

Can Southeastern Pecan Production Be Economically and Environmentally Sustainable?

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UGA Horticulture



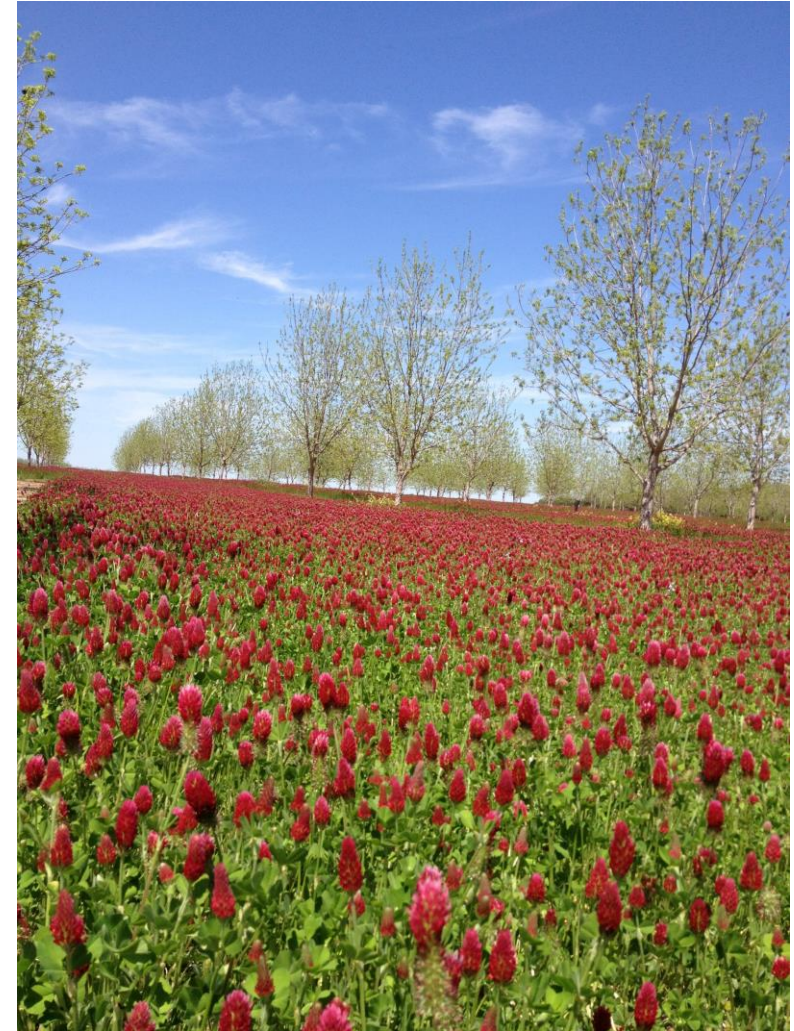
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Sustainability = the ability to maintain or support a process continuously over time

- Economic
 - Tied to yield and cost of production
- Environment
 - Tied to the functioning of natural processes we rely on
- Social
 - Tied to consumer perception

All of these are affected by the decisions we make



Current Situation

	GA State Yield (lbs)	Avg Yield/Acre	Avg Price	Gross/Acre	Variable Cost of Production	Net
2020	147.5 M	1100	1.27	\$1397	\$1485.88	-\$88.88
2021	88.6 M	642	2.06	\$1322.52	\$1485.88	-\$163.36
2022	125.5 M	870	1.64	\$1426.80	\$1807.27	-\$380.47

- Survival will require **highly productive/scab resistant** cultivars that buffer the grower from low prices and unforeseen market decline



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UGA Recommended Pecan Cultivars

2-3 sprays

5-7 sprays

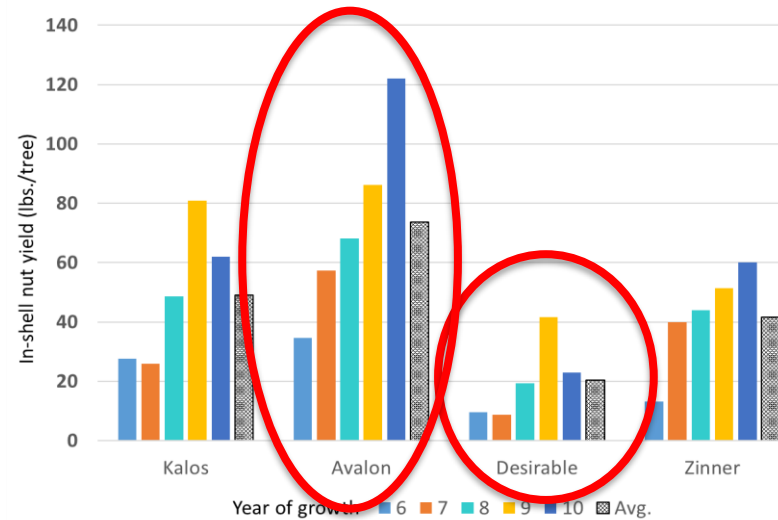
8-12 sprays

Low Input	Medium Input	High Input	Conditional	Trial
McMillan*	Caddo	Desirable	Cape Fear	Kalos
Excel*	Forkert*	Pawnee	Kiowa*	Whiddon
Elliott*	Creek		Lakota*	Tanner
Kanza*	Sumner*			Tom
Avalon*	Zinner*			Ellis
	Oconee			Eclipse

*Type II—Stigma receptive before pollen mature

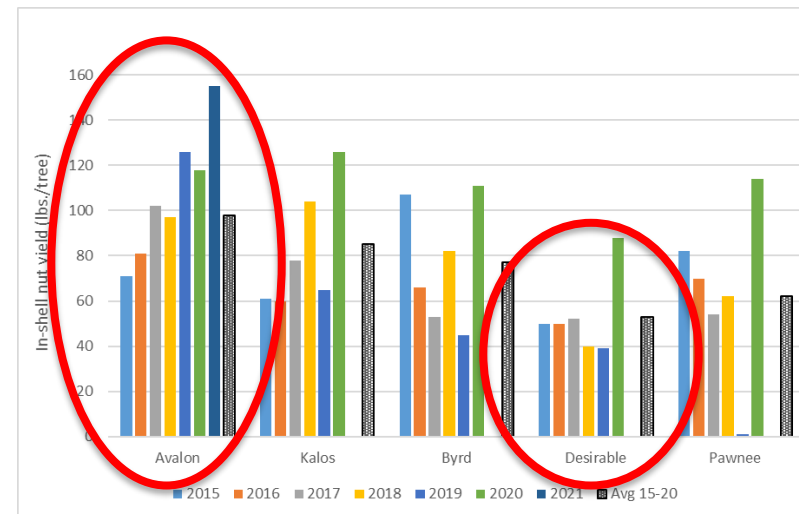
Plant for Yield Potential and Scab Resistance

