RESEARCH PROJECT TITLE: Strategies for Profitable Conservation Tillage Farming in the Pacific Northwest

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INTERIM REPORT

PROJECT OBJECTIVES:
1. To evaluate the economic feasibility of oil seeds, food legumes, and spring grains in conservation tillage crop rotations.
2. To identify equitable farmland leases for conservation tillage farming systems.
3. To assess the potential for precision weed control to cut costs in conservation tillage.
4. To identify effective financial risk management strategies for adopting conservation tillage.
5. To disseminate the results on profitable strategies for conservation farming to growers, policy makers and others.

KEY WORDS: Conservation tillage, crop rotations, economics, risk

STATEMENT OF PROBLEM: The STEEP advisory committee has communicated several research priorities for fiscal year 2002 proposals which relate to concerns about the economic viability of conservation tillage systems. These include the feasibility of various alternative crops, strategies for improving farmland leases, and concerns about grass weed control costs. Surveys also show growers are worried about the financial risks of no-till drill acquisition. This project will provide economic analysis on all four of these issues. Long term collaboration between the PI and experienced scientist cooperators ensures that economic results will be based on a foundation of quality biological and physical data. This collaboration will improve the value of the results to the region’s farmers. Responding to growers’ priority research requests on key barriers to adoption of conservation tillage in the Pacific Northwest (PNW) will reduce the long run economic and environmental losses from soil erosion in the region.

ZONE OF INTEREST: Dryland farming agro-climatic zones with 10-22 in/yr av. ppt.

ABSTRACT OF RESEARCH FINDINGS: [New project. Funding began fall 2002.]

No-till continuous spring grains are predicted to reduce dust emissions by 94% during severe wind events compared to conventional tillage wheat-fallow. But economic studies of long term experiments in east-central Washington have shown that continuous no-till hard red spring wheat has lagged winter wheat/fallow by over $40/acre/year. Canola, mustard, and safflower oilseeds in rotation with spring grains under no-till have not been competitive with winter wheat-fallow in Adams County. No-till continuous soft white spring wheat has shown greater promise.
A computerized site-specific herbicide decision model for winter wheat boosted projected profitability (which accounted for yield and revenue increases as well as cost changes) by 65% compared to the farmer, extension consultant, weed scientist and label rate recommendations. The estimated $2.43/ac cost for using the weed decision model could be easily absorbed by the model’s projected profitability advantage $16/ac over farmer applications. However, the costs of weed monitoring and adjusting herbicide application to irregular subfields might be higher in real world conditions.

We used the Simetar farm management risk simulation program developed at Texas A&M University to assess the financial riskiness of different no-till transition strategies. These strategies involve combinations of rate of adoption of no-till and different sequences of custom-rent-buy for no-till drills. The program is being applied to eastern Palouse wheat-barley-pea farms of different sizes and equity structures. New results for large high equity farms that immediately converted to no-till and purchased drills showed that risk of financial failure is 25 percentage points higher for no-till than for conventional till assuming an initial 10% no-till yield penalty which disappears by year 6. If these farms expand no-till acreage gradually from 5% to 30% over the six-year period, the increased financial failure risk for no-till is only 9 percentage points.

RESULTS AND INTERPRETATION:

This is a new project with funding received only in Fall 2002, but some research was initiated earlier in anticipation of funding.

Objective 1. To evaluate the economic feasibility of oil seeds, food legumes, and spring grains in conservation tillage crop rotations.

Research has shown that no-till continuous spring grains reduces predicted dust emissions by 94% during severe wind events compared to conventional tillage wheat-fallow. But six and seven years experimental results through 2002 at the Horse Heaven Hills and at Ralston have shown that the continuous no-till hard red spring wheat systems tested have lagged winter wheat/fallow by over $40/acre/year. Furthermore, the spring cropping systems exhibited significantly more economic risk in dry years. Of course, more yield enhancing research and public support for these soil and air quality conserving spring cropping systems, possibly using different wheat classes, might make them more competitive. Minimum tillage winter wheat-fallow systems tested at Lind and at Ralston employed substantially less tillage during the fallow operation than was typical on most area farms. These “minimum tillage” winter wheat-fallow systems, which are predicted to cut dust emissions in severe events by 54 percent relative to conventional systems, might provide a cost effective intermediate cropping system for the region.

Canola, mustard, and safflower oilseeds in rotation with spring grains under no-till have not been competitive with winter wheat-fallow at Ralston or Ritzville to date. Yields of oilseeds during the 2001 and 2002 drought years have been very low. No-till continuous soft white spring wheat has shown greater promise. More results on this crop will be available in subsequent reports.

