

Nutritional, Cultural, and Environmental Disorders of Pecan

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UGA Horticulture-Pecans



THE UNIVERSITY OF GEORGIA
COLLEGE OF AGRICULTURAL &
ENVIRONMENTAL SCIENCES

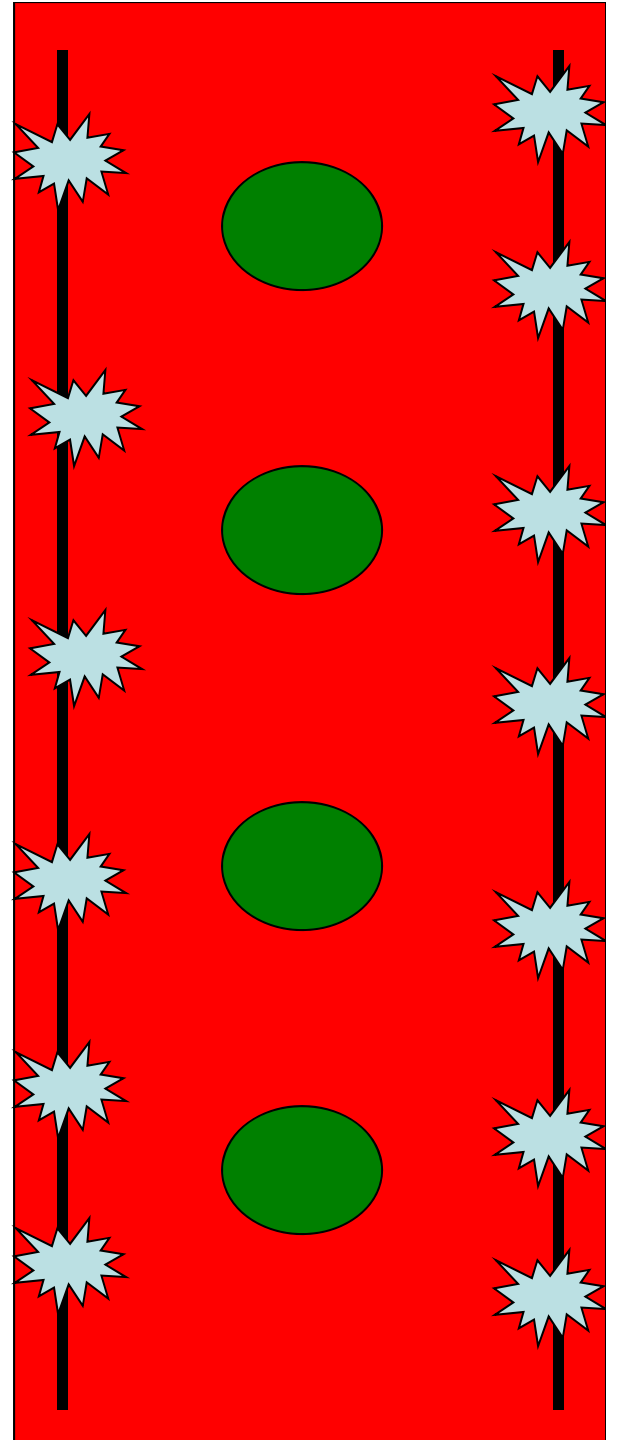
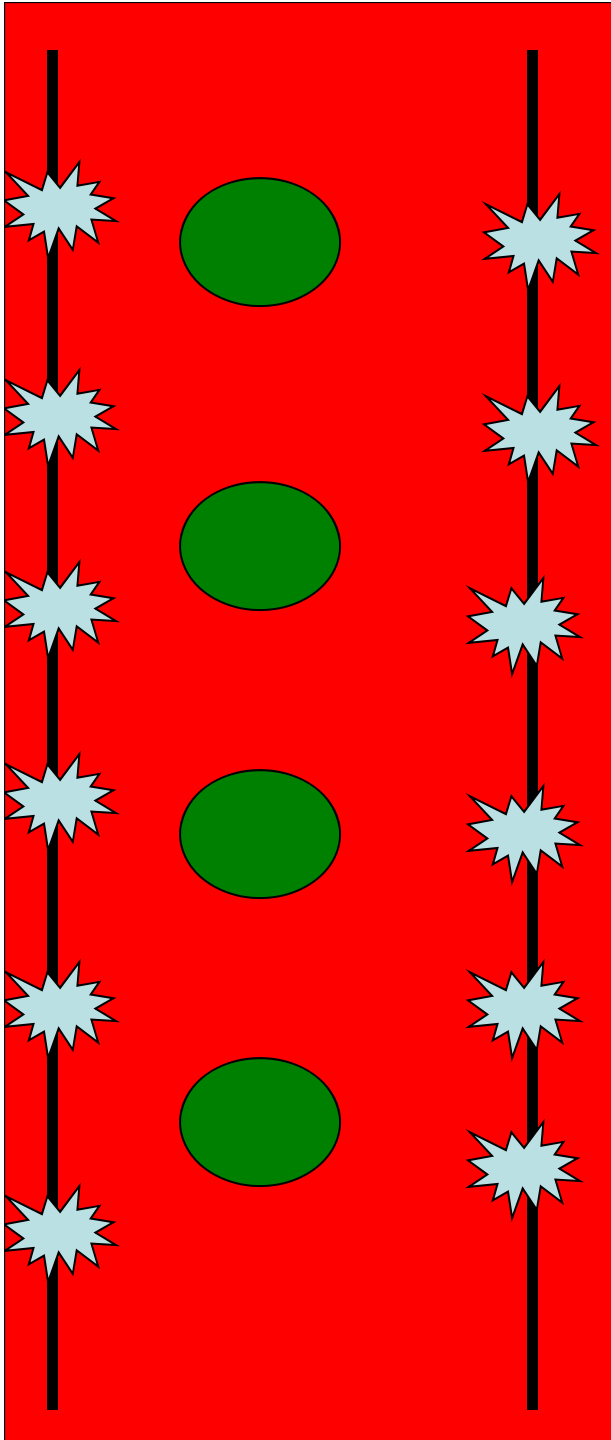


