NO-TILL WEED PROBLEMS AND CHALLENGES IN THE LOWER SOUTH

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INTRODUCTION

The majority of the no-till crop production systems in the Piedmont and Coastal Plain of the lower south (Georgia, Florida, Alabama, South Carolina and North Carolina) involves double-cropping where only one of the crops is produced without primary tillage. The most popular double-cropping system for the past several years in this region has been winter small grains (usually wheat) followed by soybeans. Approximately 30% (320,000 acres) of the double-cropped soybeans in Georgia are planted no-till. Other double-cropping combinations include small grains followed by grain sorghum, cotton, sunflowers, or peanuts and in the deep south, corn followed by soybeans or grain sorghum. Vegetable and cole crops may also be double-cropped with any of the previously mentioned crops but generally the no-till concept is not used. Each of these systems poses distinct weed control and herbicide residue problems that must be recognized and solved.

FACTORS THAT AFFECT WEED CONTROL IN NO-TILL CROPS

Several factors exist which affect weed control in no-till double-cropped systems that are not important with conventional tillage. For crops which are established following small grain harvest there is a two to six week delay in the date of planting compared to conventionally produced full season crops. This delay allows both annual and perennial weeds the opportunity to become well established and difficult to control with traditional contact herbicides, such as paraquat. Mid-June through mid-July, the time when most double-cropped soybeans and grain sorghum are planted, is historically the driest period of the year in most of Georgia, Alabama, and South Carolina. Drought stress reduces the effectiveness of the contact herbicides used to control emerged large crabgrass, common ragweed, common lambsquarters, and horseweed. The dry weather and high temperatures also reduce the effectiveness of soil-active preemergence herbicides. Research has shown as much as 50% loss of some preemergence herbicides within 5 days of application if no rainfall is received and sunny, hot conditions are experienced. The higher temperatures and drier conditions also make crop establishment more difficult. Uneven crop densities, even when planted in narrow rows, reduces the effect of crop canopy suppression on late emerging weeds and extends the period of weed control needed to avoid yield and harvest losses.

The presence of wheat straw residue on the soil at the time of herbicide application has been shown to intercept a great deal of the herbicide. At straw levels above 4,000 pounds/A only about 15% or less of the herbicide which is applied will reach the soil surface. That which remains on the straw must be washed into the soil by rainfall or irrigation. Several preemergence herbicides have been shown to have 25 to 75% of the applied herbicide retained on the straw even after 0.5 inch of sprinkle irrigation

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water was applied immediately after herbicide application. A delay in rainfall or irrigation will further decrease the amount of herbicide received by the soil. These findings would suggest that increased rates of preemergence herbicides should be used when applied to no-till straw-mulched situations or that straw residue levels should be reduced. However, it has been observed that small grain straw residues and extracts from these residues can adversely affect the growth of some weeds. It has also been noted that the presence of wheat straw gives better suppression of certain small seeded annual weeds than herbicides applied for their control in conventionally tilled areas. It is possible that the loss of herbicidal activity due to the presence of straw on the soil at the time of application may be compensated for by the effect of straw on the weeds that were to be controlled.

Another factor that must be considered is the persistence of the soil active herbicides applied in the no-till double-crop. While it is desirable to use a herbicide which provides season-long weed control, the potential for herbicide carry over into the following crop must be recognized. Most producers follow the soybean or grain sorghum crop with small grains again in the fall. The later date of herbicide application in the no-till double-crop reduces the period between herbicide application and planting of the following crop from 6 months to 4 or 5 months. Several herbicides that are currently registered for preemergence use in soybeans have the potential to persist at levels high enough to injure wheat planted after harvest. The factors which affect the persistence of the compounds and alternatives to their use must be investigated.

PROBLEM WEEDS IN NO-TILL FOLLOWING WHEAT

Weed problems in no-till crops planted after wheat harvest can be separated into two categories: **1)** those which germinate in the wheat and are present when the soybeans are planted, and 2) those which emerge after soybean planting. The most commonly occurring weeds in category one are common lambsquarters, common ragweed, and horseweed. Large crabgrass may also be present in the wheat, especially if harvest is delayed. These weeds usually germinate in March or April and are not affected by the January and February applications of 2,4-D for broadleaf weed control. Paraquat or glyphosate are commonly used to control the weeds at the time of soybean planting, however, the adverse conditions previously mentioned can decrease the effectiveness of paraquat. Glyphosate has been shown to be somewhat more effective but is also more expensive. The category two weeds can be any of those commonly found in conventionally tilled crops but the most difficult to control are sicklepod, Texas panicum, morninglories, fall panicum, and johnsongrass. Areas heavily infested with sicklepod, Texas panicum, or johnsongrass make it especially difficult to economically produce no-till crops. In the past, the lack of effective herbicides for postemergence control of grass weeds has made no-till farming impractical in many areas. However, the introduction of sethoxydim and fluazifop, for postemergence grass control in broadleaf crops, will alleviate these problems to some extent. With the loss of toxaphene for postemergence sicklepod control, this weed will remain the most troublesome weed in soybeans in the lower south and will severely hamper no-till soybean production.

FUTURE NEEDS FOR NO-TILL CROP PRODUCTION IN THE LOWER SOUTH

Several important factors will affect the future success or failure of weed control in no-till crop production in the lower south. It appears that double-cropping will remain popular and profitable for southern producers, at least in the near future. To improve weed control in the no-till crop, usually soybeans or grain sorghum, improved management, equipment, crop cultivars, and herbicides are needed.

At the present time, few producers own equipment that will efficiently plant crops in no-till situations, especially in the Coastal Plain where in-row subsoiling is necessary to break-up the hard-pan which forms in these soils. Several types of effective planters are available but difficult economic times and the high price of the equipment will hamper the transition from the established conventional tillage practices to no-till. Poor crop stands due to inadequate equipment is many times the difference between acceptable weed control and disaster. Innovative engineering of no-till equipment at affordable prices will make no-till production more of an alternative to southern producers.

At the present time, there are few soybean or grain sorghum cultivars which are adapted or have been specifically developed for the short-season double-cropping system. This is especially true where maturity group VI and VII soybeans are planted late in the growing season. These determinate types of soybeans many times do not develop a full canopy before beginning reproductive growth and therefore do not suppress the growth of emerging weeds. The introduction of indeterminate types of soybeans which are adapted to the southeast will greatly improve this situation. At the present time, a few of these varieties have been introduced but seed supplies are very limited.

Even when better equipment and cultivars become available and are in use there will still be troublesome weeds to contend with. As pointed out earlier, sicklepod, morningglories, johnsongrass, and Texas panicum will be difficult to control. The introduction of new and improved herbicides for their control is necessary. The introduction of the new foliar grass herbicides will solve some of the problems in soybeans, although, solutions are still needed for grass control in grain sorghum. Dependable morningglory control is now available with acifluorfen although proper timing of application and optimum conditions are needed for success. New herbicides must be developed which will selectively control sicklepod in soybeans. Few fields in Georgia, Alabama, or Florida do not have economic levels of sicklepod infestations. Several experimental herbicides show promise for sicklepod control but even if the decision to develop them is made it will be several years before they will become available.

No-till crop production using the double-cropping systems previously described are labor and land efficient and have shown to be benefical in erosion control and soil-water conservation. However, effective weed control is still one of the major stumbling blocks in the minds of many producers. Until effective, dependable weed control systems are available, no-till double-cropping will be difficult to utilize for many producers in the lower south.