

Cover Crop Management

**2020 Louisiana Agricultural Technology &
Management Conference
Marksville, LA**

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Kip Balkcom

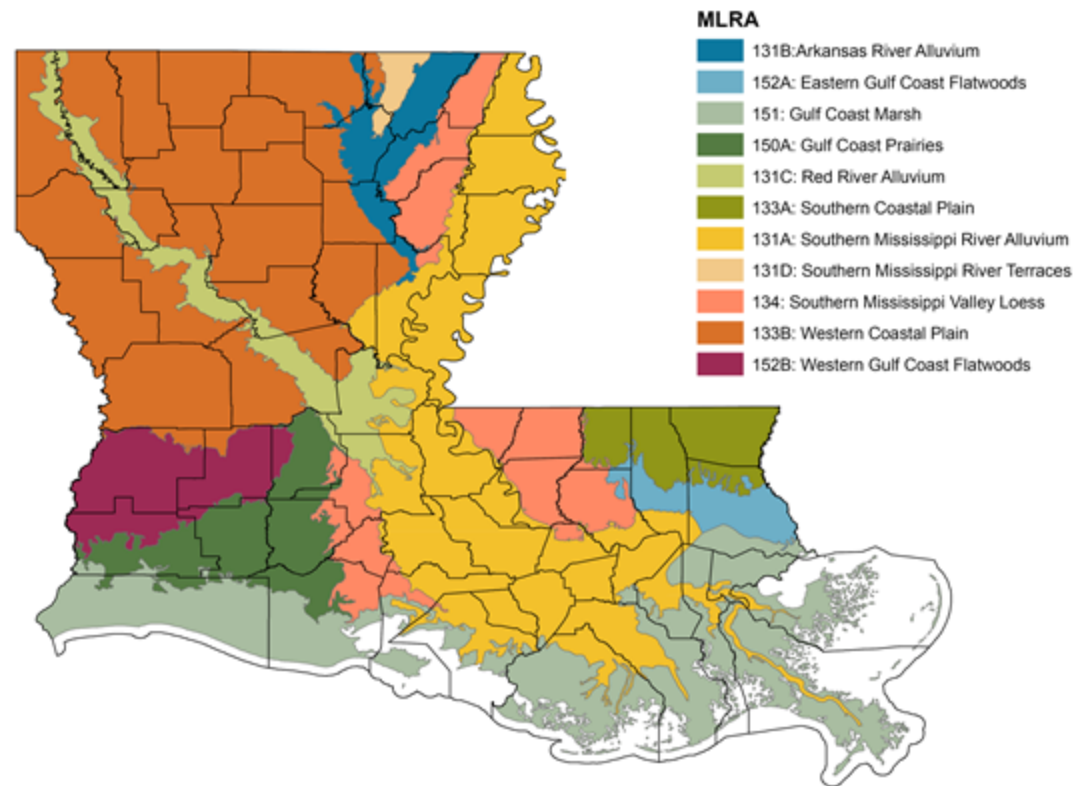
Research Agronomist

Conservation Systems Research

USDA-ARS, NSDL

Auburn, AL

Soil Types: AL vs LA



Cover Crop Benefits

(as identified by cover crop users)

- **Increases soil organic matter**
- **Reduces soil erosion**
- **Controls weeds**
- **Reduces soil compaction**
- **Provides a nitrogen source**
- **Provides nitrogen scavenging**
- **Increases infiltration**
- **Increases cash crop yields**
- **Fibrous rooting systems**



