Crop Profile for Pecan in Florida

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Production Facts

- In 2007, there were 963 pecan farms in Florida with reported acreage of 8,652 acres. Approximately three-quarters of the acreage (6,741 acres) was reported as bearing (1).

- Slightly over a third (3,153 acres) of Florida pecan acreage is native production, while the remainder (5,499 acres) is comprised of improved varieties (1,2).

- Florida pecan production has increased from the lows of 2004 and 2006 (half million pounds both years) to almost two million pounds in 2007. This amount is almost half of Florida production at its peak (3.7 million pounds in 1999). The value of the 2005 crop was $1.5 million (3,4). Hurricanes and alternate bearing have accounted for many of the low production years (2).

- In 2007, Florida ranked 13th out of the 15 states reporting pecan statistics. Florida accounts for less than one percent of pecans grown in the U.S. (4).

- Prices for pecan nuts have more than tripled from a low of 45 cents a pound in 2001 to $1.47 per pound in 2005 (3).

Production Regions

All of the commercial pecan acreage in Florida resides north of Interstate 4. It becomes increasingly concentrated to the north and west near Tallahassee.

Production Practices

The largest of the hickories, pecan can reach heights greater than 100 feet, but usually grow to less than that and has canopies that spread 40 to 75 feet. The tree needs room to grow, both below and above ground. The deciduous tree is native to the U.S., with northern Florida being its southern-most boundary (through 9A) (5).

In full sun or part shade locations, pecan trees grow best on fertile, well-drained, acid or alkaline moist soil, and are not salt-tolerant. They grow, although more slowly, on dry sandy soils and often defoliate early without irrigation (5).
Many pecan cultivars are not recommended for north Florida because of limitations such as a low percentage kernel or poor resistance to scab and other leaf diseases. 'Lakota', 'Exel', 'Gafford', and 'Headquarters' are cultivars highly recommended for north Florida due to above average yield, nut size and disease resistance. Within the historic cultivars, nut size of 'Elliott' is small, but it is highly recommended because of excellent disease resistance and high oil content. 'Curtis' is also recommended because it has produced consistently high yields and is disease resistant. 'Sumner' is a recommended cultivar because it has a good combination of yield, nut quality and disease resistance (6). Some early maturing varieties with less optimal disease resistance (e.g. 'Pawnee') are grown to try to capture the most lucrative part of the nut harvest, which is at the beginning of fall, while others with less resistance are grown for nut shape and taste ('Desirable').

**Worker Activities**

Pecan trees are picked once a season. For larger operations, the nuts are shaken from the tree, swept into a bare-ground alleyway, and collected. For smaller operations, nuts are picked up in hollow wire balls. Harvest extends from mid-September until late November. During initial set, pecan trees are trained (pruned) so that no limbs are lower than five feet. Unproductive parts of the tree are also pruned out. After about 20 years, the trees start to interfere with each other, and may be pruned for several years before removing alternate trees (2).

**Insect/Mite Management**

**Insect/Mite Pests**

Pecan has a number of insect pests that feed on shoots and foliage as well as the nut. Florida growers report yellow and black aphids, lepidopteran larvae (worms), and pecan bud moth as foliage and shoot feeders. Nut-feeding pests include pecan nut casebearer, pecan weevil, hickory shuckworm, and stink bugs. Mites are occasionally reported as being a problem. Most of these pests occur at regular and somewhat predictable times (7).

**LEAF/NUT CASEBEARERS** (*Acrobasis juglandis/Acrobasis nuxvorella*, respectively)

The pecan nut casebearer is one of the most important early season pests of pecan. The larvae overwinter in hiding spots in pecan trees and emerge to continue feeding in early spring on buds and stems. The first generation larvae produced by the females from the overwintering larvae are the most devastating, as the females oviposit directly on the developing nutlets. After the eggs hatch the larvae begin feeding on and destroy the nutlets. The distinctive signs of larval feeding damage are webbing and frass wrapped around the nutlets. A first generation nut casebearer larva can destroy all the nuts in one to several nut clusters. Nut casebearer populations may vary widely from year to year and from location to location. Populations fluctuate in response to the availability of nuts and other unknown factors. Larval parasitism rates are usually ten percent or more. Two to four generations of nut casebearer may occur, but it is the first generation larvae that are usually the most damaging (8).
Recently a sex pheromone (attractant) produced by the female nut casebearer was identified, synthesized and tested for its attraction to males with excellent results. Baited traps can be placed in the orchard to monitor nut casebearer populations. In testing the baits, the earliest male emergence observed in any year was April 5 while the latest first emergence was observed about May 10. This is a 35 day range in the emergence from year to year. This fact emphasizes how useful such monitoring and detection tools can be to growers for making management decisions (8).

