

Reducing Fertilizer Costs and Improving Orchard Floor Management in Pecans

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UGA Horticulture

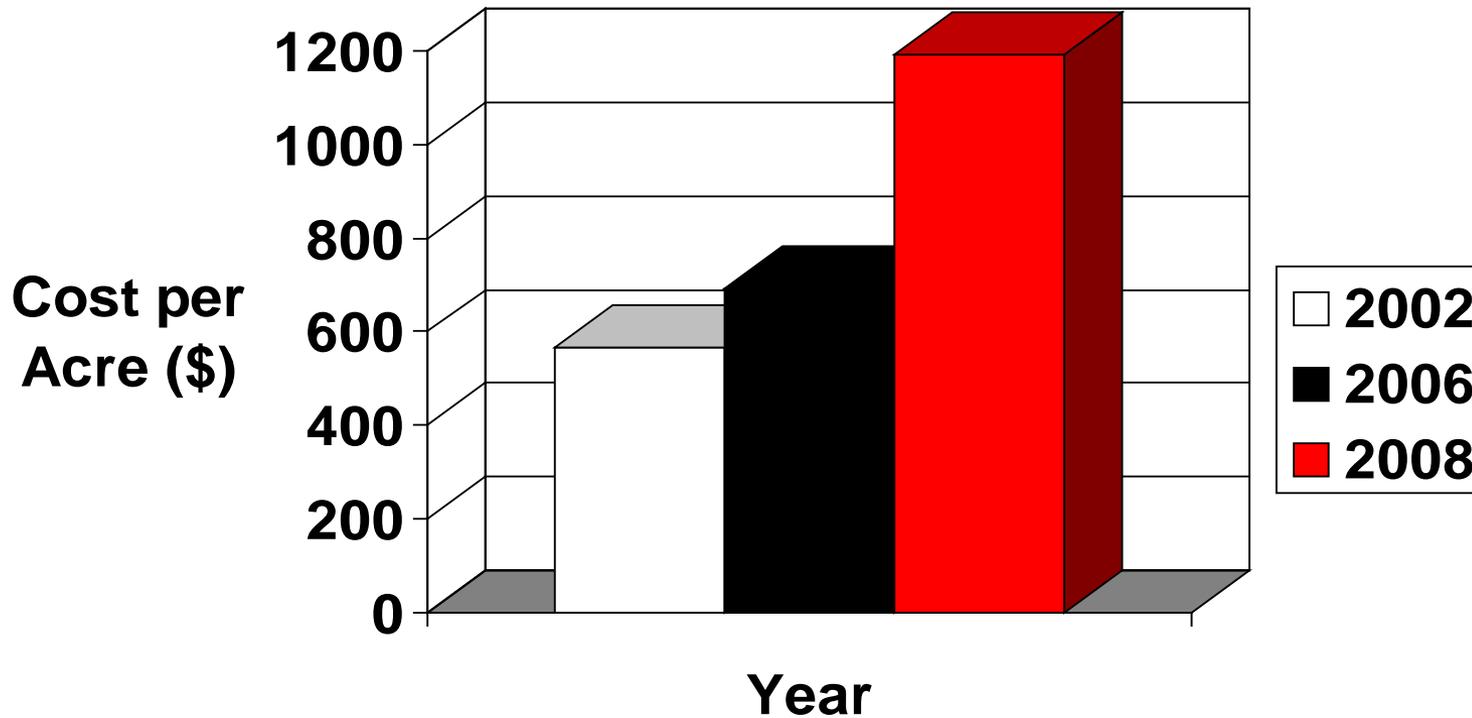
Tifton, GA

Fertilizer, Chemical, and Irrigation Costs Per Acre:

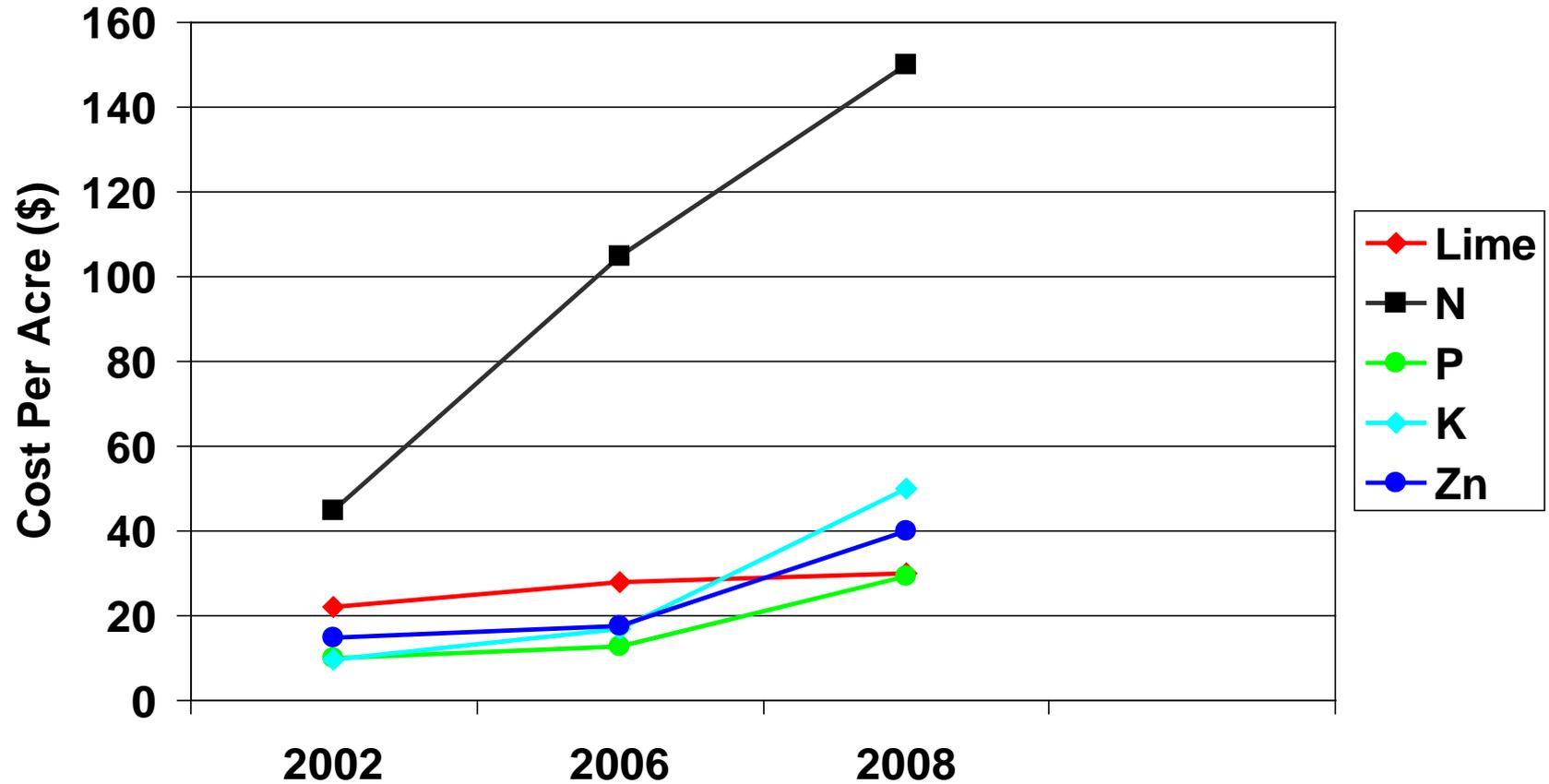
Full Production, 2002 /2006 /2008

Unit	Quant.	Price/Unit	Total/A
Lime	1 ton/A	\$22/\$28/30	\$22/28/30
N	150 lbs	\$0.30/.70/1.00	\$45/105/150
P	40 lbs	\$0.25/0.32/0.73	\$10/12.80/29.20
K	60 lbs	\$0.14/0.24/0.83	\$9.80/16.80/49.98
Zn Sulfate	50 lbs	\$0.30/0.35/0.8	\$15/17.50/40
Fungicides	8/8 Appl.*	\$9.89	\$79.12
Herbicides	3 Appl	\$5.50/\$29.25	\$16.50/87.75
Insecticides	10	\$10/14.41	\$100/144.16
Fuel Gal	33 Gal	\$.95/\$2.25/4.75	\$31/\$74.25/156.75
Irrigation			\$46.84/48/50

Total Variable Pecan Production Costs 2002-2008



Pecan Fertilizer Trends 2002-2008



Pecan Returns

	2002	2006	2008
Production	1000	1000	1000
Price	1.00	1.58	1.30*
Variable Costs	567.36	692.09	1191.17
Return	432.64	887.91	108.83

Can We Reduce This Number?