Soil Carbon

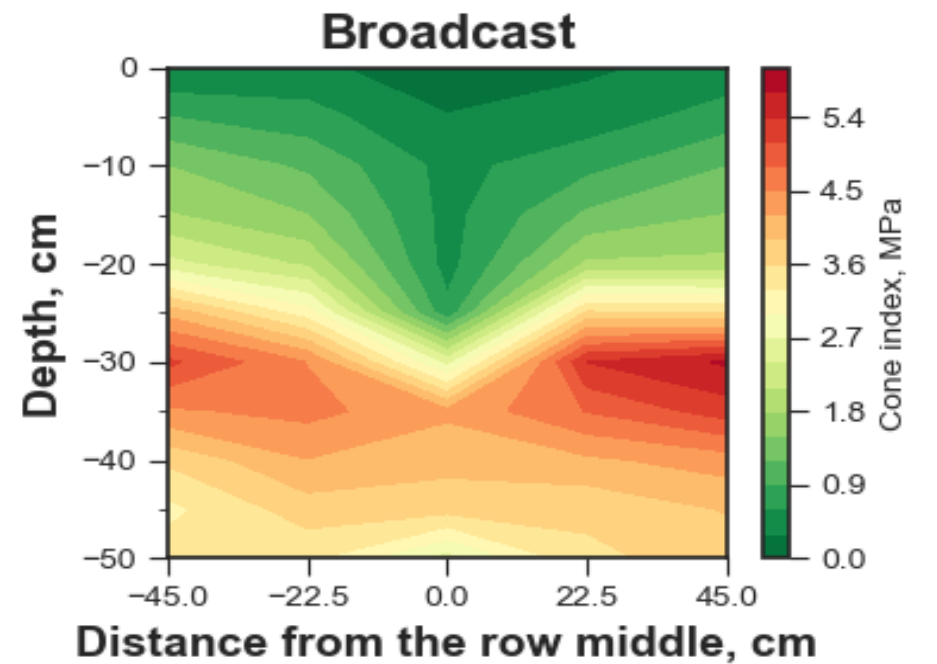
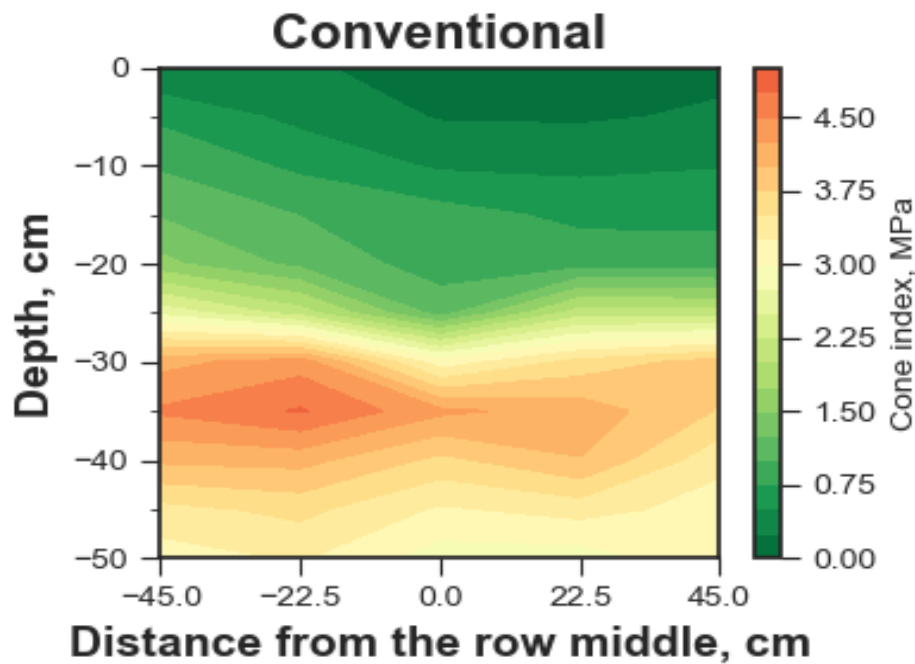
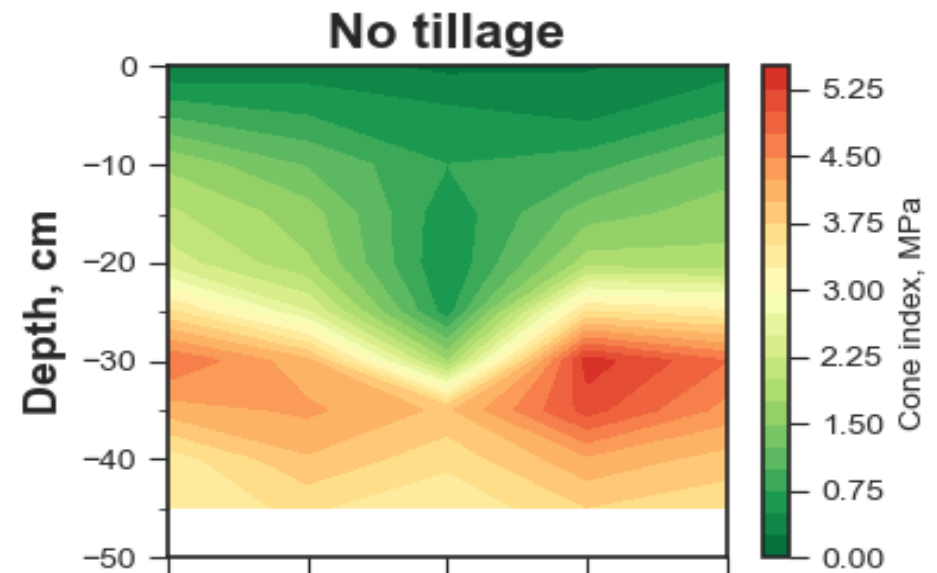
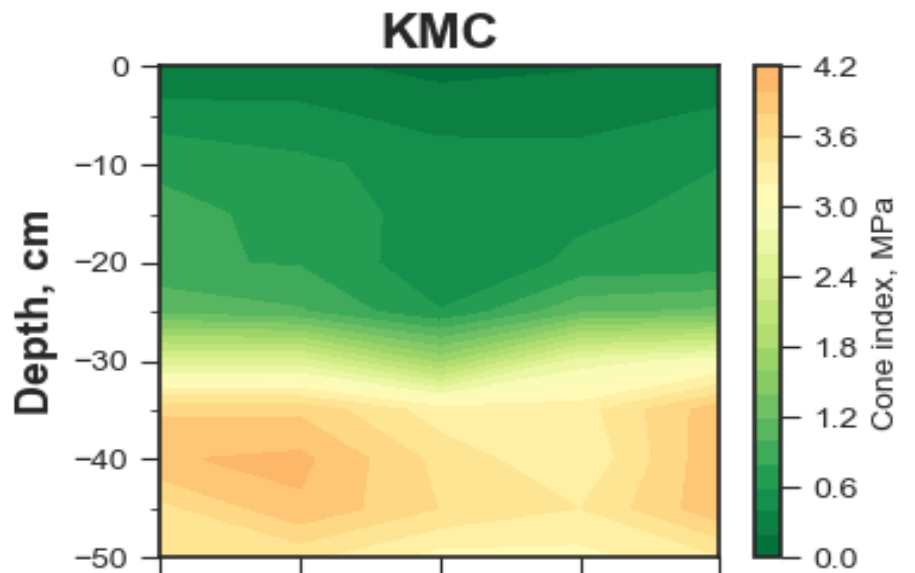
**Surface soil effects
are most critical.**



