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'Desirable' Pecan

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There are four cultivars that have become the standards of the pecan industry. They are 'Desirable,' 'Schley,' 'Stuart,' and 'Western Schley.' These cultivars are planted in large acreages throughout the pecan regions of the world. 'Schley' and 'Stuart' were two of the original "big four" planted in the southeastern United States in the 1920's; the other two were 'Alley' and 'Pabst' (10). 'Desirable,' 'Schley,' 'Stuart,' and 'Western Schley' are all being used in newly planted orchards, although new plantings of 'Schley' are very limited. These cultivars became standards of the industry because they proved to be profitable over a wide range of conditions and remained profitable as mature trees. These cultivars have passed the severe test of time.

'Desirable' is supposedly one of the first pecan cultivars developed from a controlled cross. The cross was made in the early 1900's by Carl F. Forkert from Ocean Springs, Jackson County, Miss. (10). The parentage is unknown (6), but may be 'Success' x 'Jewett.' 'Desirable' was introduced about 1915 (18), but was not widely disseminated prior to Forkert's death in 1928. This cultivar would probably have been lost if scions had not been brought to the U.S. Pecan Field Station, Philema, Ga., in 1925 (Fig. 1). From this station, 'Desirable' was extensively disseminated as US-7191 for test planting beginning in 1930, was introduced commercially in 1945 (3), and was widely planted by the early 1960's. Mr. R. M. Marbury, Sr. was one of the first, if not the first, person to establish a 'Desirable tree' from the Philema Station source. In the early 1930's, he topworked a tree in his yard on Gillionville Road, Albany, Ga. Later, Marbury topworked a portion of his orchard to 'Desirable' (F. G. Marbury, Sr., personal communication). This orchard, now known as Blue Three, is located a few miles south of Albany on Georgia Highway No. 19.

In the late 1960's and in the 1970's, planting of 'Desirable' decreased with the introduction of and renewed interest in the USDA cultivars. Presently, 'Desirable' plantings are on the increase which is associated with the less than anticipated performance of most of the USDA cultivars. Currently, in Georgia, 'Desirable' is the number one cultivar planted in new orchards. 'Desirable' has been used in pecan breeding and two cultivars, 'Houma' and, probably, 'Kiowa,' have been released with 'Desirable' parentage.

In the southeastern United States, budbreak in 'Desirable' is early and

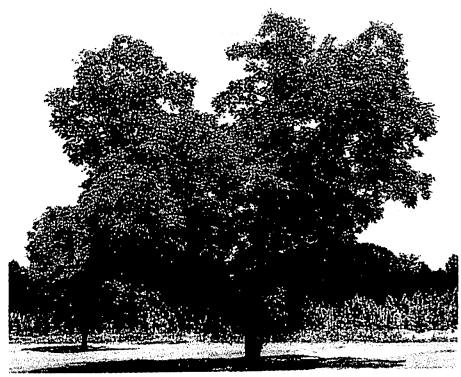

Figure 1. 'Desirable' tree, Philema, Ga. The tree, which is a topworked 'Schley,' is one of the original 'Desirable' trees in Georgia. The tree is on the grounds of what was once the U.S. Pecan Field Station.

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about five days before 'Stuart' (21), but the differential in budbreak can be much greater in seasons following mild winters. The primary bud of 'Desirable' is unusually plump, roundish, and prominent. The roundish bud often abruptly terminates in a sharply pointed tip. These characteristics become more evident from the base to the tip of the shoot. The leaf is large with reflexed leaflets (Fig. 2). In most situations, the foliage tends to be light green with the pale color often, although not always, being a distinguishing characteristic. If both leaf nitrogen and potassium are at sufficient levels, the foliage is dark green (21). Leaf retention in the fall is good (11), but color retention is poor during prolonged cool autumns. As a young tree, shoot growth is vigorous. Development of shoots is restricted to the apical portion of the one-year-old branch. That portion of the one-year-old branch without shoots is sometimes called "blind" wood. Restriction of shoots to the apical portion of the one-year-old branch results in a fan as opposed to a pole branching habit (21). The tree is moderately open (Fig. 3). Tree form is more spreading and open than 'Stuart' (1). The open nature of the tree reduces shading out in the interior of the canopy which greatly increases the fruiting area of the tree. The tree grows vigorously and, consequently, is not suited to high density planting. 'Desirable' is moderately difficult to propagate.

