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Enhancing Pecan Production Through the Tri-County Demonstration Program in Arkansas

Abstract

The Tri-County Pecan Demonstration Program in Arkansas was developed to address grower needs related to irrigation, disease management, and kernel quality. Demonstration orchards representing multiple production stages were used to deliver field-based education through collaboration between Extension personnel and cooperating growers. Demonstration practices included Integrated Pest Management (IPM) scouting, telemetry-based irrigation scheduling, and use of the Pecan Scab Hour Calculator. Outcomes were evaluated through field observations, management changes, and grower feedback. Results indicated increased adoption of data-driven irrigation practices, improved fungicide timing decisions, and greater emphasis on kernel quality management. This program demonstrates a practical framework for Extension programming in perennial crop systems.

Introduction

Commercial pecan production continues to expand in Arkansas as new orchards are established and existing plantings mature. Growers consistently report knowledge gaps related to orchard establishment, irrigation scheduling, disease forecasting, and post-harvest marketing. In response, the Tri-County Pecan Demonstration Program was established in 2020 in Prairie, Lonoke, and White counties to address these challenges. The program was developed to build applied pecan expertise through county-based demonstration, on-farm research, and grower engagement. The model emphasizes real-world outcomes rather than theoretical instruction, producing localized information to guide management decisions.

Program priorities and educational focus areas were identified through ongoing consultation with cooperating growers, field observations, county-based farm visits, and recurring production questions received by Extension personnel. Demonstration activities evolved over time in response to observed orchard conditions, grower needs, and emerging management challenges.

Program Background and Early Development (2020–2022)

The demonstration began as a grassroots effort involving multiple county agents collaborating with regional producers. The collaboration developed through recurring pecan production discussions among county Extension agents and regional growers seeking localized production support. Early partnerships helped secure demonstration sites and build momentum for applied pecan education. Initial cooperating orchards included:

- Reidhar Farm – served as the first demonstration site, supporting Integrated Pest Management (IPM) scouting, pecan weevil trapping, orchard sanitation efforts, and initial program-year observations

- Feland Farm – provided opportunities to compare irrigation strategies, orchard floor management, and mid-season disease development

A third demonstration site was added as the program evolved:

- Greg Rusher Farm (2023–2024) – contributed during the middle years of the demonstration program in spray timing and harvest-time education

These early demonstration sites helped expand pecan education efforts from individual orchard recommendations to a coordinated, multi-county Extension demonstration program involving cooperating growers, on-farm observations, and shared management discussions across the region.**Cooperator Orchards and Demonstration Design (2022–Present)**

As grower needs diversified, the program transitioned to a tiered demonstration model using orchards at different stages of pecan development. This structure allowed evaluation of irrigation strategies, crop load responses, pest pressure, and kernel-quality outcomes across orchard maturity levels.

Years Active	Cooperator	Primary Demonstration Role
2022–Present	**Shady Grove Orchard (Lonoke County)**	Immature orchard for establishment, canopy training, and irrigation preparation
2023–Present	**Feather Orchard (White County)**	Mid-stage bearing orchard demonstrating telemetry-based irrigation scheduling, scab-hour forecasting, and kernel-quality evaluations

Years Active	Cooperator	Primary Demonstration Role
2024–Present	**Sanner Farms (Prairie County)**	Mature orchard providing harvest data, kernel-quality assessments, and pest–quality interaction observations

All three orchards include multiple pecan cultivars and are equipped with telemetry-based irrigation systems, enabling comparison of management strategies across environments and developmental stages.

Methods and Educational Approach

Demonstration-Based Learning

County agents worked alongside growers to implement best management practices through field-based instruction. Core practices included:

- Pecan weevil trapping and IPM scouting
- Soil and tissue analysis for fertility planning
- Telemetry-driven irrigation adjustments
- Use of the Pecan Scab Hour Calculator for fungicide timing
- Canopy and orchard floor management
- Kernel quality assessment at harvest
- Marketing and post-harvest decision discussions

Educational activities occurred throughout the growing season and included on-site demonstrations, orchard visits, one-on-one consultations, and informal field discussions

with cooperating growers and regional producers. Regional producers routinely visited demonstration orchards throughout the growing season to observe practices, discuss management decisions, and compare production outcomes.