Non-inversion Tillage



Fall Tillage, Cone Index Values



Producer Challenges with Cover Crops

- **Time/labor required for planting and managing cover crops.**
- **Cost of planting/managing cover crops – seed costs**

Timely Planting



Pictures taken Dec. 15

Photos courtesy of Ronnie Barentine, UGA

Establishment Costs

- **Establishment**
 - Labor
 - Seed/Planting
 - Fertilizer
- **Termination**
 - Labor
 - Chemical
 - Mechanical



Establishment Costs

- **Cost of planting cover crop** *(MSU, 2020)*
 - Custom plant air - \$7.50/cwt
 - Custom plant ground - \$7.50/acre
 - No-till grain drill: \$6.32 - \$13.17/acre
 - Includes a fuel cost of \$2.30/gal for diesel fuel.



Stand Establishment

Drilling



Photo courtesy of Joel Love, UF

Stand Establishment

Broadcast



Photos courtesy of Ronnie Barentine, UGA

Stand Establishment



Vertical Tillage



Stand Establishment

6 ° Gang Angle

0 ° Gang Angle



Cover Crop Fertilization

Fertilized Non-fertilized

- **Cost of application** *(MSU, 2020)*
 - Custom application
 - \$7.50/acre
 - Fertilizer Application
 - \$3.50 – \$7.80/acre
- **Cost of material** *(MSU, 2020)*
 - Urea \$404/ton
 - \$0.44/lb of N
 - UAN28 \$251/ton
 - \$0.45/lb of N
 - UAN32 \$272/ton
 - \$0.43/lb of N

Termination: Mechanical

- **Roller/Crimping technology**
 - \$5.00/acre
- **Roller/Cultipacker** (*MSU, 2020*)
 - \$1.59 - \$3.93/acre
- **Mowing is another mechanical method, but limits benefits from cover crops.**



Termination: Chemical

- **Glyphosate, 16 oz/ac: \$0.14/oz** *(MSU, 2020)*
- **There are other chemicals that can be used for burndown, such as glufosinate.**
- **Application** *(MSU, 2020)*
 - Custom spray ground: \$7.00/acre
 - Broadcast spray: \$1.46 – \$3.02/acre



Roller + Tillage



Combine operations

Rolling the cover crop and performing strip tillage simultaneously.



Cover Crop Budget: Rye

Input / Activity	Unit	Input Cost		Cost	
		\$/unit	Units/ Acre	\$/acre	Cotton Equivalent (lbs; \$0.60)
Establishment					
Seed (Cereal Rye)	pounds	\$0.25	90	\$22.50	
No-till Drill	acre	\$9.75	1	\$9.75	
Fertilization					
Fertilization	pounds	\$0.44	30	\$13.20	
Application	acre	\$5.65	1	\$5.65	
Cover Crop Termination					
<i>Chemical Termination</i>					
Glyphosate	ounces	\$0.14	16	\$2.24	
Application	acre	\$2.24	1	\$2.24	
<i>Mechanical Termination</i>					
Rolling, etc.	acre	\$5.00	1	\$5.00	
TOTAL COST				\$60.58	101

