

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

Nitrogen

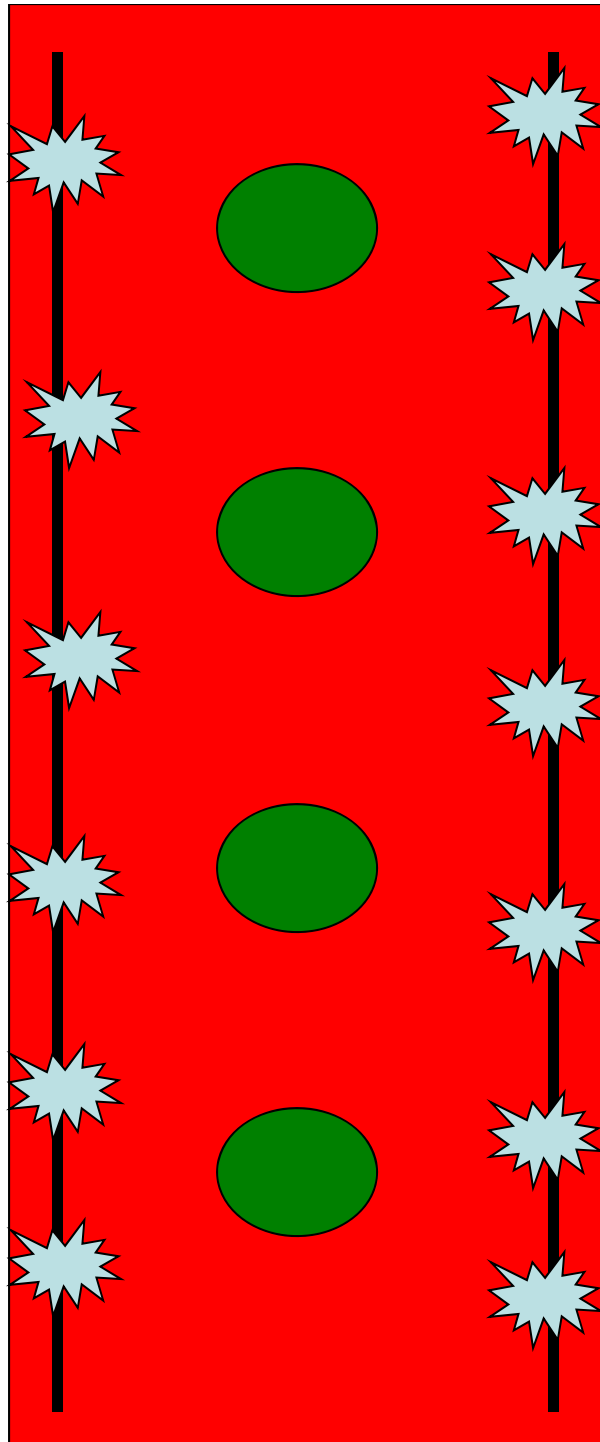
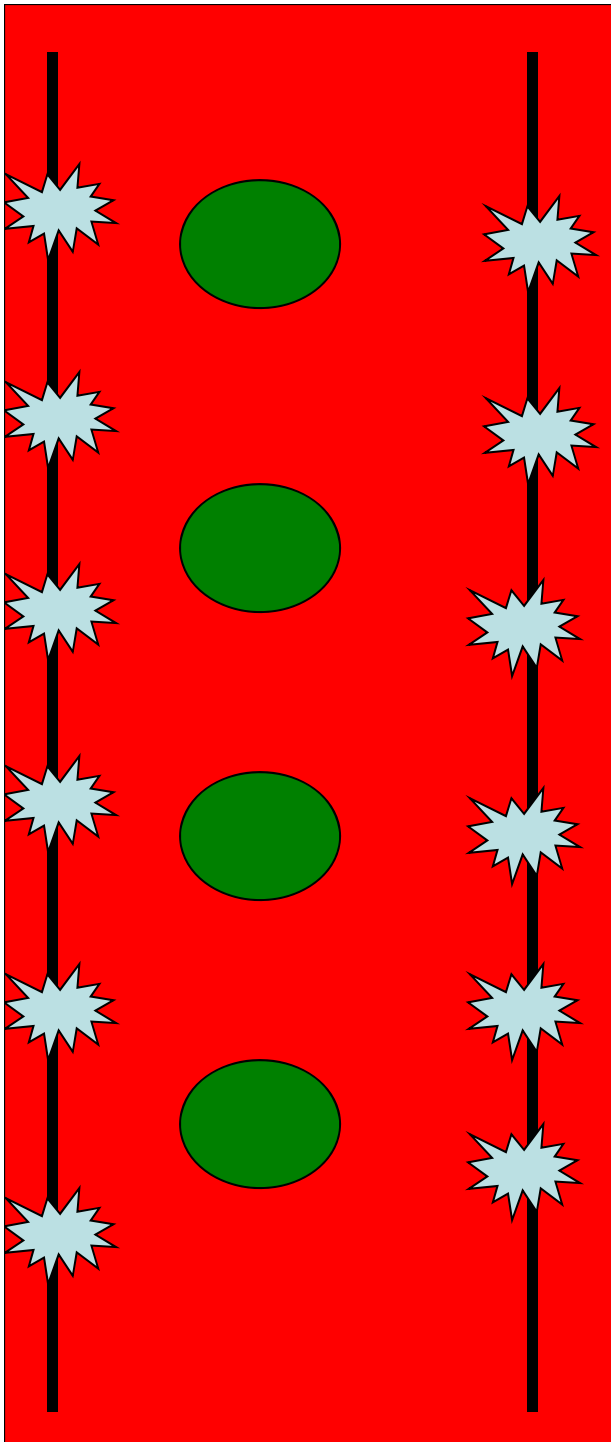


