IMPACT ON WEED PRESSURE BY EXPANDING THE CORN-SOYBEAN ROTATION TO INCLUDE WINTER WHEAT. Kevin B. Shelley and Jerry D. Doll, Outreach Educator, Nutrient and Pest Management Program and Extension Weed Scientist, Department of Agronomy, University of Wisconsin-Madison, Madison, WI 53706.

Crop rotation is often mentioned by researchers and educators as a component in an integrated approach to managing pests. Measuring or demonstrating its efficacy is less common, particularly in actual production situations. The objective of this six-year on-farm research and demonstration project is to help corn and soybean farmers in southern Wisconsin recognize potential agronomic, economic and pest management benefits associated with more diverse crop ecology. It compared a soybean-corn rotation with an expanded rotation of soybean-winter wheat-corn in which medium red clover is frost-seeded into the wheat in early spring to provide a post-harvest cover crop. Rotations have been compared on three cooperating farms in south-central Wisconsin in field-length, side-by-side, strips with two or three replications of each rotation. The comparisons were run on farms in Dane and Columbia Counties from 1998 to 2002 and on a farm in Iowa County from 1999 to 2003.

Observing weed pressure in each rotation has been the primary pest management focus. It was expected that adding a winter annual crop and legume forage cover crop to an otherwise continuous annual crop rotation would break the cycle of annual weeds, thus reducing their pressure in the year that corn follows wheat. This would be similar to the commonly observed effect of alfalfa on annual weed pressure when rotated back to corn. This would provide an additional cultural component to weed control in what is mostly a chemically based control program.

Weed pressure in each rotation was evaluated by two methods. The first involved weed seedbank sampling in which weed seeds were germinated in greenhouse flats from intensively collected soil samples in each of the field-length strips in each of years two through six of the project. The second approach made in-field weed counts in early June of the final year before any herbicides (other than preplant Glyphosate burndown) were applied. In the final year, the soybean-wheat/red clover-corn rotation had been through two complete cycles.

Contrary to our expectation, weed pressure did not appear reduced in the rotation including winter wheat/red clover. From the seedbank sampling, weed seedlings per-square-foot were higher in soil sampled from the wheat/red clover rotation for 13 of the 15 site-years sampled, though many of the differences are likely not statistically significant. Final-year weed seedlings per-square-foot were higher in the wheat/red clover rotation for two of the three cooperating farms. It is not known why, but weed pressure as measured by the seed-bank method declined in both rotations on all three farms during the 6-year period. Weeds observed in the field in the project's final year were significantly higher in the wheat/red clover rotation on two of the three farms.

On the surface, these findings would argue against the efficacy of the more diverse rotation as part of an integrated approach to weed management. However, possible competition advantages afforded crops grown in the more diverse rotation must also be considered. Economic results favored the three-crop rotation on two of the three farms in the comparison. This was due to: (1) slightly higher corn and soybean yields in that rotation, and (2) relatively high wheat yields. Teaching the agronomics for high-yield wheat was another component of the project.

2003 North Central Weed Science Proceedings 58:178.