From Soil to Shell: Managing Fertility in Home Pecan Orchards

Overview

Fertility management is one of the most powerful tools a home pecan grower has but also one of the most misunderstood. Unlike commercial orchards, where fertility programs are fine-tuned for maximum yield, home orchards require a more balanced, practical approach. The goal isn't just to grow more nuts. It's to grow healthier trees, reduce stress and support long-term productivity with minimal inputs.

With Louisiana's diverse soils and humid climate, nutrient availability can vary widely from one yard to the next. Some trees may suffer from zinc deficiency or low pH, while others thrive with little intervention. That's why understanding your site — and your tree's growth stage — is essential. A young tree establishing roots has very different needs than a mature tree filling a heavy crop.

This publication walks you through the essentials of pecan fertility, from interpreting soil and leaf tests to choosing the right fertilizer and timing your applications. You'll learn how to recognize nutrient deficiencies, how to adjust for wet or dry years and how to use tools like clover or compost to build long-term soil health. Whether you're managing a single legacy tree or a small orchard, this publication will help you make informed, efficient decisions that support your trees from the ground up.

This publication will cover:

1. **How To Apply Fertilizer in Home Orchards:** Common homeowner misconceptions (e.g., dibbling), broadcast versus banded versus foliar versus soil drench, and a practical application method table.
2. **Nutrient Needs and Soil pH:** Nutrient priorities by tree age, key nutrients for pecans (N, P, K, Zn, Ca, S, B), how needs shift from establishment to nut production, ideal pH range and how to correct imbalances.
3. **Soil Testing and Interpretation:** When and where to sample, what to look for in results and how to use them to guide fertilization.
4. **Leaf Sampling and Foliar Analysis:** Why foliar testing matters, when and how to sample, interpreting results and tracking nutrient trends over time.
5. **Interpreting Tree Performance and Adjusting Fertilization:** Visual cues like shoot growth, leaf color and nut fill; fertilizing in wet versus dry conditions; and a summary table of visual indicators.
6. **Responding to Test Results:** Action thresholds and response strategies, nutrient status categories, suggested actions and when to retest.
7. **Nutrient-by-Nutrient Guidance:** Individual entries for N, P, K, Zn, Ca, Mg, S, B, Fe, Mn, Cu, Mo and Ni, including visual symptoms, sufficiency ranges and correction methods.

8. **Organic Matter and Clover:** Foundations for Healthy Soil: Role of compost and poultry litter in improving soil structure and fertility, managing risks of overliming or micronutrient imbalance, nitrogen fixation and soil improvement through clover, recommended clover types, establishment tips and timing of mowing and fertilization to complement clover growth.
9. **Managing Fertility in Sandy Versus Clay Soils:** How nutrient behavior differs by soil type, quick identification methods and tailored fertility tips for each.

1. How To Apply Fertilizer in Home Pecan Orchards

Before diving into nutrient types and timing, it's important to understand how fertilizer should be applied. Many homeowners mistakenly believe they need to dig holes or "dibble" fertilizer into the soil. In most cases, this is unnecessary — and can even harm the tree.

Pecan roots absorb nutrients primarily from the top 6 to 12 inches of soil, especially in the zone between the trunk and the dripline. Applying fertilizer on the surface and watering it in is usually the most effective and safest method.

Fertilizer application methods for home pecan trees.

Application Method	When to Use	How to Apply	Best For
Broadcasting	Most common method for mature trees	Evenly spread fertilizer on the soil surface under the canopy, avoiding the trunk.	Nitrogen, potassium, balanced fertilizers
Banding	When applying micronutrients or correcting deficiencies	Apply in a shallow band halfway between the trunk and dripline.	Zinc, phosphorus, potassium
Foliar sprays	When rapid correction is needed or soil uptake is limited	Spray diluted solution directly onto leaves using a pump or hose-end sprayer.	Zinc, boron, manganese, nickel
Soil drench (liquid)	For small trees or targeted correction	Pour diluted solution around the dripline area.	Iron, manganese, micronutrient chelates
Avoid: Dibbled or buried granules	Not recommended	This can burn roots or concentrate salts in one spot.	—

TIP: For granular fertilizers, apply in a wide ring starting 12 to 18 inches from the trunk and extending to the dripline. Water in after application if no rain is expected.

Myth: You Have To Bury Fertilizer for It To Work

Not true! Pecan roots are most active in the upper soil layers. Broadcasting fertilizer on the surface — then watering it in — is usually **more effective and safer** than burying it. Dibbled or buried fertilizer can **burn roots**, **concentrate salts** and **miss the feeder root zone** entirely.

This misconception likely stems from older planting instructions or practices borrowed from vegetable gardening, where banding or side-dressing is common. **In home pecan orchards, surface application** is almost always the **most effective and practical method,** especially for granular fertilizers.

2. Nutrient Needs and Soil pH

Pecan trees are long-lived, deep-rooted, and nutritionally demanding, especially during establishment and nut production. While mature trees can tap into deep soil reserves, young trees rely heavily on the top 12 to 18 inches of soil, where nutrient availability can vary widely across Louisiana's diverse landscapes.

For home growers, the key to successful fertility management is understanding which nutrients matter most, when they're needed, and how those needs change as the tree matures. Overfertilizing can be just as harmful as underfeeding, especially in the early years, so timing and balance are critical.

Key Nutrients for Pecans

The seven most important nutrients for pecan health and productivity in Louisiana home orchards are:

- **Nitrogen (N):** Drives shoot growth and canopy expansion. Essential for leaf development and early vigor.
- **Phosphorus (P):** Supports root development, energy transfer and early-season growth. Often applied preplant based on soil tests.
- **Potassium (K):** Regulates water movement, strengthens cell walls and improves stress tolerance. Important for kernel fill and disease resistance.
- **Zinc (Zn):** A critical micronutrient for pecans. Supports leaf expansion, shoot elongation and nut development. Frequently deficient in Louisiana soils.
- **Calcium (Ca):** Supports root development, cell wall strength and nut quality. Often addressed through lime applications.
- **Sulfur (S):** Important for protein synthesis and enzyme function. Deficiencies are increasingly common in sandy or low-organic soils, especially in acidic regions.
- **Boron (B):** Essential for seed coat elasticity, lignin deposition, pollen tube growth and potassium regulation during kernel fill. Deficiency is a major contributor to black kernel rot and poor nut quality in southeastern soils.

Other nutrients like **magnesium (Mg), iron (Fe), manganese (Mn), copper (Cu), molybdenum (Mo) and nickel (Ni)** also play important roles in pecan physiology and shell development but are less commonly limiting in well-managed home orchards.

Soil pH and Nutrient Availability in Home Orchards

Soil pH is one of the most important — but often overlooked — factors in pecan fertility. It affects how nutrients behave in the soil, how easily roots can absorb them, and how well beneficial microbes function. Even if nutrients are present in adequate amounts, an imbalanced pH can lock them up and make them unavailable to the tree.

Ideal pH Range for Pecans

Pecans grow best in soils with a **slightly acidic to neutral pH**, ideally between **6.0 and 6.5**. This range supports optimal availability of phosphorus, zinc, calcium and other key nutrients.

- **Below 5.5:** Rhizobia (used in clover inoculation) and many beneficial microbes struggle to survive. Zinc and phosphorus uptake is reduced.
- **Above 7.0:** Iron, manganese and zinc become less available. Boron uptake may also decline.

How pH affects nutrient uptake.

pH Range	Common Issues
< 5.5	Poor root growth and low microbial activity
5.5-6.0	Zinc and phosphorus begin to become more available
6.0-6.5	Optimal range for most nutrients and microbial activity
6.5-7.0	Still acceptable, but iron and manganese may begin to decline
> 7.0	Micronutrient deficiencies (Zn, Fe, Mn, B) more likely

Correcting soil Ph:

- **Low pH (acidic soils):** Apply **agricultural lime** based on soil test recommendations. Use **calcitic lime** if magnesium is adequate or **dolomitic lime** if both calcium and magnesium are low.
- **High pH (alkaline soils):** Lowering pH is more difficult. Focus on **banded applications** of micronutrients or **foliar sprays** for zinc, iron, and manganese. Elemental sulfur may be used to gradually acidify the soil, but results are slow and depend on microbial activity and soil texture.
- **Adding organic matter can help buffer pH swings.** Compost, poultry litter or clover improve soil structure and help moderate both low and high pH conditions over time.

TIP: Always test your soil before applying lime. Overliming can suppress micronutrient uptake and create new problems.

How Nutrient Needs Change Over Time

Pecan nutrient requirements shift significantly as trees age:

- **Years 1 to 3 (Establishment):** Focus is on root development and steady vegetative growth. Nutrient needs are modest but must be well-timed. Zinc and phosphorus are especially important early on.
- **Years 4 to 7 (Canopy Expansion):** Trees begin to grow rapidly. Nitrogen demand increases, and potassium becomes more important for stress tolerance and shoot strength.
- **Year 8+ (Nut Production):** Nutrient demand peaks. Trees require more nitrogen and potassium to support flowering, kernel fill, and alternate bearing cycles. Zinc remains critical for nut development and leaf health.

Matching fertility inputs to these growth stages helps avoid common problems like stunted growth, week wood, poor kernel fill or delayed bearing.

The Role of Nutrient Balance

Even if individual nutrients are present in the soil, an imbalance between them can limit uptake, reduce tree vigor or contribute to problems like poor kernel fill or dark seed coats.

For example:

- **Too much nitrogen** without enough potassium can lead to excessive shoot growth and weak wood including branches that are poorly lignified and prone to breakage under crop load or wind.
- **High calcium or aluminum levels** can interfere with boron uptake, especially in dry soils, leading to seed coat splitting or poor nut fill.
- **Zinc and phosphorus** compete for uptake in acidic soils, so correcting one without addressing pH may not solve the problem.