- Need Varieties you can grow with 5-7 sprays and 1500-2000 lbs/acre
- Creek, Avalon, Lakota
 - Caddo, Cape Fear, Sumner, Oconee, Excel



Avg. Yields 6-10

Avalon – 73 lbs.
Kalos – 49 lbs.
Desirable – 20 lbs.
Zinner – 42 lbs.



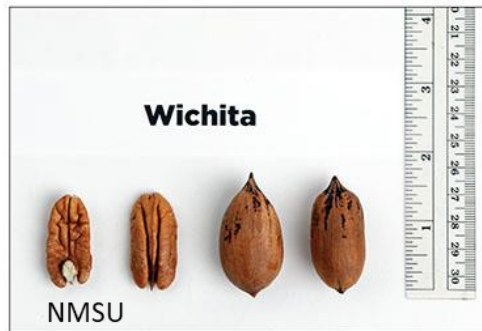
Avg. Yields 11-16

Avalon – 98 lbs.
Kalos – 85 lbs.
Byrd – 77 lbs.
Des – 53 lbs.
Pawnee – 62 lbs.

Lakota

	5 yr avg yield	Count	% Kernel	Price range
Lakota Yrs 10-14	94 lbs/tree	60	58	\$2.02

•Kernels turn amber quickly...., a factor that could negatively affect its final price.



Fruit-Thinning Lakota

	2020 Yield/tree (lbs)	2020 Nuts/lb	2020 % Kernel	% Bearing Terminals May 2021	2021 Yield /tree (lbs)	2021 Nuts/lb	2021 % Kernel
Thinned	110b	63a	56b	61.6b	155a	59b	58b
Non-Thinned	159a	62a	54a	11.6a	85b	52a	60a



Comparison of Desirable and Lakota

	Yield/tree	Yield/acre	Count	% kernel	Cost/A	Price (\$)	Gross (\$)	Net (\$)
Lakota	94.3	2546	60	58	1110.67	1.35	\$3437.10	\$2326.43
Desirable	55.5	1500	48	52	1807.27	2.00	\$3000	\$1192.73

10 sprays

Lakota- 0 sprays



Desirable- 12 sprays



Hedging Summary

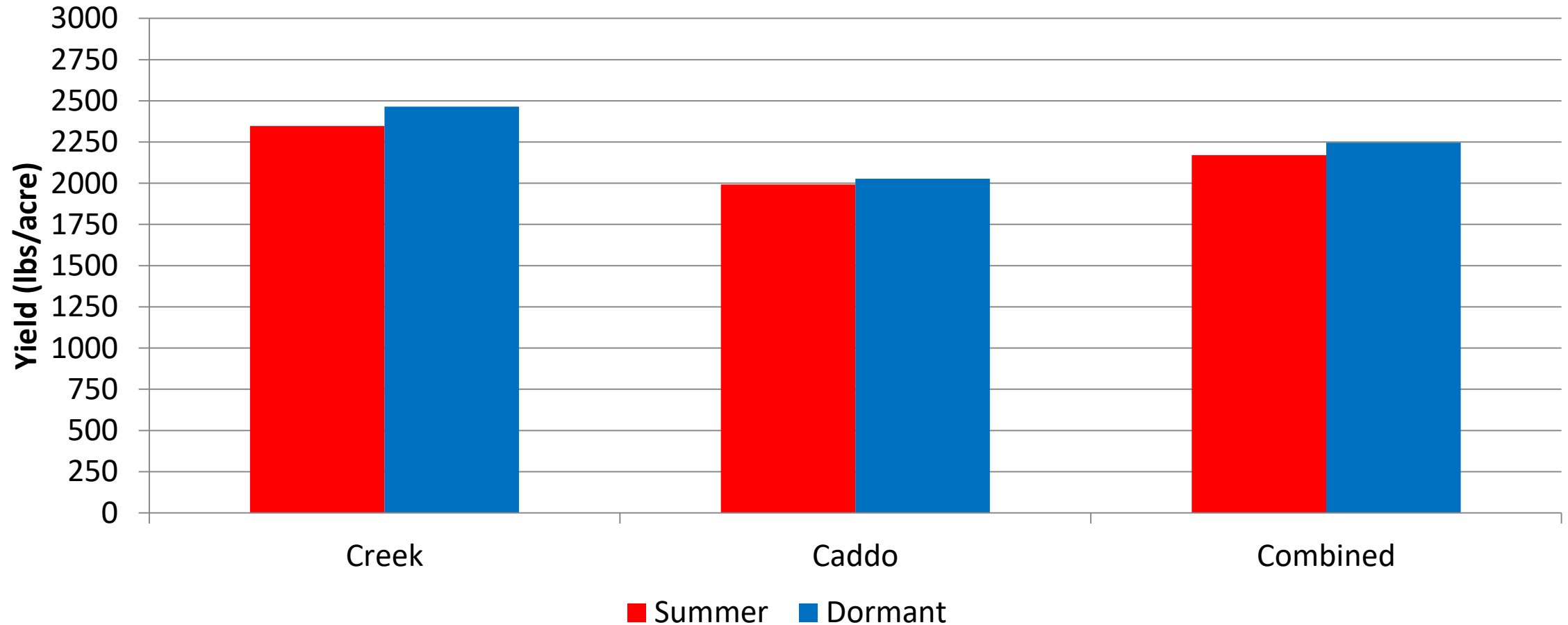
- No significant difference in yield
 - Variety Specific—Trees that fruit on the inside of the canopy respond best
- Increase in nut size and quality
- Better fungicide coverage
- Increased water efficiency of hedged trees
- Reduction in wind damage
- No Difference in Summer vs Dormant with regard to production or quality
- The tighter the tree spacing, the earlier you need to begin hedging