- N absorption by roots is driven by demand
- Demand is regulated by growth of leaves or fruit, and production of proteins.
- Flowers may be aborted if leaf N is deficient the previous summer

Nitrogen

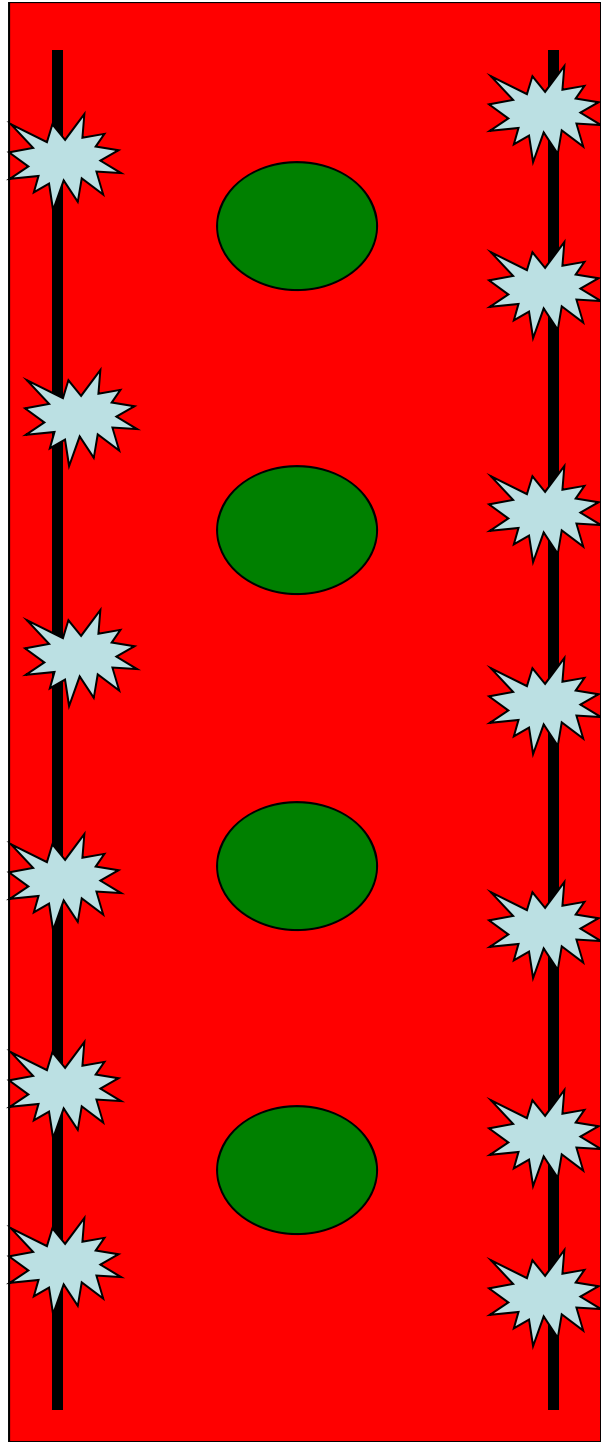
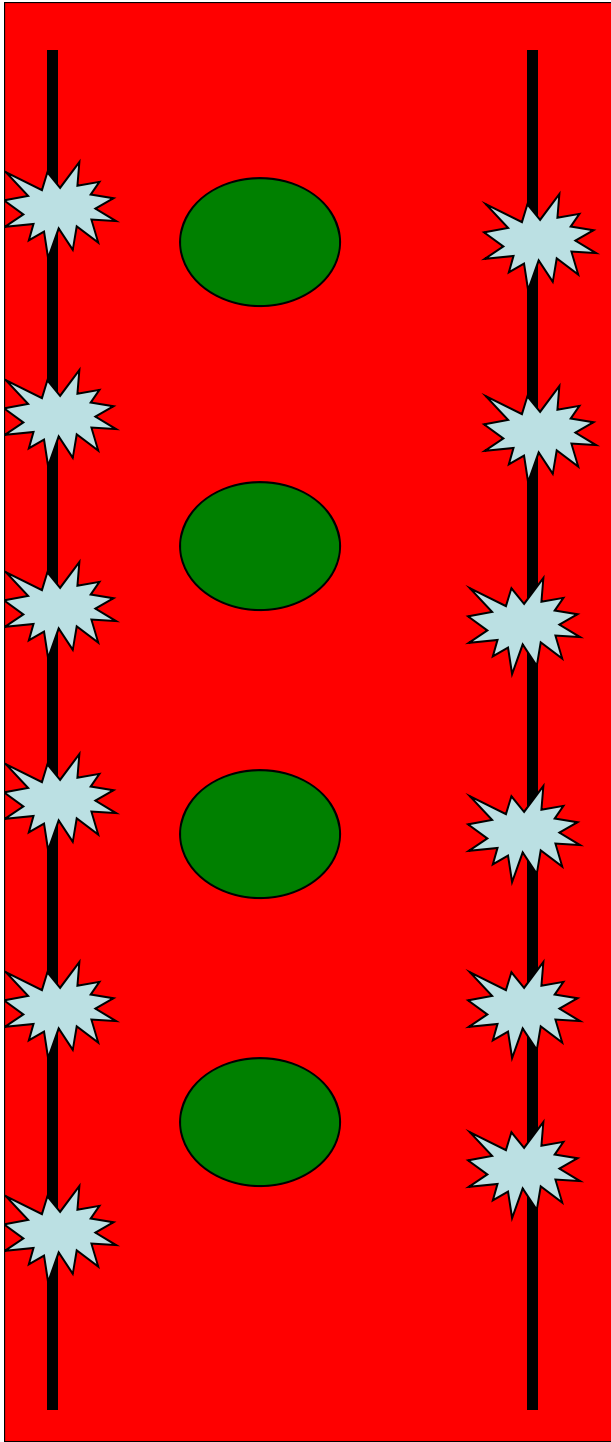
- Leaf Concentration: 2.5-3.0%
- 10 lbs N/100 lbs expected crop
- Shoot growth should be 8-12"
- Split April/June/August
- Liquid UAN through drip seems to be most efficient





Field Rate Vs. Treated Area

Treatment	Field rate (lbs/acre)	Treated area rate (lbs/acre)
Injection	31	125
Broadcast	125	125



Field Rate Vs. Treated Area

Treatment	Field rate (lbs/acre)	Treated area rate (lbs/acre)
Injection	31	125
Broadcast	125	125
Broadcast Band	31	125
Herb. Sprayer	31	125

Current 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

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

Injection is a large risk on
young trees !



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



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

N:P Imbalance

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





Leaf symptoms

Band Applications

Element applied	Trees with necrotic leaf symptoms 29 Aug. 2009 (%)	Tree necrosis rating 4 Oct. 2010
None	66	3.7a
P	33	1.5b
K	100	3.3a
P + K	17	1.3b

Symptoms appear closely linked to P shortage, even in July.



