

Pesticide Concerns in Conservation Tillages

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Pesticides are an integral component of successful crop production by conservation tillage methods. There has been much conjecture and discussion over the years about increases in pest populations as primary tillage is reduced and the need for greater pesticide quantities to control the greater number of pests. Herbicides are the most widely used pesticide in agronomic crop production, and as a result, have received the most notoriety for misuse and water contamination. My comments will address primarily herbicides for weed management in conservation tillages and concerns I have about their proper and improper use, specifically as it relates to water quality.

Herbicides must be used to manage weed infestations in conservation tillages. The potential for between row cultivation as a weed control method decreases as the amount of plant residue on the soil surface increases. Additionally, growers do not have the labor needed for the timely removal of weeds by hoeing. The concern is not whether or not herbicides will be used, but rather, which type of herbicides should be used to ensure economical weed control without contamination of the environment. The public concern for drinking water free of pesticides and other organic and inorganic contaminants will likely increase during the next few years. There are groups of people already calling for the elimination of pesticides and inorganic fertilizers for the production of food, feed and fiber. While I do not believe that to be practical, I do believe that we, as agriculturalists and pesticide users, should be at the forefront of demanding food and water supplies free of harmful chemical residues. I believe that herbicides, and other pesticides, can be used safely in various conservation tillages. All of us--farmers, scientists, the general public--must be aware of the need for conserving our soil and water resources throughout the South. Conservation tillage is one means of accomplishing this conservation and much of the South's crops are grown on land that is subject to soil erosion.

The Southern Conservation Tillage Conference has been instrumental in promoting crop production by conservation tillage methods and several people have discussed weed control and herbicide use at these meetings. At the earliest conferences, conservation tillage most often meant no-tillage, and weed control in no-till and conventionally tilled soil was compared. The general perception at these meetings was that more herbicide was required for weed control in no-till compared to conventional tillage. In actuality, whether or not additional herbicides were required depended on the type and quantity of plant residue on the soil surface at the time of planting and/or herbicide application. We have learned that less herbicides, particularly soil-active herbicides, are needed in some types of conservation tillages. The point of this short history is that some conservation tillage practices may require less dependence on soil-active herbicides for weed control and that the long held belief that more herbicides are required for all conservation tillages is not true.

As stated earlier, herbicides will be used for weed management in conservation tillage. We are concerned about herbicides used in conservation tillages being a contaminant of our surface and ground waters? As with most biological system, the answer is "that depends". It depends on the type of soil, the depth to groundwater or proximity to surface waters, the amount of plant residue on the soil surface, the amount and timing of rainfall, the type(s) of tillage operations and chemical and physical properties of the herbicide. Recently there has been concern expressed about the rapid movement of pesticides by macropore flow in no-tillage. The jury is still out on whether or not this does occur, but if it does, then a major soil and water conservation practice will be implicated as causing groundwater contamination. I point this out because, at some point, the agricultural community may be asked to say which is the lesser evil--potential herbicide contamination of groundwater or erosion of an essential resource for crop production. We--scientists, farmers, agricultural industry--should be diligent in our efforts to make sure that day never comes. We should insist on more research efforts to answer the questions before us. Does conservation tillage, as now practiced, rely too heavily on herbicides

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instead of cover crops and crop rotations? Do some types of conservation tillages lead to greater herbicide leaching into groundwater? Should the reliance on soil-active herbicides for weed management in conservation tillage be reduced? If the answers to the above questions are yes, then we have a large task facing us. What will be the response of farmers, the agricultural industry, university research and extension personnel, and state or federal agencies if the answers are yes?

Too often, the response of governing agencies to pesticide related problems has been based on emotion and not on scientific fact. I am concerned that herbicides will be targeted indiscriminately as major contaminants and all of us involved with conservation tillage should actively pursue the facts. If a herbicide is found to contaminate groundwater, then let us be the first to say its' registration should be canceled. Likewise, we should be vocal in supporting the continued use of herbicides that do not present a health risk.

I believe we will see major efforts to restrict certain types of pesticides in the next few years. This belief is based on the number of reports, confirmed and unconfirmed, of herbicides in water supplies. Major research efforts are being conducted in many states to monitor water supplies for the presence of pesticides. Herbicides, being the most widely used, will bear the

brunt of the publicity as the results of these studies are published. Atrazine and alachlor are the herbicides most often mentioned as contaminants of well water. These two herbicides have served as the "backbone" of weed management programs in corn grown with conservation tillages. The corn grower, either conventional or conservation tillage, will be hardpressed to effectively manage weeds in corn without these herbicides. Other herbicides with similar chemistry are also widely used in corn production and will be closely monitored in the future.

I do not wish to be totally negative regarding herbicides for conservation tillage and I certainly do not advocate going back to conventional tillage methods on the erodible soils of this country. The herbicides used most widely for control of weeds at or before planting (glyphosate, paraquat) are tightly adsorbed to soil and do not pose a risk of water contamination. There are many foliarly applied herbicides to manage weeds in conservation tillage; however, many growers will have to change their attitudes and equipment to effectively use them. Finally, although several soil-applied herbicides are "under fire" for contamination of surface ground waters, ample data exists to show conservation tillages reduce total herbicide runoff in surface waters, and generally, herbicides degrade faster under conservation tillages.