

## Optimizing Cover Crop Benefits through Species Selection and Management

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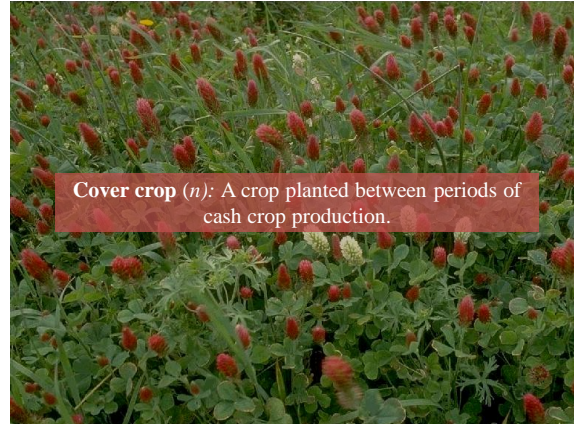
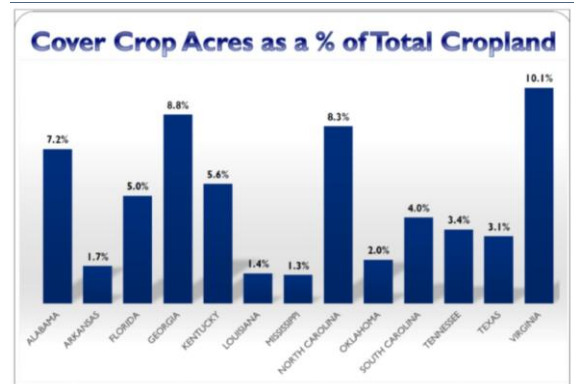
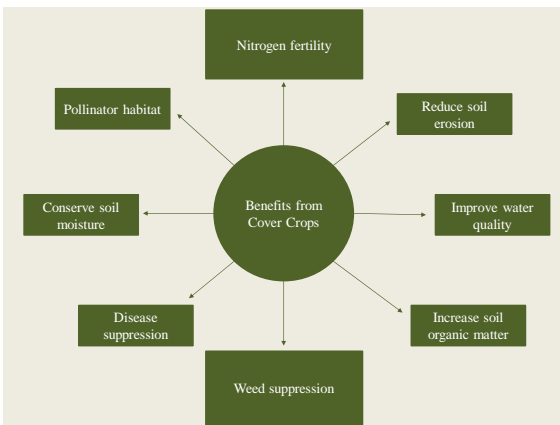
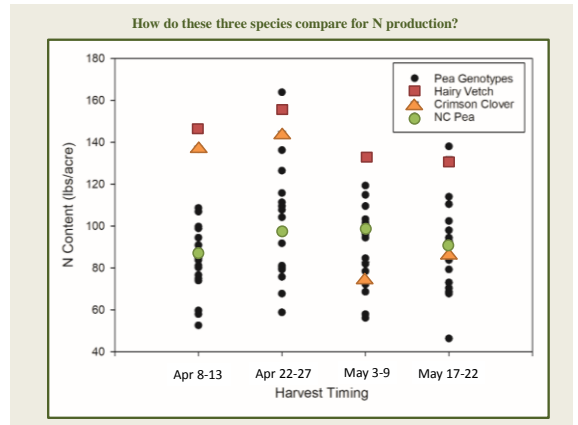
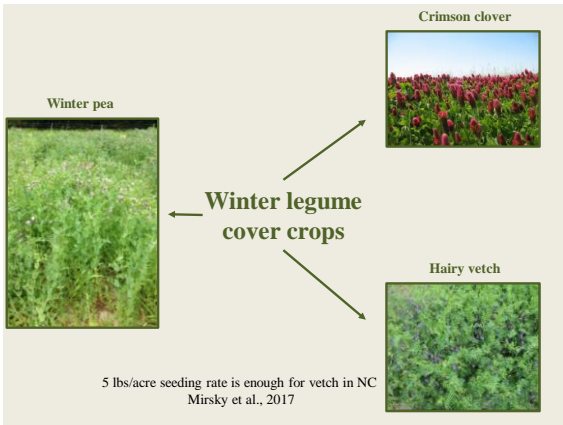
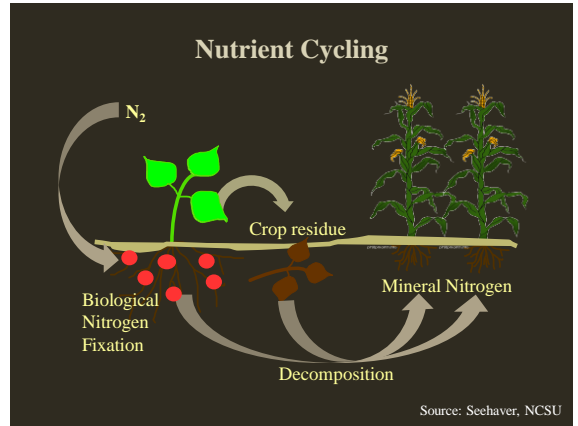