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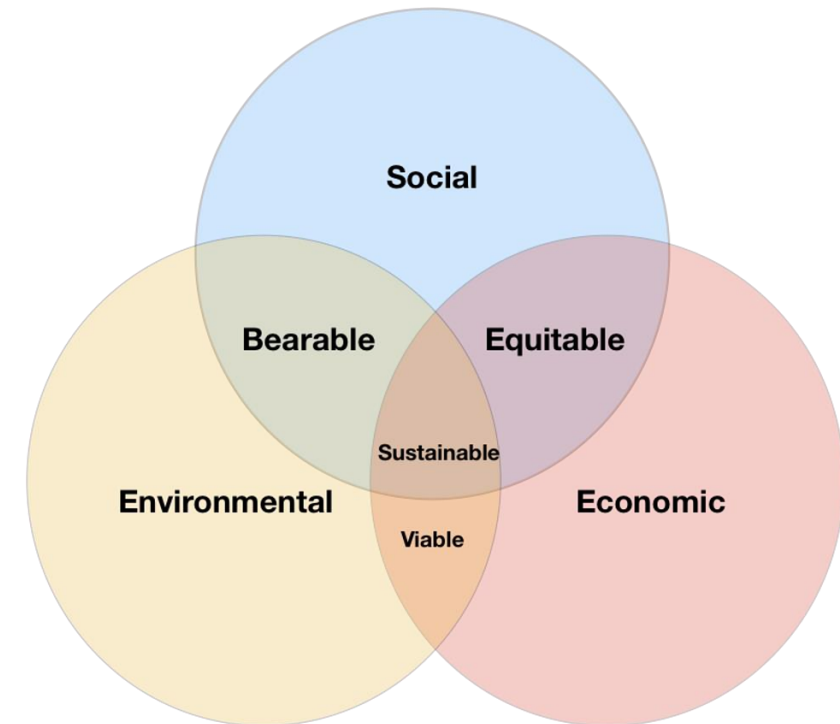
Summer Vs Dormant Hedging Yield Summary



Planted 2006

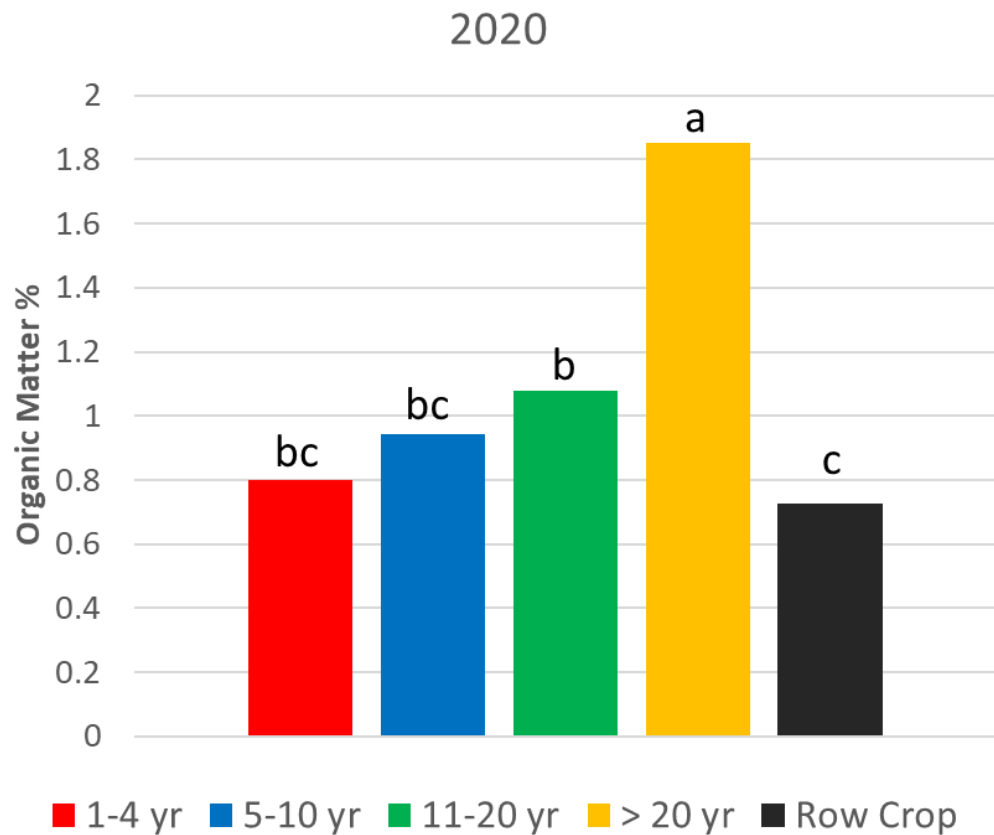
Why Should We Be Concerned with Environmental Sustainability?

- 60% of consumers buy products and services from companies that are environmentally responsible
- 54% of consumers try to purchase products or services from brands that take a stand on environmental issues
- Southeastern pecan production inherently has a good sustainability story to tell
 - Native to U.S.
 - Untilled soils
 - Perennial/Long-lived
 - Carbon storage in soil and tree
 - Recycle nutrients
 - Tree roots serve as safety net for N leaching
 - Low erosion
 - Biologically Diverse
 - Management Practices can further enhance

