similar in all respects except that one had more ascorbic acid than the other. Both were selected for their superior characteristics of production and fruit quality. The selections were similar in all respects except that one had more ascorbic acid than the other. Both were selected for their superior characteristics of production and fruit quality. The selections were similar in all respects except that one had more ascorbic acid than the other.

One of the selections, originally designated as Ruby × Supreme 6-29, is described in this paper as the cultivar, ‘Homestead’. The tree produces large crops of superior fruit. The fruit is large, with a thick pulp and relatively few seeds. The pulp is red and sweet, with excellent flavor and texture. Acidity is low, making this a good fruit for the fresh market. It is also desirable for processing into guava shells and other products.

The guava, Psidium guajava L., is an important fruit throughout the tropics and warm subtropics. It is harvested from wild trees and is cultivated on farms of all sorts, from the most primitive subsistence farms to those of the largest multinational agricultural companies. The fruit, rich in vitamins and minerals, is consumed fresh and processed into many products (5, 8, 10).

The guava is native to Tropical America. It was introduced to Florida in 1847 (5) and became naturalized in the southern part of the state. The usefulness and nutritive value of the fruit were quickly recognized by the local population, who harvested fruit from both wild and cultivated trees. For a long time most of the available fruit was small, acid and seedy, the product of unimproved seedling trees (8).

When the University of Florida Subtropical Experiment Station (now Tropical Research and Education Center, TREC) was established at Homestead in 1930, one of its main objectives was the improvement of fruits important to the people of Florida, including the guava (2, 3, 4, 8, 9). During the late 1930's and the 1940's seeds and plants of good selections of guava were introduced from many countries of the tropics and planted at TREC. The best of these were used in a breeding program which produced numerous guava cultivars. They included acid types, intended primarily for processing (1, 3, 4, 9), and sweet types, intended for fresh consumption as well as processing (2, 3, 4, 9). This paper describes the ‘Homestead’ guava, one of the products of the TREC fruit improvement program.

Origin

In 1945 G. D. Ruehle used hand pollination to make crosses between the ‘Ruby’ and the ‘Supreme’ guavas, two cultivars he had selected previously (3, 6). The ‘Ruby’ had a sweet, red-fleshed fruit and the ‘Supreme’ had a sweet, white-fleshed fruit. A severe hurricane that year damaged the guava plantings at TREC severely and destroyed all of the fruit but one from the hand pollinations. The seeds from that fruit were planted and produced 150 seedlings, 130 of which were planted in the field at TREC in 1946.