In home orchards, the goal isn't to chase perfect ratios. It's to avoid extremes and recognize when one nutrient might be blocking another. That's why **soil testing and leaf analysis** are so valuable. They help you see the whole picture, not just one number.

3. Soil Testing and Interpretation

Getting the Foundation Right

Before you apply fertilizer — or even plant a tree — it's worth taking a close look at your soil. A simple soil test can reveal critical information about pH, nutrient levels and potential limitations that could affect pecan growth for decades. For home growers, this is one of the most cost-effective steps you can take to avoid long-term problems.

Without testing, it's easy to misjudge what your trees actually need. Some nutrients may be present but unavailable due to low pH. Others may be overapplied, leading to imbalances that interfere with uptake. The result? Trees that struggle to establish, bear inconsistently or produce poor-quality nuts, despite your best efforts.

Soil testing helps you avoid those pitfalls by identifying what's missing, what's excessive and how to bring things into balance. It's especially important before planting, but it's just as valuable in established orchards where years of nutrient removal or leaching may have quietly depleted key reserves.

Micronutrient testing should always be included. While macronutrients like nitrogen, phosphorus and potassium are essential, micronutrients such as zinc, boron, manganese and copper are just as critical, especially in pecans. Young trees need them to establish strong roots and shoots, while older trees may have exhausted local reserves after decades of growth.

Because pecan trees lack root hairs, they absorb nutrients more slowly than many other species. Even after correcting a deficiency in the soil, it may take two to three years for that change to show up in the leaves, especially for micronutrients like zinc or boron.

When and Where To Sample

Soil samples should be collected at least three to six months before planting or fertilizing. Fall or early winter is ideal, giving you time to apply lime or nutrients before spring growth begins. For most home orchard settings, you'll want to sample the **top 8 to 12 inches of soil**, which reflects the active root zone for nutrient uptake. **Avoid including the surface organic layer,** such as mulch, compost or decomposed leaf litter, as it can skew test results and overestimate nutrient availability.

For **single trees or small groupings**, focus your sampling in the immediate root zone. Collect multiple cores from within a 5-to-10-foot radius of each planting site, or halfway between the trunk and drip line for established trees. Avoid sampling from lawn areas or between trees. Those spots may not reflect the conditions that actually affect root uptake.

For **larger plantings or small orchards**, divide the orchard into blocks based on soil type, tree age or management history. Sample each block separately. Within each block, collect 15 to 20 cores, mix them thoroughly in a clean bucket and submit a composite sample. If you're planting into previously cultivated land, or suspect subsoil issues, consider also sampling down to 12 inches to assess deeper fertility and pH.

The goal is to capture the variability that matters without overcomplicating the process.

How To Submit a Sample

Soil samples can be submitted to a variety of public or private testing labs. Many state extension offices offer soil test kits and instructions tailored to local conditions. These kits typically include sample bags, submission forms and mailing instructions. Your local extension agent may also help interpret results and guide fertilizer decisions based on your site and goals.

If using a private lab, make sure it provides recommendations suitable for fruit and nut trees and includes micronutrient analysis. Some labs offer faster turnaround or additional testing options, but interpretation may require more familiarity with pecan-specific nutrient needs. Always follow the lab's instructions for sample depth, labeling and packaging to ensure accurate results.

Regardless of which lab you choose, be sure to:

- Follow the sampling instructions carefully.
- Label each sample clearly.
- Include the appropriate forms and payment.
- Mail the sample directly to the lab's address.

What To Look for in Your Soil Test

Understanding your soil test results doesn't require a background in agronomy, but it does help to know what matters most for pecans. While pH sets the stage for nutrient availability, elements like phosphorus, potassium and zinc directly influence root growth, canopy vigor and kernel quality. Calcium and magnesium affect nutrient balance and uptake, while sulfur and boron — often overlooked — can be critical in acidic or sandy soils. Even if your trees appear healthy, a soil test can reveal hidden limitations that may be holding back performance. Use this guide to interpret your results and make informed decisions about lime, fertilizer and long-term soil management.

What to look for in your soil test.

Soil Property	Index Range	Pecan-Specific Desired Range	Why It Matters
pH	6.5-7.0	6.0-6.5	Affects nutrient availability. Low pH can limit P, Ca and Zn uptake.
Phosphorus (P)	Low is <26; medium is 26-50; high is >50	30-60 pounds/acre	Supports root development and early growth. Apply preplant if low.
Potassium (K)	Low is <91; medium is 91-150; high is >150	100-150 pounds/acre	It's critical for water regulation, stress tolerance and kernel fill.
Calcium (Ca)	Balanced with Mg	400-900 pounds/acre	Supports root health and nut quality. It also affects boron uptake.
Magnesium (Mg)	Balanced with Ca	90-100 pounds/acre	Important for chlorophyll and photosynthesis. Watch Ca:Mg ratio (3:1 to 7:1).

Soil Property	Index Range	Pecan-Specific Desired Range	Why It Matters
Sulfur (S)	Low is <6; medium is 6-10; high is >10	10-50 pounds/acre	It is needed for protein synthesis; often low in sandy or acidic soils.
Zinc (Zn)	Low is <10; medium is 10-20; high is >20	15-20 pounds/acre	It's essential for shoot growth and nut development and is often deficient in La. soils.
Boron (B)	Soil levels may be tested, but foliar analysis is more reliable for pecans.	0.5-1.0 pounds/acre	Critical for seed coat elasticity and kernel fill. Deficiency is linked to black kernel rot.
Copper (Cu)	Soil levels may be tested, but foliar analysis is more reliable for pecans.	0.5-1.5 pounds/acre	Copper supports lignin formation and enzyme function.
Manganese (Mn)	Soil levels may be tested, but foliar analysis is more reliable for pecans.	15-50 pounds/acre	It is important for shell strength and photosynthesis.
Iron (Fe)	Soil levels may be tested, but foliar analysis is more reliable for pecans.	12-25 pounds/acre	Iron is involved in chlorophyll formation, and deficiency causes interveinal chlorosis.
Nickel (Ni)	Soil levels may be tested, but foliar analysis is more reliable for pecans.	5-15 pounds/acre	It's required for urease activity and seed development, and deficiency causes mouse ear.
Nitrogen (N)	Foliar analysis is more reliable for pecans.	(foliar) 2.5%-3.3% high input 2.2%-2.5% low input	Soil tests are rarely provide reliable N levels for pecans. Recommendations are based on tree age, shoot growth and crop load — not soil N levels.

4. Leaf Sampling and Foliar Analysis

Seeing What the Tree Sees

Soil tests tell you what nutrients are available in the ground, but leaf sampling shows what the tree is actually using. That's an important distinction in pecans, which lack root hairs and often absorb nutrients more slowly than other fruit or nut trees. Even after correcting a deficiency in the soil, it can take two to three years for some nutrients, especially micronutrients like zinc or boron, to show up in the leaves. Leaf analysis gives you a direct look at what's making it into the canopy and helps you stay ahead of problems before they affect yield or nut quality.

Why Leaf Sampling Matters

Pecan trees are slow to show visible signs of nutrient stress, and by the time symptoms appear, the damage may already be done. Leaf sampling offers a proactive way to monitor nutrient uptake and fine-tune your fertility program, especially in home orchards where foliar sprays may not be practical and soil applications take time to work.

It's particularly useful for:

- Confirming whether soil-applied nutrients are reaching the canopy
- Diagnosing hidden deficiencies before symptoms appear
- Tracking nutrient trends over time
- Adjusting fertilizer rates in mature trees or correcting imbalances

It also gives you the opportunity to act early when nutrient levels are still in the low-to-medium range so you can prevent deficiencies from developing in the first place.

When and How To Sample

Timing and Technique Matter

The standard window for pecan leaf sampling in Louisiana is **late July to early August**, once leaves are fully expanded but before kernel fill begins. Sampling too early may give misleading results, while sampling too late can reflect nutrient redistribution rather than uptake. This timing ensures that the sample reflects what the tree is absorbing during a critical phase of nut development.

To collect a representative sample:

- Choose **healthy, sun-exposed compound leaves** from the **middle of the current season's growth**. Avoid shaded interior branches or damaged limbs.
- For individual trees or small plantings, collect **50 to 100 leaflets** from across the canopy.
- For larger orchards, divide the planting into blocks based on cultivar, age or soil type. Sample each block separately, collecting leaflets from multiple trees within each block.
- Place samples in a **paper bag** (not plastic), label clearly and submit to a certified lab for analysis.

If you're sampling multiple cultivars or management zones, keep samples separate and label them accordingly.

The red circle highlights the middle of the current season's growth while the yellow arrow points to the middle leaflet pair that should be collected. Photo by William Reid

The yellow arrow indicates the position on the shoot where leaflets were removed while the red circle shows the actual leaflets collected for analysis. Photo by William Reid

Interpreting Foliar Test Results

Once your leaf analysis results come back from the lab, the next step is understanding what they tell you. Each nutrient is reported as a concentration in the leaf tissue, usually in parts per million (ppm) or as a percentage of dry weight. These values reflect what the tree has actually absorbed and transported to the canopy, making them a direct indicator of nutrient status.

If a nutrient is in the **low or low-medium range**, it may not yet be causing visible symptoms, but it's a sign that the tree is approaching deficiency. This is the ideal time to act. Adjusting your fertility program while levels are still marginal can prevent problems before they affect yield or nut quality. Likewise, excessively high nutrient levels, especially nitrogen or potassium, can increase the risk of leaf scorch, nutrient lockout or poor return bloom.

