WEED MANAGEMENT CONSIDERATIONS IN CONSERVATION TILLAGE SYSTEMS - COTTON

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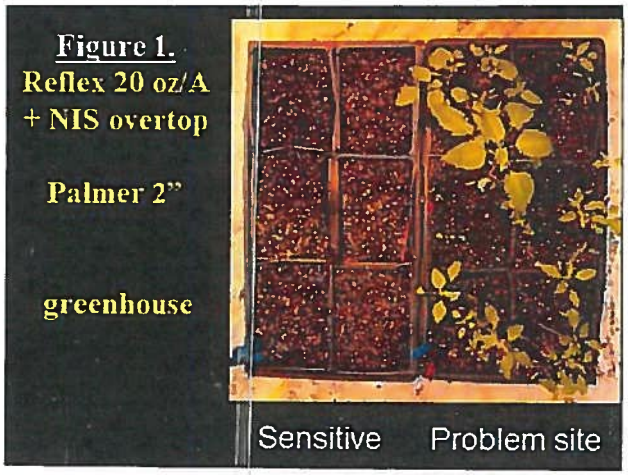
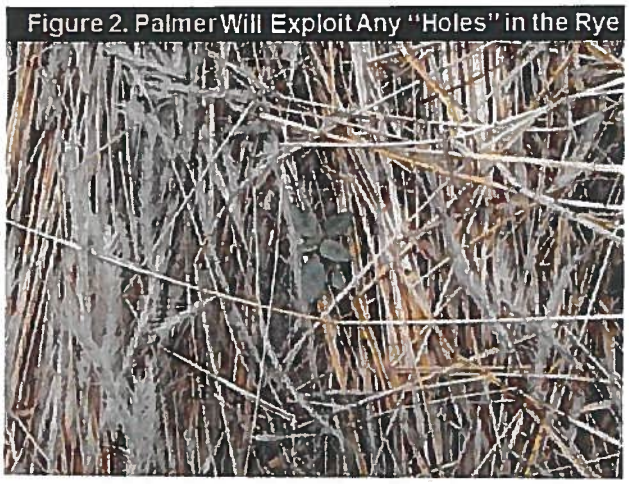
Herbicide Resistance Threatens Our Future! Unlike never before, herbicide resistance threatens the sustainability of our family farms. The lack of new herbicide modes of action along with the overuse of some herbicides has led to serious issues in the development of herbicide resistance. Ryegrass and Palmer amaranth pose the greatest threats because of their genetic and competitive potentials. Herbicide resistant Palmer amaranth has cost Georgia's cotton industry well over $1 billion and the pest continues to evolve. Palmer resistance to the PPO herbicides (common PPO herbicides include Valor, Reflex, Goal, Blazer, Flexstar, Cobra, and many more) is wide spread in the mid-south and is becoming a significant issue in the Carolinas. Although Palmer resistance to PPO herbicides has not been confirmed in Georgia, we are concerned! Figure 1 shows the response of a sensitive population (sensitive meaning it is responding like it should) of Palmer to Reflex POST compared to the response of a Palmer from a problem field. Cover crops, if managed properly, have the potential to greatly reduce herbicide selection thereby extending the life of herbicides and the farm. However for most fields, cover crops are just one part of a sound diversified management program (Fig 2).





When to Control Cover Crops? Cover crop planted, cash crop planted, herbicides selected, and the availability of irrigation should all be considered when developing a plan to terminate a cover crop. Cotton research has shown the need to kill cover crops (with the exception of cereal grains) at least 10 days prior to planting to ensure ***cotton stand*** loss does not occur. It is important to note, cotton is likely more vulnerable than other agronomic crops in regards to potential stand loss with untimely burndown applications. ***Soil moisture*** depletion by cover crops is likely an even bigger challenge as a crop like rye can deplete moisture from the soil rapidly. In dryland areas where managing the water source is not feasible, the cover crop needs to be killed early enough to allow ample rainfall to replenish soil moisture facilitating proper bed formation and a quickly germinating cash crop. After cover crop termination, a great benefit is often observed with the dead plant matter preserving moisture in the soil over long periods of time.

