Reasons for Poor-Quality Pecans

Pecans (*Carya illinoensis* spp.) can be planted and cultivated in any soil in South Carolina aside from poorly drained soil, hardpan or stiff clays, or thin sands with a high water table. Trees should be spaced at least forty feet apart to provide sufficient room for future growth, good air circulation and light exposure. When selecting a tree for your landscape, a cultivar with good disease resistance is the most important factor to consider. Other crucial considerations include yield potential, nut size and quality, bloom or pollination type, precocity or age the tree begins to bear, and time of nut harvest.

There are a multitude of reasons why a pecan tree may fail to produce either the quality and/or quantity of nuts desired. This fact sheet will cover the most common reasons for poor production (quality and quantity) of nuts.

Pollination

Pollination is the process by which pollen from the anthers of a flower is transferred to the stigma of the same flower or of another flower. This enables fertilization, which results in the development of seeds from the flowers. With pecans, pollination is the necessary first step for the production of nuts, and this is primarily facilitated by wind; insect pollinators are not actually a contributing factor.

There are several factors that influence pollination of pecans. First, there is the tree itself and the manner in which they produce flowers. Pecan trees are monoecious, which means that both male and female flowers develop on the same tree. However, the male and female flowers are formed in two separate locations, although in close proximity to one another on the tree’s branches. The male flowers are called catkins and produce pollen for pollination. The female flowers are called pistillates and require adequate pollen for nut development.

The real issue is that these two flower types develop at different times. This creates a pollination problem because either the pollen production or the receptive female flower is past maturity when the other one is reaching maturity. If this occurs, it will result in a low percentage of flowers being pollinated, which in turn causes either low nut production or poorly developed nuts.

The most common solution to compensate for this is to plant two different cultivars where the pollen shed of one tree matches the timing of receptivity of the female flowers on the other tree, and vice versa. This means that to insure cross-pollination, trees of bloom Types I and II should be included in a planting. On bloom Type I varieties the pollen matures first, and on bloom Type II varieties the female flowers mature first. One may also see these bloom types listed in catalogs as proandrous (Type I) and protogynous (Type II). It is a common practice in the commercial production of pecans for growers to plant up to five different cultivars to ensure proper pollination.

For homeowners that live in an area with a sizeable population of wild or planted pecan trees, this generally does not become an issue. These trees provide additional pollen sources for wind pollination of the home orchard. However, the pollination may be inadequate if only one type of cultivar is planted.

Weather

The weather plays a critical role in pollination. Extremely low temperatures that produce a significant freeze will either damage or kill the female flowers and the catkins. Damaged or dead flower parts will impact pollination and overall nut
production. The degree to which nut production will be impacted will depend upon both the severity and duration of the temperature extremes. For example, in the spring of 2014 a late frost impacted several pecan cultivars that were in bloom and reduced nut production by an estimated 50%.

Rain also greatly impacts pecan development. When the male flowers (catkins) are actively producing pollen, rain can wash the pollen off of the catkins down to the ground. This either reduces or eliminates the amount of pollen that may reach the stigmas of the female flowers. The longer it rains the greater the impact, and nut production may be significantly impacted. As noted earlier, wind is the primary source for transferring the pollen from the male flowers to the female flowers. Under normal weather conditions pollination is generally not a concern.

Fertilization
Proper nutrition is essential in order to maximize tree growth and nut production. Clemson University highly recommends soil testing in order to adequately address nutrient concerns and proper soil pH. The most reliable and commonly used tool for growers who are serious about maximizing nut production is the foliar or leaf tissue analysis. Together both soil and foliar tests provide a comprehensive approach for fertility and environmental sound nutrient management practices. They also can provide an economic benefit by not purchasing and applying unnecessary fertilizers. For additional information on these two tests and fees associated with them contact your local County Extension Service office, the Clemson Extension Home & Garden Information Center, or visit the Clemson Agricultural Lab website at: www.clemson.edu/regulatory/ag_svc_lab/index.html. Additional information on soil testing can be found in HGIC 1652, Soil Testing.

It was common practice for many to make annual and/or bi-annual applications of fertilizer based on diameter of tree trunk and poor nut production. This is no longer the case. In fact, improper nutrient management, whether inadequate or excessive, is now known to cause more problems than benefits in nut production. The problem with these approaches is that excessive application of fertilizer promotes disease and insect pest issues that directly impact nut growth and development. On the other hand, the lack of proper nutrients will result in poor nut development and growth. However, in order for a grower to be absolutely sure about nutrient levels, a foliar analysis also must be conducted to identify any nutrient excesses or deficiencies.