Fig.1. Cover crop acres as a percent of total cropland acres for states in the Southern SARE Region (USDA-NASS, 2016).

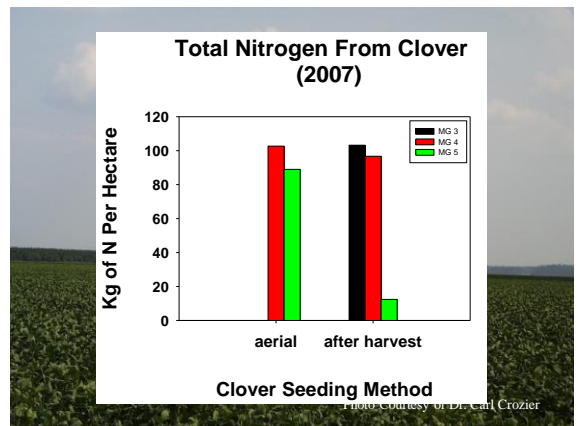


**What are the economics of cover crop use on my farm?**

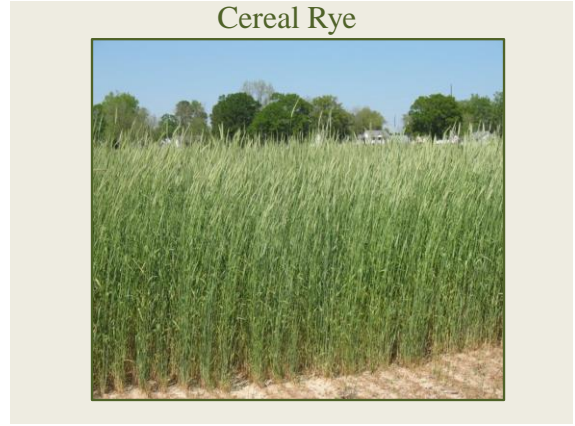
**Optimizing cover crop benefits will help maximize economics**



### How do I optimize N release and cash crop N uptake?







**Achieving Rye Heights  $\geq$  6.5 Feet Tall At Rolling**

Planting Date	Seeding Rate	Fertilizer (25 units N or manure)	Pollen Shed
Before Nov 1	70-90 lb/A	Within 3 wk of plant	April 1-15
Nov 1 - 15	80-90 lb/A	Within 2 wk of plant	April 7-21
Nov 15 - 30	90 lb/A	Within 1 wk of plant	April 15-30
Dec 1- 15	120 lb/A	At planting	Mid May

Stanley, Culpepper, UGA, 2018

Maximize soil cover

Roll winter cereal cover crops perpendicular to the direction they were drilled

Source: Matt Ryan, Cornell



**Biomass production and residue persistence are key for weed control!**

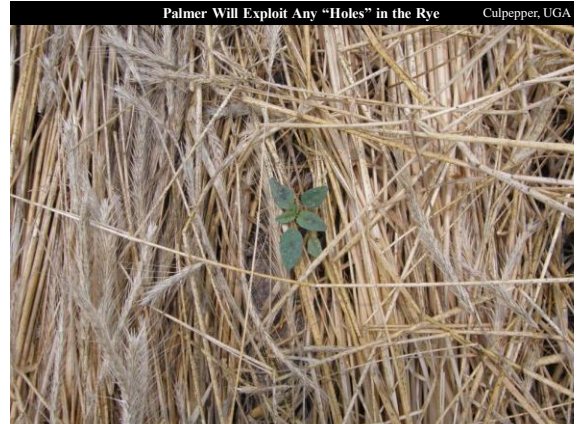
**Small Grains**

- Can produce substantial biomass, especially cereal rye!
- Residues decompose slowly



**Legumes**

- Biomass production is moderate
- Residues decompose rapidly, especially when wet and hot