Leaf Tissue Ranges

| | Desired Range |
|---------------------|---------------|
| Leaf N | 2.5-3.0% |
| Leaf P | 0.14-0.3% |
| Leaf K ¹ | 1.25-2.5% |
| Leaf Ca | 1.0-1.75% |
| Leaf Mg | 0.30-0.6% |
| Leaf S | 0.20-0.35% |
| Leaf Fe | 50-300ppm |
| Leaf Zn | 50-100ppm |
| Leaf B | 50-100ppm |
| Leaf Cu | 6-30ppm |
| Leaf Mn | 100-2000ppm |
| Leaf Ni | >2.5ppm |

N Recommendation for Mature Pecans

- *Pecans can be fertilized with a significantly lower field rate of N than is currently used if applications are directed toward tree row with irrigation and weed control*
- 100-125 lbs N per acre (*treated area rate*) directed toward herbicide strip only
- Split with 60-75% applied in April; remainder in June or late August
- Increase by 25% on sandy soils



Fertigation of Young Trees

1st year trees: 'Cunard' on Orangeburg soil

| Treatment | Caliper Growth (mm) | Leaf N |
|--------------------------------------|---------------------|--------|
| Fertigation (6.16 units N/acre)X4 | 5.4a | 2.63a |
| 10-10-10 (1 lb/tree) | 6.5a | 2.61a |
| Granular N (0.36 lbs/tree)X4* | 7.6a | 2.76a |
| Control (No N applied) | 6.7a | 2.63a |

Fertilizer N materials;

Fertigation treatments =UAN (28%) (total of 0.84 lbs N per tree)

