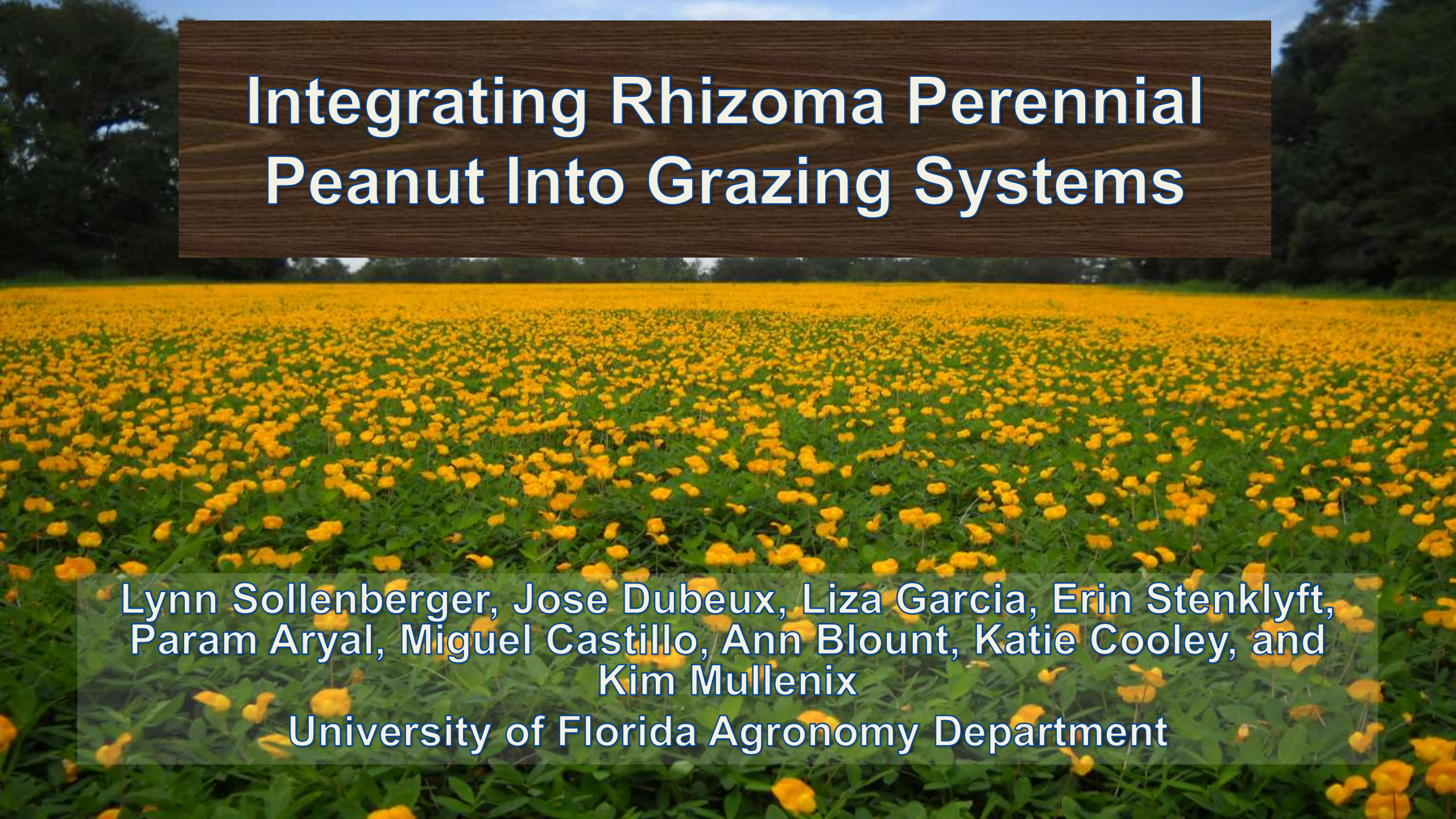
Integrating Rhizoma Perennial Peanut Into Grazing Systems



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Overview

- Perennial peanut is a great hay crop

- Does it fit in grazed pastures?

Overview

- Why it may
  - Greater forage quality and animal performance than grass
  - Fixes nitrogen to avoid/reduce need for N fertilizer
  - Peanut is competitive with aggressive grasses, spreads into new areas of grass, and survives for a very long time under grazing

Overview

- Vision – a grazed peanut-grass pasture that requires no nitrogen fertilizer inputs

How do we get there?

- Identify or develop varieties that are well suited for use in grazed pasture
- Define viable methods of establishment
- Document potential increases in animal performance from including peanut

Identify or develop varieties that are well suited for use in grazed pasture

- Do rhizoma peanut types vary in growth characteristics that relate to grazing tolerance?