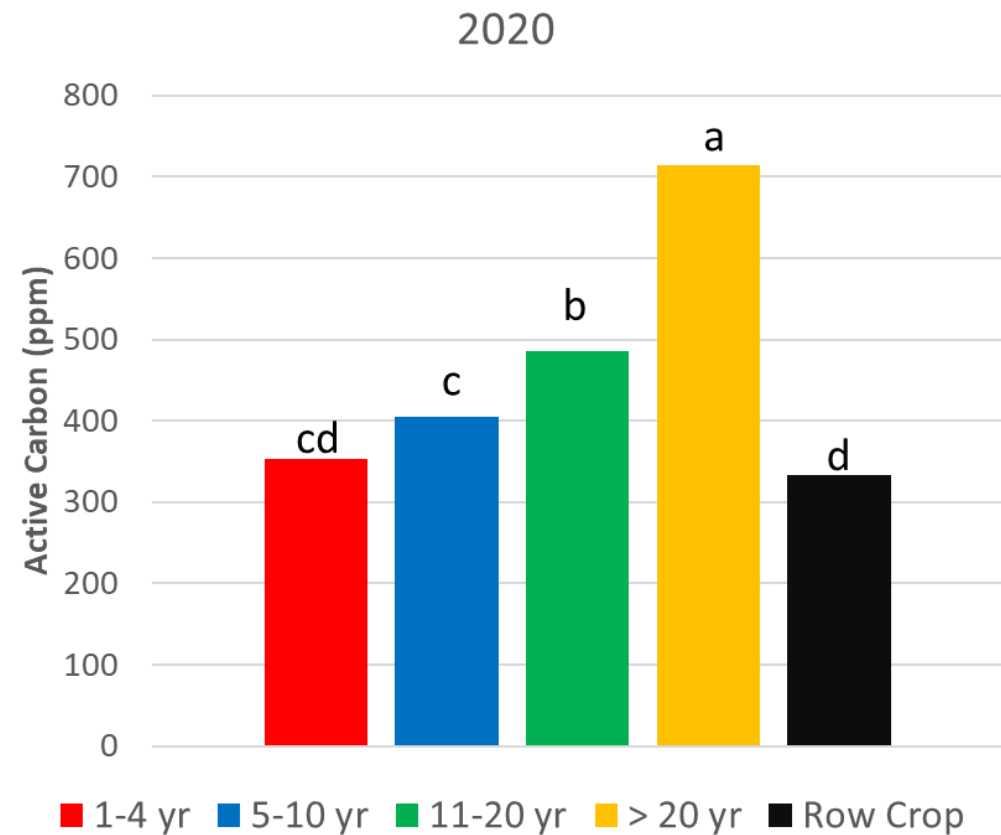


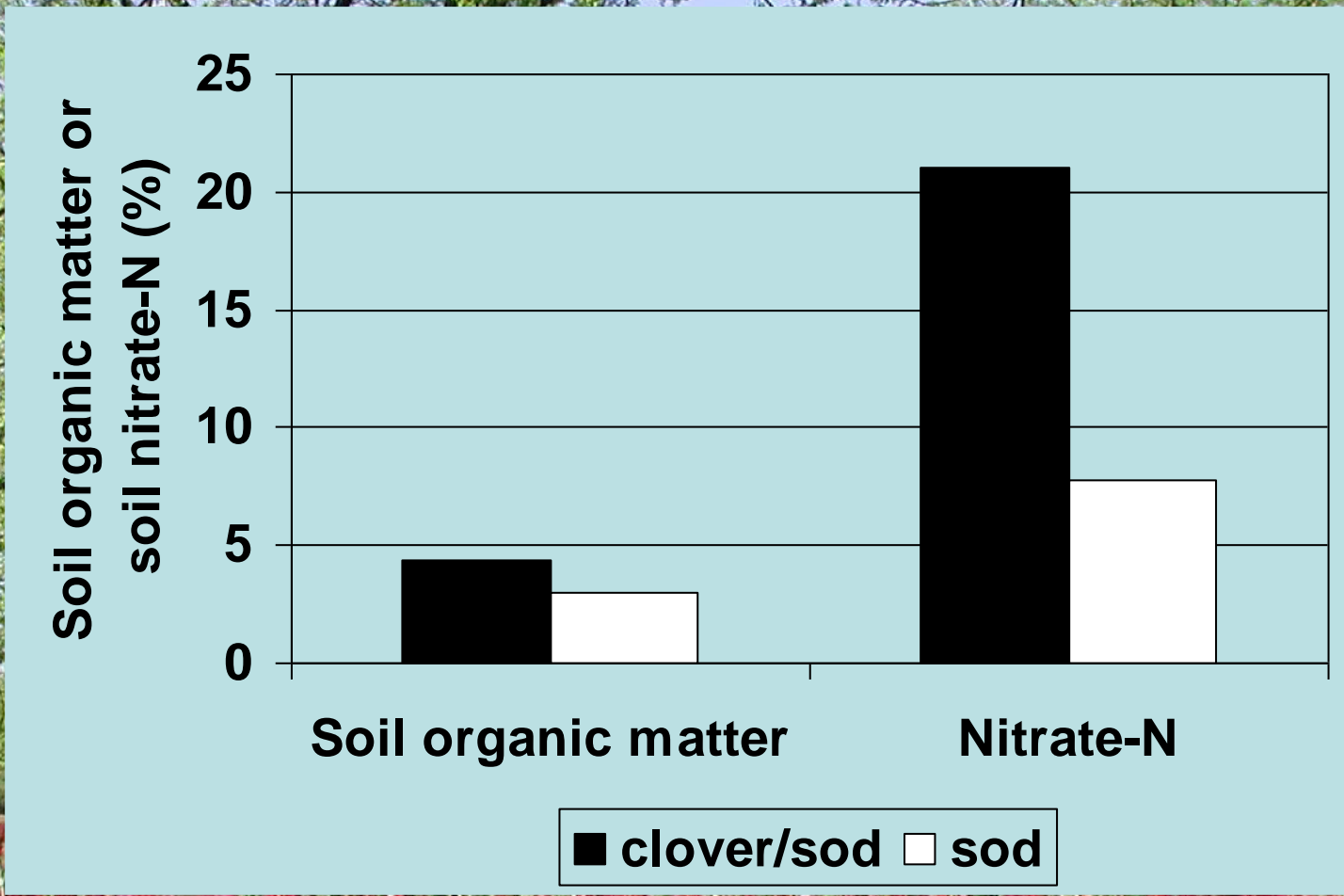
Assuming taste and price are often roughly equal, the modern consumer prefers sustainable food brands and adds them to their digital and physical shopping carts daily.

