# Cover Crops and Weed Management

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Monsanto Company

Photos courtesy of S. Culpepper

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- Surface mulches from **cover crops suppress weed growth by reducing light levels at the soil surface**, thereby slowing photosynthesis. In return, these conditions **reduce seed germination and act as a physical barrier to seedling emergence and growth** (Teasdale et al. 2007).

- **Weed suppression increases with increasing cover-crop biomass**; Historical biomass levels achieved in the mid-Atlantic region of the United States have typically been low (e.g., 3,300 kg / ha) and insufficient to provide adequate levels of weed suppression (Mohler and Teasdale 1993).

- **Manipulating planting date in the fall or termination date in the spring** may allow growers to achieve a **higher level of weed suppression** (Duiker and Curran 2005). The rate of cover accumulation in the spring is influenced by the timing of fall planting.

- **Uniform distribution of the cover-crop residue is needed** for consistent suppression of weeds (Creamer et al. 1996).

- **The effect of cover-crop residues on weed control is species specific**, with annual species being quite susceptible to cover-crop surface mulches, whereas perennials are not (Liebman and Davis 2000).

- **Weed suppression with cover-crop residues alone has been reported to be inconsistent and inadequate, often requiring integration of herbicides or other control methods** into a weed management program (Williams et al. 1998).

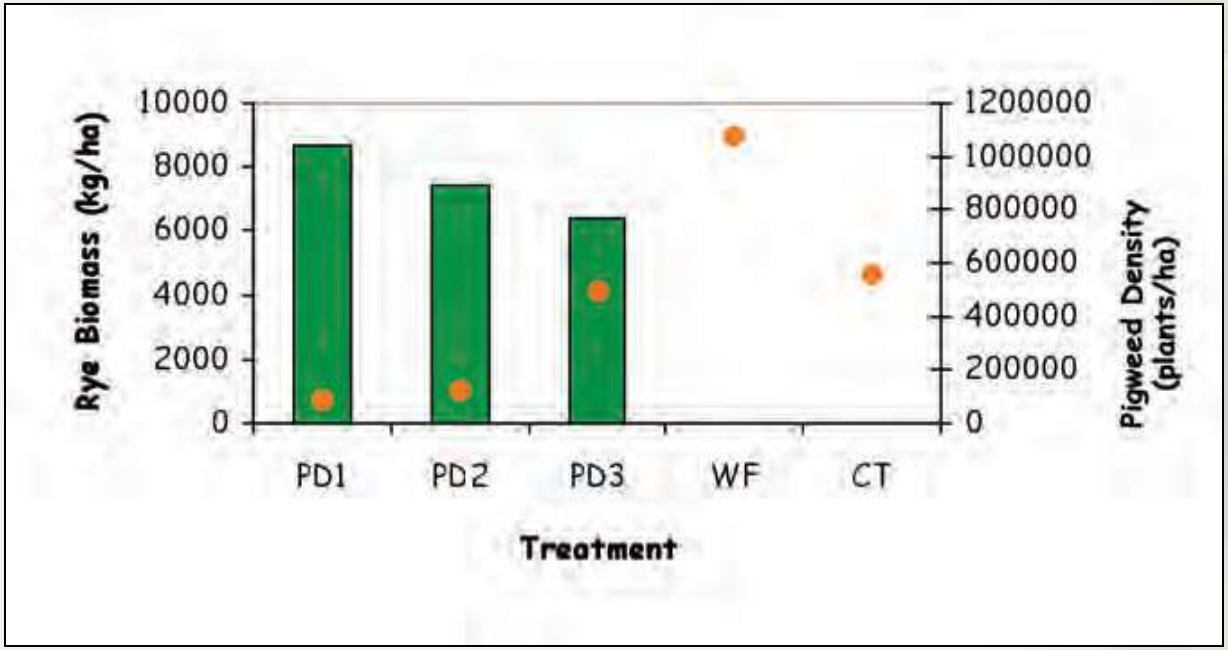
# Knockdown of Cover Crop Prior to Planting

- Research assessing the weed suppression of covers has focused on **herbicide-killed cover crops or control accomplished mechanically by mowing** (e.g., rotary or flail mowing) **or stalk chopping** (Teasdale and Rosencrance 2003).

- In general, **these control methods do not uniformly distribute residue on the soil surface**, (Teasdale and Mohler 1993).

- **Roller crimpers are a relatively new residue management tool** adapted from equipment used in southern Brazil and Paraguay that lays cover crops down while crimping and damaging the vascular tissue (Ashford and Reeves 2003).

# Weed suppression related to density of cover crop




Pigweed growth is suppressed by cover crop residue, the more the better. Green bars represent rye biomass (left axis); orange dots represent pigweed density (right axis). PD1, PD2, and PD3 correspond to cereal rye planting dates 1, 2, and 3 (4 weeks prior, 2 weeks prior, and on the average first frost date). WF is winter fallow; CT is conventional tillage (multiple disking).

Price et al, 2011

# Cover Crop alone may not provide needed weed control…..



Pigweed emerging in the planter row

Results and photos courtesy of S. Culpepper, University of GA

# Cover Crop as Aid to Weed Management and Con-till

Recommended practice for Palmer amaranth control in south Georgia (S. Culpepper, Univ of GA, 2011)


Deep plowing and cover crop planting in the fall

Spring rolling and planting


# Potential Benefits for Georgia Growers

1. Improved Palmer control
2. Protect herbicide chemistry
3. Labor (compared to tillage)
4. Wind and water erosion
5. Prevents GR horseweed
6. Prevents/Lowers GR ryegrass
7. Moisture conservation
8. Reduce herbicide inputs
9. Higher yields on dryland
10. Protection from EPA
11. Reduces thrips damage

# Summary

- Can a cover crop system eliminate the need for herbicides in high production agriculture? Not Always
- Will cover crops allow a reduction is herbicides needed and or herbicide rates?
  - Reduced need for herbicides early; perhaps
  - Reduce herbicide rates; NO
- Is one cover crop better than another for weed suppression?
  - Some cereals may be better than others (rye>wheat)
  - Allopathic responses need to be considered
    - Rye, brassicaceae crops , barley , turnip are known to be allopathic but effects vary by species
- Will one system work for all locations? Not Likely
  - Cover crop X weed species X crop X environment
- What are some of the major research needs from a weed management perspective?
  - Cover crop becoming a problem weed (i.e. annual ryegrass)
  - Cost of the cover crop planting/knockdown versus production savings
    - Effectiveness of cover crop to reduce in-crop weed management costs
  - Availability of effective herbicides to manage the weed spectrum
  - Better understanding of how cover crops interact with herbicides and other weed management options to build a sustainable system