- Do growth characteristics matter? Ecoturf vs. Florigraze

Chico

Tito

Characteristics of Several Rhizoma Peanut Lines

Peanut Line	Height at harvest (inches)	Yield (tons/acre/year)	Below-ground biomass (tons/acre)
Chico	6	4.4	3.17
Ecoturf	9	4.7	2.80
Ona 33	10	5.9	2.66
Quincy A	8	4.4	3.62
Tito	12	5.3	2.49

Katie Cooley, unpublished data

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Identify or develop varieties that are well suited for use in grazed pasture

- Do rhizoma peanut types vary in growth characteristics that relate to grazing tolerance?

- Do growth characteristics matter? Ecoturf vs. Florigraze

A Case Study – Florigraze vs. Ecoturf

- Previous research showed that Florigraze is very tolerant of grazing but long-term overgrazing causes stand decline.

- What happens with lower-growing types?

Sward Characteristics Under Hay Management (10-wk regrowth)

Cultivar/ Germplasm	Canopy height (in)	Bulk density (lb/acre/inch)
Ecoturf	15	288
Florigraze	12	267

Cooley et al., unpublished

Sward Characteristics Under Grazing

Cultivar/ germplasm	Grazing frequency (wk)		*P* value	Grazing frequency (wk)		*P* value
	3	6		3	6	
	Pre-grazing canopy height (inches)			Herbage bulk density (lb/acre/inch)		
Ecoturf	3.5 b	4.7 b	< 0.01			
Florigraze	5.9 a	7.1 a	< 0.01			

Mullenix et al., 2016

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	Pre-grazing canopy height (inches)			Herbage bulk density (lb/acre/inch)		
Ecoturf	3.5 b	4.7 b	< 0.01	590 a	400 a	< 0.01
Florigraze	5.9 a	7.1 a	< 0.01	290 b	310 b	0.84

Mullenix et al., 2016

Grazing Management of Ecoturf (Stenklyft)

- **Regrowth interval**
  - 1, 4, and 7 wk

- **Post-grazing stubble height (SH)**
  - 2 and 4 inches

	2015		2016	
Regrowth interval (weeks)	Stubble height (inches)		Stubble height (inches)	
	2	4	2	4
	tons/acre			
1	4.70	3.22		
4	3.71	2.98		
7	3.75	2.50		

	2015		2016	
Regrowth interval (weeks)	Stubble height (inches)		Stubble height (inches)	
	2	4	2	4
	tons/acre			
1	4.70	3.22	6.06	3.60
4	3.71	2.98	4.10	3.37
7	3.75	2.50	4.40	3.49

Persistence (after 2 years)

Frequency (wk)	Percentage peanut (%)	Rhizome-root mass (tons/acre)
1	90	7.3
4	92	8.6
7	90	8.2

Regrowth interval (weeks)	Year	
	2015	2016
	Post-grazing leaf mass (lb/acre)	
1	950	704
4	614	562
7	491	533

Persistence

Frequency (wk)	Percentage peanut (%)	**Rhizome-root mass (tons/acre)**
1	90	**7.3 (+0.66)**
4	92	**8.6 (+0.49)**
7	90	**8.2 (+1.14)**

Conclusions

- Ecoturf responds to grazing very differently than Florigraze.
- Short growth habit and a lot of leaf close to soil surface under heavy grazing reduces potential negative impact on stored carbohydrates.
- Ecoturf shows excellent promise for use in grazed pasture.
- If we want peanut types that are successful under grazing, we need to select ones built for grazing.

How do we get there?

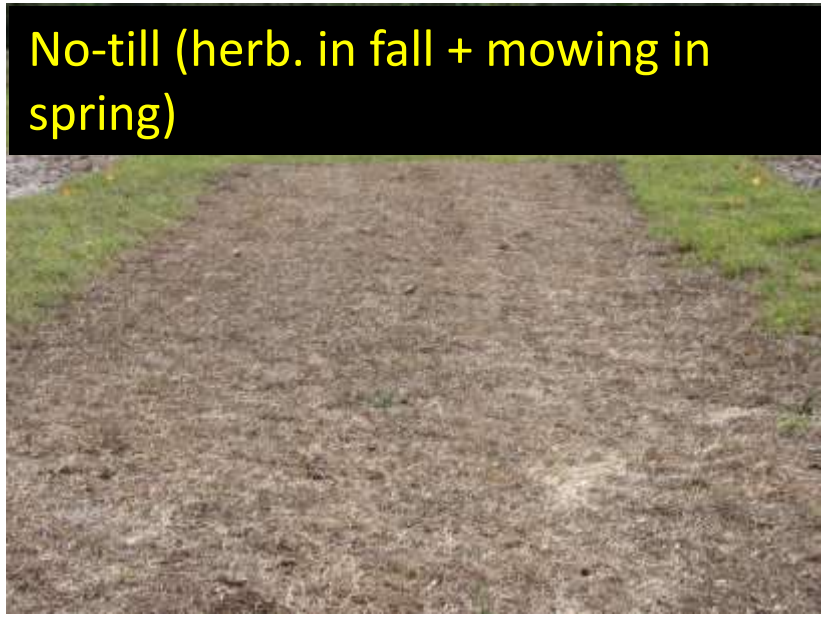
- Identify or develop varieties that are well suited for use in grazed pasture
- Define viable methods of establishment
- Document potential gains in animal performance from including peanut

