Weeds and Cover Crops

In a way, weed management trials and cover crop trials belong together. A cover crop growing in a row crop field travels a fine line between failure and becoming a weed itself. On the other end of the spectrum, there are years and situations when weeds take a vacation. What does that mean for management practices? **Doug Alert and Margaret Smith** (Hampton) have used flame cultivation occasionally and have carried out several on-farm trials of flaming. In the wet spring of 2001, for instance, they found flaming reduced velvetleaf numbers and increased corn yields. 2004 was a different environment (Table 1). The first three weeks of May were dry – good conditions for rotary hoeing. So perhaps it isn't surprising that flaming (at stage V4) after two rotary hoeings made no difference in weeds or corn yields. But this was the test that Doug was looking for. He writes "Having attended several meetings and being told flaming will increase corn yields even with no need for weed control, I thought this needed checking out... I will use the flamer as needed for weed control but do not plan to use it on all corn acres."

In 2006, **Ron and Dottie Dunphy** (Creston) faced the same no-weeds "predicament." In cooperation with Michigan State University, Ron was evaluating the effectiveness of flaming. Again, the first three weeks of May were dry, and the first hoeing went well. Substituting flaming for the second hoeing made no difference in weeds or yield, and of course flame cultivation is more costly than hoeing (Table 1). In 2007, Dunphy carried out a similar trial, comparing: 1) two rotary hoeings and one cultivation to 2) that same combination followed by flaming a week later. The mechanical controls kept overall weed numbers low, but flaming was associated with a lower weed number that was just short of statistically significant at the 95% confidence level.

Ron Dunphy shows the weed window at a field day

It may be too easy to say "If you don't need it, don't use it." Just before a flush of weeds, the field often *looks* clean. Ron has given himself a "preview" of emerging weeds by placing a pane of glass on the ground. The soil under the glass of the "weed window" stays warmer, and so spring weeds emerge there before they are visible in the rest of the field. By June, though, weeds emerge in the field the same time as under the glass. Michigan State University would like to predict weed emergence by accumulated heat units, or "degree-days." So far, though, Ron is keeping a closer eye on the field than on the thermometer.

"Rye on the ridges" is a cover cropping technique developed by several PFI members who use ridge tillage. It accomplishes the main purposes of cover crops – building soil tilth, recycling crop nutrients, and suppressing weeds – while minimizing extra seeding expense and keeping the cover crop where it can be eliminated. Rye is the cover crop most frequently used because it is vigorous, winter hardy, and inexpensive. To seed the rye, units on the grain drill are plugged so that seed is only planted right on the ridges, leaving the valleys between the ridges undisturbed. The ridge is the location where the cover crop does most good, and it is the easiest place to manage. As the subsequent row crop is planted, the planter row cleaner simply scrapes the cover crop off the ridge.

Cooperators **Doug Alert and Margaret Smith** (Hampton) and **Richard and Sharon Thompson**(Boone) carried out trials that helped them understand when to use this practice and when not to (Table 1). In 2004, the Thompsons evaluated rye-on-ridges both preceding corn and before soybeans. The rye was seeded in the fall before the row crops and then eliminated with the planter ridge cleaner the following spring. The corn was planted May 1 and the soybeans on May 8; that month the Thompsons received 6½ inches of rain. The soybeans following rye yielded the same as following no cover, but the corn following the rye cover yielded significantly less (7.4 bushels per acre) than the corn that did not follow the cover crop. Why? Precipitation was adequate throughout the growing season, which discounts the possibility of moisture competition between the rye and the corn. Dick Thompson suspects the corn was affected by allelopathic factors left in the soil by the rye. Allelopathy refers to negative effects of one plant on another above and beyond straightforward competition for resources. Rye is thought to be one of the most strongly allelopathic crops. It is not unusual for the allelopathic effect to differ from one crop to another, which could explain why soybeans were seemingly unaffected by the previous rye.

Bottom line: After this trial, Dick Thompson will no longer try to use a rye cover crop before corn. On the other hand, the 2004 soybean yield was not affected by the cover crop. (Weed numbers were low and not

Rye on Ridges. On the right, the planter has cleaned the ridges

significantly different between the cover crop treatment and the control.) Apparently the soybeans were not affected by allelopathy. And in a dry spring when there might be moisture competition, soybeans would be somewhat better able to come back from early stress than is corn. See page 23 for more of Dick and Sharon's reflections.

In 2006, Doug Alert and Margaret Smith carried out a similar trial in soybeans. The rye cover was seeded on the ridges in April rather than in the fall, but otherwise the treatments were the same. And the outcome was the same too – low weed pressure in both treatments and no difference in soybean yields from the cover crop. Doug's conclusion was that the rye-on-ridges should be reserved for situations in which there is likely to be weed pressure.