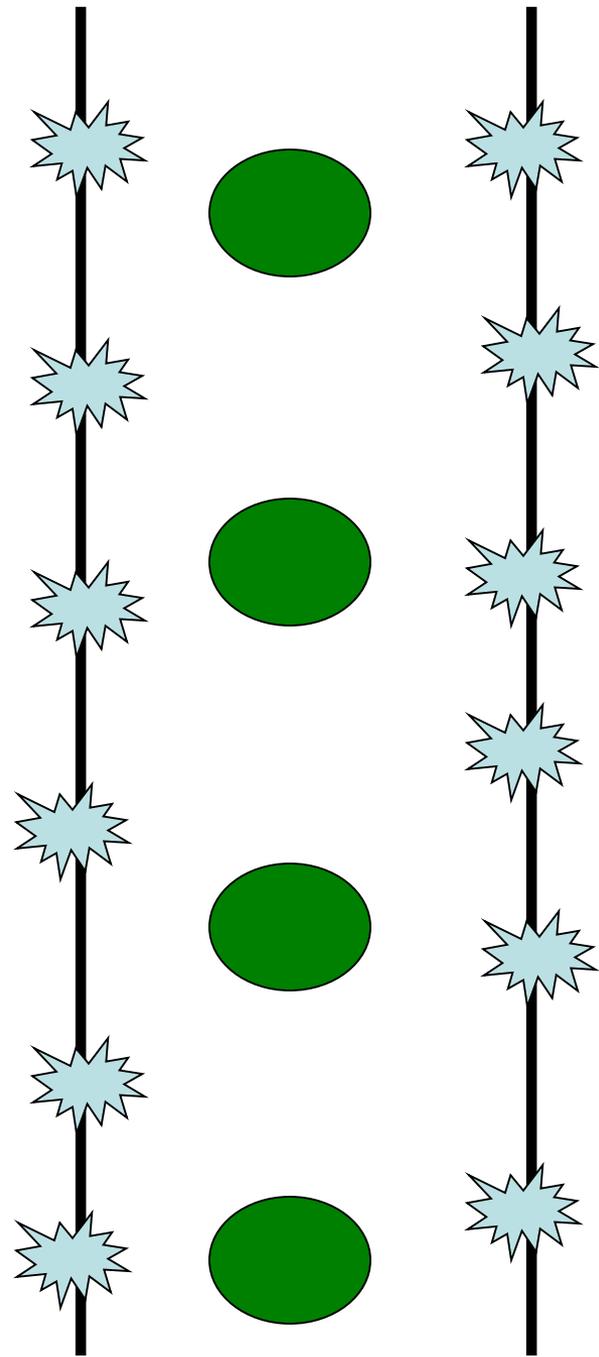
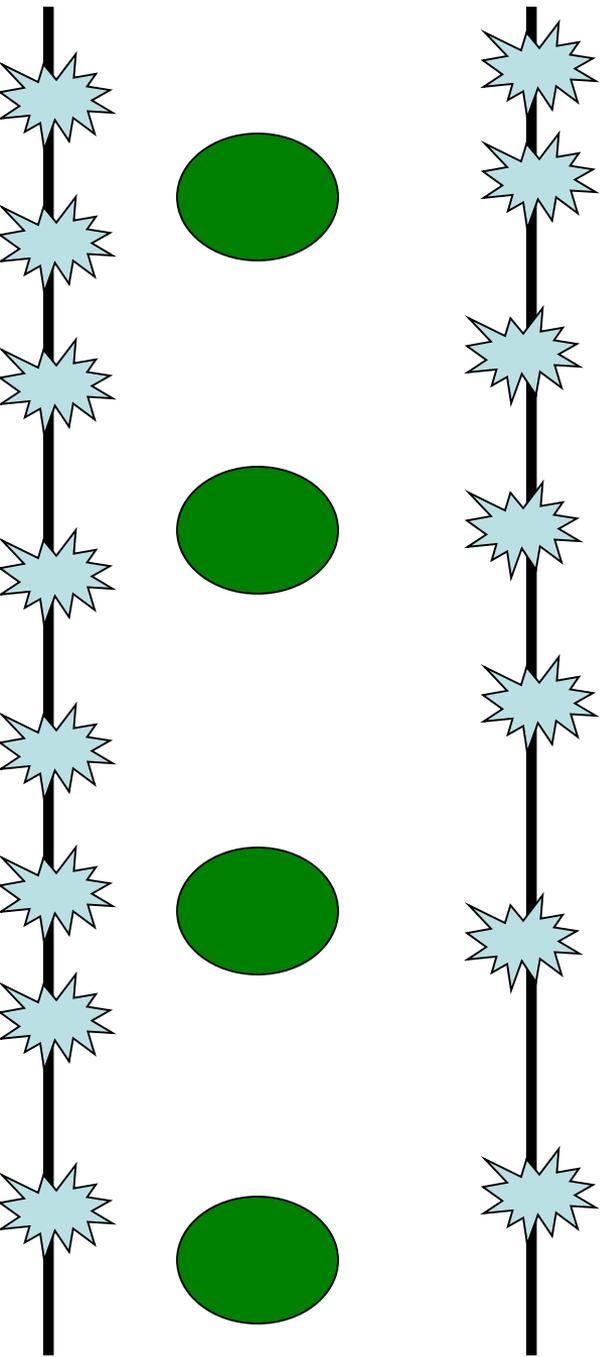