So, the appropriate method for determining pecan tree fertility needs is to conduct both a soil and leaf-tissue analysis and to follow test recommendations for fertilizer and lime. For additional information on this visit the Clemson Agricultural Lab website at: www.clemson.edu/public/regulatory/ag_svc_lab/index.html.

Zinc Deficiency
Zinc is an essential trace element required by pecan trees for successful nut production. A deficiency in zinc generally creates an abnormal growth pattern of the leaves known as a “rosette.” The most noticeable symptoms of rosette is bronzing and mottling of leaves; early defoliation; dead twigs in tops of trees; abnormally small nuts; small, yellowish, chlorotic leaves; short thin twigs growing on older scaffold branches with rosettes of small, yellowish leaves at the tips. An early sign is a wavy margin on the leaflets. Diagnosing such zinc deficiency symptoms is difficult because disease, insect pest, and mite infestations may cause similar symptoms. Confirmation based on a leaf tissue analysis is a standard practice in the pecan industry, and one that everyone should use.

Recently, horticulturists have gained a better understanding of zinc, soil pH and other nutrient interactions. Based on research, it is no longer recommended to make an annual application of zinc based on the diameter of the tree’s trunk because annual applications of zinc may result in an excessive amount of this trace element in the soils, which can lead to other problems and toxicity issues. The proper method is to conduct a leaf tissue analysis as discussed.

For additional information on this topic please contact your local County Extension Service office or the Clemson Extension Home & Garden Information Center. For information on leaf tissue analysis and how to collect a leaf tissue sample, please: http://www.clemson.edu/public/regulatory/ag_svc_lab/plant_tissue/plant_tissue_index.html.
**Alternate Bearing**

Pecans are known to be an “alternate bearing” crop. This means that high yielding years will often be followed by marginally yielding years. This two or more year cycle is very common in most cultivars or varieties used today. Another contributing factor of this natural phenomenon is lack of either rainfall or irrigation water. Pecans originated in an area abundant in ground water and have a long history and need for water, especially during nut development.

Since the 1970s all commercial producers irrigate pecans in order to insure the best possible nut quality, and to reduce the differences in nut production (quantity) each year. An irrigated crop generally does not have as great of margin between years as a non-irrigated crop, commonly referred to as “dry-land production.”

Another contributing factor is inadequate fertilization. When a tree produces a large nut crop, it utilizes a large amount of nutrients and energy. If these nutrient deficiencies are not properly identified and replenished, there will generally be a reduction in yield the following year. To accurately determine which nutrients and their amounts needed, one needs to annually test both the soil and leaves as noted in the “Fertilization” selection above.

To help prevent alternate bearing, use sound cultural practices as noted. This includes both disease and insect control, and the proper use of fertilizer and zinc.

**Early Defoliation**

At times it can be a common occurrence for pecans to lose a majority of their leaves in either August or September. This is known as “early defoliating” and usually is the result of either an insect or disease outbreak or both. If this occurs, it can lead to a poor yielding crop the following year, as the leaves are the energy-producing agents of the tree. If the leaves are compromised, the tree will be less adept at regenerating energy lost in the year’s growth and production. Another cause of defoliation is drought. However, under drought stress, the leaf loss will be at a slower and steady rate. The best way to manage this potential issue is to scout for insects and disease and apply appropriate remedies for the problems, and to irrigate the trees as needed.

**Probable Causes for Nuts Failing to Fill**

Failure of nuts to fill is caused mainly by insect and disease damage to leaves and an inadequate number of leaves. Drought also causes failure to fill, if it occurs late in the growing season.

**Premature Loss of Nuts**

During many years a lack of pollination causes the greatest loss of nuts. Since pecans are wind-pollinated only, excessive rainfall during the spring bloom prevents pollination as noted earlier, and the poorly pollinated flowers produce small nuts that subsequently abort. Insect pest damage, disease pressure and drought are three other factors that can result in premature nut drop.

For more information on pecan diseases, please see fact sheet [HGIC 2211, Pecan Diseases](#). For more information on insect pests, please see [CE-23 Pecan Insects & Disease](#) and [EIIS/FV-2 Pecan Weevil](#).

Prevent nut loss by harvesting early. Harvesting the nuts as soon as they mature ensures better quality. One of the quickest ways to lose nut quality is to let them lay on wet ground.

Revised by Mark Arena, Specialty Crops Agent 12/14. Originally prepared by Bob Polomski, Extension Consumer Horticulturist, and Marjan Kluepfel, HGIC Information Specialist Clemson University. New 03/00.

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