Fall Residue Management for Direct Seeding Spring Crops (Fairfield)

Goal

To determine the optimal level of fall residue management prior to seeding spring crops.

In the annual cropping region of Spokane County, direct seeding into heavy residue can be challenging, especially in the spring when the soil is cold and wet. Stubble ground warms slower than cultivated ground, and in some seasons this can be an apparent detriment to the farmer who wishes to transition to direct seeding.

The farmer wanted to compare how 3 fall residue management treatments on winter wheat stubble impacted the spring crops in the rotation.

Methods

The 3 residue management treatments he compared were:

- Mowing
- Fall disk rip plus a spring harrow
- Standing stubble (check treatment)

We laid out the plots in the fall after winter wheat harvest. There were 2 replications of each treatment in 2001, 3 in 2002, and 4 in 2004. The farmer used a Schulte mower (28 feet wide) for the mowing treatment and a John Deere (17.5-ft) disk ripper. In the spring, he harrowed the disk rip plots only using a 10-bar flex harrow. He did no residue management operations on the standing stubble (check plots).

The farmer used a Great Plains 3010 double disk drill with 8-inch row spacing to seed all the plots. In 2001, he grew Harrington spring barley seeded into 80 bu Madsen; and in 2003, he grew Brewer lentils following 60 bu Zak spring wheat.

Results and Discussion

The summary of the 3-year yield data is shown in Figure 2 and the adjusted returns are in Figure 3. In order to have all results on the same scale, all crop yields are in lb/A. The complete results of the analysis are in Table 2 in the Appendix section. Because the differences between treatments were not consistent from year to year, we have shown the results for each year rather than combining them.

Adjusted return was the gross economic return on a treatment less the cost of the residue management treatment *only* (no seeding, herbicide, fertilizer, harvest costs). We used *total costs* that included ownership, depreciation, fuel, maintenance, and wear and tear on the equipment. The costs for the treatments were: standing stubble - $0/A, mowing - $10.78/A, fall disk rip - $10.00/A (grower estimate), and $14.04/A (WSU estimate) plus spring harrow - $2.25. We used target grain prices of $3.80/bu for wheat, $2.21/bu for barley, and $11.94/cwt (loan rate) for lentils.

In 2001, for Harrington barley, the disk rip and harrow treatment (2,729 lb/A) statistically outyielded the mowed (2,285 lb/A) and standing stubble (2,086 lb/A) treatments (Figure 2). The disk rip treatment ($10/A) also had the highest adjusted return ($116.33/A) in this season (Figure 3 and Appendix Table 2) compared with $98.96/A for direct seeding and $97.32/A for mowing. However, due to statistical non-

significance, the disk ripping treatment would not necessarily always return more than direct seeding. This trend was re-emphasized when we analyzed the data using $14.04 for the cost of disk ripping (Appendix Table 2).

Figure 2. Effect of 3 fall residue management treatments on yield of subsequent spring crops at Fairfield, WA, from 2001 to 2003.