Organic Matter



Biologically Active Carbon





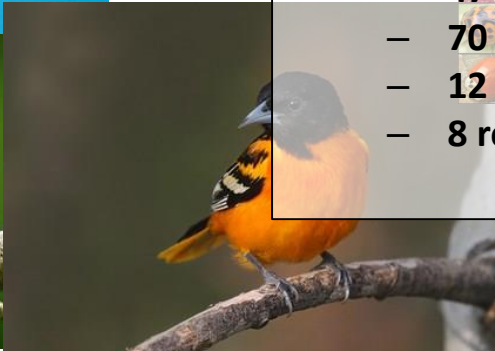
Crimson Clover:
70-130 lbs N
3500-5500 lbs dry matter/A

White Clover:
80-200 lbs N
2,000-6,000 lbs dry matter

Biological Diversity in the Orchard

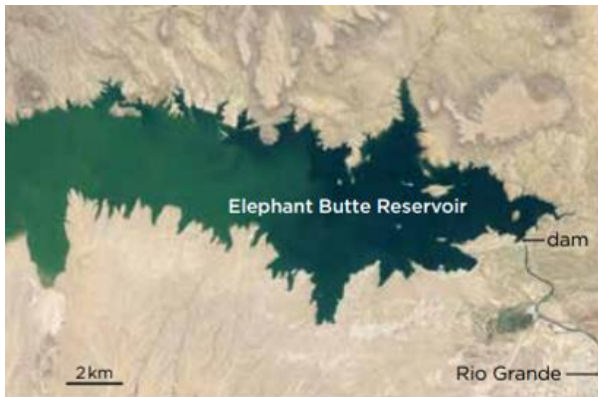


- **180 species of insect pests and mites (+associated natural enemies)**
- **Texas Survey:**
 - 181 species of spiders alone from 26 families
- **2012 “survey”:**
 - 204 species other than pecan
 - 38 plants
 - 47 birds
 - 70 insects
 - 12 mammals
 - 8 reptiles /amphibians

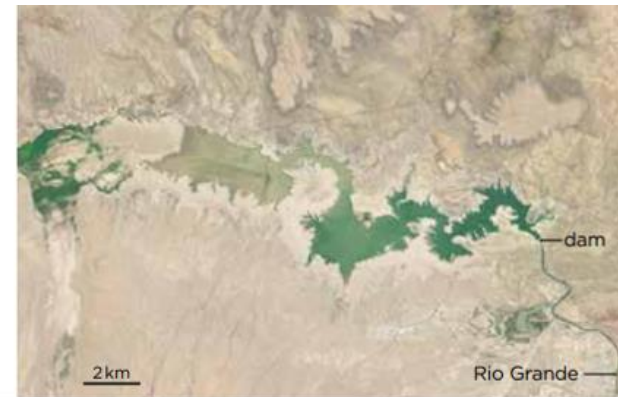


The Water Issue In The West

- Water quantity and quality in Western U.S. is a serious challenge
- The Rio Grande Project supplies the water for pecan production in the Mesilla, Rincon, and El Paso Valleys
- Supplement with groundwater which has high salt content
- **New Mexico** tops the list of states expected to run out of water first. The state's score is on par with the United Arab Emirates in the Middle East and Eritrea in Africa, the World Resources Institute (WRI) found. California ranks second, followed by Arizona, Colorado and Nebraska.



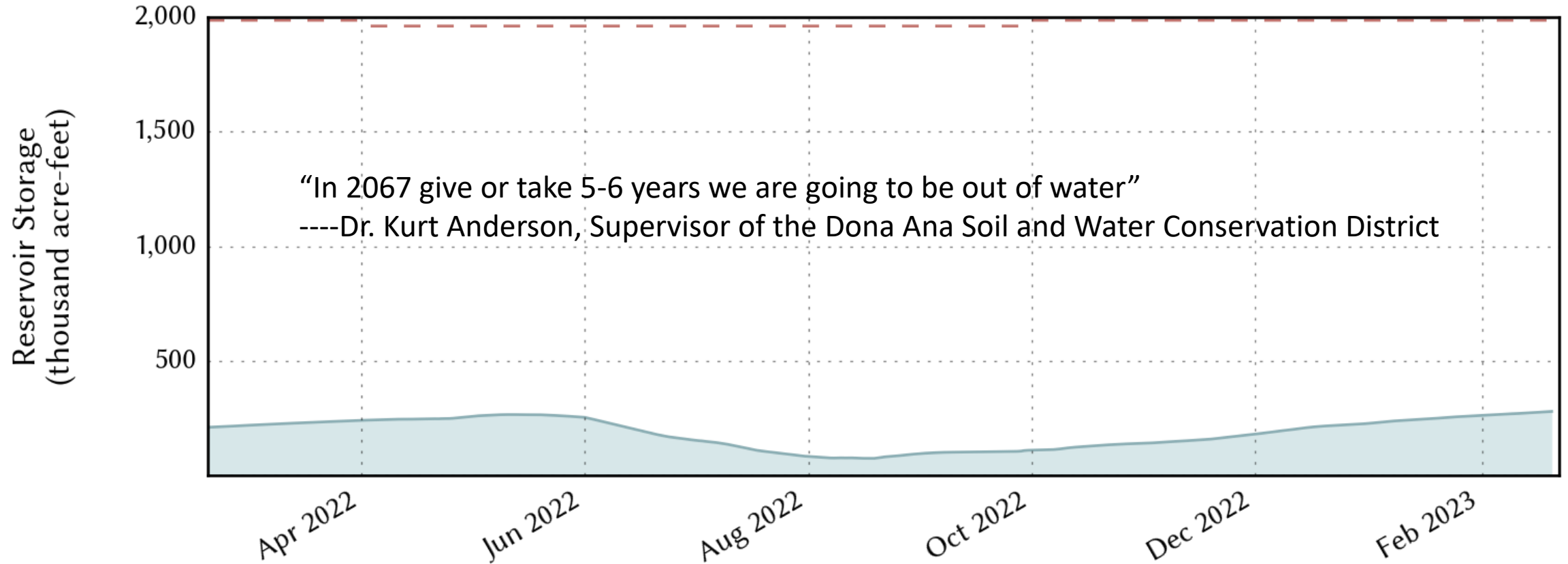
1994



2013

The Water Issue in the West

Conservation Pool Flood Pool



May 2022 at 13% of full capacity (up 1.7% from 2021)