Rating
1



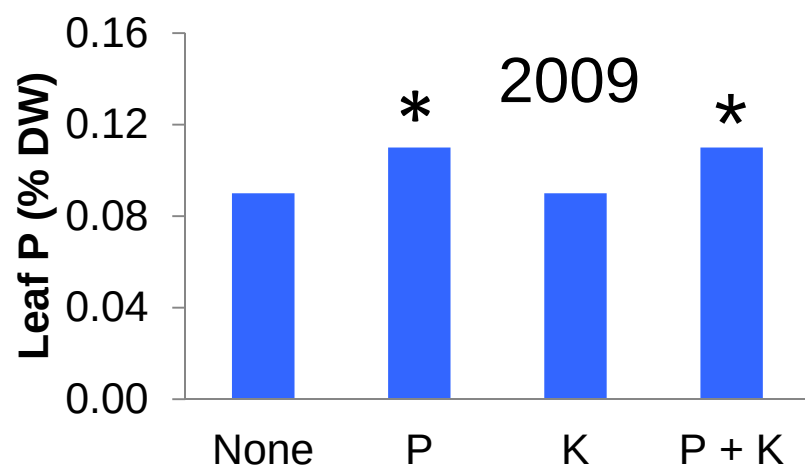
Rating
3



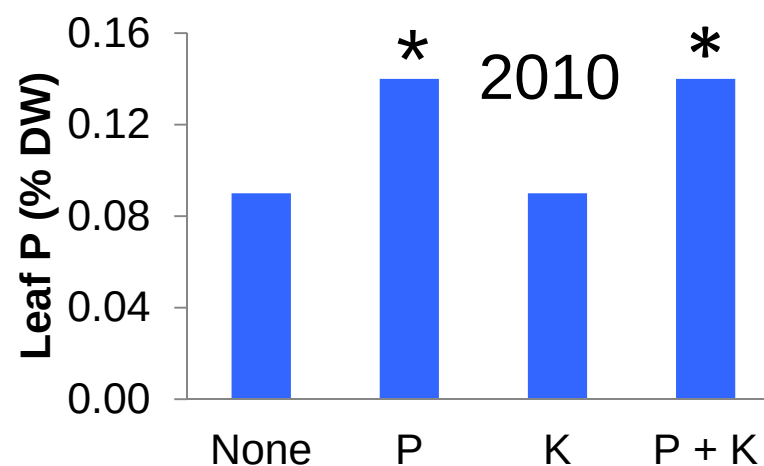
Rating
5

July leaf P

131 lb/acre P₂O₅



262 lb/acre P₂O₅



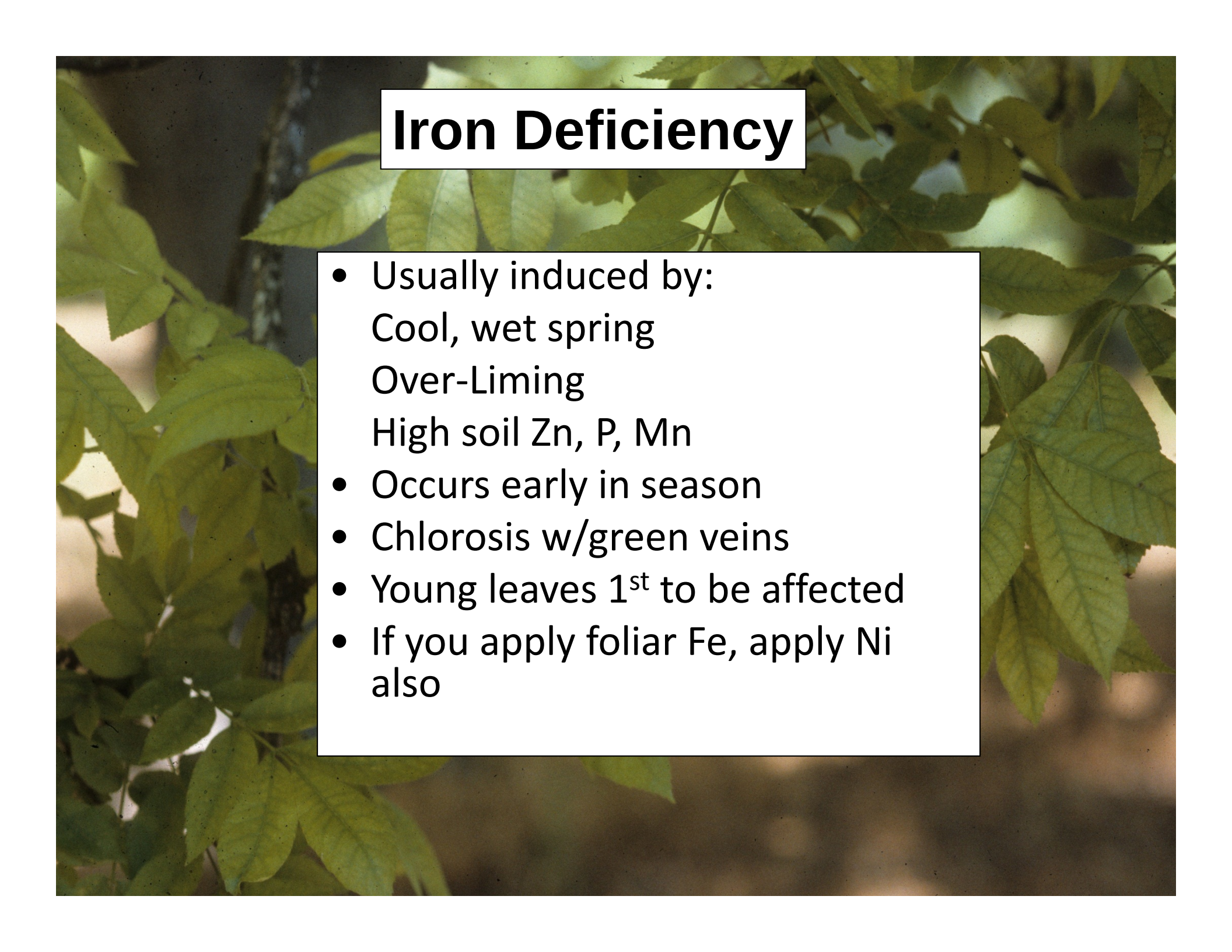
P application increased leaf P both years. Leaf P concn reached the target concn by the second year.

Mike Smith, Oklahoma State Univ.



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
- Begin 2 wks after bud-break until shoot elongation complete







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

Why is my leaf S deficient?

- Coastal Plain soils are naturally low in S
- S leaches readily
- C:S ratio
- Foliar S applications are beneficial
 - Foliar S = 2.5-5.0 lbs/A
 - Flowable=1 qt/acre
 - Be careful at high temps and when mixing with miticides or Elast