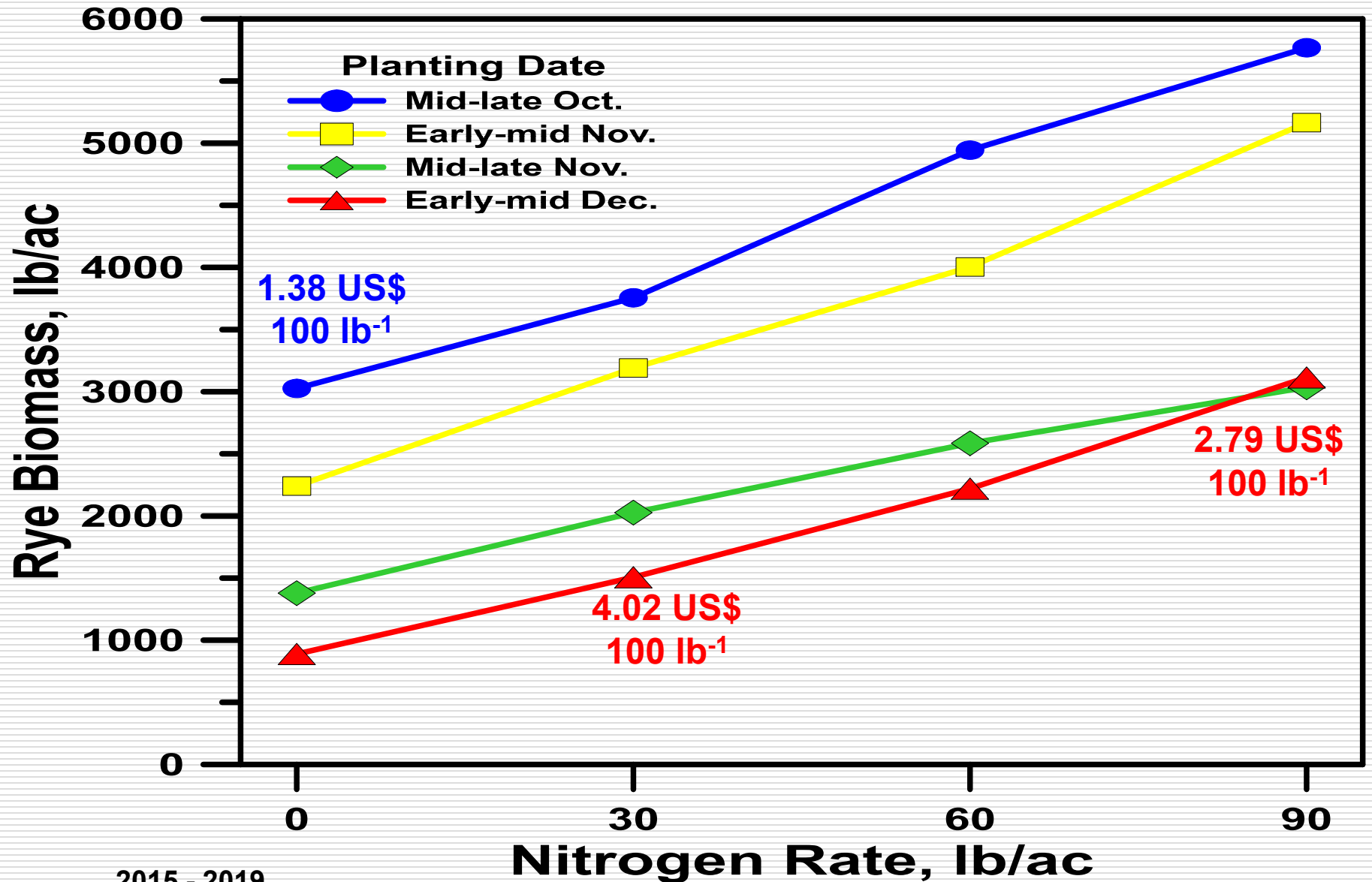
Management Options

6-year Experiment
Peanut/Cotton Rotation
2014 – 2015: Peanut
2015 – 2016: Cotton
2016 – 2017: Peanut
2017 – 2018: Peanut
2018 – 2019: Peanut



- **Cereal rye**
- **Planting date**
 - Mid – late October
 - Early – mid November
 - Mid – late November
 - Early – mid December
- **Seeding rate**
 - 60 lb ac⁻¹
 - 90 lb ac⁻¹
- **Nitrogen rate**
 - 0 lb N ac⁻¹
 - 30 lb N ac⁻¹