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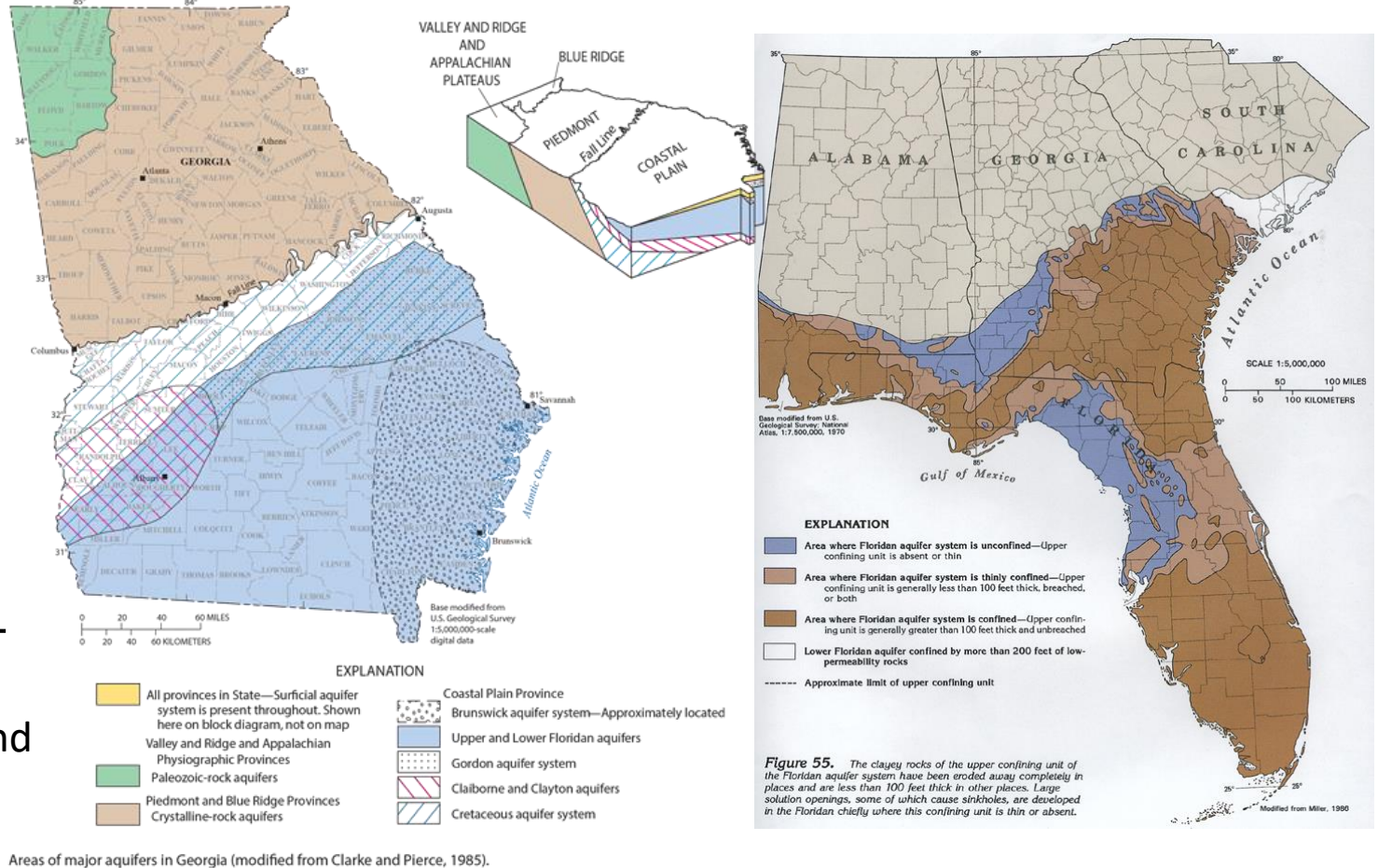
Southeastern U.S. Water---Floridan Aquifer

Floridan Aquifer

- Underlies 100,000 square miles
- Recharged annually by rainfall
- The majority of recharge to the Floridan aquifer system occurs in the areas where it is unconfined or semiconfined, **approximately 10-25 in/yr**, whereas in the areas of confinement the recharge is less than 1 in/yr.

Layers-Floridan, Claiborne, Clayton, Cretaceous, Gordon, Brunswick

- Water levels in most SE aquifers respond rapidly to precipitation and irrigation