In addition to individual nutrient levels, it's also important to watch for imbalances between nutrients. Ratios like nitrogen to potassium (N:K) or calcium to magnesium (Ca:Mg) can influence uptake and tree performance.

Leaf sampling should be repeated annually or at least every few years to track trends and fine-tune your fertility program over time.

Foliar Nutrient Sufficiency Ranges for the Home Orchard

Leaf analysis is one of the most effective tools for monitoring pecan tree nutrition. The nutrient ranges presented here are tailored for home orchards, with an emphasis on maintaining tree health and consistent production under low-input management. These targets are adapted from research on native and low-input cultivar orchards and are intentionally more conservative than commercial standards. They are designed to support long-term tree vigor, reduce the risk of nutrient imbalances and minimize unnecessary fertilizer use.

Foliar nutrient sufficiency ranges for the home orchard.

Nutrient	Sufficiency Range (Low-Input)	Notes
Nitrogen (N)	2.3%-3.0%	Lower end of commercial range; supports healthy canopy without overstimulation
Phosphorus (P)	0.12%-0.30%	Adequate for root function and kernel development
Potassium (K)	0.85%-2.50%	Supports water regulation and kernel fill
Zinc (Zn)	60-150 ppm	Critical for shoot growth and nut development
Calcium (Ca)	0.70%-1.75%	Important for root health and nut quality
Magnesium (Mg)	0.30%-0.60%	Supports chlorophyll and photosynthesis
Sulfur (S)	0.20%-0.35%	Needed for protein synthesis
Boron (B)	15-50 ppm	Key for seed coat elasticity and kernel fill
Manganese (Mn)	100-2,000 ppm	Supports lignin biosynthesis and shell strength
Iron (Fe)	50-300 ppm	Involved in chlorophyll formation
Copper (Cu)	6-30 ppm	Important for lignin and enzyme function
Nickel (Ni)	>2.5 ppm	Required for urease activity and seed development

Quick tips for foliar testing in home orchards:

- Use foliar testing to confirm uptake, especially for micronutrients like Zn and B.
- Annual sampling is ideal. At minimum, test every two to three years to stay ahead of deficiencies.
- Watch for downward trends even if values are normal.
- Borderline results may not need correction unless stress is visible.
- Nutrient ratios (e.g., N:K, Ca:Mg) can reveal hidden imbalances.

5. Interpreting Tree Performance and Adjusting Fertilization

Tailoring Fertilization to Tree Age and Performance

Fertilizing pecan trees effectively requires more than just following a calendar. It means adjusting your approach based on both the tree's age and its current performance. Young trees need nutrients to support root development and canopy growth, while mature trees require a balanced program that sustains yield and prevents stress. Leaf color, shoot growth and nut production offer important clues about whether your fertility program is working.

Year-by-Year Guidelines for Young Trees (Years 1 to 5)

Fertility management during the first five years of a pecan tree's life should focus on establishing healthy roots, balanced canopy growth and resilient soil conditions. In Year 1, fertilizer is typically withheld at planting to avoid root burn and overstimulation. A small application may be warranted in early summer if the tree has put on at least 2 to 4 feet of growth. From Year 2 onward, split applications of balanced fertilizer help support steady shoot elongation and early root expansion. Rates remain conservative to avoid excessive vegetative growth, which can delay bearing and increase susceptibility to stress.

By Year 3, trunk diameter becomes a more reliable guide for adjusting fertilizer rates. Trees should be evaluated for shoot length, leaf color and overall vigor before applying nutrients. Pale foliage or weak growth may signal a need for micronutrient support, especially zinc or boron in areas where deficiencies are common. Organic matter, such as compost, aged manure or mulch, should be incorporated annually to improve nutrient retention and soil structure.

In Years 4 and 5, trees begin transitioning toward maturity. Annual foliar sampling should begin in mid-July to track nutrient uptake and guide future adjustments. Trees that show strong growth and healthy leaf color may not require full fertilizer rates, while those underperforming may benefit from targeted corrections. If trees begin bearing, kernel fill and nut quality become important indicators of potassium and boron status. By the end of Year 5, growers should be prepared to shift toward a mature tree fertility program that incorporates leaf analysis, yield history and nutrient balancing.

Year-by-year fertilizer guidelines for young pecan trees.

Year	Timing	Fertilizer Type	Rate	Application Notes
Year 1	June (only if ≥2-4 feet of growth)	5-10-15	1 pound per tree	Broadcast in a 25-square-foot area around tree. Avoid trunk contact. No fertilizer at planting.
Year 2	March, May, June	10-10-10	1 pound per tree per application	Apply evenly around tree. Avoid trunk contact.
Year 3	March and June	10-10-10	4 pounds per inch of trunk diameter (measured 1 foot above ground)	Split into two applications. Example: A 1.5-inch tree gets 3 pounds in March and 3 pounds in June.
Year 4	March and June	10-10-10	4 pounds per inch of trunk diameter	Begin annual foliar testing in mid-July. Adjust rates if leaf N is above 2.7% or below 2.3%.
Year 5	March and June	10-10-10	4 pounds per inch of trunk diameter	Continue foliar testing. Begin monitoring nut fill and kernel quality if trees begin bearing. Prepare to transition to mature tree fertility program.

Fertility for Mature Trees

As pecan trees transition from establishment to regular bearing, their nutrient demands shift from supporting growth to sustaining productivity. Mature trees require more nitrogen, potassium and micronutrients to maintain canopy health, support kernel development and recover from crop stress. Fertility programs should consider crop load, tree vigor and seasonal conditions.

Key considerations for mature tree fertility include:

- **Nitrogen demand increases** with crop load. Use shoot growth and leaf color as visual indicators, and adjust rates based on foliar nitrogen levels.
- **Potassium becomes critical** for kernel fill, stress resistance and leaf retention. Maintain a leaf N:K ratio near 2:1 to avoid scorch.
- **Micronutrient deficiencies** (especially zinc and boron) are more likely to impact nut quality and return bloom in mature trees.
- **Split applications** of nitrogen improve uptake and reduce loss, especially in sandy or saturated soils.
- **Foliar testing** is essential for tracking nutrient uptake and identifying hidden deficiencies before symptoms appear.

Fertility priorities for mature trees.

Goal	Fertility Focus	Notes
Maintain canopy health	Nitrogen, zinc	Use shoot growth and leaf color as guides.
Support kernel fill	Potassium, boron	Monitor N:K ratio and leaf retention.
Improve stress recovery	Calcium, magnesium	It's especially important after drought or heavy crop years.
Prevent alternate bearing	Balanced N and K	Avoid excessive N in "on" years.
Correct deficiencies quickly	Foliar sprays	Especially for Zn, B, Mn, Fe and Ni.

Seasonal Fertility Calendar for Louisiana Home Pecan Orchards

Spring (February to April):

Apply lime, phosphorus or potassium if soil test results indicate deficiency.

Begin nitrogen fertilization once trees show active growth (typically March to April).

Apply zinc or boron if foliar levels were low the previous year.

Take soil samples in **February or early March** if not done in fall.

Summer (May to July):

- **Monitor shoot growth and leaf color** for signs of nutrient stress.
- **Apply nitrogen to young trees** if growth is strong and soil moisture is adequate.
- **Collect leaf samples** for foliar nutrient analysis in **mid- to late July**.
- **Avoid fertilizing during prolonged wet or dry spells.** Wait for stable soil conditions.

Fall (August to October):

- **Apply potassium or micronutrients** only if **foliar or soil tests** show deficiency.
- **Apply lime or compost** if conditions allow and pH adjustment is needed.
- **Optional:** Apply **nickel** in fall if foliar levels were low and trees are bearing.

Winter (November to January):

- **Take soil samples** for spring planning, especially before planting new trees or adjusting pH.
- **Apply lime or compost** if soil is workable and not saturated. This gives time for pH adjustment before spring growth.

Applying lime during the dormant season allows time for soil pH adjustment before spring growth begins. This practice is best done when soil is workable and not saturated, reducing stress on trees and improving nutrient availability for the coming season. Photo by William Reid

Interpreting Tree Performance and Adjusting Fertilization

Fertilizing pecan trees effectively means more than following a calendar. It requires responding to the tree's signals and adapting to seasonal conditions. In home orchards, where inputs are often limited and tree performance varies by site, successful fertility management depends on observing visual cues like shoot growth, leaf color and nut fill, and adjusting fertilization based on weather, tree vigor and observed stress.

Fertilizing in Wet Versus Dry Conditions

In Louisiana, seasonal weather can swing between extremes. While March is often the target month for fertilization, **saturated soils** can delay nutrient uptake and increase leaching risk, especially for nitrogen. On the other hand, **dry conditions** can limit root activity and reduce uptake even when nutrients are present.

In wet conditions, delay fertilization until soils begin to dry and trees show signs of active growth. Applying nutrients to waterlogged soils increases the risk of runoff and root stress.

In dry conditions, ensure adequate soil moisture before fertilizing. Drought-stressed trees may not absorb nutrients efficiently, and early fertilization can lead to salt buildup or poor response.

Microbial activity also slows under extreme moisture conditions. In saturated soils, oxygen depletion can suppress the microbial processes that release nutrients from organic matter. In dry soils, microbial function declines due to dehydration. Both extremes can delay nutrient availability, especially for nitrogen, phosphorus and sulfur.

TIP: If you can't walk through the orchard without leaving deep footprints, it's too wet to fertilize. If the soil is powdery and cracking, it may be too dry. Consider irrigating before applying fertilizer.