 - 60 lb N ac⁻¹
 - 90 lb N ac⁻¹

Plant Date and Nitrogen Rate



2015 - 2019
Avg. of 60 and 90 lb rye/ac

Conservation Systems Research

More information available at:

Website: www.ars.usda.gov/sea/nsdl

Subscribe to mailing list: NSDL-Highlights@ars.usda.gov

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Cover Crop Mixture - Cotton

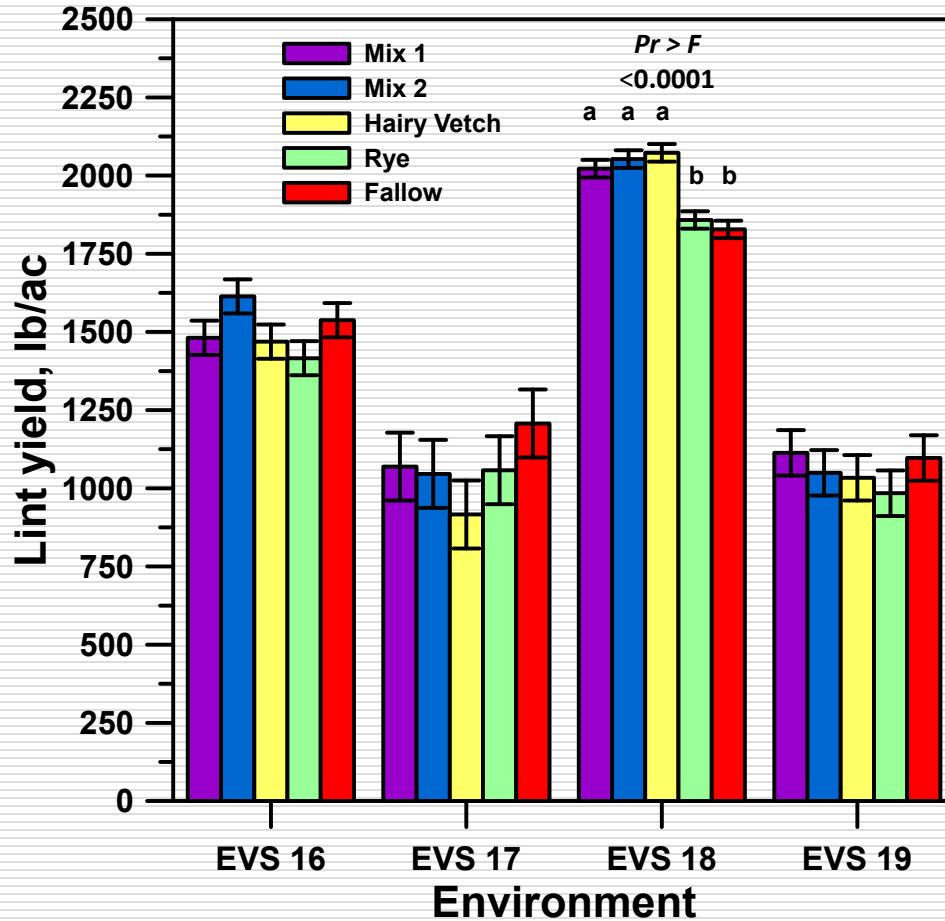
5 cover crop treatments x 4 cotton N rates