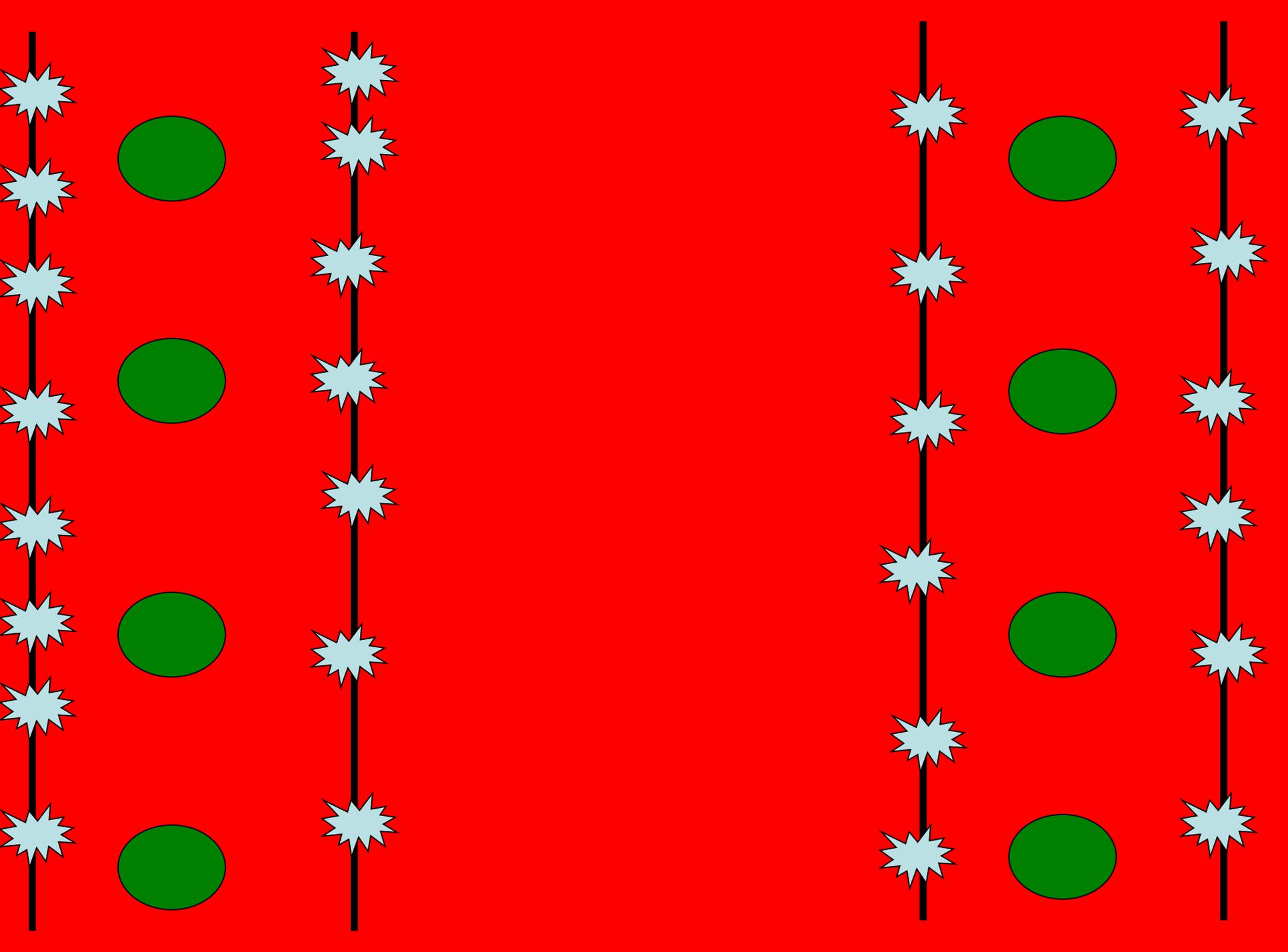
Are we using too much N?