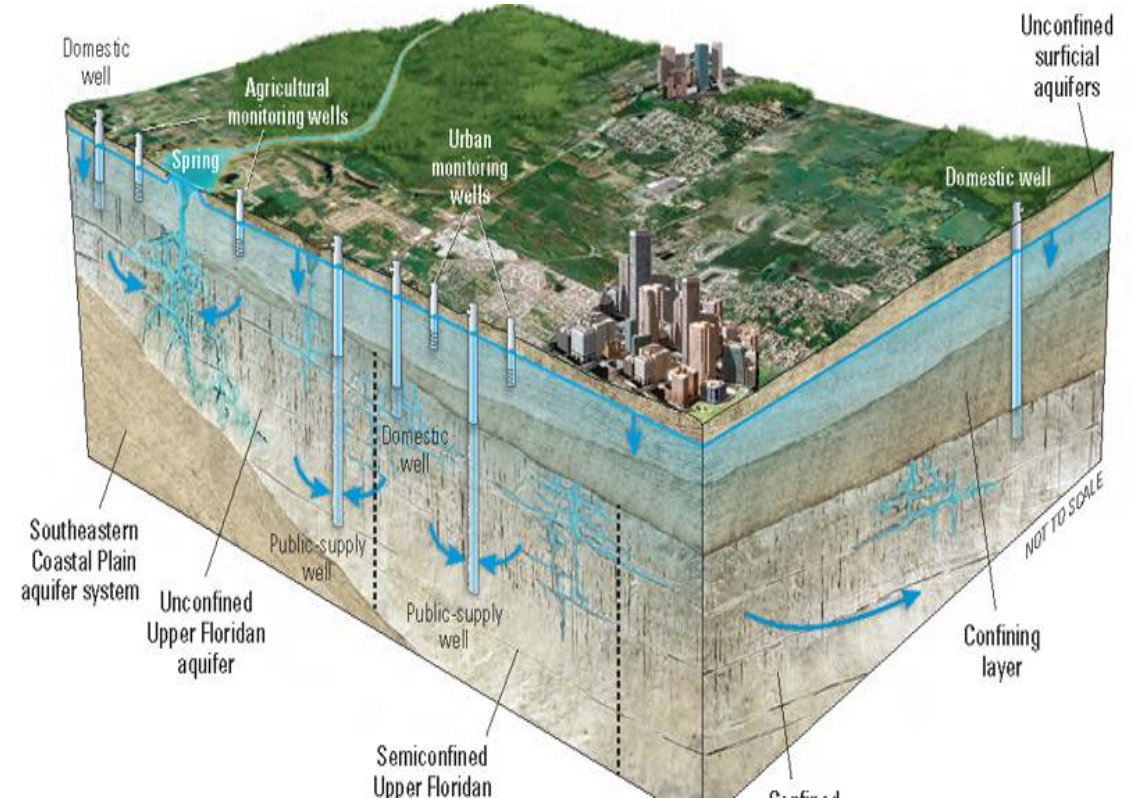


Southeastern U.S. Water---Challenges

- **Population**

- The Southeast's overall population growth was **129.39%** over 1958-2021 outpaced the United States' increase of 90.58%.
- Florida, South Carolina, Georgia at 8,9, and 10

- **Intensification of Agriculture/Industry**



Hedge Pruning as a Tool of Sustainability

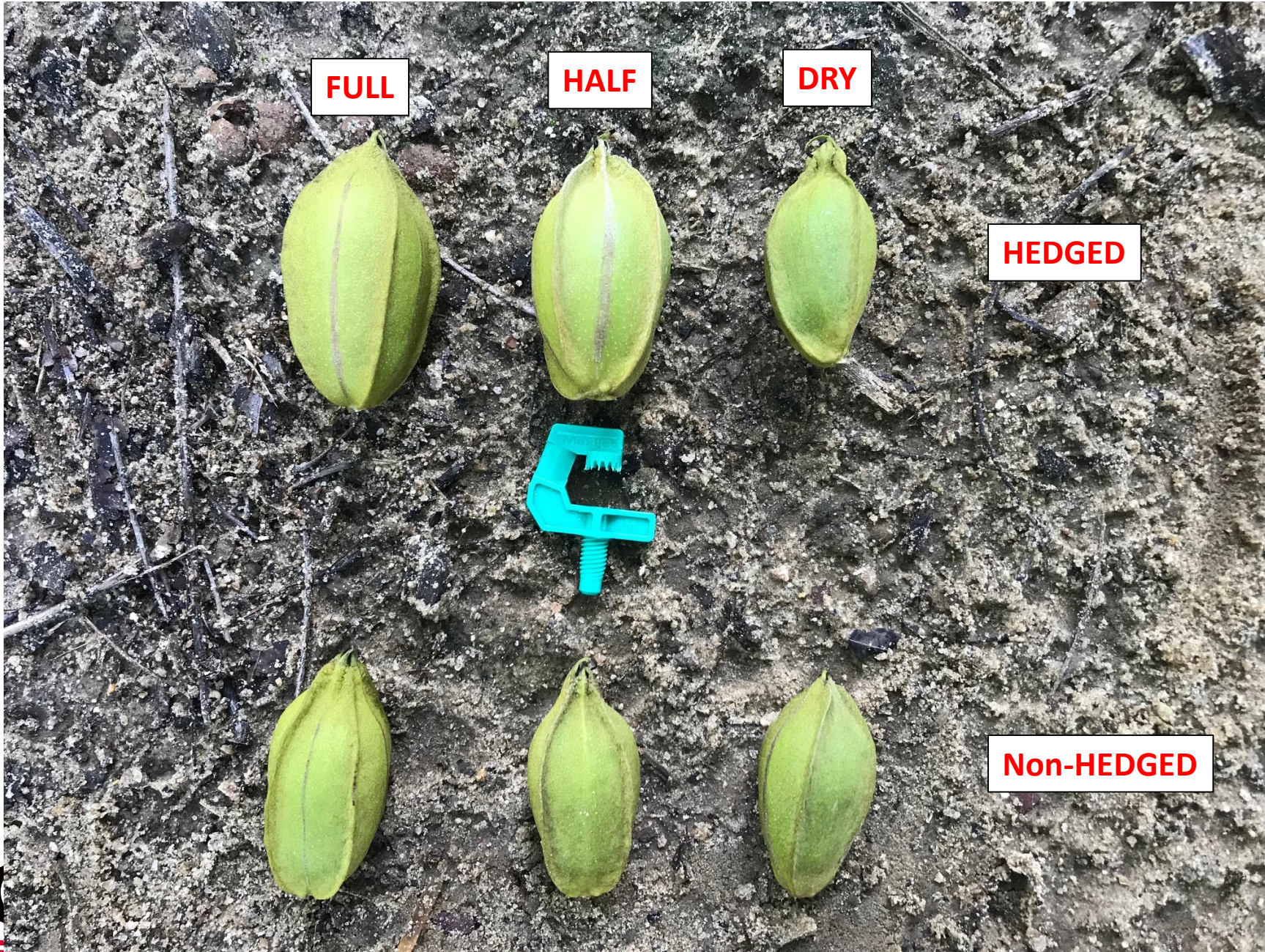
- **Increased Tree Water Use Efficiency**
- **Better Spray Coverage**
- **Reduced Wind Damage**
- **Manage Crop Load**

- *Reduced water use?*
- *Reduced fertilizer use?*
- *Enhance SOM by shredding prunings?*