Cover Crop	Nitrogen Rate (lb/ac)
Fallow	0
Rye – 90 lb/ac (fertilized)	60
Hairy Vetch – 20 lb/ac	90
Rye (30 lb/ac) + Vetch (10 lb/ac)	120
Rye (30 lb/ac) + Vetch (20 lb/ac)	

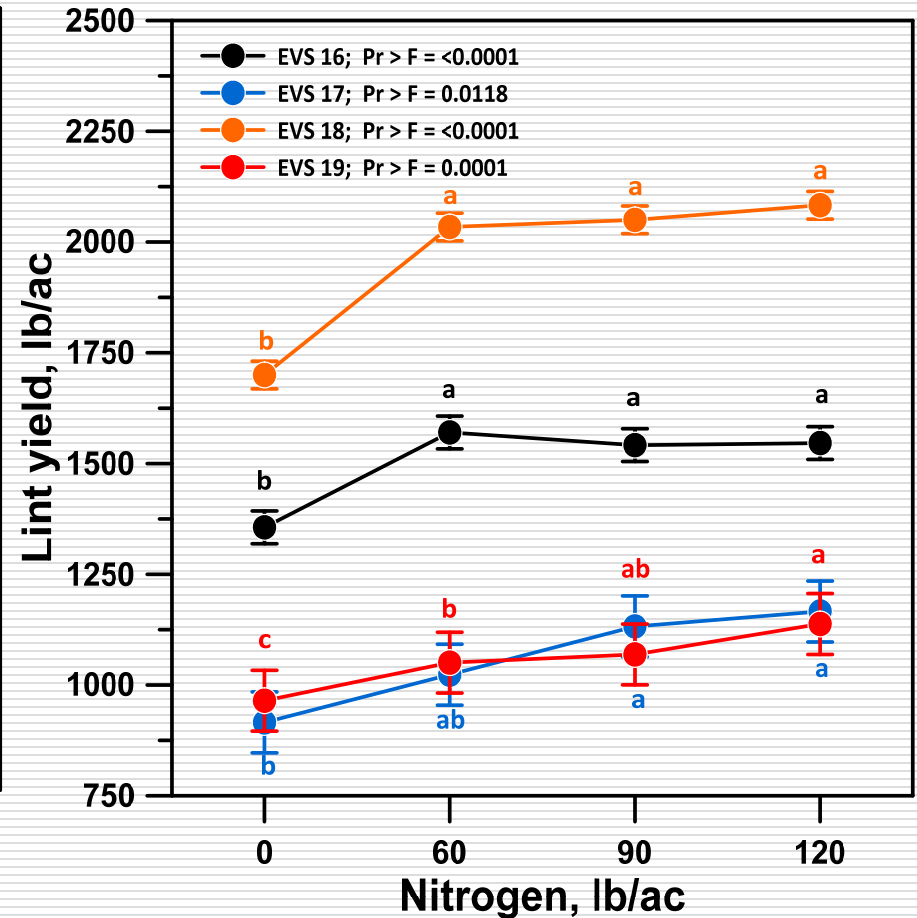
Cover Crop Mixture	Seeding Rate	2016	2017	2018	2019	4 year Average
Biomass	lb/ac	-----Biomass (lb/ac)-----				
Rye/Vetch	30/10	3811	5900	5634	4853	5050
Rye/Vetch	30/20	3982	5432	5711	4071	4800
Rye + 30 lb N ac.	90	3111	5821	4903	2910	4186
Vetch	20	3350	4343	3620	6000	4328
Average		3057	4528	3974	4459	
Cover Crop Mixture	Seeding Rate	Seed Cost	Total Cost	4 year Biomass	Average Biomass Cost	
Cost	lb/ac	-----US \$/ac-----		lb/ac	US \$/100 lb	
Rye/Vetch	30/10	31.50	50.35	5050	1.00	
Rye/Vetch	30/20	55.50	74.35	4800	1.55	
Rye + 30 lb N ac.	90	22.50	60.58	4186	1.45	
Vetch	20	48.00	66.85	4328	1.54	