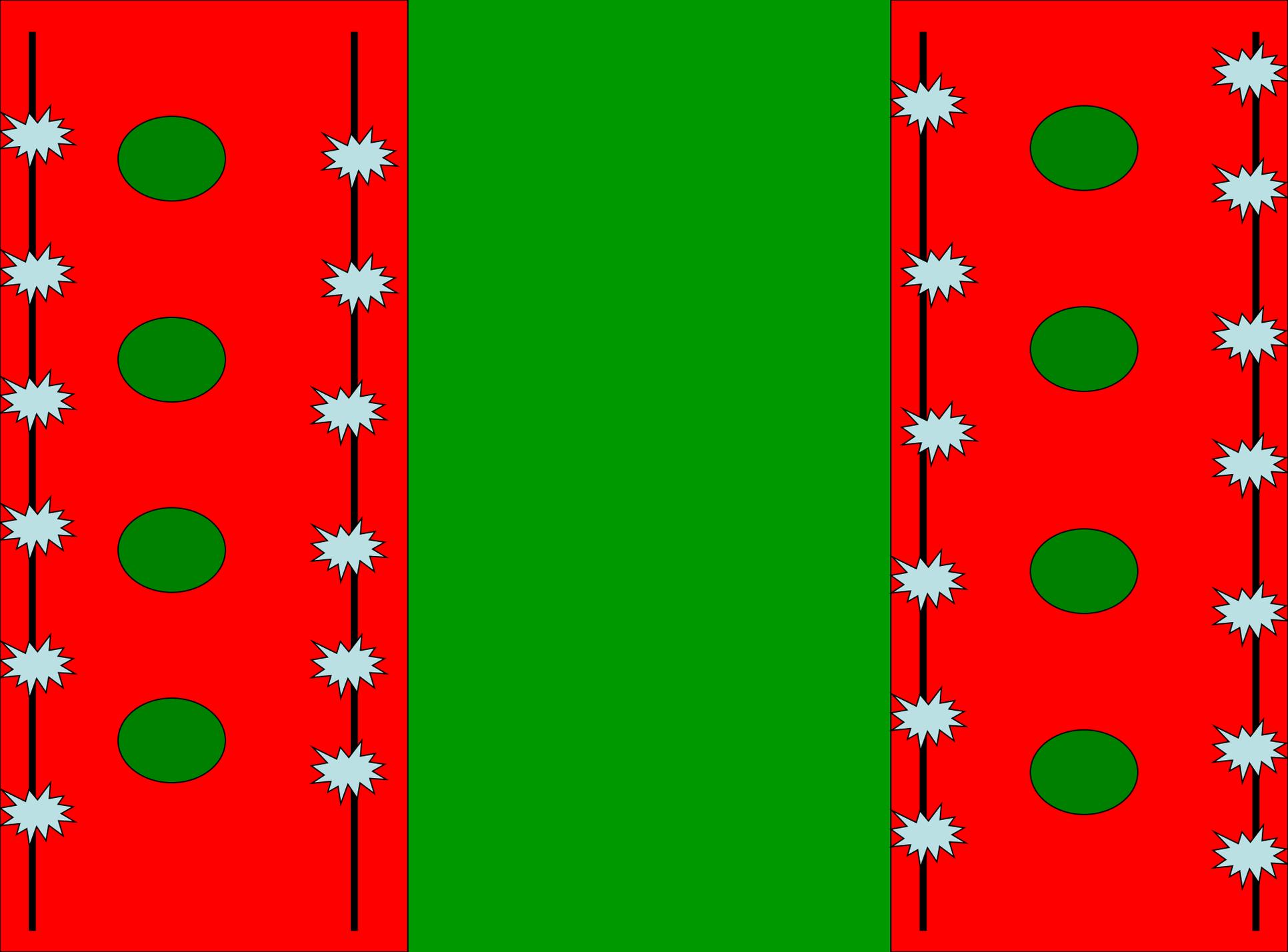
- Yield and leaf N of Mature 'Stuart' trees in good condition did not respond to N at rates of 0-120 lbs/A until 6 years later (Worley 1974).
- Pecan Orchards cycle nutrients