Granular N treatment=Urea (46%) (total of 0.84 lbs N/tree)

*Last granular application received 0.72 lbs material/tree to reach total of 0.84 lbs N/tree

All fertigation and granular N treatments received P-K through irrigation system in April via 10.5 gal/acre of 1-6-13

Fertilizer Application Dates:

10-10-10: May 9

Fertigation & Granular N: May 9; June 28, July 12; August 6

Fertigation of Young Trees

2nd year trees: 'Cape Fear' on Red Bay soil

| Treatment | Caliper Growth (mm) | Leaf N |
|-------------------------------------|---------------------|--------|
| Fertigation (12.32 units N/acre) X4 | 17.4ab | 2.72ab |
| Fertigation (6.16 units N/acre) X4 | 21.1a | 2.74a |
| 10-10-10 (1 lb/tree) X3 | 19.7ab | 2.72ab |
| Granular N (0.36 lbs/tree)X5 | 14.8b | 2.56bc |
| Control (No N applied) | 16.2ab | 2.50c |

Fertilizer N materials:

Fertigation treatments =UAN (28%)

total of 1.68 lbs N/tree and 0.84 lbs N per tree for high and low rates

Granular N treatment=Urea (46%) (total of 0.84 lbs N/tree)

All fertigation and granular N treatments received P-K through irrigation system in April via 10.5 gal/acre of 1-6-13

Fertilizer Application Dates:

10-10-10: April 23, June 28, July 12

Fertigation : April 23, June 28, July 12, August 6

Granular N: April 23, May 23, June 28, July 12, August 6

Nitrogen

Young trees

- **Year 1:** 1 lb 10-10-10 in June if growth is good
(2-4' terminal growth)
- **Year 2:** 1 lb in April and 1 in June
- **Year 3-4:** 2-3 lbs in April and June
- **Year 5:** 4-6 lbs in April and June

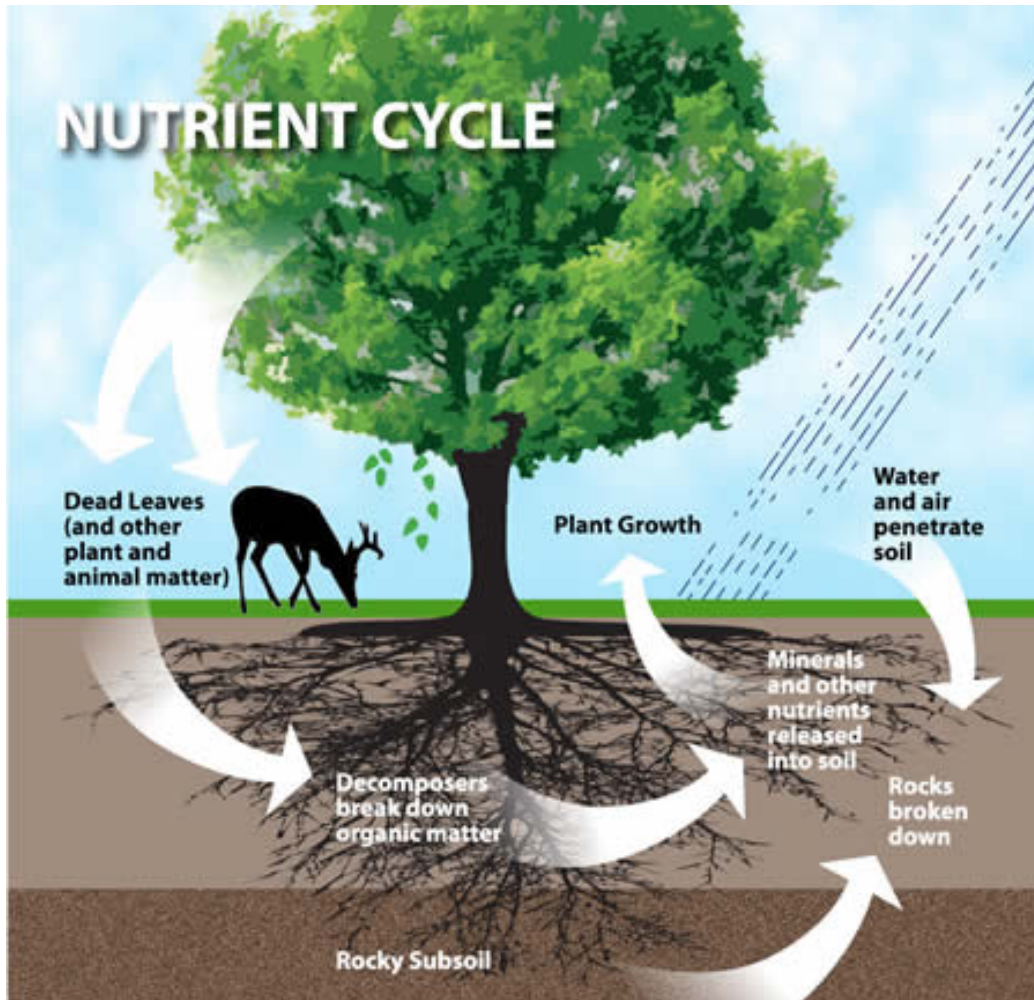
**Fertigation can be done but at
total rate of only 10-15 lbs N/acre
Good option for large
growers**