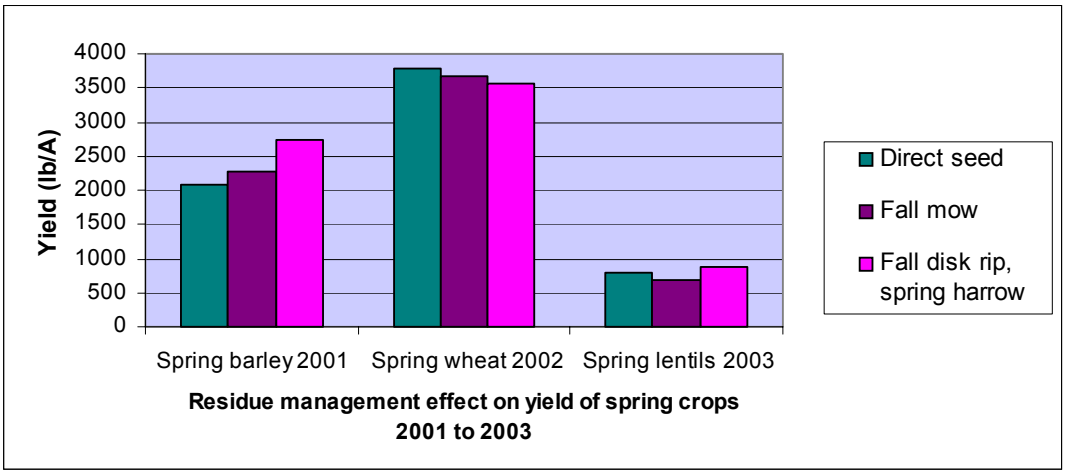
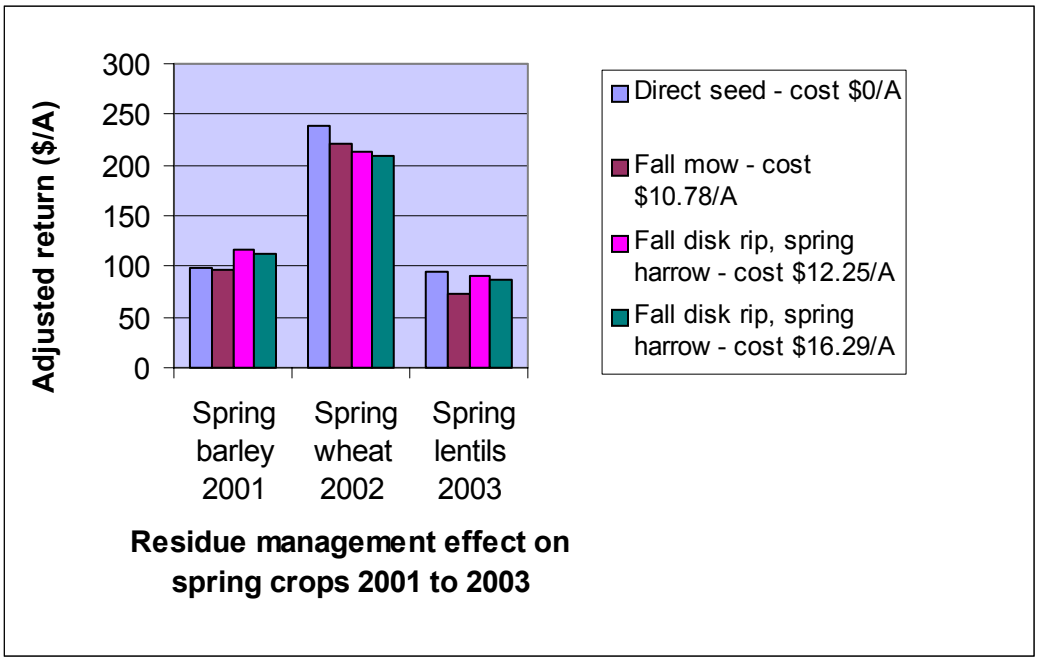


Figure 3. Effect of 3 fall residue management treatments on adjusted return of subsequent spring crops at Fairfield, WA, from 2001 to 2003.



With the Zak spring wheat crop in 2002, the direct seeding treatment outyielded (Figure 2) the disk ripping, but not the mowing treatment. It had higher adjusted return (Figure 3) than did both other

treatments when we used both the $10/A and the $14.04/A cost for disk ripping. The farmer noted that although he seeded the test plots 10 days later than the rest of the field, the yields in these plots were not depressed. This indicated that waiting for the soil to dry prior to direct seeding was not necessarily negative.

In 2003, the lentil crop in all the plots yielded poorly due to drought conditions. The disk rip treatment significantly outyielded the mowing, but not the direct seed treatment (Figure 2), and the results were similar for adjusted returns (Figure 3).

From the data obtained we were unable to draw broad conclusions about the success of different residue management treatments. Across the 3 years of the project, direct seeding equaled or exceeded the tillage treatment in 2 years. Also, in 2 of the 3 years it tended toward or demonstrated being the treatment with the best economic return, assuming that all other management practices were the same among treatments (i.e., herbicide costs were assumed to be the same for all treatments we considered). The disk ripping treatment had very similar trends, so it seemed that neither treatment was consistently better or worse than the other. Fall mowing was either the lowest, or tended to be the lowest scoring treatment for both yield and adjusted return.

Observations

In 2002, the farmer noticed that the plant stand in the direct seeded plots was reduced, he had a problem with the drill tubes being cold and inflexible and cutting off seed going through the draws, but it seemed uniform across treatments. This season he seeded the plots 10 days after the rest of the field, but the yield did not differ.

In 2003, he noticed the soil was not completely dried in the direct seed plots, which caused compaction. That year the spring was extremely wet, but the weather then dried early with little to no rain after early May. This reduced yields for all spring crops, but especially the lentils. The yields in the plots did not necessarily correlate with yields of similar crops on the rest of the farm due to the differential in time of seeding.

While the results of the study were not dramatic, they provided him with enough validity to continue pursuing direct seeding. He is maintaining flexibility in his approach, and in many situations uses a 2-pass seeding system.