Why do you have a herbicide strip?



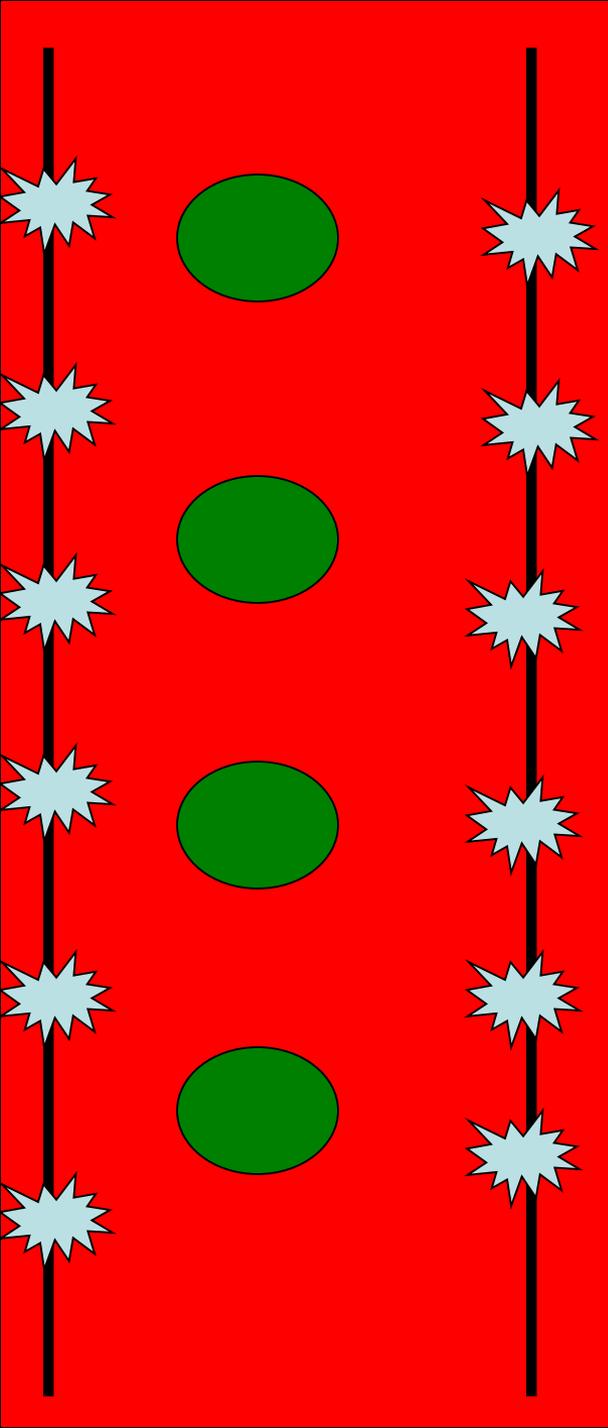






Band Applications

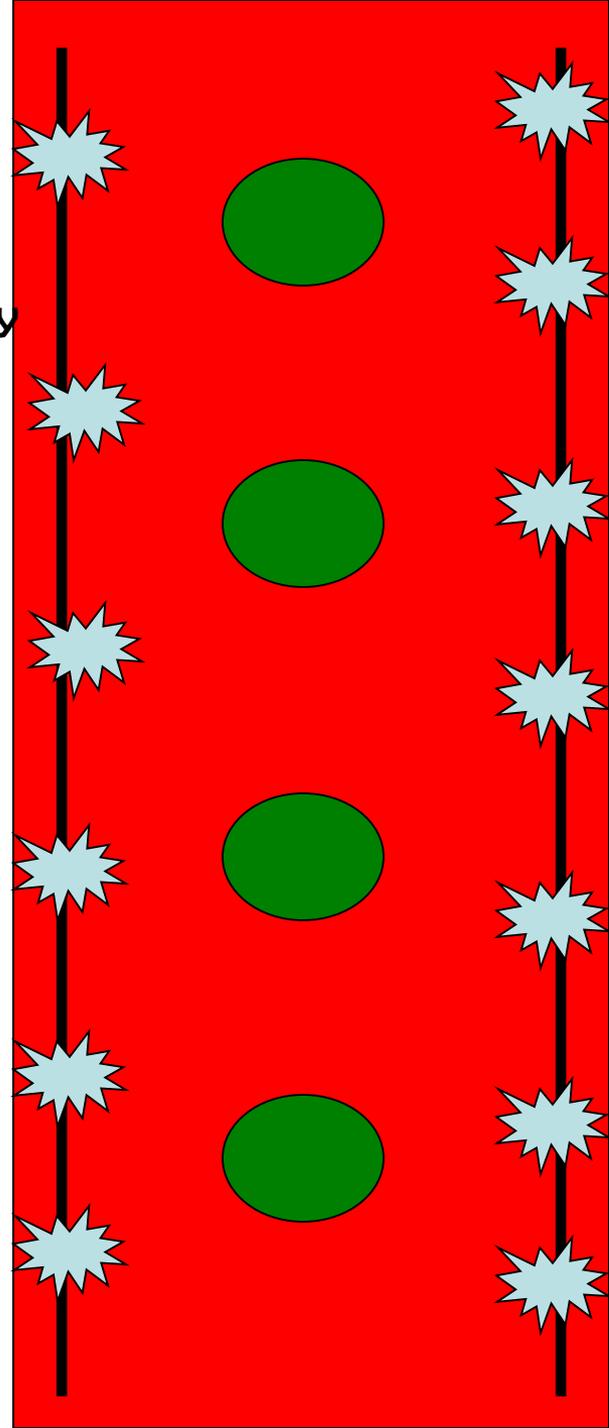
- Apply fertilizer over the herbicide strip/drip emitter line
- More efficient/reduced fertilizer cost
- Determine area of application!



- 40 X 40
- 12 foot wide herbicide strip:
- $12/40 = 30\%$
- Can reduce area that you apply fertilizer to by 70% with band application

At a rate of 75 lbs per acre:
 $100 \text{ acres} \times 75 = 7500 \text{ lbs N}$
 $7500 \times .30 = 2250 \text{ lbs N}$

● At \$1/lb = a savings of \$52.50 per acre with band application





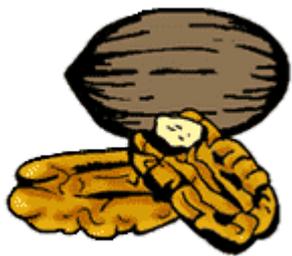
Broadcast Band Application



Liquid 28-0-0-5 applied over herbicide strip

Effect of N Application Method on 'Stuart' Pecan

Treatment	Leaf N	Crop Load
Injection	2.98a	60.6a
Broadcast Band	2.89ab	50.2b
Broadcast	2.85b	51.2ab
Liquid N Herbicide Sprayer	2.80b	54ab



Poultry Litter

- Have sample analyzed
- Typically:

N	60 lbs/A
P	60 lbs/A
K	40 lbs/A
Ca	30 lbs/A
Zn	0.6 lbs/A
Cu	0.6 lbs/A

Nutrients are organically bound

- 60% (36 lbs N/ton) is available for crop uptake during the season.
- Do not apply after first week of June
- Use BROILER litter and NOT LAYER litter
 - Ca/Mg



Poultry Litter Costs

- Total Synthetic Cost N,P,K,Zn = 162.66/A
- 1 ton litter = \$35-\$50/A
 - 1 appl.: \$50/Acre for 39 lbs N, 48 lbs P, +K, +Zn
 - 2 appl.: \$100/Acre for 78 lbs N, 96 lbs P, +K, +Zn
- Not much difference if N is only benefit (@ \$50/ton)



N Credit for Legumes

- General N Recommendation for Pecans
 - 10 Lbs N/ 100 lbs expected crop
- Crimson Clover
 - Year 1 = Replaces 30 lbs N/Acre
 - On Year = 150 lbs N - 30 lbs N = 120 lbs N/Acre
 - Off YEAR = 75 lbs - 30 lbs = 45 lbs N/Acre
 - After 3 Years = Replaces 75-150 lbs N/Acre
 - On Year = 150 lbs N - 100 lbs N = 50 lbs N/Acre
 - Off Year = No additional N required

Effect of Clover on Organic Matter and N

Sample Site	Soil Nitrate-N	Soil Organic Matter
4" Sod	3.78	1.34
8" Sod	4.18	1.66
4" Sod+Clover	13.95	2.32
8" Sod + Clover	10.75	2.90

Orangeburg Loamy Sand

Why is Organic Matter Important?

- Higher inputs required with lower organic matter
- Increased Water-Holding Capacity
- Nitrate provided to plants via mineralization as soil organisms decompose organic matter
- Neg. charged humus holds K, Ca, Mg, preventing loss
- Provides natural chelates that keep Zn and Cu in forms plants can use
- Reduced compaction, better water-holding capacity, reduced erosion
- Slows down (Buffers) changes in pH
- For every 1% increase in organic matter , 10 lbs N released
- Crop yield increased 12% for every 1% increase in organic matter

Growing Clover and Pecans

- Allow clover to re-seed
- Adequate soil K and P levels
- Keep pH between 6-7
- Good seed-soil contact.
- Plant as soon as possible after harvest
- Control competing grasses and weeds.
- Allow clover to re-seed before mowing

Durana White Clover

- Perennial, low growing, hardy, spreads by stolons, drought tolerant, persistent.
- Developed by Dr. Joe Bouton, forage breeder at Tifton, from hardy native strains of white clover in Georgia.



Crimson Clover

- Cool-season annual, but re-seeds well in the south
- Seeds out in late May/June
- May require re-seeding every 3-5 years depending on soil type



Planting Clover

DURANA

- Plant 3-4 lbs. seed, pre-inoculated, in late September-November.
- Seed costs \$6.50 per lb.,
- \$19.50 to \$26 per planted acre.

CRIMSON

- Plant 15-18 lbs/A drilled; Increase seeding rate by 25% where broadcast
- Inoculate seed
- Seed cost: \$1.50-\$2.00/lb
- \$22.50-\$36 per planted acre



- One advantage for a tough perennial clover is that, once established, it is difficult to kill with herbicide.
- 1 pt of 2,4-D, in January, will kill small wild radish plants and is tolerated by established white clover.
- 9 ounces of glyphosate, as a chem-mow, will not hurt clover much, and will suppress many weeds, reducing need for mowing.



Bill Goff



Bill Goff



**Treated with wiper, 5% glyphosate,
2% 2,4-d amine , 15 days earlier**



No wiper trt., mowed 15 days earlier

Bill Goff

Chem-Mowing vs Mechanical Mowing

- Chem Mowing---Application of low herbicide (glyphosate) rates (6 oz/A)
- Provides 45-90 Days Control
- 2 Applications/Season
- At least $\frac{1}{2}$ the cost of mechanical mowing

Chem Mowing Can Help Minimize Drought Stress

- Mechanical mowing of weeds stimulates growth and increases uptake of soil water
- Chem mowing does not lead to increased uptake of soil water, making more moisture available to trees

- **Fertility and orchard floor management programs should focus on reducing cost, increasing N use efficiency, and improving orchard soils.**