Managing the N:K Ratio

- K levels should be based on leaf N levels and expected yield; N:K ratios should be kept at or below 2.0-2.5:1
- Given a recommended leaf N level of 2.5%-3.0%, leaf K levels should be realistically maintained between 1.25%-1.5%, accordingly.
- The most efficient method of improving the N:K ratio may be to reduce N application rate

Nutrient Cycling in Orchard Environment



- Large amount of nutrient turnover in orchard system
- 1000 lb/acre pecan crop removes 1.6 lbs P per acre
- 1000 lb/acre pecan crop removes 2.3 lbs K per acre



N:P Imbalance

- Scorching & defoliation occurs 7-10 days before shuck split



Banding Zn, P, and K



- Band Zn @4-5 **lbs/tree**
- Band K at 8 **lbs/tree**
- Band P at 100-120 **lbs/acre**
- Make applications over drip emmitters or in wet zone of microsprinklers



- Band Zn on opposite side of tree from P and K

Banding is a useful tool when uptake is a problem



Magnesium Deficiency

- 0.30-0.6% leaf
- Deficiency occurs on acid soils (pH <5.5)
- Use Dolomitic lime
- High K or Ca
- If pH adequate, apply foliar Magnesium Sulfate at 5 lbs/100 gallons (4" shoot growth to July)

Iron Deficiency

- Usually induced by:
Cool, wet spring
Over-Liming
High soil Zn, P, Mn
- Occurs early in season
- Chlorosis w/green veins
- Young leaves 1st to be affected
- If you apply foliar Fe, apply Ni also





Zinc

- Necessary for shoot elongation, leaf expansion, and yield
- 2 lbs Zinc sulfate + 3 lbs Urea or Potassium Nitrate/100 gallons or Zinc Nitrate
 - Begin 2 wks after bud-break until shoot elongation complete
- Apply 50 lbs Zinc sulfate to soil when soil Zn <50 lbs/a



5 lbs Zn sulfate per tree



Nickel

- Zinc Management
- Apply 1 pt/A in spring (April) while canopy is developing (parachute stage);
- 2nd application: 1 pt/A 30-60 days after 1st appl.
- Third application of 1.5-2 pts/A in late Sept.-early October before leaf fall to prevent mouse ear in the spring flush.