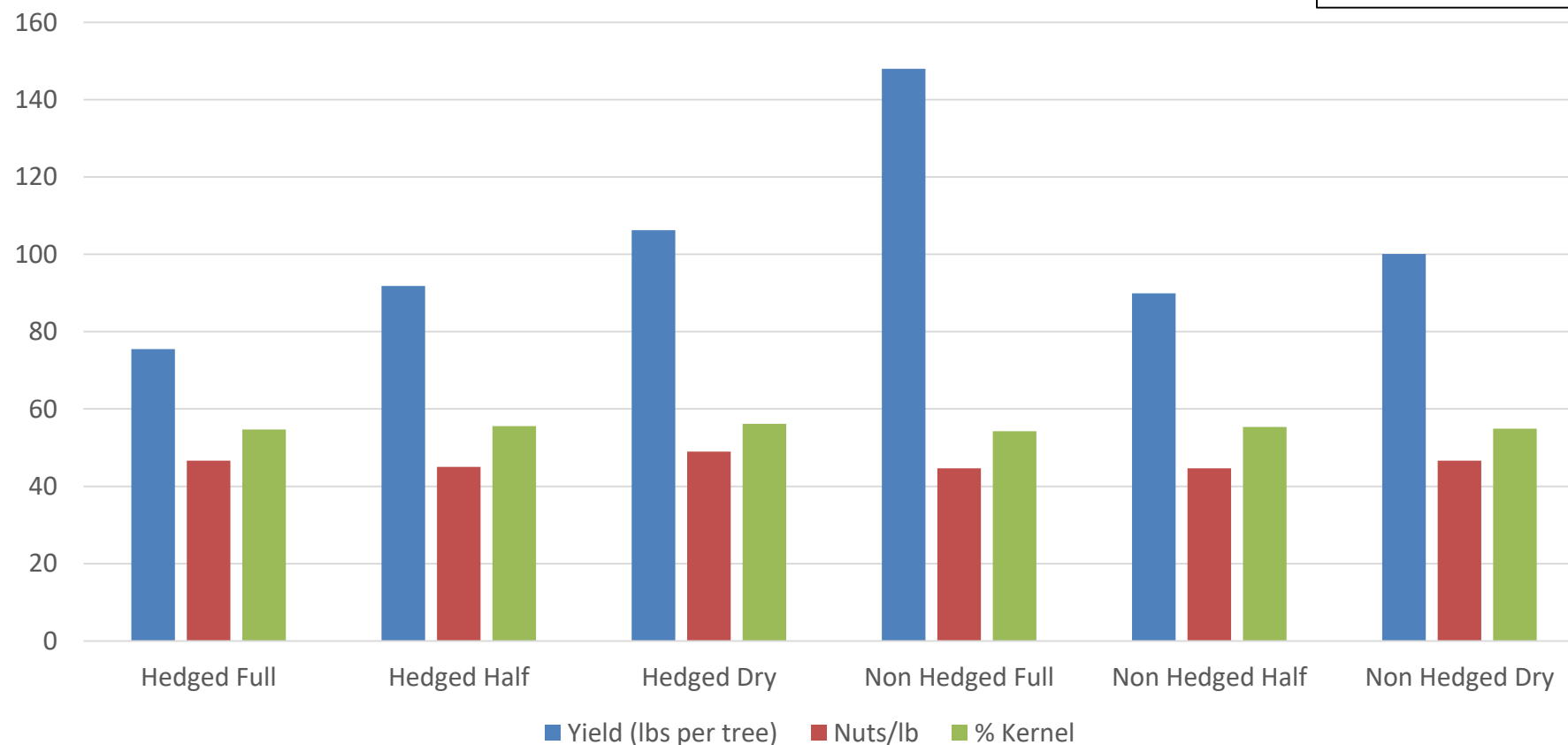
Effect of Hedging and Irrigation

JULY 25, 2022

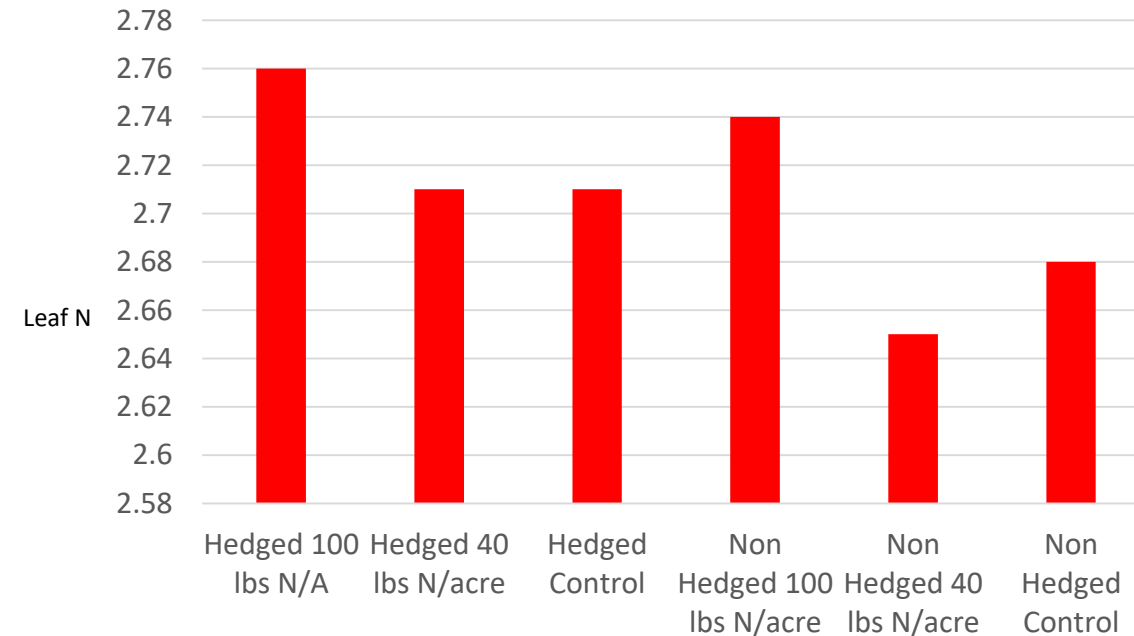


Effect of Hedging and Irrigation

*No statistical differences observed



Effect of Hedging and Nitrogen Fertilizer



*Non-Hedged trees = statistically higher yield (lbs/tree)
No differences with regard to fertilizer

Returning Limb Prunings to Orchard Soil



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Keys to Pecan Sustainability in SE

- **Higher Yields at Lower Cost**—buffers grower from unforeseen price fluctuations
 - *More resistant varieties, higher yield potential, hedge*
- **Water and Fertilize More Efficiently**
 - *Water by schedule as needed, fertilize as needed, credit clover, hedge*
- **Scout and spray as needed**
 - *Targeted insecticides, resistant varieties*
- **Build SOM**
 - *Clover, return prunings to soil*
- **Get the story out**