Male moths emerge about three days before females and females require about 3 days for mating before laying eggs. Eggs require about four days before hatch and larvae feed on buds for two days before nut entry. Population buildup requires about 2-4 days. Adding all of these stage durations together provides an estimate that first nut entry takes place about 12-16 days after the first male is trapped. Based on the trap captures, timing for examination of nutlets for eggs and nut entry can be timed properly (7-12 days after the first capture) and treatment decisions can be better timed. Because nut casebearer occur early in the season, it is wise to apply an insecticide only when necessary and to select an insecticide that will have the least impact on beneficial insects such as ladybug beetles and lacewings (8).

BLACK/YELLOW APHIDS (*Melanocallis caryaefoliae/Monelliopsis pecanis*, respectively.)
All aphids on pecans have similar life histories and development. They overwinter as fertilized eggs in crevices in the bark or other protected places on the tree. Wingless female aphids known as stem-mothers hatch about late March. These stem-mothers move out to the opening buds and leaves and feed until fully grown. When grown, they give birth to living young without mating. The young are likewise all females and later, they too give birth to living young. Pecan aphids have two population peaks: one in May - June and a larger one in August - October. Winter cover crops of hairy vetch with crimson clover planted in row middles are recommended to augment beneficial predatory insects. In most years beneficial insects will build up in the cover crops in February - April and then suppress the May - June aphid populations in pecan. The action level for black aphid is between two and five per leaf (2). A newly introduced lady beetle, *Harmonia axyridis*, is an important biological control of pecan aphids. It is suggested that pyrethroids not be used alone or in combination in early or mid season and not be used more than twice per season (7,9).

PECAN WEEVIL (*Curculio caryae*)
The pecan weevil can be a serious pest of pecans in Florida. The adults emerge from the soil beginning in July and can continue emergence into November. Adults feed on the nuts until the shell begins to harden and then they begin laying eggs. Feeding prior to shell hardening prevents nut development and causes the nut to drop. Growers should monitor for adult weevils starting about mid-July using Tedders or circle traps. Drought periods will delay weevil emergence (7).

STINK/PLANT BUGS
Several species of these bugs normally inhabit pecan often in low populations. Populations increase as stink bugs outside the orchard enter orchards in the fall where
they are commonly referred to as kernel-feeding hemiptera. The timing and movement of stink bugs into pecan in the fall is related to weather conditions and to the type of vegetation and crops surrounding the orchard. For example, drought conditions increase the numbers of bugs in the orchard as does cooler weather. Weeds also attract and hold stink bugs in orchards. Peanuts should not be planted near a pecan orchard because stink bugs move out of peanuts into pecan when peanuts are harvested. On the other hand, research has found that small plots of soybean planted outside the orchard as a trap crop during the growing season can be effective at suppressing stink bug populations and reducing pesticide use within the orchard if the soybeans are treated on a timely basis with pesticides (10).

Stink bugs that feed on pecans before shell hardening cause injury termed black pit that leads to nut abscission. In nuts with black pit, the interior is decayed and black in color. Species that feed on nuts after shell hardening damage the kernel, but rarely cause abscission. This damage is termed kernel spot. The kernel spots are variable in size, sunken and bitter to taste. Kernel spot lowers nut quality and is undetectable until shelling (10).

**Chemical Control**
A schedule of yearly maintenance has been published for Florida pecan (7). A review of historic insecticide usage indicates that about a third of growers employ these materials during nut production. This proportion of use generally coincides with the acreage of improved varieties that are cultivated under increased inputs (11). Due to the cost of materials, return on nuts, and cost of application (which is high in pecan due to height of tree), minimal insecticides are used.

Insecticides and miticides registered for use on Florida pecan include azadirachtin, *Bacillus thuringiensis*, bifenazate, bifenthrin, calcium polysulfide, carbaryl, chlorpyrifos, cyfluthrin, cyhalothrin, cypermethrin, deltamethrin, dicofol, endosulfan, esfenvalerate, etoxazole, fenbutatin, hexythiazox, imidacloprid, insecticidal oils, insecticidal soaps, kaolin, malathion, methidathion, methomyl, methoxyfenozide, phosmet, pymetrozine, pyrethrins+/-rotenone, spinosad, spirodiclofen, sulfur, tebufenozide, and thiamethoxam.

Growers report insecticide applications ranging from none (generally small acreage) to eight times a year. Only methoxyfenozide and *B.t.* were reported as active ingredients employed, but mite treatment was also reported.