Strip-planting of perennial peanut

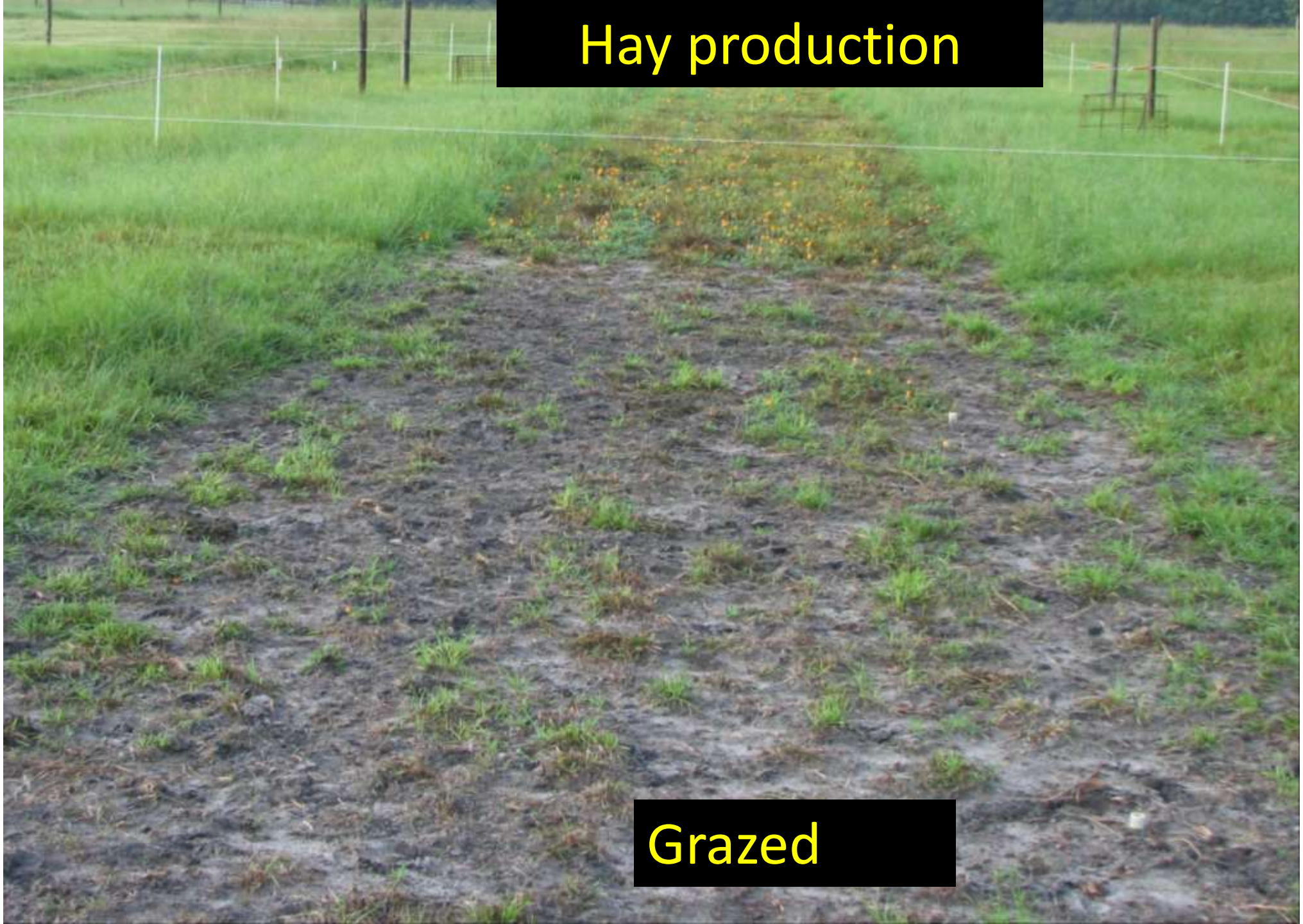
Glyphosate (fall) + deep tillage (spring)

Lifted-sod

No-till (herb. in fall + mowing in spring)



Tillage only (spring)


Hay production
Grazed

Second season (1-yr-old plot). Forage before grazing

1 hour after start of grazing

What did we learn?