Cover Crop Mixture - Cotton

Cotton Lint - Covers



Cotton Lint - N



Questions about Cover Crop Mixtures

- **Correct/Practical Ratios – Don't overload with cereals.**
- **Benefits – Yield increase, C increase, N requirement reduction, microbial increase.**
- **Costs vs Benefits**

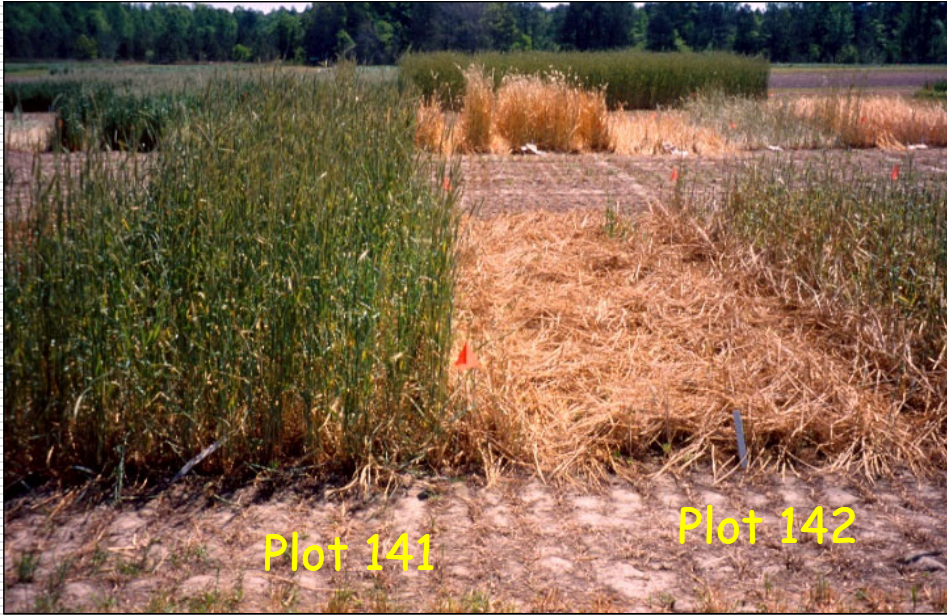
Carbon sequestration (2004-2009)

Carbon sequestration rates

Cover Crop	0-5 cm	5-10 cm	10-15 cm	Total
	-----kg C ha ⁻¹ yr ⁻¹ -----			
None	620	134	27	781
Rye	815	168	37	1020
Wheat	775	165	38	977
SED†	88	35	29	133
P value	0.0689	0.5734	0.9304	0.1742