Technology Integration

All demonstration orchards utilized AgSense® telemetry for real-time moisture monitoring and irrigation scheduling. This technology allowed growers to shift from calendar-based irrigation to stress-driven watering decisions based on soil moisture and environmental data. Program impacts were evaluated through grower feedback, observed management changes, adoption of demonstration practices, and repeated field observations across cooperating orchards.

Program milestones included:

Year	Innovation	Impact
2021	Scab-hour forecasting	Improved fungicide timing
2023	Telemetry-based irrigation	Reduced tree stress and improved nut fill consistency
2024	Kernel-quality monitoring	Linked crop load and water fluctuation to nut value
2026*	AI-enabled casebearer traps	Introduces predictive insect monitoring

*Deployment planned based on 2025 acquisition and preparation

Beginning in 2022, youth field experiences involving school-aged students and 4-H participants introduced participants to pecan production, irrigation technology, pest management, harvest practices, and agricultural career opportunities through orchard visits led by Extension personnel and cooperating growers.

Results and Impacts (2020–2025)

2020 — Establishing the Foundation

- Developed multi-county IPM scouting network
- Established orchard sanitation demonstrations
- Pecan scab was identified through repeated field observations, grower discussions, and recurring disease-related management concerns within cooperating orchards.

2021 — Advancing Disease Management

- Adoption of scab-hour forecasting improved fungicide timing
- Producers recognized weather-driven shifts in scab severity

2022 — Program Expansion

- Added orchards representing different developmental stages
- Demonstrated telemetry as a practical irrigation tool

2023 — Irrigation Becomes Strategic

- Visual or calendar-based irrigation replaced by moisture-threshold decisions
- Growers began treating irrigation as a controllable management input

2024 — Nut Quality Emerges as Profit Driver

- As scab control stabilized, kernel quality replaced disease severity as the primary profitability constraint

- Water stress, crop load, and environmental variability strongly influenced nut value

2025 — Quality Defines Profitability

Shady Grove Orchard remained immature and provided no harvest data. Feather Orchard and Sanner Farms supplied bearing-tree observations and kernel-quality assessments.

Most nuts demonstrated strong kernel fill and commercial quality. However, stress-related issues were documented in portions of the crop, including:

- Darkened seed coats associated with irrigation fluctuation, environmental stress, and excessive crop load
- Embryo rot linked to warm, humid shuck conditions and premature germination triggers
- Stink bug injury resulting in large darkened areas due to enzyme injection during feeding
- Pecan weevil probing causing late-season kernel discoloration

These issues were not associated with any specific orchard, cultivar, or management program, indicating environmental and stress interactions as the primary drivers.

Discussion

The Tri-County Demonstration documented a transition in Arkansas pecan production from reactive to predictive management. Disease forecasting systems enabled proactive fungicide programs, reducing scab severity and allowing greater attention to orchard stress and crop load.

The most significant behavioral shift occurred in irrigation. Prior to telemetry, growers irrigated based on visible drought symptoms or calendar habit. With telemetry installed at all cooperating orchards, irrigation became data-driven, improving nut fill consistency and reducing stress-related kernel defects.

With disease pressure contained, nut quality emerged as the primary profitability frontier, indicating that Arkansas pecan production now requires an emphasis on stress mitigation and crop load management rather than disease-centered strategies alone.

Implications for Extension Work

The Tri-County Demonstration provides actionable implications for Arkansas pecan education:

- Local demonstration accelerates adoption of new technologies
- Orchard stage determines information readiness and training needs
- Telemetry-based irrigation should be prioritized statewide
- Nut-quality education must accompany disease management training
- Demonstration-based delivery remains the most effective model for perennial crops

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