Boron

- Foliar B application improves fruit retention and percent kernel in the absence of noticeable B deficiency
- Poor mobility of B to flowers
- 3 sprays beginning with 2nd spray Timing of applications should be during the prepollination stage

Boron and pH

- Most Liquid Sources of Boron (even Boric acid) will raise pH in the tank mix
- Dry formulations of Boric acid tend to lower pH
- Depends on the solvent used

Foliar Sulfur Trial

| 2011 | Percent Kernel | Nut Weight | Count |
|-------------------|----------------|------------|-------|
| Sulfur 1 qt/100 g | 50.7a | 9.7a | 47.0b |
| Urea 4 lbs/100g | 50.2a | 9.2b | 49.2a |
| Sulfur+Urea | 50.2a | 9.5ab | 47.6b |
| Untreated | 50.6a | 9.2b | 49.2a |

| 2012 | Percent Kernel | Nut Weight | Count |
|-------------------|----------------|------------|--------|
| Sulfur 1 qt/100 g | 52.7a | 11.2a | 40.8b |
| Urea 4 lbs/100g | 52.4a | 9.9b | 46.3a |
| Sulfur+Urea | 53.1a | 10.2ab | 44.4ab |
| Untreated | 52.9a | 10.4ab | 43.7ab |



Water Stage Split of Pecan

- Occurs in August/September on Certain Varieties (late water stage/early shell hardening)
- Occurs w/in 24 hrs of heavy influx of water to soil
- Most split occurs in upper 1/3 of canopy
- Split occurs in pre-dawn hours
- Fruit falls from tree within 7 days of splitting



Managing Water Split

- Maintain soil moisture 2-3 wks before shell hardening (limited)
- Fruit thinning
- Micronutrients?
 - B, Ni