A flooded pecan orchard creates saturated soils. Fertilizing under these conditions increases the risk of nutrient leaching, runoff and root stress. Delay applications until soils begin to dry and trees resume active growth. Photo by William Reid

Deep soil cracks in a pecan orchard indicate severe dryness. Fertilizing under these conditions can lead to poor nutrient uptake and salt buildup. Irrigate before applying fertilizer or wait until several rain events have moistened the soil to apply after drought conditions, ensuring adequate moisture for absorption. Photo by William Reid

Using Tree Performance To Guide Fertilization

Visual cues from the tree are often the first sign that nutrient adjustments are needed. While soil and foliar tests provide precise data, observing shoot growth, leaf color and nut development throughout the season can help home orchardists make timely, practical decisions.

Shoot Growth

Annual terminal shoot growth is a reliable indicator of nitrogen status and overall tree vigor:

- **6 to 10 inches** of new growth is ideal for mature trees.
- **Less than 4 inches** may indicate nitrogen deficiency or root stress.
- **More than 12 inches** may suggest overfertilization or excessive vegetative growth, which can reduce return bloom.

Use pruning shears or a ruler to measure the current season's growth on several representative branches. If growth is weak, consider increasing nitrogen or checking for root limitations (e.g., compaction, waterlogging).

Leaf Color

Leaf color reflects chlorophyll content and can signal deficiencies in nitrogen, magnesium or iron:

- **Pale green or yellowing leaves** often indicate low nitrogen or sulfur.
- **Interveinal chlorosis** (yellowing between green veins) may point to magnesium, manganese or iron deficiency.
- **Rosette or wavy leaves** suggest zinc deficiency, especially in older trees or high-pH soils.

Visual symptoms should always be confirmed with a foliar test before making major adjustments.

Pale green to yellow leaves on a pecan branch indicate reduced chlorophyll, commonly linked to nitrogen deficiency. Visual symptoms should always be confirmed with a foliar test before making major adjustments. Photo by William Reid

Nut Yield and Kernel Quality

Nut production offers insight into long-term nutrient balance:

- **Poor kernel fill** may indicate potassium or boron deficiency.
- **Blackened or shriveled kernels** are often linked to boron deficiency or drought stress.
- **Alternate bearing** can be worsened by excessive nitrogen in "on" years or poor potassium availability in "off" years.

Tracking yield trends over time helps identify whether fertility programs are supporting consistent production or contributing to biennial swings.

Visual cue summary table: Common symptoms and likely nutrient associations.

Symptom	Likely Nutrient Issue
Pale green or yellowing leaves	Nitrogen or sulfur
Interveinal chlorosis	Magnesium, manganese, or iron
Rosette or wavy leaves	Zinc
Short shoot growth (<4 inches)	Nitrogen deficiency or root stress
Excessive shoot growth (>12 inches)	Overfertilization or excessive nitrogen
Poor kernel fill	Potassium or boron
Blackened or shriveled kernels	Boron deficiency or drought stress
Biennial bearing pattern	Excess nitrogen in “on” years, poor potassium in “off” years, or overall insufficient fertility

6. Responding to Test Results

How To Interpret Results

Compare your results to established sufficiency ranges. For home orchards, use the **low-input target ranges** provided in this guide. These reflect nutrient levels that support tree health and kernel quality without pushing for maximum yield.

- **Below range**: Indicates a deficiency. Increase fertilizer rate or switch to a more available form (e.g., foliar spray).
- **Within range**: Maintain current rate. Monitor for signs of imbalance or stress.
- **Above range**: Reduce or withhold fertilizer. Excess nutrients can cause toxicity or suppress uptake of others.

Making Adjustments

Use the following general approach when adjusting rates based on foliar test results. However, note that some nutrients, such as boron, zinc and nickel, have narrow sufficiency windows and can become toxic if overapplied. Always consult nutrient-specific guidance before making large adjustments.

For each of the following nutrient statuses, take these suggested actions:

- **Very low:** Double last year's rate or apply maximum recommended rate. (This is not recommended for nutrients with narrow safety margins such as boron, zinc and nickel. Refer to nutrient-specific pecan publication for safe adjustment ranges.)
- **Low:** Increase the rate by 25% to 35%.
- **Sufficient:** Maintain the current rate.
- **High:** Reduce the rate by 35% to 50%.
- **Very high:** Withhold fertilizer for that nutrient.

Example: If foliar nitrogen is 2.0% (below the 2.2% to 2.5% low-input sufficiency range), increase nitrogen by 25% to 30% the following spring. If it's above 2.5%, reduce the rate or skip the next application.

When To Retest and How To Respond

Soil and foliar testing are most useful when paired with regular observation and timely follow-up. Use the guidelines below to decide when to retest and how to respond if trees show signs of stress or underperformance, even when test results appear normal.

- **Retest soil** every two to three years or sooner if major amendments are made.
- **Retest leaves** annually in mid-July to track trends and catch deficiencies early.
- **Respond to poor performance** by:
  - Reviewing foliar and soil test results
  - Checking for pH or drainage issues
  - Adjusting fertilizer rates or timing
  - Considering micronutrient interactions

If trees continue to underperform despite adequate nutrient levels, consider other stressors such as **drought, compaction, disease or root damage**.

7. Nutrient-by-Nutrient Guidance

Nitrogen (N)

Nitrogen is the primary driver of shoot growth, leaf expansion and canopy development in pecan trees. It plays a central role in photosynthesis and is often the first nutrient to show visible deficiency symptoms, especially in young or heavily bearing trees. However, nitrogen must be managed carefully. Excessive nitrogen can lead to overly vigorous vegetative growth, poor kernel fill, delayed hardening and increased susceptibility to pests and alternate bearing.

Visual indicators of nitrogen status:

- **Low nitrogen:** Pale green foliage, reduced shoot growth (less than 4 inches), early leaf drop, poor nut fill
- **Excess nitrogen:** Dark green foliage, excessive shoot growth (more than12 inches), delayed leaf hardening, reduced return bloom

Soil sufficiency range:

Not routinely tested for pecans.

- Soil nitrogen levels fluctuate rapidly and are **not a reliable indicator** of nitrogen availability for pecan trees.
- Nitrogen recommendations are based on **tree age**, **shoot growth**, **leaf color** and **foliar nitrogen levels** — not soil test values.
- Use **foliar analysis** and **visual cues** (e.g., shoot length, leaf color) to guide nitrogen adjustments.

Foliar sufficiency range (low-input target):

2.2% to 2.5% nitrogen (dry weight) in mid-July leaf samples.

- Values above 2.7% may indicate overfertilization in low-input systems.

Baseline nitrogen rates for mature trees:

- **“On” years:** 150 pounds N per acre
- **“Off” years:** 50 to 75 pounds N per acre
- **Yield-based rule of thumb:** Apply **10 pounds of nitrogen per acre for every 100 pounds of expected in-shell yield**

These rates can be adjusted based on foliar test results, shoot growth and visual cues. In home orchards, where yield is often lower and tree density is reduced, rates may be scaled down proportionally.

Adjustment guidelines:

- If foliar N is **below 2.2%**, increase nitrogen by 25% to 30% the following spring.
- If foliar N is **within range**, maintain current rate.
- If foliar N is **above 2.7%**, reduce rate or skip the next application.

Application tips:

- Use **split applications** in spring (e.g., March and May/June) to improve uptake and reduce leaching.
- Avoid applying nitrogen at planting. Begin fertilization only after the tree shows 2 to 4 feet of terminal shoot growth.
- In mature trees, adjust nitrogen based on crop load. Heavy crop years may require higher rates; light crop years may benefit from reduced inputs to support return bloom.

Avoid fertilizing when soils are saturated:

Nitrogen should not be applied when soils are saturated or heavy rain is forecast. Wet conditions increase the risk of nitrogen leaching or runoff, especially in sandy or poorly structured soils. If your orchard is experiencing prolonged wet weather in early spring, it's better to **delay fertilization** until the soil begins to dry and trees are actively growing. Applying nitrogen under wet conditions not only wastes fertilizer. It can also contribute to nutrient imbalances and environmental runoff.

Common sources for home orchards:

- **10-10-10 granular fertilizer** (balanced N-P-K)
- **Urea (46-0-0)** for targeted nitrogen supplementation
- **Organic options** like composted poultry litter or legume cover crops (e.g., clover) for slow-release nitrogen

Phosphorus (P)

Phosphorus supports **root development**, **energy transfer** and **early-season growth**. While deficiencies are less common than nitrogen or zinc, low phosphorus can limit root function and reduce the tree's ability to support canopy growth and kernel development, especially in acidic or sandy soils.

Visual indicators of phosphorus deficiency:

- Reduced shoot growth despite adequate nitrogen
- Weak root systems or poor early-season vigor
- Purplish leaf coloration (rare in pecans)

Soil sufficiency range:

30 to 60 pounds/acre phosphorus

- Soil index range:
    - Low: Less than 26
    - Medium: 26 to 50
    - High: More than 50
- Apply phosphorus preplant if soil test is in the low or medium range.
- In acidic soils (pH less than 6.0), phosphorus availability may be limited even if soil levels are adequate.

Foliar sufficiency range (low-input target):

0.12% to 0.30% phosphorus (dry weight) in mid-July leaf samples

Action threshold:

If foliar phosphorus is **below 0.12%**, apply **100 pounds/acre of phosphate (P_2O_5)**. This threshold is based on recommendations from Smith et al. (2012) and is appropriate for native and low-input cultivar orchards.

Application tips:

- Apply phosphorus in **early spring**, ideally before budbreak.
- **Banding** phosphorus midway between the trunk and dripline is more effective than broadcasting, especially in low-input systems.
- In acidic soils (pH less than 6.0), phosphorus availability may be limited even if soil test levels are adequate. Consider liming to improve uptake.