Figure 2. 'Desirable' leaf. The leaflets are reflexed relative to the horizontal plane of the rachis.

'Desirable' is protandrous. An abundance of pollen is produced very early in the pollinating season and 'Desirable' is an excellent early pollinizer for many cultivars over a wide geographic range. Occasionally, the prolific catkin production is associated with death of a few one-year-old branches within a tree. Branch death results from excessive depletion of carbohydrate reserves by the massive catkin production. Extensive overlapping of pollen shedding and stigma receptivity is common in areas with mild winters (21). In Brownwood, Tex. (13) and Brazil (7), 'Elliott' is a suitable pollinizer for 'Desirable'; in Georgia (27), 'Cape Fear' and 'Elliott' in combination will pollinate 'Desirable.'

'Desirable' is more precocious than 'Stuart' and comes into commercial production about two years earlier. Under ideal culture, a commercial yield is obtained in the sixth year. The yield from a 'Desirable' tree is about 15 percent greater than 'Stuart' (21). 'Desirable,' like 'Stuart,' has a "built-in" fruit thinning mechanism. Thinning occurs during the second drop and is due to a lack of pollination and/or fertilization, either one or both of which do not occur in many of the flowers. Lack of fertilization is, by far, more likely (22). Regardless, a second fruit drop occurs consistently from one year to the next. The number of fruits per cluster is often only one or two. The inherent capacity for fruit thinning and the open nature of the tree are dominant factors in 'Desirable' being one of the, if not the, most consistent cultivars in annual production. Occasionally, however, the second drop is excessive and yields are substantially below normal. On the other extreme, when the second drop is low, the tree fruits excessively and production is off the next year.

The shuck of the fruit is glossy and convoluted (Fig. 4). Nut maturity is about four days later than 'Stuart' (21). However, nut maturity in 'Desirable,' unlike 'Stuart,' is not excessively staggered and a higher percentage of fruit can be removed from the tree during the first harvest.

Nut shape is oblong or blocky with an obtuse base and an apex that varies from obtuse to obtuse asymmetric. When the apex is asymmetric, the apex has the appearance of being slightly curved. Shell halves within nuts vary from equal to unequal in size. C•oss section is oval and the nut is slightly compressed on the non-suture sides. The surface of the compressed areas is rough, otherwise shell topography is smooth. The suture is sometimes slightly elevated, but not throughout its entire length. Ridges are subtle, but often there is one ridge which is more evident near the apex. Stripes are sparse. Dots are more abundant than stripes, but are not dense. Markings are brownish-black on a light brown background (21).

The 'Desirable' nut is large and bigger than 'Stuart.' A high quality 'Desirable' will have a count of 42 to 44 nuts per pound, although the average is more like 47. The shell is medium thick and thinner than 'Stuart.' As a result of the medium thick shell, there is minimal breakage during mechanical harvesting. The nut is also very suitable to mechanical shelling and a high percentage of intact halves is obtained. A percent kernel of 52 is good with 54 being excellent. If percentage kernel is on the low side, for example 52%, the interior of the kernel is solid. This is in contrast to 'Stuart' which tends to have "air pockets" when percentage kernel is marginally low. The kernel is very attractive with a color rating of 6.8 (1 = dark; 10 = light) or higher. Flavor is good and is considered by some to be better than 'Stuart' (21).

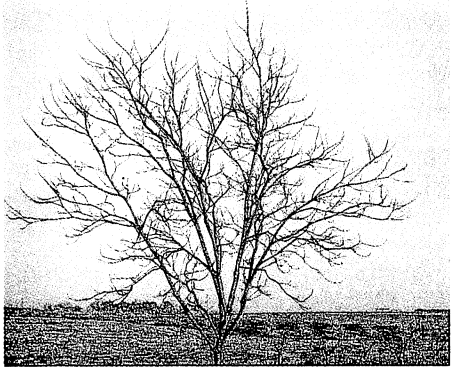

Figure 3. Tree form in 'Desirable.' The tree is moderately open due to the relatively sparse branching and fairly wide crotch angles.