Shuck Decline

- Not a disease
- Brought on by tree stress
Mainly fruiting stress +
drought



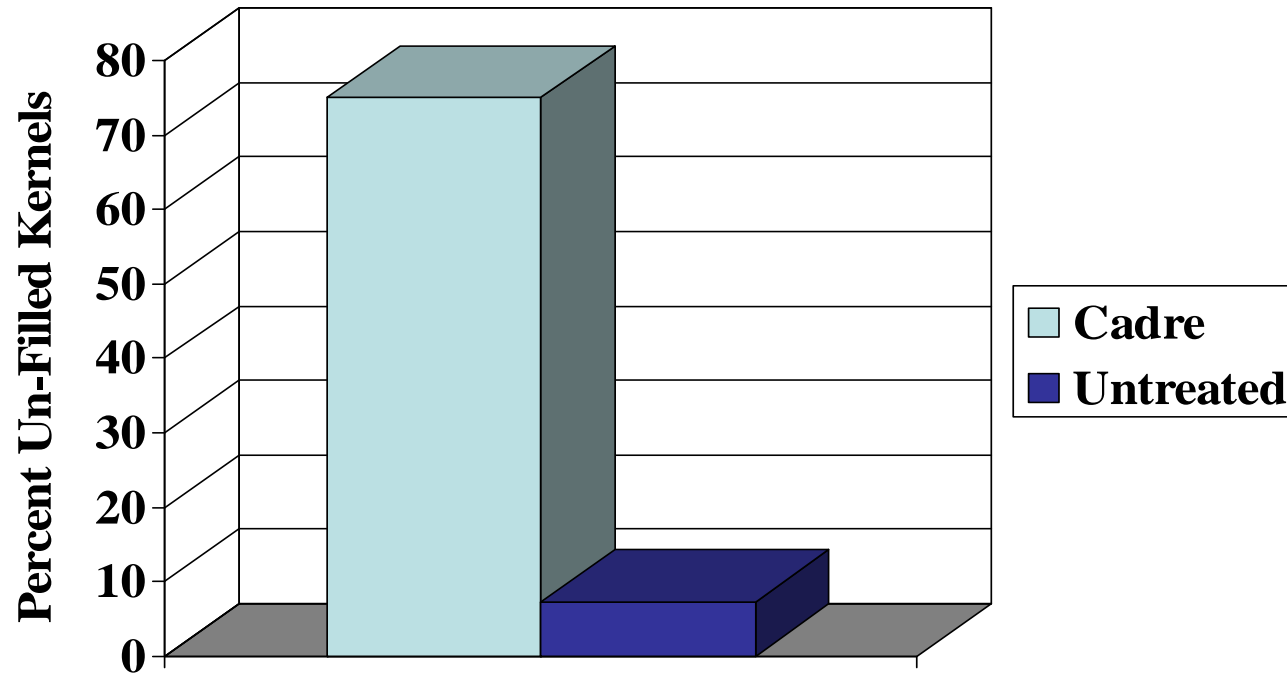
Shuck Sticking

- Inadequate soil moisture at harvest
- Failure of kernel to develop
 - Ethylene
- Cadre