Common sources for home orchards:

- **Triple superphosphate (0-46-0)** for targeted phosphorus supplementation
- **10-10-10 or 5-10-15** for balanced applications
- **Bone meal or composted manures** for organic phosphorus, though slower to release

Potassium (K)

Potassium is essential for **water regulation**, **stress tolerance** and **kernel fill** in pecan trees. It strengthens cell walls, improves drought resilience and supports nutrient transport. Deficiencies often show up as poor nut fill or leaf scorch, especially in sandy soils or high-yield years.

Visual indicators of potassium deficiency:

- Leaf edge burn or marginal necrosis
- Poor kernel fill or shriveled nuts
- Premature leaf drop in late summer

Soil sufficiency range:

100 to 150 pounds/acre potassium

- Soil index range:
    - Low: Less than 91
    - Medium: 91 to 150
    - High: More than 150
- Potassium is especially important in sandy soils or high-yield years.
- Apply preplant or banded in early spring if soil test is below 100 pounds/acre.

Foliar sufficiency range:

0.85% to 2.50% potassium (dry weight) in mid-July leaf samples

- Values below 0.85% may indicate deficiency in native or low-input systems.

Adjustment guidelines:

- If foliar K is **below 0.85%**, apply **100 pounds/acre of potassium oxide (K_2O)** in early spring.
- If foliar K is **within range**, no additional potassium is needed unless soil tests are low.
- If foliar K is **above 2.5%**, avoid further applications to prevent nutrient imbalance.

Application tips:

- **Potassium mobility varies by soil type.** In **sandy soils**, potassium can leach quickly, especially with heavy rainfall or irrigation. In **heavier soils**, potassium tends to bind to clay particles and move more slowly. In both cases, **banded applications** placed midway between the trunk and dripline can be more effective than broadcasting.
- Potassium demand increases in **"on" years** with heavy crop loads. Monitor leaf levels annually to avoid depletion.

Common sources for home orchards:

- **Muriate of potash (0-0-60)** or **sulfate of potash (0-0-50)** for targeted K supplementation
- **10-10-10 or 5-10-15** for balanced applications
- **Wood ash or composted manures** for organic potassium, though variable in content

Calcium (Ca)

Calcium supports **root development**, **cell wall strength** and **nut quality**. It also plays a key role in **nutrient balance**, particularly with boron and magnesium. While deficiencies are uncommon in well-limed soils, low calcium can occur in **acidic**, **sandy** or **heavily leached** sites, especially where magnesium or aluminum levels are high.

Visual indicators of calcium deficiency:

- Weak root systems or poor anchorage
- Tip burn or marginal leaf necrosis (rare in pecans)
- Poor nut fill or shell integrity in extreme cases

Soil sufficiency range:

400 to 900 pounds/acre calcium

- Maintain a **Ca:Mg ratio between 3:1 and 7:1** for optimal uptake.

Foliar sufficiency range:

0.70% to 1.75% calcium (dry weight) in mid-July leaf samples

- Values below 0.70% may indicate deficiency, especially in acidic soils or high rainfall areas.

Adjustment guidelines:

- If foliar Ca is **below 0.70%** or soil Ca is **below 400 pounds/acre**, apply lime based on soil test recommendations.
- Target a **soil pH of 6.5 to 6.8** to improve calcium availability and overall nutrient uptake.
- Avoid overliming, which can suppress zinc uptake and lead to micronutrient imbalances.
- If calcium is low and magnesium is adequate, use **calcitic lime**.
- If both are low, use **dolomitic lime**.

Application tips:

- Apply lime **several months before planting** or fertilization to allow time for pH adjustment.
- In established orchards, recheck pH and Ca levels every three to five years.
- If pH is already optimal but calcium is low, **gypsum (calcium sulfate)** may be used without altering pH.

Common sources for home orchards:

- **Agricultural lime (calcitic or dolomitic):** Primary source for calcium and pH adjustment
- **Gypsum (calcium sulfate):** Provides calcium without raising pH
- **Composted manures or organic matter:** Contribute small amounts of calcium over time

Magnesium (Mg)

Magnesium is essential for **chlorophyll production**, **photosynthesis** and **enzyme activation**. It also plays a role in **nutrient balance**, particularly with calcium and potassium. While magnesium deficiency is less common than zinc or nitrogen, it can occur in **acidic**, **sandy** or **heavily leached soils**, especially where calcium levels are high or dolomitic lime has not been used.

Visual indicators of magnesium deficiency:

- **Interveinal chlorosis** (yellowing between green veins), especially on older leaves
- **Leaf curling** or marginal necrosis in severe cases
- May be mistaken for potassium or manganese deficiency without foliar testing

Soil sufficiency range:

90 to 100 pounds/acre magnesium

- Maintain a **Ca:Mg ratio between 3:1 and 7:1** for optimal uptake.

Foliar sufficiency range:

0.30% to 0.60% magnesium (dry weight) in mid-July leaf samples

- Values below 0.30% may indicate deficiency, especially in acidic or sandy soils.

Adjustment guidelines:

- If foliar Mg is **below 0.30%** or soil Mg is **below 90 pounds/acre**, apply magnesium based on soil test recommendations.
- If pH is low, **dolomitic lime** is preferred to raise pH and supply Mg.
- If pH is adequate, use **magnesium sulfate** or other soluble Mg sources.

Application tips:

- Apply lime or magnesium sulfate **in early spring** or **fall** to allow time for incorporation.
- In sandy soils or high rainfall areas, Mg may leach more quickly. Monitor levels every two to three years.
- Avoid overapplication of calcium, which can suppress magnesium uptake.

Common sources for home orchards:

- **Dolomitic lime:** Supplies both magnesium and calcium while raising pH
- **Magnesium sulfate (Epsom salt):** Fast-acting Mg source, especially when pH is already optimal
- **Composted manures:** Contribute small amounts of magnesium over time

Sulfur (S)

Sulfur is essential for **protein synthesis**, **enzyme activation** and **chlorophyll formation**. While sulfur deficiency is relatively uncommon in older orchard soils, it is increasingly observed in **sandy**, **low-organic** or **acidic soils** — especially where ammonium sulfate or zinc sulfate are not routinely used.

Visual indicators of sulfur deficiency:

- **Uniform yellowing** of younger leaves (similar to nitrogen deficiency but affects new growth first)
- **Stunted shoot growth** or pale foliage in early season
- May be mistaken for nitrogen deficiency without foliar testing

Soil sufficiency range:

10 to 50 pounds/acre sulfur

- Soil index range:
    - Low: Less than 6
    - Medium: 6 to 10
    - High: More than 10
- Sulfur is mobile in soil and may leach quickly in sandy or high-rainfall areas.
- Soil tests are helpful, but foliar analysis is often more reliable for diagnosing sulfur status.

Foliar sufficiency range:

0.20% to 0.35% sulfur (dry weight) in mid-July leaf samples

- Values below 0.20% may indicate deficiency, especially in sandy or low-organic soils.

Adjustment guidelines:

- If foliar S is **below 0.20%** or soil S is **below 10 pounds/acre**, consider using sulfur-containing fertilizers.
- Sulfur deficiency can often be corrected incidentally through use of **ammonium sulfate** or **zinc sulfate** in routine fertilization.

Application tips:

- Apply sulfur-containing fertilizers **in early spring** or **with nitrogen applications**.
- Monitor sulfur levels every two to three years in sandy soils or areas with low organic matter.
- Avoid overapplication, which can acidify soil and affect micronutrient availability.

Common sources for home orchards:

- **Ammonium sulfate (21-0-0):** Supplies both nitrogen and sulfur
- **Zinc sulfate ($ZnSO_4$):** Commonly used for foliar zinc correction and contributes sulfur
- **Elemental sulfur:** Used for pH adjustment and long-term sulfur supply
- **Composted manures and organic matter:** Slow-release sulfur source

Zinc (Zn)

Zinc is one of the most commonly deficient nutrients in many pecan soils and is essential for **leaf expansion**, **shoot elongation** and **nut development**. While foliar sprays are widely used in commercial orchards, they require repeat applications and specialized equipment which is often impractical for home growers. For long-term management, **soil-applied zinc** offers a more accessible and sustainable option, especially for mature trees.

Visual indicators of zinc deficiency:

- **Rosette or wavy leaves**, especially on new growth
- **Shortened internodes** and stunted shoots
- **Poor kernel fill** or delayed nut maturity
- Symptoms often worsen in high-pH soils or after heavy liming

Soil sufficiency range:

15 to 20 pounds/acre zinc

- Soil index range:
    - Low: Less than 10

    - Medium: 10 to 20
    - High: More than 20
- Zinc availability decreases sharply in high-pH or calcareous soils.

Soil-applied zinc is more effective when banded and placed near the root zone.

Foliar sufficiency range:

60 to 150 ppm zinc (dry weight) in mid-July leaf samples

- Values below 60 ppm may indicate deficiency, especially in older trees or high-pH soils.

Recommended soil-based strategy for home orchards:

For long-term correction, apply **50 to 100 pounds/acre of zinc sulfate ($ZnSO_4$, 36% Zn)** in a **banded strip** near the dripline.

- This one-time application can support zinc nutrition for **three to five years**.
- A one-time banded application of zinc sulfate can be effective in correcting zinc deficiency in pecan trees for multiple years.

Foliar option for young trees:

For small or nonbearing trees, foliar sprays may still be practical:

- Apply **$ZnSO_4$ (36% Zn)** at **2 pounds/100 gallons** for nonbearing trees or **6 pounds/acre** for bearing trees.
- Begin at **budbreak**, then repeat at **two-week intervals** for two to three applications.
- Foliar Zn is absorbed unevenly, so higher leaf concentrations are needed to ensure uptake.