How to Control the Cover Crop? Most cover crops and winter weeds can be effectively controlled with herbicides. The most effective, broad scale options for controlling commonly grown cover crops when in a vegetative stage of growth (cereal grains, vetch, clover) and common weeds such as horseweed, wild radish, and primrose includes Roundup + dicamba or 2,4-D; obviously, the 2,4-D or dicamba is not necessary if controlling just cereal grains. Dicamba is more effective on clover and horseweed while 2,4-D is more effective on wild radish and primrose. Once cover crops and weeds are more mature with seeds present, Gramoxone mixtures with products like diuron (cotton only) are also often effective. As weed scientists, we would discourage the use of ryegrass as a cover if herbicides are used for its control because of the plants ability to quickly become resistant to all effective herbicides. If one must control ryegrass with a herbicide and resistance is not already present, apply full rates of Roundup followed by Gramoxone 5 to 7 days later. Temperatures, especially night time temperatures, can greatly influence herbicide performance and of course always check plant back intervals before planting the cash crop. More detailed recommendations can be provided to you by your UGA Extension agent.

Do I Need A Residual Herbicide In the Burndown? One of the most important goals for successful weed management is making sure Palmer amaranth is not present at planting. Residual herbicides are often an essential part of a burndown to achieve this goal. However, the question of "Am I getting my money out of a residual herbicide when I am spraying a cover" is a valid

question. In a rolled cover system, the creases that will last much of the season become present at rolling and the value of a residual herbicide is evident nearly always (Fig 3; photo 30 days after rolling/burndown). In cover crops such as rye that can be effectively rolled, weed control is often improved with the rolling process.

A more challenging question by growers is "Does my residual herbicide help me if I apply it in a standing grain cover or in a field where the cover crop completely covers the soil?" In the first scenario (Figure 4), there often is a large amount of soil touched by the sun's rays but as the sprayer is moving quickly across the field the spray often contacts the side of the cover and not the soil. Once the residual herbicide enters the cover crop, it is not likely to provide residual weed control. One could potentially slow the sprayer speed down to the point where the spray is moving straight down improving soil contact or alternatively a sequential application may be needed; keep in mind if the sun's rays reach the soil and pigweed seed are in the field they will likely germinate as conditions warm. For the second scenario where the residual herbicide cannot reach the soil surface because of plant debris (i.e., the sun's rays cannot reach the soil surface). Palmer and several of the other problem weeds should not germinate until the soil becomes exposed from plant decay or when the field is planted. Hopefully, the cover will last at least through planting where a preemergence residual system can be implemented; if the cover does not last until planting then sequential burndown sprays may be needed.

Figure 3. Residual control provided after rolling and spraying rye.

Figure 4. Will the Residual Herbicide Reach The Ground?

Ideal Seedbed and Crop Stand Are Required. Input costs for most cash crop seeds have risen dramatically; thus, it is essential that growers achieve the perfect stand. Many experienced growers have a technique to achieve this goal. However for beginners or those of us that still have much to learn with our equipment, considering a skip-row cover cropping system is advised. Essentially, no cover crop is present in the 8-10 inch zone where the ripper shank will run and the cash crop seed will be planted (Fig 5). Alternatively when cover crops are broadcast, the same zone kill approach can be achieved with winter banded herbicides (Fig 6). These techniques can be used to generate a large amount of biomass with a perfect seedbed.

Figure 5. Planting a Skip-Row Cover to Improve Stand

Figure 6. Using Herbicides to Create a Skip-Row Cover to Improve Stand

As herbicide resistance threatens our farms, it is essential for all growers to apply two residual herbicide modes of action that are effective on Palmer amaranth preemergence behind the press wheel even in conservation tillage systems. And of course, a timely POST system including a directed layby application is encouraged.