Proposal for 2010-2011
Northwest Columbia Plateau PM_{10} Project

Objective # 8: **Develop awareness and acceptance of best management practices via on-farm testing of improved technologies in farmers' fields, extension outreach programs, and other educational materials.**

Title: ***High Residue Farming in Irrigated Systems for Wind Erosion Management***

Personnel: Principal Investigator: **Andy McGuire, WSU Extension; Sally Hubbs, Technician, WSU Extension;**
Cooperators: **Phil Peterson, WSU Extension; Farmers: Dale Gies, Wes Boorman, Fred Lindsey, Gavin Johnson, Ken Schutte, Alan Bartelheimer, Rick Nielson, Hank Lee, Travis Shew, Jame Freeman, Alan Williamson, Eric Williamson, Sam Krautscheid, Mike Goodwin.**

Project Objectives

1. To transfer direct seeding technology to irrigated farming regions of the Columbia Basin.
2. Continue the experiment to determine the feasibility and effect on hay quality of direct seeding alfalfa after wheat harvest.
3. Monitor soil changes in high residue farming demonstration field.
4. Investigate potential of high residue farming with vegetable crops.

Recent Accomplishments

- We demonstrated the feasibility of direct seeding corn into undisturbed corn stubble. Good stands (34,556-35,380 plants per acre) were achieved using a conventional planter modified for direct seeding. However, early plant growth was slowed due to the high amounts of residue which kept the soil cooler than bare tilled soils. A cooler than normal spring and deep planting also delayed emergence. Yields ranged from 5.2 to 6.1 tons per acres (15.5% moisture). These are respectable given the conditions but not quite competitive with yields in tilled fields. Moving residue off of the row might reduce or eliminate this difference.
- We investigated the relative effects of residue removal and tillage on soil temperature in the seed zone. Soil temperatures at 2" depth were monitored at replicate sites in a fall strip-tilled field in the strip, in between strips, and in between strips with residue removed. The results showed that fall strip-tilled soil was warmer than either the untilled soil with or without residue cover. However, soil that had the residue removed just before planting (no tillage) was nearly as warm as the fall strip-tilled soil. The untilled, residue covered soil was the coolest. Removing residue warmed the soil much more than tillage: +1.0 °F from tillage, +6.6 °F from removing residue, and +7.0 °F from removing residue and tillage on average.

Planned Research

Objective 1: Direct seeding and strip-till technology, including the knowledge gained through the research conducted as part of this project, will be transferred to farmers in the Columbia Basin through the following:

1. High residue farming systems field day. These field days will give farmers an opportunity to see the equipment used in direct seeding and the crops that have been direct seeded. They will also hear the results of recent research, observations from cooperating farmers, and direct seeding basics from the local extension educator. Farmers attending this field day will receive the information they need to begin planning the residue management that they will need to do in the fall to prepare for direct seeding the following year. It will also give us the opportunity to hear from farmers what their concerns are with adopting direct seeding systems in irrigated areas.
2. A High Residue Farming under Irrigation workshop. This annual workshop will assist farmers in learning the latest in high residue farming technology through lectures and discussion with a farmer panel. Experienced researchers will be brought in from areas where farmers are currently direct seeding in high amounts of residue.

Objective 2: We will conduct a second year of this experiment. Depending on results of the first year, the treatments may be modified. Alfalfa will be planted after spring wheat at the WSU Othello HRF field using the following HRF methods: direct seeded with standard drill, direct seeded with no-till drill, broadcast and packed. Residue levels will range from completely removed to undisturbed and one treatment will use a vertical tillage operation and/or mowed. The experiment will be replicated and randomized and evaluated by measuring stand establishment, winter survival, and 1^{st} and 2^{nd} cutting yields and contamination by residue. Cost estimates for each combination of methods will be made.

Objective 3: We are conducting a long-term high residue farming demonstration using a wheat-corn-dry beans rotation at the WSU Othello research unit. In the spring after corn harvest the soil will be sampled for analysis of soil properties to determine the changes that take place and how quickly they take place. Planned measurements are water infiltration, soil aggregate stability, soil penetration resistance, organic matter levels, nutrient levels by depth, earthworm populations, soil biology assays and bulk density.

Objective 4: We will assemble a focus group of vegetable producers, processor representatives, and Extension specialists to discuss the potential for increasing the use of high residue farming in vegetable production. The group will identify those vegetables with the highest feasibility to incorporate these practices and the various practices that should be tested. This effort will be preparation for obtaining a specialty crops block grant to investigate strip-tillage in vegetable production. Potential crops are green peas, garden beans, carrots, onions, and sweet corn.

References cited

None