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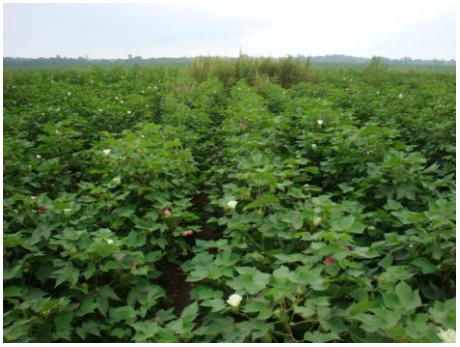
Herbicide-resistant Weeds Threaten Soil Conservation Gains: Finding a Balance for Soil and Farm Sustainability

Until the development of highly effective herbicides, conservation tillage was not feasible.

- Tillage has been an integral part of crop production since crops were first cultivated.
- Growers and scientists have long recognized both beneficial and detrimental aspects of tillage.
- Herbicides such as glyphosate minimized the need for tillage as a weed control tactic.

The evolution of glyphosate resistance has threatened global food production.

- When any single herbicide mechanism of action is used repeatedly without alternative management tactics, selection pressure becomes intense for plants that are tolerant or resistant to that herbicide.
- The unintended consequence of the predominance of glyphosate-resistant crops has been intense selection pressure for the development of glyphosate-resistant weeds.
- In many agroecosystems prevention is no longer an option.



Decreased Palmer amaranth infestation in Georgia cotton following inversion tillage and mulching. The nontreated control is in the background.

Diversity is the key to effective mitigation of herbicide resistance.

- Rotation of herbicides, specifically when the mechanisms of herbicide action are considered, is an important tactic to mitigate and manage herbicide-resistant (HR) weed populations.
- A number of transgenic and nontransgenic HR crops have been available since 1984.
- Mechanical weed control strategies are historically important components of an integrated weed management program.
- Crop rotations potentially have an important role in decreasing the likelihood of the evolution of HR weed biotypes.

Conclusions:

- Herbicide-resistant weeds pose one of the most significant threats to soil conservation.
- Some weed species have resistance to herbicides such that they have forced growers to include or intensify tillage.
- The National Resources Conservation Service currently has a number of HR best management practices that qualify for programs such as the Environmental Quality Incentive Program. Often these practices are not given priority status, and therefore they either are not listed as options at the local level or are not funded by soil conservation district boards.
- Stronger educational programs are needed that demonstrate how HR weeds can be best managed without losing the tremendous conservation gains attained in recent decades.
- More research is needed on how to best meet the needs of HR weed management, while at the same time meeting soil conservation compliance goals.

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