August 12th



**Palmer Amaranth Response to Cover Crops Plus a Herbicide System. Macon County, GA.**

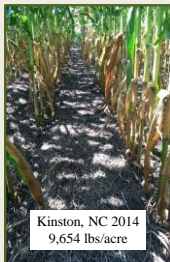
**Weedy Cover**

**Rolled Rye Cover Crop**



Herbicide Program For Both Covers: Staple + Reflex + Direx PRE; Roundup WMax + Dual Magnum POST; Direx + MSMA Layby

Source: Culpepper



Kinston, NC 2014  
9,654 lbs/acre



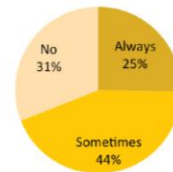
Salisbury, NC 2013  
9,790 lbs/acre



Salisbury, NC 2014  
10,155 lbs/acre

**2017 SARE Survey Results**

**DO YOU SEE IMPROVED CONTROL OF HERBICIDE-RESISTANT WEEDS AFTER USING CEREAL RYE AS A COVER CROP?**



n=736

Source: SARE

### Keys to achieving high cover crop biomass are also potential limitations to growers

- High seeding rates
- Early establishment
- As you delay cover crop planting, fertilize your cover crop accordingly

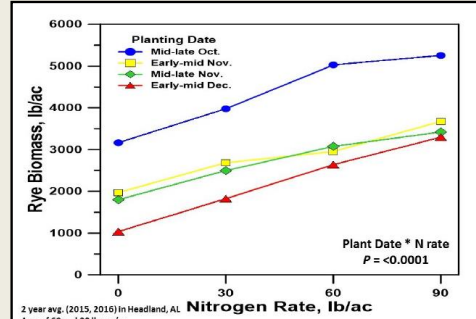


Fig. 2. Rye biomass averaged over two seasons across four planting dates and four N rates.

Source: SSARE, Balkcom et al.

### Using cover crop mulches

Top Dry (lbs/acre)	Fertilized Cover Crop Dry Biomass (lbs/acre)
400	4,580
260	NA
60	5,680
80	NA
900	5,840
990	6,110

Not enough cover crop biomass to provide adequate weed control in the absence of herbicide use

### Soil moisture as affected by cover crop treatment averaged over 5 environments

How?

- Decrease water loss through evaporation
- Reduce runoff and increase infiltration

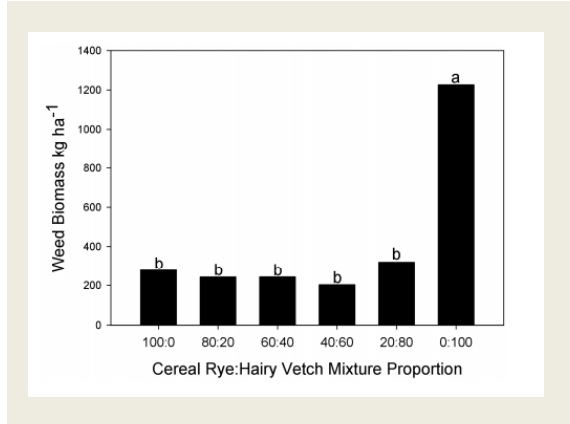
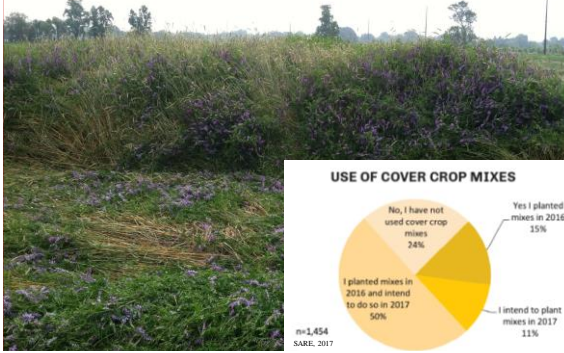
### Soil Moisture Dooly Co. On-Farm Rye 2014

- Soil moisture measured weekly for 17 weeks
- Two depths
  - 4 inches
  - 8 inches
- 10/17 weeks soil moisture higher in rye at 4"
- 3/17 weeks soil moisture higher in rye at 8"

Collins, UGA (NCSU)

### Gathering lots of current data about cover crops on farm sites – growing knowledge!

# Cover Crop Mixtures



## NC Coastal Plain Environments

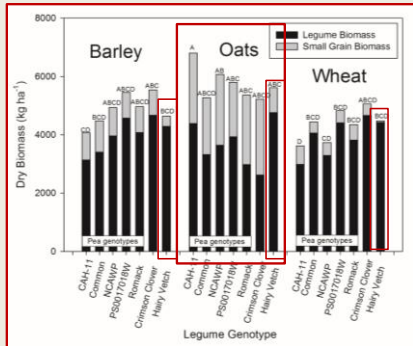


Figure 1. Total biomass as affected by legume genotype and small grain in a combined analysis of the Coastal Plain environments (Clayton 2016, Clayton 2017, Kinston 2016, Rocky Mount 2017).

