

Routing Pecan Scab— Protecting a Popular Nut

Sweet, tasty pecans remain one of the most popular foods native to North America. Last year, U.S. consumers ate 134 million pounds of them.

But this staple of pies and ice cream and other confections faces a tiny, yet powerful enemy: pecan scab disease. If unstopped, the fungus can destroy a crop, forcing food companies to import pecans to meet demand.

Agricultural Research Service scientists Bruce W.

Wood and Charles C. Reilly are doing their part to ensure that consumers have an adequate supply of pecans. Wood, a horticulturist, and Reilly, a plant pathologist, work at the ARS Southeastern Fruit and Tree Nut Research Laboratory in Byron, Georgia. There, they are developing new strategies to combat pecan scab and protect this native nut crop.

Wood, who heads the Byron lab, says two of the main

advances leading to the U.S. pecan industry's success have been the introduction of fungicides and airblast spray technology for quickly and effectively dispersing pesticides throughout an orchard.

"We're studying ways to build and improve on these advances," he says. "The approaches have quadrupled yields and boosted farmers' profits. But they've also increased operating costs, at a time when wholesale prices for pecans have declined. So we're developing ways to effectively control scab while reducing spraying

costs and minimizing environmental impact."

Pecan scab, caused by the fungus *Cladosporium caryigenum*, is generally the most damaging pecan disease. Discovered on pecans in 1888, it started to become a problem in the early 1900s, when farmers first domesticated the crop.

Scab attacks the foliage, twigs, and developing fruit. The disease causes lesions to appear on leaves as small, charcoal gray to black, concentric

scab is not a problem in arid western regions, like New Mexico, Arizona, and California. Overall, it costs pecan growers at least \$22 million each year in losses and control costs.

Holding the Threat at Bay

Current scab control strategies often require 9 to 11 fungicide sprays per season. Growers typically spray first when leaves begin to emerge from swelling buds, around the first or second week in April.

But scientists have found that young leaves emerging from breaking buds in the spring are not vulnerable to scab. It is after the leaves have grown for about 10 to 14 days that foliage becomes susceptible, Reilly says.

"This means that growers can abbreviate their spray schedule by eliminating or delaying the typical first spray. This could save about \$15 to \$18 an acre in control

costs and also cut pesticide use."

Reilly says weather conditions are the driving force in scab infection and that the disease worsens during periods of high rainfall. "We're developing new predictive spray methods, so growers can potentially reduce costs and pesticide use by cutting the spray schedule during dry years," he says.

Grower complaints of substantial crop losses to scab—even though their orchards received several fungicide sprays per year—have

ROB FLYNN (K8122-1)



Horticulturist Bruce Wood (left) and plant pathologist Charles Reilly inspect greenhouse plants for pecan scab damage.

circles. Severe infection causes defoliation, fruit abortions, and poorly filled fruit, thus reducing yields. It is active throughout the growing season and, if left unchecked, can cause near total crop losses.

The disease continues to be a problem, particularly for the primary commercial pecan tree varieties—Desirable, Schley, and Stuart—grown in the Carolinas, Georgia, Alabama, Florida, Mississippi, Louisiana, and east Texas, where the climate is generally moist. Pecan

raised suspicions about emerging scab resistance to fungicides.

“We haven’t been able to prove increased resistance,” says Reilly. “But we have discovered major deficiencies in the timing and techniques of fungicide application that may give the false impression of resistance.”

To the scientists’ surprise, Reilly says, they discovered the disease protection from fungicides only lasts about half as long as the 2 to 3 weeks previously assumed. “Standard control strategies traditionally used in commercial orchards leave developing fruit unprotected from scab about half of the time,” says Reilly.

A second discovery was that the approximate 4-day kickback activity—the fungicide’s ability to kill scab after infection—was closer to being nonexistent for most fungicides, under commercial field conditions.

“This new information will allow growers to adjust spray strategies to spray orchards quickly once infective conditions develop, or to spray before conditions are right for the disease to take hold,” Reilly says.

Better Spray Coverage

A major scab control problem for pecan growers is the time required to spray an entire orchard. Airblast sprayers typically used in orchards carry 500 or 1,000 gallons of fungicide, travel about 2 miles an hour, and deliver about 100 gallons of spray per acre. This restricts spray coverage to about 75 acres a day. Many commercial pecan orchards are over 400 acres and require more than one airblast sprayer to protect the crop in a timely manner.

To measure fungicide application, the researchers studied how much and where spray materials were

being deposited in the trees, some of which are up to 70 feet tall.

“We discovered that a primary reason for poor scab control was uneven coverage,” says Wood. “The top third of the tree receives very little spray, and coverage of the lower two-thirds is often excessive.” The scientists concluded that contemporary spray equipment contributes to scab-related losses because foliage and fruit are often poorly covered by pesticides.

Wood and Reilly are evaluating a new nozzleless sprayer developed by Michigan State University researchers that will allow for improved protection against disease and insect pests. The sprayer penetrates the tree canopy better, while reducing spray volumes by one-half to two-thirds.

“Preliminary evaluation of this new spray technology for pecans appears highly promising,” says Reilly. “The strategy includes use of an atomizer that creates uniform droplet size, giving superior penetration of fungicides carried by a high-energy airstream into the tree canopy. The nozzles on traditional sprayers either clog up or wear out, causing a need for frequent inspection and replacement.

“On average, growers produce about 286,000 million pounds of pecans per year,” Reilly says. “They’re very excited about having new scab control strategies that lessen crop losses and save money, while reducing pesticide usage.”—
By **Tara Weaver, ARS.**

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If unchecked, lesions like these caused by pecan scab can lead to tree defoliation and reduced yields.

ROB FLYNN (K8125-1)



This new nozzleless sprayer uses one-half to two-thirds less spray to achieve superior coverage and penetration of the tree canopy.