**Weed Management**

**Weed Pests**
Weeds can reduce pecan yields by competing primarily for water and nutrients. Florida pecan growers report problems with sedges (such as nutsedge), pusley, dayflower, briars, and vines (such as cypressvine morningglory). Two plants that grow on pecan trees, Spanish moss and mistletoe, are also considered weeds.
Mechanical Control
About a quarter of Florida pecan growers report regular mowing (two to four times a year) for weed control. A small number of growers report using guns to prune mistletoe as well as mechanical harvest of this plant as well as Spanish moss.

Chemical Control
There are a number of herbicides labeled for use on bearing pecan (diuron, simazine, glyphosate, norflurazon, oxyfluorfen, paraquat, napropamide, oryzalin, carfentrazone, fluazifop, glufosinate, sethoxydim, 2,4-D, halosulfuron, rimsulfuron, and pelargonic acid). Trifluralin, diquat, clethodim, bentazon, flumioxazin, and pendimethalin can be used on non-bearing pecan trees (12).

Approximately half of Florida pecan growers reported herbicide use, mainly glyphosate several times a year. Use was also reported for oryzalin. Copper materials were reportedly used for Spanish moss control, while 2,4-D was reportedly used for mistletoe control when the pecans are dormant.

Disease Management

Disease Pathogens
The principal disease affecting pecan production in Florida is scab (Cladosporium carigenum), which can affect leaves, stems, and nuts. All Florida growers report this as the primary disease in pecan. Other diseases that can be problematic include downy spot, zonate leaf spot, vein spot, brown spot, and liver spot. Many of these fungi are undescribed on Florida-grown pecan (5,6,13,14).

High humidity and high summer rainfall have limited the range of acceptable cultivars for the southeastern U.S. due to the difficulty in controlling pecan scab. Although there are several highly recommended cultivars that also have good to high resistance to scab (>Elliott<, >Lakota<, >Gafford<), substantial acreage exists that must be treated for scab and other leaf diseases (6,11). Additionally, many cultivars that were originally regarded as resistant to scab, are now considered quite susceptible because the pathogen has adapted to the cultivar (13).

The scab fungus attacks actively growing tissue. Stem tissue can be infected in early spring, leaves can be infected from bud break until fully expanded, and nuts are susceptible from the time they are formed until they have ceased growth in late summer. Nuts are especially susceptible to infection during the period of rapid enlargement, usually from late June through July (13).

Infections are started from spores of the fungus and previous year’s infections. Warm weather produces sporulation, leading to primary and secondary inoculum spread. Lesions are generally circular, range in size from pinpoint to about one-quarter of an inch in diameter are light brown to black, and on leaves most numerous along the veins, but can occur everywhere (13).
Lesions on nuts become sunken and often hardened and crack as they age. Severely infected nuts can be distorted and may stop growing. These may drop prematurely or remain attached to the tree throughout the season. Less severe infections and infections that occur later in the season reduce the growth of the nuts and lower yields (13).

**Chemical Control**
A schedule of yearly maintenance has been published for southeastern pecans (14). A review of historic fungicide usage indicates that nearly half of growers employ these materials during nut production (11).

Fungicides registered for use on Florida pecans include triphenyltin, fenbuconazole, propiconazole, tebuconazole, azoxytrobin, kresoxim, pyraclostrobin, trifloxystrobin, dodine, copper hydroxide/sulfate, thiophanate, calcium polysulfide, carbonic acid, sulfur, phosphorous acid, and ziram. The organotin and triazole fungicides have historically been utilized by growers. Several products are manufactured that are mixtures of triazoles and organotin or triazoles and strobilurins (14).

Growers report fungicide applications ranging from none (generally small acreage) to between three and eight times a year. Fenbuconazole, propiconazole, dodine, trifloxystrobin, and triphenyltin hydroxide were reported as active ingredients employed.

**Biological Control**
Several biological fungicides have been registered for use in pecan. *Bacillus subtilis* and *B. pumilus* are both registered for use in this crop.

**Nematode Management**

**Nematode Pests**
Plant-parasitic nematodes are microscopic roundworms, found in soils, which primarily attack plant roots. General signs of nematode damage include stunting, premature wilting, leaf yellowing, root malformation, and related symptoms characteristic of nutrient deficiencies. Stunting and poor stand development tend to occur in patches throughout the field as a result of the irregular distribution of nematodes within the soil. Pecan roots are known to host the sting nematode (*Belonolaimus longicaudatus*) (15).

**Chemical Control**
The only nematicides registered for use on pecan in Florida are aldicarb and azadirachtin. Azadirachtin is generally accepted as an insecticide, and little data exist that gauges the efficacy of this material against nematodes.
Other Pests

In addition to insects, weeds, diseases, and nematodes, pecans can be damaged by rodents (squirrels) and birds (crows). Approximately 200 to 300 feet of open space are required from other forested areas to reduce the impact of rodent feeding (2) and a substantial percentage of growers do use guns to control squirrels and crows.

Contact

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References


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