Like 'Stuart,' 'Desirable' tends to produce good quality nuts during a heavy crop year. This is due to the fact that the number of nuts in a cluster is not excessively large. There is a strong demand for 'Desirable' in the marketplace. The demand is due to the relatively large kernel size, good kernel color, consistent quality, and ease of hand cracking (when sold inshell). 'Desirable' kernels are one of the best for roasting and salting. This is because the kernel has good color retention dur-ing the roasting process. 'Desirable' nuts typically sell for a higher price than 'Stuart.' In storage, kernel stability is good inshell, but only fair if shelled (26).

'Desirable' breaks buds early in the spring making the tree very susceptible to late spring freezes. 'Desirable' is also susceptible to early fall freezes (9) and to winter freezes (23, 24). Winter injury is especially serious in young trees. Consequently, 'Desirable' should not be planted in marginal climates or on sites with poor air drainage. As a general rule, seedling juvenile trunks, which are far more resistant to winter injury than cultivar trunks (23), should be used whenever 'Desirable' is planted in areas subject to freezing temperatures. The bud or graft union should be at least one foot above the ground, the greater the distance the better. Because weak trees are especially susceptible to winter injury, every

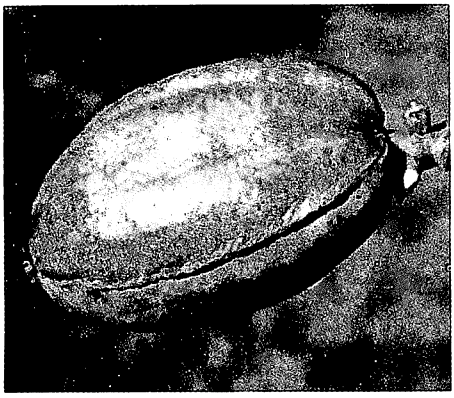

Figure 4. 'Desirable' fruit. Cluster size often consists of one or two fruits. Shuck surface is glossy and convoluted.

attempt should be made to keep the tree healthy. Consequently, retaining the foliage on the tree until the end of the growing season is of major importance. Special attention should be given to the potassium status of the tree as low potassium increases susceptibility of pecan trees to winter injury (17).

Abnormal flowering (male and female inflorescence within the pistillate cluster) occasionally occurs in 'Desirable.' Abnormal flowering is induced by temperatures near freezing during or just before budbreak (20). Abnormal flowering occurs more often in 'Desirable' than most other cultivars and may be due to the earliness of budbreak increasing the chances of winter injury rather than any inherent characteristic. Abnormal flowering does not occur frequently and thus is not a major detriment to production.

'Desirable's' susceptibility to scab varies with geographical location. At Hanna, La., 'Desirable' is much more susceptible to scab than 'Stuart' (1), but at Gainesville, Fla., the reverse occurs (16). In Louisiana, 'Desirable' was reported to scab as severely as 'Schley' (1) and 'Western Schley' (15) in the 1970's, but it was immune in 1944 (8). In areas where 'Desirable' is highly susceptible to scab, experience has shown that scab is much easier to control in the open canopy 'Desirable' than in the dense canopy 'Schley.' The leaf is also susceptible to vein spot, downy spot, and liver spot (8). The fruit is especially susceptible to powdery mildew (2). Control, however, of all these diseases is relatively easy if sprays are timed properly. This cultivar has moderate resistance to fungal leaf scorch (12) but high susceptibility to bunch disease (11).

'Desirable' is immune to southern pecan leaf phylloxera at Brownwood, Tex. (4), but is susceptible to pecan phylloxera (1). The cultivar has moderate resistance to pecan bud moth (14), black pecan aphids (5, 21) and stink bug (5). Following yellow aphid infestations, the leaf has good resistance to sooty mold accumulation (21, 25). 'Desirable' is very susceptible to the potato leafhopper. Severe leaf curl results from heavy infestations occurring during the leaf expansion period (April and early May in the south-

