Cover Crops and Weed Management

• 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).
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.....

No herbicide

Herbicide

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

Herbicide with no Cover Crop

Herbicide with Cover Crop
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 in 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