Proposal for 2006-2007
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

Project Title: On-Farm Testing of Cropping Systems Technology to Improve Profitability and Erosion Control in Low and Intermediate Rainfall Areas of Eastern Washington

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Other Partners/Cooperators: Wheat Grower and Crop Improvement Associations in Adams and Lincoln Counties.

Accomplishments
Through a series of on-farm test, a mustard price decision matrix was developed to assist producers determine what price structure is required to produce mustard profitably in comparison to spring barley in crop rotation. This project not only helps producers with profitable alternative crop production, but is also vital for Washington State as it develops a biofuel industry. A second accomplishment is utilizing the information gained through the on-farm testing program on Dark Northern spring wheat production so growers can capture higher market prices, securing additional profits, and reduce summer fallow acreage.

Objectives
Utilize on-farm testing to accelerate the development and grower adaptation of minimum tillage and no-till systems, and more intensive crop rotations that improve profitability, erosion control and soil productivity in low and intermediate rainfall areas of Adams and Lincoln Counties in eastern Washington.

Recent Accomplishments
The Northern Lincoln County field tour continues to be a valuable source of outreach focusing on direct seed systems and crop rotations that prevent or reduce wind erosion. This year the
tour was focused on no-till fallow management and new technology (Weedseeker®) that has the opportunity to greatly reduce the production costs of chemical fallow and increase the weed control efficacy. This tour also focused on the value of incorporating yellow mustard in an intense direct seed cereal crop rotation. A second tour, Cropping Systems and Soil Quality tour, was organized this year to introduce producers to direct seed cropping systems utilizing the Weedseeker sprayer technology in no-till fallow systems in Oregon this past summer. This tour also talked focused on soil quality as Dr. Jill Clapperton led a workshop that included time in multiple soil pits. The feasibility of the undercutter fallow method in Oregon was also a focal point of this tour.

Grower presentations remain a vital piece of the Lincoln-Adams On-Farm Testing Program as multiple presentations were presented throughout the year. The focus was on no-till fallow management and on-farm testing highlights. An oral presentation was given entitled “Value in Incorporating Yellow Mustard (Sinapis alba L.) into an Intense Direct Seed Crop Rotation” at the Western Society of Crop Science.

A series of on-farm trials over three years and two locations examining the benefits of fall fertilization for spring cereal grain production in a two-pass seeding system were just completed. Nearly all of the fall-applied nitrogen was accounted for in the top foot of the soil profile prior to spring seeding. Fall applied nitrogen had no agronomic benefit or detriment in comparison to spring applied nitrogen fertilizer. This allows growers to help spread out and reduce spring workloads and capitalize on potentially lower nitrogen cost in the fall.

Another series of on-farm trials examining low vs. high disturbance fertilizer application in a two pass seeding system was just completed. Over the past four years there was no difference between the two fertilizer methods in stand establishment and tillers per plant. Fertilization with the higher disturbance “shank” applicator produced greater yield and grain protein; however, there was variability within years. Spring wheat fertilized with a low disturbance “coulter” applicator improved grain test weight. For growers applying fertilizer with a high disturbance shank machine in a two-pass seeding system has the potential to improve yield; however, it may not provide greater yields every year over applying fertilizer with a low disturbance coulter type fertilizer applicator.

A series of on-farm trials examining the value of yellow mustard in an intense direct seeded cereal grain rotation is complete. Over four years spring barley has produced greater yield than mustard, but mustard has averaged larger economic returns primarily because of market price. Overall it was concluded that yellow mustard has value as alternative crop in an intense cereal grain cropping rotation under direct seeding conditions as yellow mustard in rotation produced $11/ac more gross economic return than spring barley included in rotation. However the value is closely related to market price.

Under the drier-than-average conditions experienced over the past few years, growers have increased their interest in incorporating or utilizing no-till fallow into their rotation. A series of on-farm trials was established in 2003 to examine a no-till fallow system vs. a minimum tillage fallow system. Results from this past year were very similar to the previous year as there was no difference in yield and return above costs between the two fallow systems when planted at
the same time. Delaying winter wheat seeding on the no-till fallow system by one month reduced yield 17% and return above costs by 23%. At the conclusion of this series of on-farm tests, growers will have a better understanding of the agronomic and economic differences between a no-till and minimum tillage fallow system and will potentially adopt no-till or minimum tillage fallow systems with reduced risks.

**Planned Research**

**Spring Cereal Production and Direct Seed Systems:** Spring cereal production remains a vital best management tool for reducing wind erosion and improving air quality. It also remains a vital option to maintain or improve overall farm profitability given favorable market prices. On-farm test are being established to examine the benefits and/or detriments of mixing Dark Northern Spring (DNS) wheat varieties to maximize yield, protein and overall profitability in both the dry and intermediate precipitation zones in the Lincoln-Adam Extension area. A second on-farm test is being developed to compare soft white spring wheat production and hard white spring wheat production. The objective of this research is to develop a tool or mechanism that will assist growers in the decision to plant soft white or hard white spring wheat production given current market prices and fertilizer costs.

Soil compaction problems have been expressed by growers utilizing direct seed annual cropping systems throughout the Lincoln-Adams Extension area. A very intensive on-farm test was initiated in the fall of 2004 and expanded in 2005 to exam the benefits of using a low soil disturbance ripper (ecolo-til® 2500) in comparison to a higher soil disturbance paratil ripper and a no rip control. The objective of this research is to determine if there is a benefit to utilizing the low soil disturbance to reduce soil compaction, improving grain yield and quality while maintaining a direct seed cropping system. If a benefit to utilizing this equipment is observed, than this project is designed to determine how frequently it has to be used to maintain the benefits.

**Winter Wheat –Summer Fallow Systems:** Work is continuing on the trials examining winter wheat established in a no-till fallow system and a minimum tillage fallow system. Additional locations are being looked at with similar goals of increasing winter wheat acreage in direct seed systems and further diversifying the cropping system. Work is also being planned to further examine the feasibility of the undercutter for minimum tillage fallow systems in the low precipitation zone with the goal of helping assist farmers adopt this method and reduce wind erosion and increase farm income. A more focused outreach program is also being designed to assist farmers adopt “undercutter” minimum tillage fallow systems.

**Diversified Alternative Cropping Systems:** On-farm test examining the feasibility of yellow mustard in an intense cereal grain rotation is completed and outreach is being expanded to further assist growers to incorporate mustard into crop rotation. On-farm tests will also focus on finding alternatives and compliments to soft white winter wheat on summer fallow production and may include hard red winter wheat, winter canola, winter triticale, winter barley, and the incorporation of livestock into the farm operation to improve profitability and reduced wind erosion.