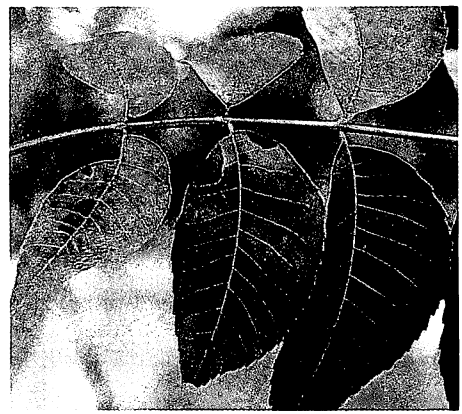

Figure 5. Classical symptom of nitrogen and potassium imbalance in 'Desirable.' The scorch usually first appears at the base of the leaflet as indicated in the photograph. The basal two leaflets are lighter in color than the next two leaflets. The lighter color is indicative of potassium deficiency. In Georgia, the scorch occurs in mid-May if the disorder is very severe, but normally it occurs in early to mid-June. Defoliation can be massive. Scorch from a nitrogen and potassium imbalance occurs before fungal leaf scorch (21). Also the scorch is not bordered by a dark line as with fungal leaf scorch.

eastern United States) or during the period of the second cycle of shoot growth. In addition to damage to the leaf, this insect poses a problem of early insecticide use vs. integrated pest management. The necessity to spray for potato leafhopper may kill beneficial insects which repress other insect pests, mainly aphids.

'Desirable' is very sensitive to an imbalance between nitrogen and potassium (Fig. 5). Potassium must be maintained at a relatively high level in the leaf or else leaf scorch and premature defoliation occur in mid-May or June (Georgia conditions). In a planting of mixed cultivars, the scorch is an excellent indicator of the overall potassium status of the orchard. If scorch does not occur in 'Desirable,' potassium is within the range for high yield and nut quality in 'Desirable' as well as in other cultivars in the orchard (19). Foliage retention is good (11) when nitrogen and potassium are properly balanced. The shoot is moderately susceptible to mouse ear.

'Desirable' has an especially high sunlight requirement. The high light required by 'Desirable' is particularly evident when this cultivar is used as a replant in a mature orchard. Tree growth is often weak and spindly relative to a 'Stuart' replant. The growth problem is further accentuated by 'Desirable's' sensitivity to a nitrogen-potassium imbalance which requires extra potassium application above that given to mature trees. 'Stuart' does not have these problems to the same degree as 'Desirable' and, consequently, 'Stuart' makes better replant in an old orchard.

Mature 'Desirable' trees are about two and one-half times more sensitive to high winds than 'Stuart' (21). Consequently, 'Desirable' definitely should not be planted in coastal areas that are subject to hurricanes. 'Desirable's' sensitivity to wind damage is due, in part, to the tree's strong tendency to produce weak limb crotches. During the tree's early life, training is essential for a strong tree structure because of the tendency to produce weak crotches.

'Desirable' is sensitive to drought conditions. During water stress, leaves are lost more readily from 'Desirable' than from some other cultivars such as 'Elliott,' 'Farley,' and 'Stuart.' On the other extreme, 'Desirable' is more sensitive than most other cultivars to poorly drained soils.

'Desirable' is an excellent cultivar because of the production of better than average yields on a fairly consistent basis, good nut size, dependable kernel quality, high suitability to mechanical shelling, and high demand for the nut in the marketplace. As a mature tree 'Desirable' is probably the best cultivar available. However, 'Desirable' is one of the most sensitive cultivars and should not be planted unless excellent cultural practices are to be employed.

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Irrigation Management Influence on Fruit Quality and Storage Life of 'Redspur' and 'Golden Delicious' Apples

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Abstract

During three crop seasons 'Redspur Delicious' apps (*Malus domestica*, Borkh) from furrow irrigated plots had more red color and lower soluble solids content (SSC) than trickle irrigated apples. 'Golden Delicious' from furrow irrigated plots were larger, softer and had lower SSC than apples from trickle irrigated plots. No carbohydrate or mineral differences were evident for 'Redspur' or 'Golden Delicious' from furrow or trickle irrigation treatments. No other fruit quality differences were apparent between trickle or deficit-trickle irrigation treatments. Fruit quality losses occurred with both cultivars during storage, but losses were not related to irrigation type. Good quality fruit was produced with all irrigation procedures, even under limited water.

Introduction

Fruit grown in semi-arid regions of the world generally require supplemental irrigation to supply water needs. Water supplies in these regions can vary greatly from year to year and insufficient supplies are not uncommon. Restricted supplies require care-

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