	C:S ratio (1-6" depth)
Mean	504:1
Sample Range	95:1-1600:1

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



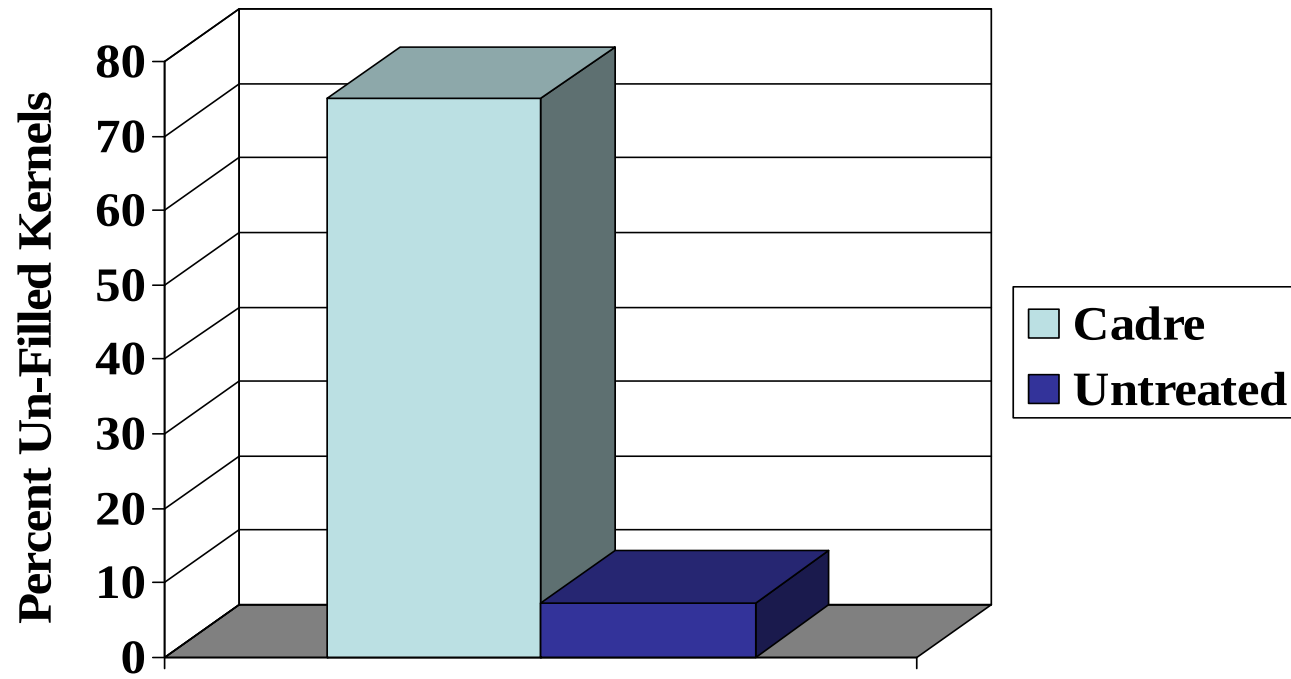
Shuck Sticking

- 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

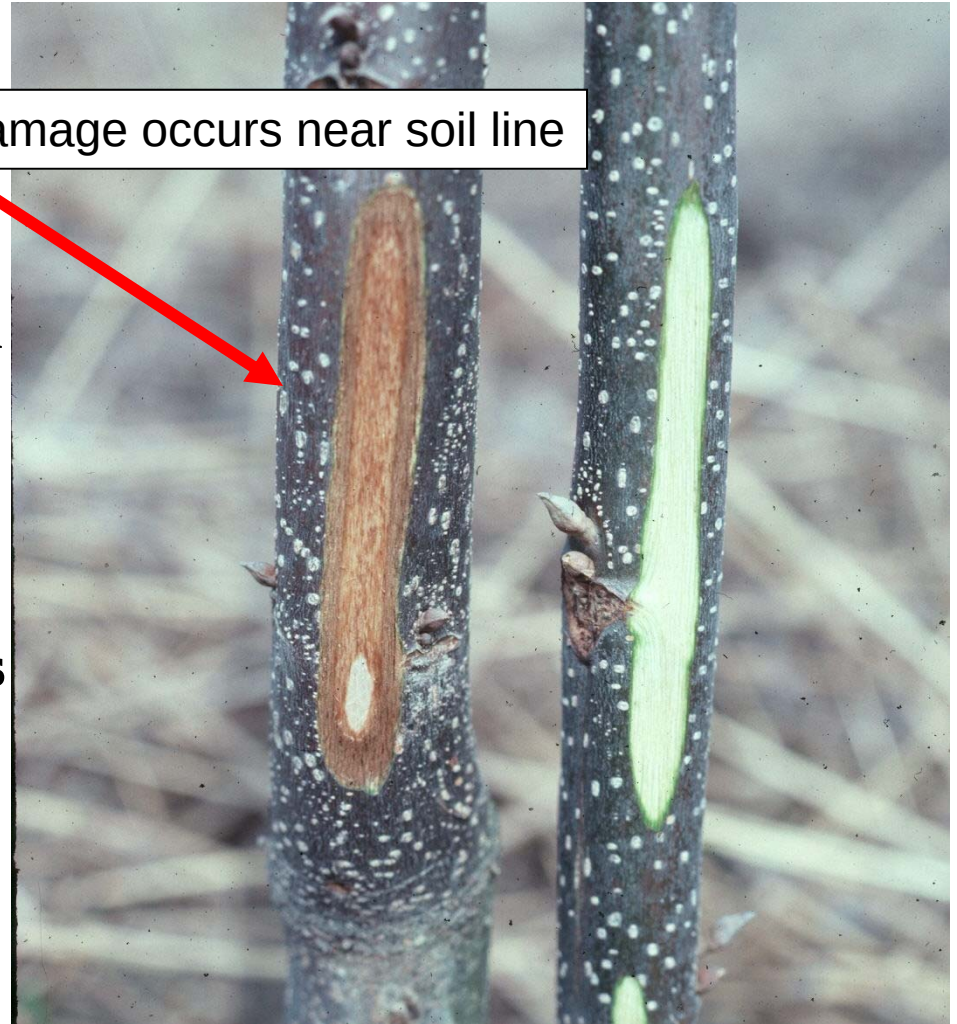


Paraquat

- **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

Effect of 2007 Easter Freeze on 'Desirable' Pecan

	Damage	Shoot Length (cm)	% Pistillate Shoots	#pist./ terminal	Chl
<i>32 DAF</i>	0	12.98	95	3.3	----
	80-100	5.62	65	2.0	----
<i>47 DAF</i>	0	12.98	95	2.75	39.95
	80-100	5.62	37.5	0.8	30.23