† standard error of the difference

Soil Water Conservation



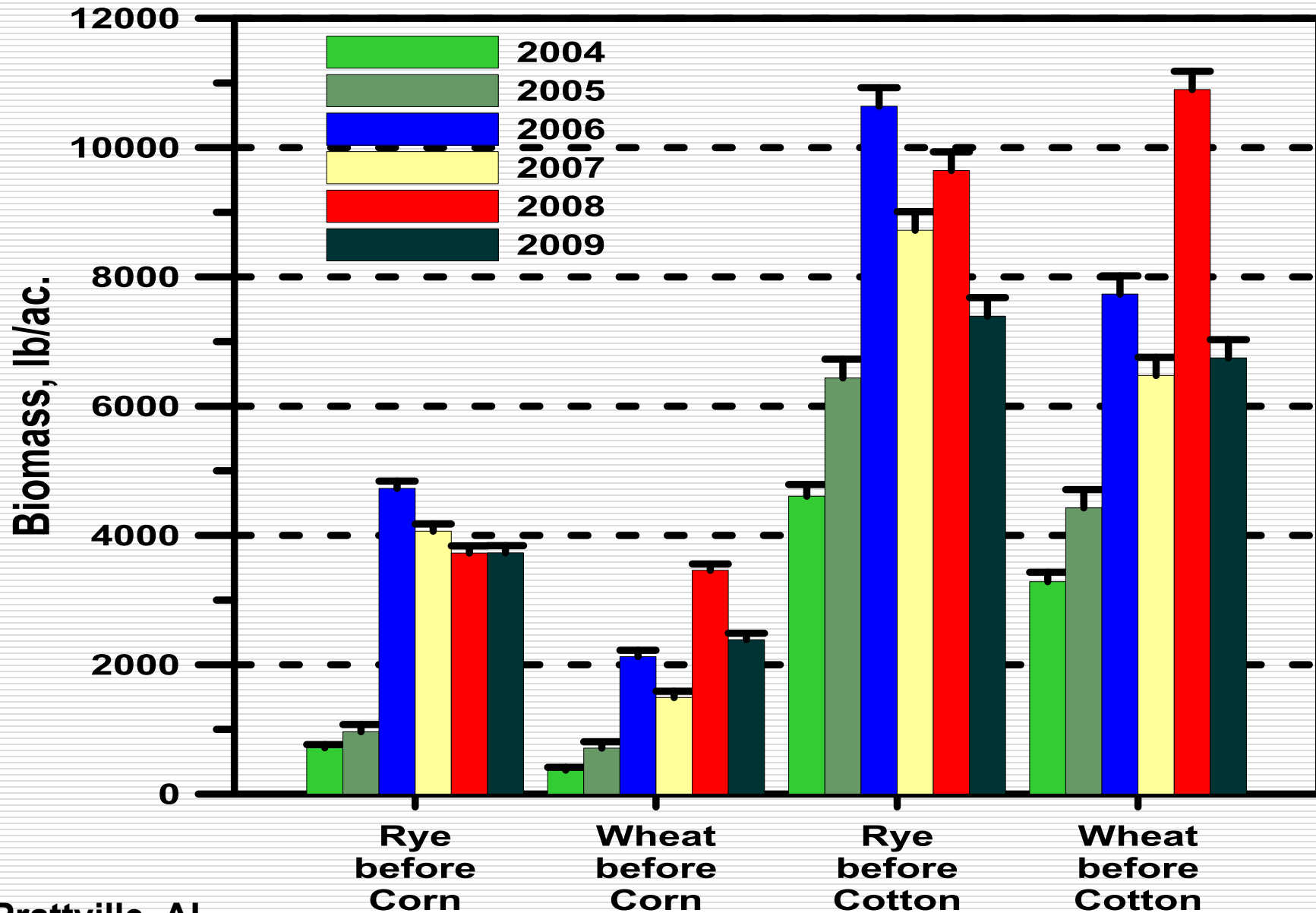
Maximize Biomass >> Benefits

- **Soil fertility and pH**
- **Quality seed**
- **Inoculate legumes – specific, fresh /coated**
- **Plant early**
- **Good stand establishment**
- **Terminate late**

More **Less**
Management **Management**



Time of Termination



Prattville, AL

Summary

- **Producers have to figure out a system that works best on their operation, given their challenges and goals. Typically, no “one size fits all” solution.**
- **Consider these management factors to successfully incorporate cover crops into your farming operation.**