Application tips:

- **Band soil-applied zinc** midway between the trunk and dripline to improve uptake.
- Avoid applying zinc directly to the trunk or exposed roots.
- Monitor foliar Zn levels every two to three years to track trends and adjust as needed.
- In high-pH soils, consider combining zinc sulfate with **elemental sulfur** to improve availability.

Common sources for home orchards:

- **Zinc sulfate ($ZnSO_4$):** Preferred for both soil and foliar applications
- **Zinc oxide (ZnO):** Less soluble but used in some banded treatments
- **Chelated zinc products:** May be used for foliar correction but are more expensive
- **Composted manures:** Contribute trace amounts of zinc over time

Boron (B)

Boron is a critical micronutrient for **seed coat elasticity**, **pollen tube growth** and **potassium regulation during kernel fill**. Deficiency is a major contributor to b**lack kernel symptoms** — a condition where the seed coat splits and the kernel darkens or shrivels, often mistaken for disease or drought damage. In home orchards, boron is frequently deficient due to **acidic soils**, **low organic matter** and **limited fertilization history**.

Visual indicators of boron deficiency:

- **Blackened or shriveled kernels**, especially in otherwise healthy trees
- **Split seed coats** or poor shell fill
- **Reduced nut quality** despite adequate nitrogen and potassium
- Symptoms often appear in late summer and may be mistaken for drought stress

Soil sufficiency range:

0.5 to 1.0 pounds/acre boron

- Soil boron levels are helpful, but **foliar analysis is more reliable** for pecans.
- Boron availability decreases in **dry soils**, **high calcium soils** and **high pH conditions**.

Foliar sufficiency range:

15 to 50 ppm boron (dry weight) in mid-July leaf samples

- Values below 15 ppm may indicate deficiency, especially in sandy or acidic soils.

Adjustment guidelines:

- If foliar B is **below 15 ppm**, apply **1 to 2 pounds/acre of boron** as **solubor (20.5% B)** or **borax (11% B)**.
- Apply in **early spring** or **late winter**, ideally before budbreak.
- Avoid overapplication. Boron has a **narrow safety margin** and can become toxic if overapplied.

Application tips:

- **Broadcast or banded soil applications** are preferred for mature trees.
- For small-scale use, **20 Mule Team Borax** (11% B) can be applied at a rate of **1 tablespoon per 100 square feet**, or **1/8 to 1/4 cup per mature tree**, spread evenly under the canopy.
- Apply in **late winter or early spring**, ideally before budbreak.
- In sandy soils or areas with low organic matter, consider **split applications** or **annual reapplication** at lower rates.
- Avoid overapplication. Boron has a **narrow safety margin** and can become toxic if overapplied.
- Do not mix boron with high-salt fertilizers unless diluted. This can increase burn risk.

Common sources for home orchards:

- **20 Mule Team Borax (11% B):** Widely available household product suitable for soil application
- **Solubor (20.5% B):** Water-soluble and suitable for soil or foliar use
- **Micronutrient blends:** May include boron, but check label for actual content
- **Composted manures:** Contribute trace amounts of boron over time

Iron (Fe)

Iron is essential for **chlorophyll formation** and **photosynthesis**. While total iron is often abundant in soils, it may be **unavailable** to pecan trees in **high-pH**, **poorly drained** or **compacted soils**. Iron deficiency is more common in **young trees**, especially those planted in alkaline or disturbed sites.

Visual indicators of iron deficiency:

- **Interveinal chlorosis** (yellowing between green veins), especially on **young leaves**
- **Pale or bleached foliage** in severe cases
- Often confused with magnesium or manganese deficiency, but appears on **new growth first**

Soil sufficiency range:

12 to 25 pounds/acre iron

- Soil iron levels are often misleading. **Foliar analysis is more reliable** for diagnosing deficiency.
- Iron availability decreases sharply in **alkaline soils (pH greater than 7.0)** and in **poorly aerated conditions**.

Foliar sufficiency range:

50 to 300 ppm iron (dry weight) in mid-July leaf samples

- Values below 50 ppm may indicate deficiency, especially in high-pH or compacted soils.

Adjustment guidelines:

- If foliar Fe is **below 50 ppm**, consider applying **chelated iron (EDDHA or DTPA)** as a soil drench or foliar spray.
- In high-pH soils, **lowering pH** or improving drainage may be more effective than adding iron alone.
- Iron deficiency is often **site-related** — correcting compaction or improving aeration may restore uptake.

Application tips:

- For soil correction, use **EDDHA-chelated iron** (stable at higher pH) applied as a drench near the dripline.
- For rapid correction, apply **foliar iron sprays** in early spring and repeat as needed.
- Avoid overapplication. Excess iron can interfere with manganese and zinc uptake.

Common sources for home orchards:

- **EDDHA-chelated iron:** Best for high-pH soils; long-lasting and root-available
- **DTPA-chelated iron:** Effective in mildly acidic to neutral soils
- **Iron sulfate ($FeSO_4$):** Less effective in alkaline soils; may stain surfaces
- **Composted manures and organic matter:** Improve iron availability over time by enhancing microbial activity and buffering pH

Manganese (Mn)

Manganese plays a key role in **photosynthesis**, **enzyme activation**, and **lignin biosynthesis**, which supports shell strength and disease resistance. While soil manganese is often high, availability can be limited in **high-pH**, **sandy**, or **poorly aerated** sites. Deficiency is more likely in **upland soils** or where lime has been overapplied.

Visual indicators of manganese deficiency:

- **Interveinal chlorosis** on **young to midaged leaves**
- **Pale green foliage** with green veins (similar to iron deficiency)
- **Reduced shoot growth** or weak shell development in severe cases

Soil sufficiency range:

15 to 50 pounds/acre manganese

- Soil tests are helpful, but **foliar analysis is more reliable** for diagnosing Mn status.
- Manganese availability decreases in **alkaline soils** and may be suppressed by high iron or phosphorus levels.

Foliar sufficiency range:

100 to 2,000 ppm manganese (dry weight) in mid-July leaf samples

- Values below 100 ppm may indicate deficiency, especially in high-pH or sandy soils.

Adjustment guidelines:

- If foliar Mn is **below 100 ppm**, apply **manganese sulfate ($MnSO_4$)** at **5 to 10 pounds/acre** as a soil application or **1 to 2 pounds/100 gallons** as a foliar spray.
- In high-pH soils, foliar sprays are more effective than soil applications.
- Avoid applying manganese with phosphate fertilizers, which can reduce uptake.

Application tips:

- For soil application, band manganese sulfate near the dripline in early spring.
- For rapid correction, apply foliar manganese in **early to midseason**, especially during active shoot growth.
- Monitor leaf levels every two to three years to avoid buildup or interactions with iron and zinc.

Common sources for home orchards:

- **Manganese sulfate ($MnSO_4$):** Most effective and widely available form
- **Chelated manganese (EDTA):** Useful for foliar sprays, especially in high-pH soils
- **Micronutrient blends:** May include manganese; check label for actual content
- **Composted manures:** Contribute trace amounts over time

Copper (Cu)

Copper supports **lignin formation**, **enzyme function**, and **disease resistance** in pecan trees. It plays a role in **vascular integrity** and **shell development** and may influence nut quality in years with high disease pressure. While copper deficiency is rare, it can occur in **sandy**, **low-organic**, or **overlimed** sites, especially where micronutrients have not been supplemented.

Visual indicators of copper deficiency:

- **Dieback of shoot tips** or weak twig growth
- **Delayed leaf expansion** or distorted young leaves
- **Poor shell strength** or increased susceptibility to fungal infection

Soil sufficiency range:

0.5 to 1.5 pounds/acre copper

- Soil copper levels are helpful, but **foliar analysis is more reliable** for pecans.
- Copper availability decreases in **high-pH soils** and may be suppressed by excess phosphorus or organic matter.

Foliar sufficiency range:

6 to 30 ppm copper (dry weight) in mid-July leaf samples

- Values below 6 ppm may indicate deficiency, especially in sandy or high-pH soils.

Adjustment guidelines:

- If foliar Cu is **below 6 ppm**, apply **copper sulfate ($CuSO_4$)** at **3 to 5 pounds/acre** as a soil application or **0.5 to 1 pound/100 gallons** as a foliar spray.
- Avoid mixing copper with phosphate fertilizers unless diluted. This can reduce uptake.
- Copper toxicity is rare but possible. Avoid repeated applications without testing.

Application tips:

- Apply copper sulfate **in early spring** or **with other micronutrients** if multiple deficiencies are present.
- In high-pH soils, foliar sprays may be more effective than soil applications.
- Monitor leaf levels every two to three years to track trends and avoid buildup.

Common sources for home orchards:

- **Copper sulfate ($CuSO_4$):** Widely available and effective for both soil and foliar use
- **Chelated copper (EDTA):** Useful for foliar correction in alkaline soils
- **Micronutrient blends:** May include copper; check label for actual content
- **Composted manures:** Contribute trace amounts of copper over time

Molybdenum (Mo)

Molybdenum is required in **trace amounts** for **nitrogen metabolism** and **enzyme function** in pecan trees. It helps convert nitrate into usable forms within the plant and may influence overall vigor in low-nitrogen or acidic soils. While deficiencies are rare, molybdenum may be limiting in **very acidic soils (pH less than 5.5)** or where organic matter is extremely low.