<i>91 DAF</i>	0	12.98	52.5	0.95	44.93
	80-100	7.525	15.0	0.30	42.08

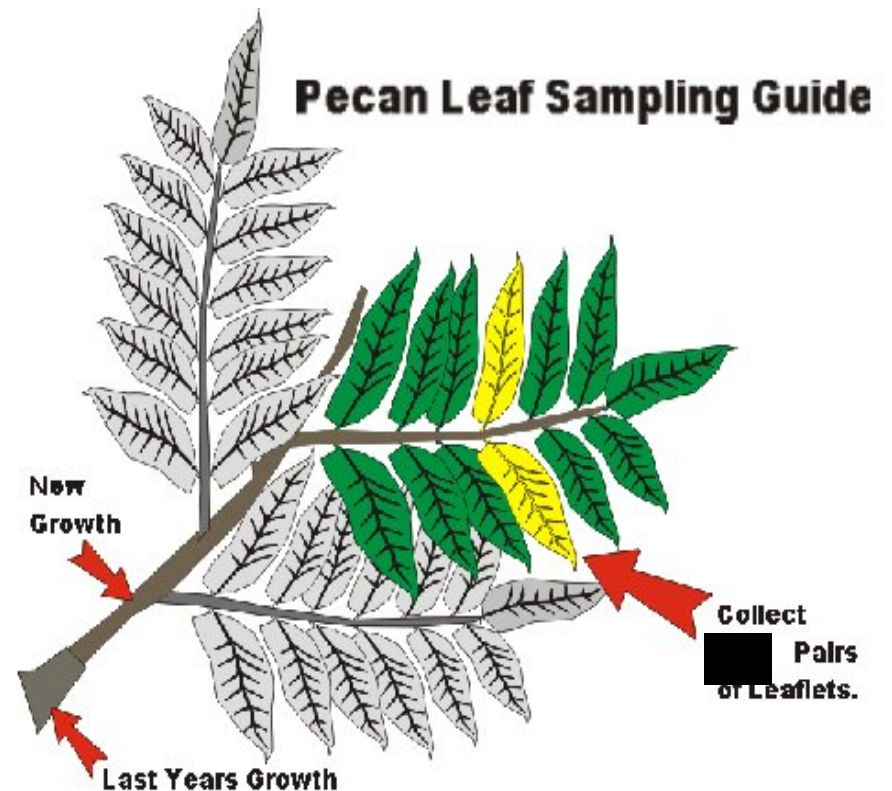
Effect of 2007 Easter Freeze on 'Kiowa' Pecan

	<i>Damage</i>	<i>Shoot Length (cm)</i>	<i>% Pistillate Shoots</i>	<i>#pist./ terminal</i>	<i>Chl</i>
<i>32 DAF</i>	0	---	---	---	---
	80-100	---	---	---	---
<i>47 DAF</i>	0	17.73	95	3.05	38.81
	80-100	20.74	5.0	0.15	26.14
<i>91 DAF</i>	0	22.49	85	2.38	43.33
	80-100	36.85	5.0	0.15	39.88

****30% of damaged shoots showed mouse ear symptoms***

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.