## NC Piedmont Environment

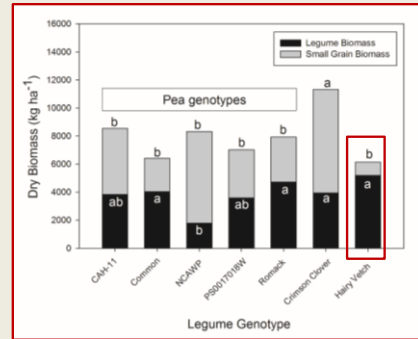
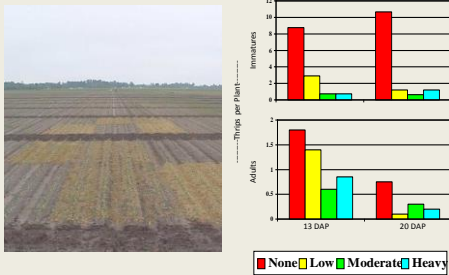


Figure 2. Total biomass averaged over small grain species as affected by legume genotype and legume biomass averaged over small grain species as affected by legume genotype at the Piedmont environment (Salisbury 2017).

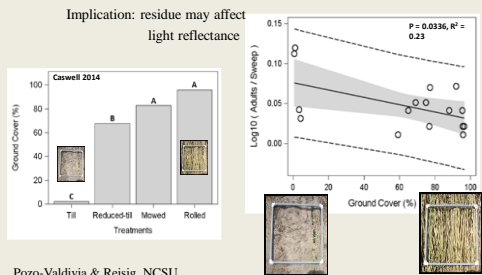
## Thrips and Conservation Tillage (Influence of Ground Cover)



Olson, D., A. Davis, S. Brown, P. Roberts, and C. Phatak. 2006. Cover crops, the no-till and/or no-till treatment effects on thrips. J. Appl. Entomol. 130(2):302-304.

## The Effect of Tillage and Ground Cover

- Tillage successfully manipulated previous crop residue
- There was a correlation between kudzu bugs and ground cover



Pozzo-Valdivia & Reisig, NCSU

### Keys to optimizing cover crop benefits

- Appropriate species selection for goals
- Cover crop variety matters!
- Management is important



### Disease



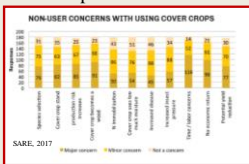
### Cereal rye breeding

M.S. Student:  
Shannon Koss

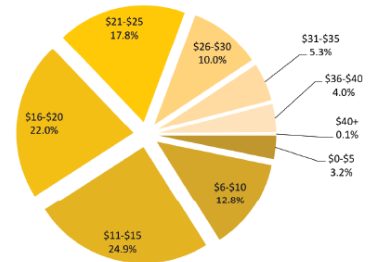


### Challenges with cover crop use

- Timing (establishment and termination)
- Seeding costs
- Equipment investments
- Lack of regionally adapted cultivars



### COVER CROP SEED EXPENSES PER ACRE



n=1,430



## Cover Crop Costs

- Cereal Rye: 29 cents/pound (\$14.70/50#)
- Oats: 29 cents/pound (\$14.50/50#)
- Triticale: 64 cents/pound (\$32.00/50#)
- Wheat: 24 cents/pound (\$12.00/50#)
- Tillage Radish: \$1.79/pound (\$89.50/50#)
- Crimson Clover: \$3/pound (\$150.00/50#)
- Hairy Vetch: \$2.24/pound (\$112/50#)
- Winter Peas: 70 cents/pound (\$35/50#)

CPS, Jeff Spivey, 10/17/2018

## Planting into heavy residue



Planting into standing cover crop



Using cover crop mulches for weed control in cotton

Cover crop re-seeding at cotton harvest

## Cover crop research in progress

- Legume cover crop breeding
- Cereal rye breeding
- Soil moisture monitoring
- Crimson clover re-seeding



## Questions?