Visual indicators of molybdenum deficiency:

- **Pale or yellow foliage**, especially in younger leaves
- **Stunted growth** or poor response to nitrogen fertilization
- Symptoms are subtle and often masked by other deficiencies

Soil sufficiency range:

Not routinely tested for pecans

- Molybdenum availability increases with **higher pH**.
- Deficiency is more likely in **strongly acidic soils** or where nitrogen metabolism is impaired.

Foliar sufficiency range:

0.1 to 1.0 ppm molybdenum (dry weight) in mid-July leaf samples

- Values below 0.1 ppm may indicate deficiency, especially in acidic or low-organic soils.

Adjustment guidelines:

- If foliar Mo is **below 0.1 ppm**, apply **sodium molybdate** or **ammonium molybdate** at **0.5 to 1.0 ounce/acre** as a foliar spray.
- Soil applications are rarely needed unless pH is extremely low.
- Correcting soil pH may improve molybdenum uptake without direct supplementation.

Application tips:

- Apply foliar molybdenum in **early spring** if deficiency is confirmed.
- Avoid overapplication. Mo is needed in very small amounts and can become toxic at higher levels.
- **Molybdenum is especially important for orchard floor legumes** like **white clover**, which are commonly used in home orchards to improve soil health and fix nitrogen. Mo is required for the **nitrogen-fixing enzymes** in clover root nodules, and deficiency can limit nitrogen cycling in the orchard.

- In acidic soils (pH less than 6.0), molybdenum availability declines. **Liming** may improve uptake for both trees and clover.

Common sources for home orchards:

- **Sodium molybdate:** Used in foliar sprays for rapid correction
- **Ammonium molybdate:** Alternative foliar source
- **Micronutrient blends:** May include molybdenum; check label for actual content
- **Liming acidic soils:** Improves molybdenum availability indirectly

Nickel (Ni)

Nickel is required in **trace amounts** for **urease activity**, which enables pecan trees to metabolize nitrogen from urea-based fertilizers. It also plays a role in **seed development** and may influence **nut quality** and **leaf health** in mature trees. While nickel deficiency is rare in many crops it is more common in pecans, especially in **sandy**, **low-organic** or **high-pH soils**, especially where urea is used and other micronutrients are limited.

Visual indicators of nickel deficiency:

- **Mouse ear symptoms** can include rounded, cupped or distorted young leaves.
- Tree may exhibit **poor seed development** or shriveled kernels.
- Symptoms often appear in **spring** and may be mistaken for zinc or boron deficiency.

Young pecan leaves show mouse ear symptoms (rounded, cupped or distorted) next to healthy leaves for comparison. Nickel deficiency is more common in pecans than in many crops, especially in sandy or high-pH soils and where urea-based fertilizers are used. Photo by William Reid

Soil sufficiency range:

5 to 15 pounds/acre nickel

- Soil nickel levels are rarely limiting, but **foliar analysis is more reliable** for pecans.
- Nickel availability may decline in **high-pH soils** or where **micronutrient interactions** suppress uptake.

Foliar sufficiency range:

More than 2.5 ppm nickel (dry weight) in mid-July leaf samples

- Values below 2.5 ppm may indicate deficiency, especially in trees fertilized with urea or growing in sandy soils.

Adjustment guidelines:

- If foliar Ni is **below 2.5 ppm**, apply **nickel sulfate** or **nickel nitrate** at **0.5 to 1.0 ounce/acre** as a foliar spray.

- Nickel is needed in very small amounts. Avoid overapplication.
- If using **urea-based fertilizers**, monitor nickel levels periodically to ensure proper nitrogen metabolism.

Application tips:

- Apply **foliar nickel** in **early spring**, especially if mouse ear symptoms are observed.
- **Soil-based correction is not practical** in most home settings. Nickel is needed in such small amounts that foliar sprays are the most effective and efficient method.
- Homeowners can spray the **lower canopy** using a hose-end or pump sprayer. Even partial canopy coverage can help correct deficiency over time.
- Nickel deficiency may be more common in **young trees**, **sandy soils** or **high-pH sites**.
- Monitor leaf levels every two to three years if urea is used or if symptoms persist.

Common sources for home orchards:

- **Nickel sulfate:** Used in foliar sprays for rapid correction
- **Nickel nitrate:** Alternative foliar source
- **Micronutrient blends:** May include nickel; check label for actual content
- **Composted manures:** Contribute trace amounts of nickel over time

Pecan nutrient summary table for home orchards.

Nutrient	Soil Sufficiency Range	Foliar Sufficiency Range	Deficiency Symptoms	Preferred Correction Method
Nitrogen (N)	Not reliable in soil tests	2.2%-2.5% (low input)	Pale leaves, weak shoot growth, poor nut fill	Split spring applications of N fertilizer (e.g., 10-10-10 or urea)
Phosphorus (P)	30-60 pounds/acre	0.12%-0.30%	Weak roots, poor early growth	Preplant incorporation or banded spring application of P_2O_5
Potassium (K)	100-150 pounds/acre	0.85%-2.50%	Leaf edge burn, poor kernel fill	Banded spring application of K_2O (e.g., muriate or sulfate of potash)
Zinc (Zn)	15-20 pounds/acre	60-150 ppm	Rosette leaves, short internodes	Soil banding with $ZnSO_4$ or foliar sprays (young trees)
Calcium (Ca)	400-900 pounds/acre	0.70%-1.75%	Weak roots, poor nut fill	Lime (calcitic or dolomitic) or gypsum if pH is adequate
Magnesium (Mg)	90-100 pounds/acre	0.30%-0.60%	Interveinal chlorosis on older leaves	Dolomitic lime or magnesium sulfate (Epsom salt)
Sulfur (S)	10-50 pounds/acre	0.20%-0.35%	Yellowing of young leaves	Ammonium sulfate or zinc sulfate; elemental sulfur if needed
Boron (B)	0.5-1.0 pounds/acre	15-50 ppm	Black kernel, split seed coat	Soil-applied borax or solubor; avoid overapplication
Iron (Fe)	12-25 pounds/acre	50-300 ppm	Chlorosis on young leaves	Foliar chelated iron (EDDHA/DTPA); improve drainage or pH
Manganese (Mn)	15-50 pounds/acre	100-2,000 ppm	Chlorosis on mid-aged leaves	Foliar $MnSO_4$ or soil banding; avoid phosphate interactions
Copper (Cu)	0.5-1.5 pounds/acre	6-30 ppm	Shoot dieback, distorted leaves	Foliar or soil-applied $CuSO_4$; monitor for toxicity
Nickel (Ni)	5-15 pounds/acre	>2.5 ppm	Mouse ear, poor seed development	Foliar nickel sulfate or nitrate; monitor if using urea
Molybdenum (Mo)	Not routinely tested	0.1-1.0 ppm	Pale foliage, poor N metabolism	Foliar sodium/ammonium molybdate; lime acidic soils

8. Organic Matter and Clover: Foundations for Healthy Soil

Healthy soil is the foundation of a productive pecan orchard. In home settings — where inputs are often limited and long-term sustainability is a priority — building and maintaining soil organic matter is one of the most effective ways to support tree health, nutrient availability and water retention. Organic matter improves soil structure, enhances microbial activity and increases the soil's ability to store and supply nutrients over time.

One of the most practical and beneficial ways to build organic matter in Louisiana pecan orchards is through the use of **cool-season legumes like clover**. When managed properly, clover can serve as a living mulch, a nitrogen source and a soil-building cover crop, all while supporting beneficial insects and reducing erosion.

Role of Compost and Poultry Litter in Soil Health

Compost and aged poultry litter improve soil structure, increase organic matter and supply nutrients in a slow-release form. These materials can be especially helpful in sandy or low-organic soils, where nutrient leaching and poor water retention are common. When used correctly, they support microbial activity, enhance nutrient cycling and reduce the need for synthetic fertilizers.

However, not all compost or manure sources are created equally. **It's essential to know the nutrient profile of any organic amendment before applying it to your orchard.** Poultry litter in particular can vary widely in composition depending on how it was managed. Many sources contain **high lime content** due to the common practice of liming poultry houses between flocks. Repeated applications of such material can raise soil pH and interfere with micronutrient uptake, especially zinc and iron. In some cases, **manganese levels can become excessively high**, leading to toxicity symptoms in sensitive soils or cultivars.

To avoid unintended consequences, test compost and manure sources when possible, and monitor soil and foliar nutrient levels regularly. Apply these materials in moderation, and avoid placing them directly against young trunks. When used thoughtfully, compost and poultry litter can be powerful tools for building long-term soil health in home pecan orchards.

Using Clover and Legumes for Nitrogen Enrichment

Cool-season legumes like crimson and white clover offer one of the most practical and sustainable ways to enrich soil nitrogen in home pecan orchards. These plants form symbiotic relationships with soil bacteria that convert atmospheric nitrogen into a plant-available form — a process known as nitrogen fixation. When managed properly, clover can supply a significant portion of a tree's nitrogen needs while also improving soil structure, supporting beneficial insects and reducing erosion.

A vigorous stand of crimson clover may contribute **70 to 150 pounds of nitrogen per acre**, while white clover can fix **100 to 150 pounds per acre**, depending on soil conditions and rainfall. However, most of this nitrogen is not released until early to midsummer when the clover begins to decompose, typically after flowering and seed set. For this reason, clover is best viewed as a **slow-release, organic nitrogen source** that complements rather than replaces synthetic fertilizer, especially in the early years of establishment.

To make the most of clover-based nitrogen, homeowners should **time supplemental nitrogen applications to avoid interfering with fixation**. Applying nitrogen too early in the season — while clover is actively growing — can suppress fixation and encourage competitive grasses. Instead, consider **splitting nitrogen**

applications, with the first portion applied in late spring only if needed, and the second portion timed for **mid- to late summer**, after the clover has died back and its nitrogen is beginning to release. This approach supports kernel fill while allowing the legume to contribute meaningfully to the orchard's fertility.