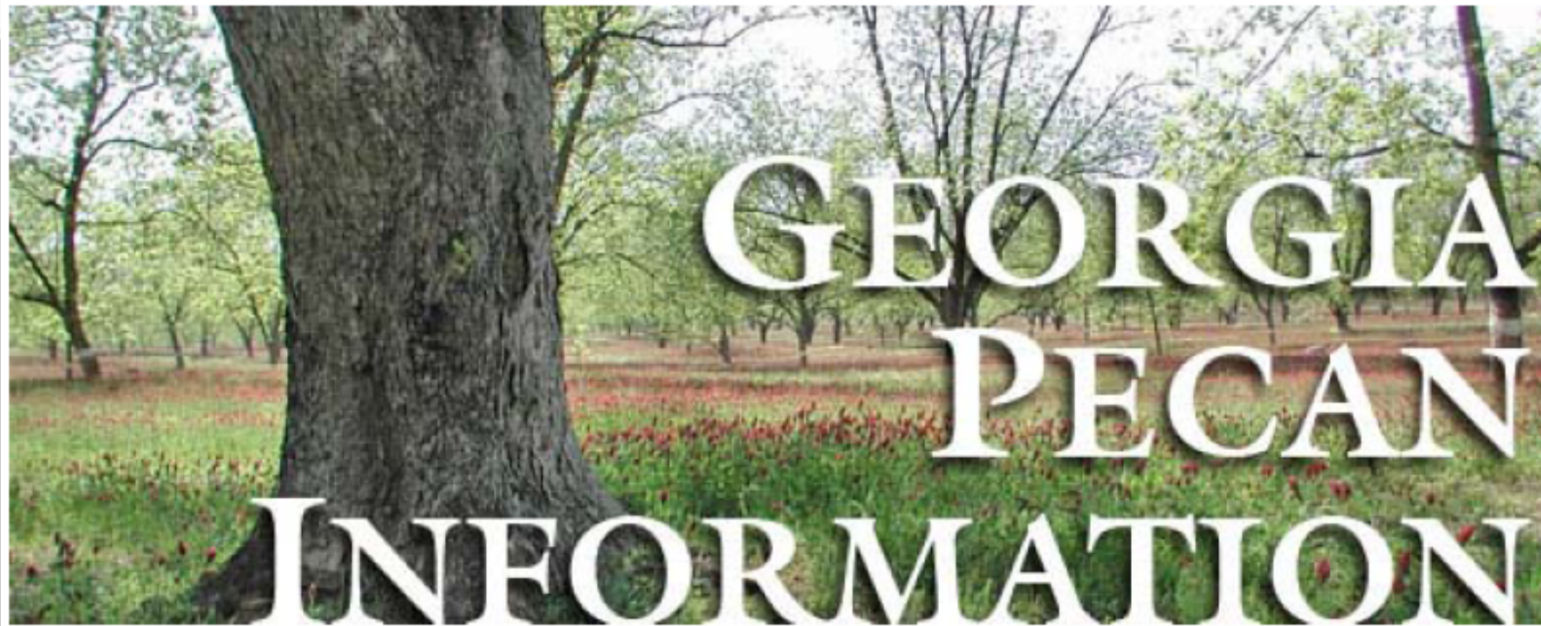
Soil Sampling

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



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Commodities: Fruits & Vegetables

Georgia Pecan Information

During the late 1800's, landowners began to recognize the potential profit of pecans in the southeastern United States. By the late 1800's, several individuals near Savannah, Georgia had produced and marketed pecans on a small scale. By 1889, there were only 97 acres of pecans planted in Georgia.

Thousands of acres of pecan trees were planted in southwest Georgia between 1910 and 1925. Most of these trees were initially planted as real estate investments rather than for nut production. Thousands of acres were sold in five and ten acre units, primarily in Dougherty and Mitchell Counties, which are

Pecan Hotline

1-800-851-2847

[New! Fruit Thinning DVD](#)

Quick Links

- [Important Dates](#)
- [2011 Pecan Spray Guide](#) (pdf)
- [Pecan Growers' Handbook](#)
- [Georgia Pest Management Handbook](#)

Useful Info

- <http://www.caes.uga.edu/commodities/fruits/pecan/>
- Southeastern Pecan Growers' Handbook
- Pecan Pest Hotline: 1-800-851-2847
- GPGA Annual Meeting---March 30--Perry