Cadre



Reduced by Fruit Thinning





Water-Logging/Die-back

- Wet feet
- Usually most severe problems on young trees



Herbicide Damage



Command



Round Up

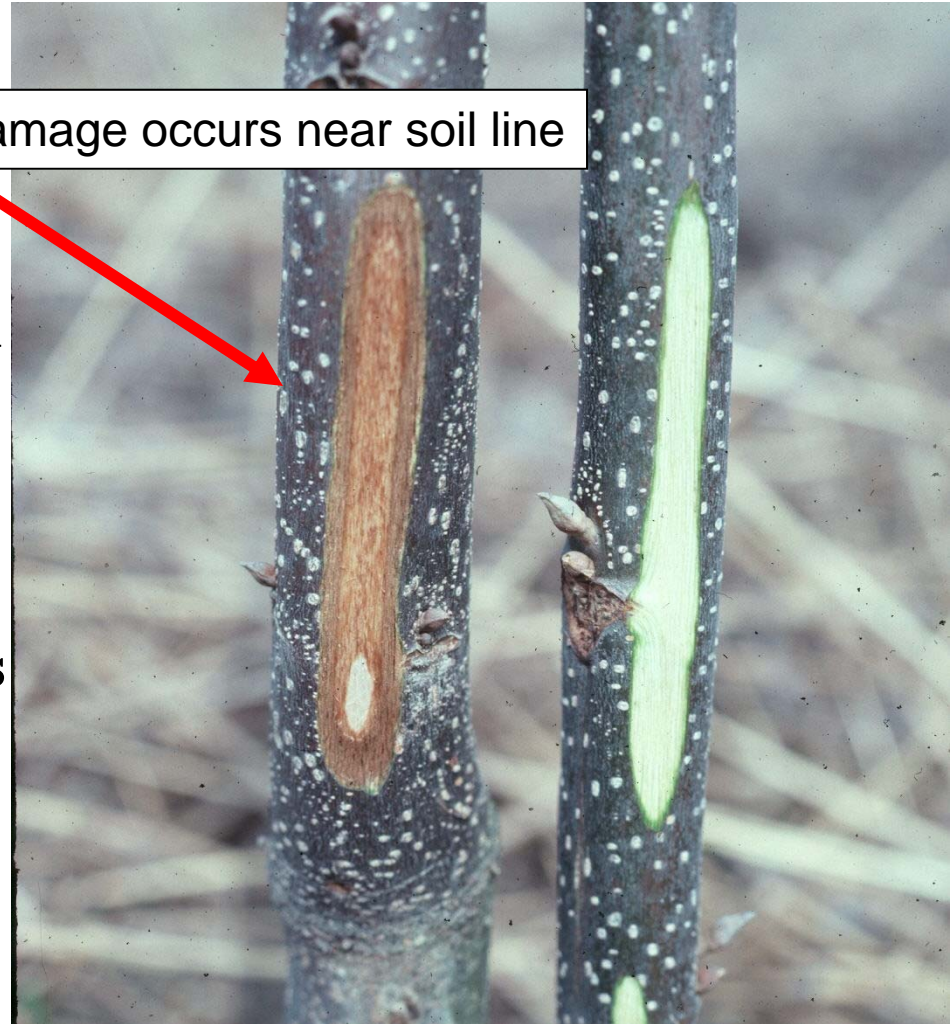


Paraquat

- **Typical Symptoms of Cold Injury:**

- Longitudinal splitting of bark
- Separation of bark from wood
- Sunken areas on limbs/shoots
- Death/browning of cambium, inner bark, phloem
- Symptoms may be delayed
- Sporadic death of small shoots in canopy
- Delayed budbreak
- Sparse canopy

Damage occurs near soil line



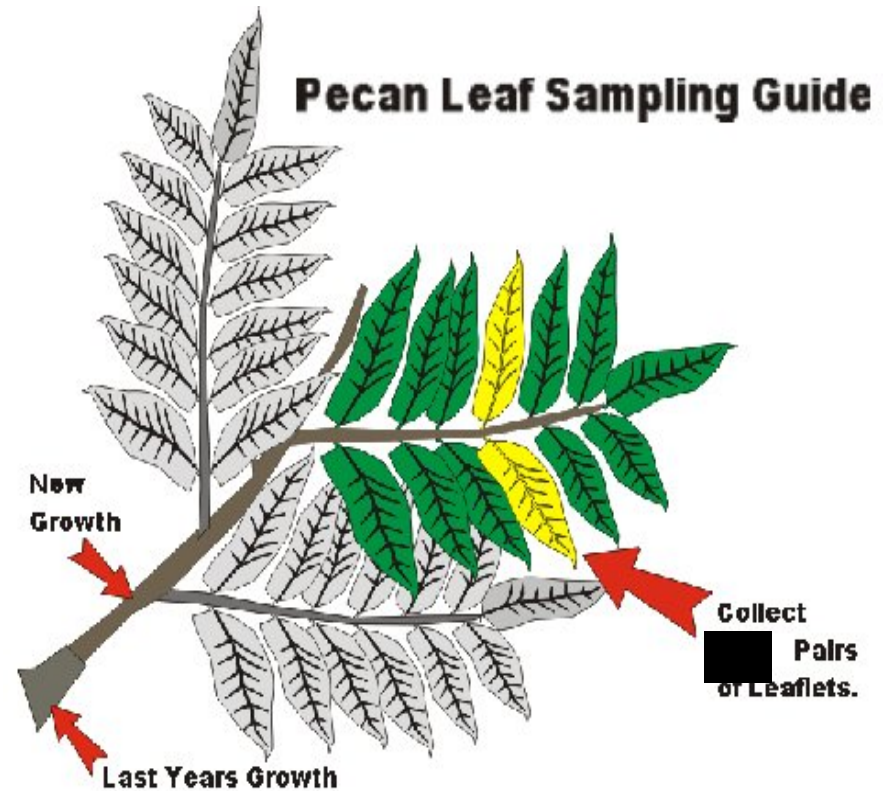




'Desirable'
May 8, 2007

Leaf Sampling

- Sample trees between July 7th and August 7th.
- Use terminal shoots exposed to the sun.
- Collect leaflets from all sides of the tree.
- Avoid leaflets damaged by insects and diseases.



Soil Sampling

- Useful for pH and toxicities
- Late Fall/Winter or at same time each yr
- Sample uniform area
- 1 pint/sample (15-20 cores) over large area
- Sample to 6-8" depth

Beware of Miracle Salve



Useful Info

- <http://www.caes.uga.edu/commodities/fruits/pecan/>
- Southeastern Pecan Growers' Handbook
- Pecan Pest Hotline: 1-800-851-2847
- Blog: <http://blog.extension.uga.edu/pecan/>
- GPGA Annual Meeting---March 24-26--Perry



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