Over time, orchards with well-managed clover stands tend to show higher soil nitrate levels, improved organic matter and better soil structure than those without legumes. In low-input systems, clover can serve as both a fertility tool and a soil-building strategy, especially when paired with regular monitoring of phosphorus, potassium and zinc levels during establishment.

Variety Selection and Establishment Tips

Choosing the right clover variety and establishing it properly are key to getting the most benefit from legumes in a home pecan orchard. Not all clovers perform equally well in Louisiana's soils and climate, and some are better suited to low-input or dryland conditions than others.

Recommended varieties for Louisiana home orchards:

- **Crimson clover** is one of the most reliable and widely adapted options. It grows during the cool season, produces high biomass and typically reseeds for three to five years. Varieties like Dixie, AU-Robin and Flame are good choices.
- **White clover** (especially intermediate types like Durana) spreads aggressively by stolons, tolerates mowing and provides year-round ground cover in irrigated orchards. It is slower to establish but more persistent over time.
- **Ball clover** is a good option for heavier soils or moist bottomland sites. It forms a dense mat and suppresses weeds well but is less drought-tolerant than crimson or white clover.

Establishment guidelines:

- **Planting time:** Seed clover in **November or December**, after pecan harvest. Seeding earlier may result in seed loss during sweeping or harvest operations.
- **Seeding rate:**
    - Crimson clover: 15 to 18 pounds/acre drilled or 20 to 30 pounds/acre broadcast.
    - White clover: 2 to 3 pounds/acre drilled (increase by 25% if broadcast).
- **Seeding depth:** No deeper than **¼ inch**. Planting too deep is a common cause of stand failure.
- **Inoculation:** Use the correct **rhizobial inoculant** for the clover species. Mix with a sticking agent and apply to seed just before planting.
- **Soil pH:** Maintain pH near **6.5**. Rhizobia do not function well in acidic soils (pH less than 5.5).
- **Weed management:** Ryegrass and other cool-season weeds can outcompete young clover. Use preemergent herbicides (e.g., oryzalin) or selective post-emergents (e.g., sethoxydim) as needed.

Important Reminders for Clover Management in Home Orchards

To maximize the benefits of clover in your orchard, keep the following in mind:

- **Time mowing to support reseeding and harvest efficiency.** Allow clover to flower and reseed before mowing, typically in late spring or early summer. This helps maintain the stand and ensures continued nitrogen contribution in future years. In mature orchards, mow clover prior to harvest to avoid interference with nut collection and sweeping.

- **Ensure proper inoculation for nitrogen fixation.** Many clover seed mixes are sold preinoculated with the appropriate *Rhizobium* bacteria, but inoculant viability can decline over time. For best results, especially in soils where clover hasn't been grown before, consider applying fresh inoculant at planting. Use a sticking agent to help the inoculant adhere to the seed and ensure soil pH is above 5.5 to support rhizobia survival and activity.

Other legumes like hairy vetch and lupine may be useful in larger orchards or mixed-use plantings. These species fix high amounts of nitrogen but require more management and are less suited to small-scale or traffic-heavy areas. They are best used in settings where mowing, rotation or cover crop cycling is feasible.

Clover variety comparison for home orchards.

Clover Type	Estimated N Fixation	Pros	Cons	Best Fit For
Crimson clover	70-150 pounds N/acre	Fast early growth; high biomass; good erosion control; reseeds for 3-5 years	Dies back by early summer; annual; may need reseeding on sandy soils	Most home orchards, especially where fall planting and reseeding are feasible
White clover (e.g., Durana)	100-150 pounds N/acre	Year-round ground cover; spreads by stolons; tolerates mowing and foot traffic; good weed suppression	Slower to establish; requires more moisture; may not reseed as reliably	Irrigated orchards or lawns; long-term ground cover under mature trees
Ball clover	About 70-100 pounds N/acre	Dense mat for weed suppression; good N source; performs well on heavier soils	Poor drought tolerance; less suited to sandy or dry upland sites	Bottomland or moist, loamy soils with good winter moisture

9. Managing Fertility in Sandy Versus Clay Soils

Louisiana's diverse soils range from deep alluvial clays to coarse sandy uplands and each presents unique challenges for nutrient management in pecan orchards. Understanding how your soil type affects nutrient retention, leaching and root access is essential for making informed fertilizer decisions.

Sandy Soils

Sandy soils are common in upland areas and parts of central and western Louisiana. These soils drain quickly, warm up early in spring and are easy to work; but they also:

- **Leach nutrients rapidly**, especially nitrogen, potassium, sulfur and boron
- **Have low cation exchange capacity (CEC)**, meaning they hold fewer nutrients overall
- **Dry out quickly**, increasing drought stress and reducing nutrient uptake

Fertility tips for sandy soils:

- **Split nitrogen applications** to reduce leaching losses. Apply smaller amounts more frequently.
- **Use slow-release or organic sources** (e.g., compost, poultry litter, clover) to improve nutrient retention.
- **Monitor potassium and boron closely**, as both are prone to leaching and may need annual supplementation.
- **Incorporate organic matter** to improve water-holding capacity and nutrient buffering.

Clay Soils

Clay soils are more common in bottomlands and river terraces. They hold nutrients well and retain moisture; but they also:

- **Drain slowly**, which can lead to waterlogging and root stress
- **Compact easily**, especially when worked wet, limiting root growth and oxygen availability
- **Fix phosphorus**, making it less available to plants even when soil test levels are high

Fertility tips for clay soils:

- **Avoid fertilizing when soils are saturated**, especially with nitrogen. Wait until soils begin to dry and trees are actively growing.
- **Band phosphorus applications** to improve uptake, especially in acidic or high-iron clays.
- **Use gypsum** (calcium sulfate) to improve structure and calcium availability without raising pH.
- **Monitor zinc and iron**, which may become less available in high-pH or compacted clays.

If you are unsure whether your soil is sandy, clayey or somewhere in between, the following table offers simple tests to determine soil type.

Quick tip: How to identify your soil type by feel.

Texture Test	What You Feel	Likely Soil Type
Rub moist soil between your fingers	Gritty, falls apart easily	**Sandy soil:** Drains quickly, low nutrient retention
Rub moist soil into a ribbon	Sticky, forms a long ribbon	**Clay soil:** Holds water, prone to compaction
Squeeze moist soil into a ball	Smooth, crumbly, holds shape	**Loam:** Ideal mix of sand, silt and clay

TIP: You can also dig a small hole and observe drainage. If water disappears quickly, it's likely sandy. If it pools or drains slowly, it's likely clay.

Nutrient behavior in sandy versus clay soils.

Nutrient	Sandy Soils	Clay Soils	Management Tips
Nitrogen (N)	Leaches quickly; low retention	Retained longer but prone to loss in saturated soils	Split applications in sandy soils; delay fertilization in wet clays
Phosphorus (P)	Available but may leach in very coarse sands	Often fixed and unavailable despite high soil test levels	Band applications in clay; preplant incorporation in sandy soils
Potassium (K)	Highly leachable, especially in low CEC sands	Retained well but may bind tightly in high pH clays	Monitor annually in sandy soils; adjust based on foliar tests
Calcium (Ca)	Often low; benefits from lime or gypsum	Usually adequate; may be excessive in overlimed clays	Use calcitic lime in sands; gypsum in clays if pH is already high
Magnesium (Mg)	Can leach; often low in sandy soils	May be adequate or excessive depending on Ca:Mg ratio	Use dolomitic lime in sands; monitor Ca:Mg ratio in clays
Sulfur (S)	Leaches easily; often deficient	Retained better but may be low in low-organic clays	Use ammonium sulfate or elemental sulfur in sandy soils
Zinc (Zn)	Deficiency common; uptake limited in high pH sands	May be unavailable in compacted or high pH clays	Soil banding or foliar sprays; monitor leaf levels annually
Boron (B)	Highly leachable; deficiency common	Retained better but still prone to deficiency	Apply low rates annually in sandy soils; avoid overapplication
Iron (Fe)	Often adequate but uptake limited in high pH sands	Deficiency common in high pH or poorly drained clays	Foliar sprays or acidifying amendments if pH is high
Manganese (Mn)	May be low in very acidic sands	Often adequate but can be toxic in low pH clays	Monitor foliar levels; avoid overliming in clay soils

Organic matter plays a critical role in improving fertility across all soil types but especially in sandy and clay soils. In sandy soils, it helps retain nutrients and moisture that would otherwise leach away, while also boosting microbial activity. In clay soils, it improves structure, reduces compaction and enhances root penetration by loosening dense particles and increasing aeration. Whether you're working with coarse sand or heavy clay, adding compost, aged poultry litter or growing cover crops like clover can increase organic matter over time, making your soil more resilient, nutrient-efficient and better suited to long-term pecan production.

How organic matter improves sandy versus clay soils.

Soil Type	Organic Matter Benefits	Why It Matters
Sandy soils	Increases water-holding capacity; improves nutrient retention (especially N, K, B); enhances microbial activity	Sandy soils drain quickly and have low CEC. Organic matter helps buffer against drought and nutrient leaching.
Clay soils	Improves soil structure and aeration; reduces compaction and crusting; enhances root penetration and drainage	Clay soils hold nutrients but can become waterlogged and compacted. Organic matter helps loosen the soil and support healthy root growth.

For more information on pecan care and orchard management, see other titles in the From Soil to Shell: Louisiana Pecan Series and the Louisiana Home Orchard: Pecans publication available through the LSU AgCenter.

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