- Seedbed preparation
  - Peanut can establish successfully in a range of conditions;
  - shoot emergence generally better in prepared seedbed; end of Year 1 cover better with no-till likely due to less weed competition

- Weed control
  - Imazapic or imazapic plus 2,4-D greatly improve establishment success; better light environment for new RP shoots

What did we learn?

- Variety selection
  - Lower growing types or those that can adapt to close defoliation are favored;
  - good success with Ecoturf; it performed better than Florigraze and Peace when strip planted

- Defoliation management
  - Cattle are attracted to planted strips and graze peanut very hard;
  - use of strip-planted fields for hay recommended for 2 yr to allow peanut to establish and start to spread into surrounding grass before grazing

- What about planting peanut and grass at the same time vs. planting peanut in strips with grass or alone?

Treatments

- Peanut planted alone
- Peanut planted simultaneously with bahiagrass seed
- Peanut planted in tilled strips in existing bahiagrass pastures

October – Year of Planting

Treatment	Peanut shoot	Peanut below ground	Peanut total weight
	lb/acre		
Together	460	410	870
Peanut alone	980	760	1740
Peanut in strip	1240	940	2180

Do Year 1 differences in shoot and below-ground mass continue to be evident in the year after planting?

October – Year after Planting

Treatment	Peanut shoot	Peanut below ground	Peanut total weight
	lb/acre		
Together	610	1625	2240
Peanut alone	2130	6100	8230
Peanut in strip	1640	5000	6740

Conclusions

- Ecoturf establishes well when planted in pure stand in a prepared seedbed or when strip planted into bahiagrass.
- Planting Ecoturf and bahiagrass at the same time is not an optimal management practice.
- If planting a new area and a bahia-Ecoturf mixture is desired:
  - Establish Ecoturf in pure stand
  - Control grass and weeds for at least the year of planting
  - Later, stop grass herbicide applications and a bahiagrass-peanut mixture will form

- Planting date effects on establishment of four peanut varieties

October – Year of Planting

Variety	Planting date					
	April 9, 2016			June 28, 2016		
	Shoot weight†	Rhizome weight†	% cover	Shoot weight†	Rhizome weight†	% cover
Ecoturf	670	820	47			
Florigraze	1520	1290	50			
Peace	980	723	55			
Tito	1430	1430	49			

† lb/acre

Param Aryal, unpublished data

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Ecoturf	670	820	47	1960	1520	49
Florigraze	1520	1290	50	2050	1610	49
Peace	980	723	55	**4200**	**3840**	**81**
Tito	1430	1430	49	**2860**	**3390**	**67**

† lb/acre

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Tito	1430	1430	49	21.6	2860	3390	67	33.8

† lb/acre

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Grazing study

Warm-season	Cool-season
Fertilized bahiagrass = 100 lb N per acre (BGN)	Cool-season grass + 100 lb N/acre
Unfertilized bahiagrass pastures (BG)	Cool season grass-legume mixture + 30 lb N/acre
Bahiagrass-rhizoma peanut mixture (BG-RP)	Cool season grass-legume mixture + 30 lb N/acre

NIFA Award #: 2016-67019-24990

Animal performance (averages over two years)

	Stocking rate (steer/ac)	Average daily gain (lb/hd/d)	Gain per acre (lb/ac/yr)
BG	1.42	1.11	429
BGN	1.54	1.12	436
BG-RP	1.30	1.40	501

The legume system with 30 lb N/acre/year produced approximately 70 lb of additional liveweight/acre/year. Liza Garcia, unpublished data

NRCS EQIP Program

- New cost share program by NRCS to strip-plant rhizoma peanut into bahiagrass pastures (512 is the code for the EQIP practice).

- They provide $172/acre of solid strip. So, if you are covering 50% of the land area with peanut strips, you would get $86/acre.

- Exploring a cost-share program with FDACS, but there is nothing final in that regard.

Take-home Messages

- Lower-growing or highly adaptive varieties are likely better options for grazing
  - –Assume a more prostrate growth habit when grazed closely
  - –Maintain leaf close to soil surface to speed regrowth and minimize use of reserves

Take-home Messages

- Establishment management is key to achieving productive grass-legume mixtures
  - –Timing of planting
  - –Managing defoliation after planting
  - –Controlling competition from other plants

Take-home Messages

- Rhizoma peanut-bahiagrass pastures plus cool-season forages can produce more animal product per acre with less N fertilizer than grass alone

Thank you!