Objective 2. To identify equitable farmland leases for conservation tillage farming systems.
A questionnaire is under development to assess the role of landlords in retarding or promoting adoption of no-till. A literature review of landlord influence on no-till adoption in other regions of the country has also been initiated. Based on this review, preliminary computations shows that equitable crop shares would require tenants to receive increased crop shares relative to the 1/3:2/3 crop shares which have been traditional for winter wheat/fallow.

**Objective 3.** To assess the potential for precision weed control to cut costs in conservation tillage. A computerized site-specific herbicide decision model for winter wheat proved easy to use and showed potential to increase profit while reducing postemergence grass herbicides, but not broadleaf herbicides, in the eastern Palouse study region. The model increased broadleaf herbicide rates by an average of 0.45 to 0.91 label rates compared to competing recommendations, but reduced the more expensive grass herbicides by an average of 0 to 1.0 label rates. The projected costs of weed control using the model were slightly higher than for the farmer and extension recommendations, but much lower than the weed scientist and label rate recommendations. On average, the model recommendations boosted projected profitability (which accounted for yield and revenue increases as well as cost changes) by 65% compared to the farmer, extension consultant, weed scientist and label rate recommendations. The estimated $2.43/ac cost for using the weed decision model could be easily absorbed by the model’s projected profitability advantage $16/ac over farmer applications. However, the costs of weed monitoring and adjusting herbicide application to irregular subfields might be higher in real world conditions. More research and field testing is needed to develop cost effective procedures for monitoring weed densities and other site characteristics and for adjusting herbicides to subfield management units.

**Objective 4.** To identify effective financial risk management strategies for adopting conservation tillage.

We used the Simetar farm management risk simulation program developed at Texas A&M University to assess the financial riskiness of different no-till transition strategies. These strategies involve combinations of rate of adoption of no-till over total farm acreage and different sequences of custom-rent-buy for no-till drill acquisition. The program is being applied to eastern Palouse wheat-barley-pea farms of different sizes and equity structures. New results for large high equity farms that immediately converted to no-till and purchased drills showed that risk of financial failure is 25 percentage points higher for no-till than for conventional till assuming an initial 10% no-till yield penalty which disappears by year 6. If these farms expand no-till acreage gradually from 5% to 30% over the six-year period, the increased financial failure risk for no-till is only 9 percentage points.

We are currently using the program to compute the breakeven initial yield penalty or premium for no-till relative to conventional tillage which will result in equal financial risk over a six-year period. Different growers with varying agroclimatic zones and experience will possess different relative no-till yield potential. Farmers also vary in terms of size and equity structure which influence their ability to withstand financial risk. Hence it is important to determine the breakeven yield penalty/premium which can make no-till financially viable for different farmers.

**Objective 5.** To disseminate the results on profitable strategies for conservation farming to growers, policy makers and others.
We have responded to requests for information from newspapers and magazines on the economics of conservation systems, crop rotations, and management practices as requested. Publications on the economic viability of different conservation tillage spring crop rotations and management practices were presented to growers, industry, and scientists in WSU’s 2002 Field Day Proceedings. Results on economics of differing crop rotations and tillage systems throughout western North America were published in a professional journal. Related research on conservation tillage wheat-fallow systems was published in a professional journal and subsequently presented for popular audiences in an industry magazine and conservation tillage handbook. Results on the economics of a site-specific weed management model were presented at a professional meeting and posted on the Internet. Results on economics of conservation farming systems were also presented at a field day and at annual meetings for the Ralston and Columbia Plateau Air Quality projects. D. Young will present the results of STEEP research at the Direct Seed Meetings in Pasco, WA in January 2003. Young is a member of the State Advisory Committee for the Natural Resources Conservation Service (NRCS) in Washington state where he has been able to communicate research findings to NRCS on a regular basis.

INTERACTION (COOPERATION) WITH OTHER SCIENTISTS CONDUCTING RELATED ACTIVITY: Adams County farmers Ron Jirava and Curtis Hennings provided land for conservation farming experiments. They also provided valuable information on machinery use, production costs, crop performance, and farm programs in their areas. Doug Rowell, a farmer in the Horse Heaven Hills of Benton County, provided similar information. John Burns, WSU-Extension and Dennis Roe, NRCS, were particularly helpful in the selection of farmers who could provide information on the no-till transition. Several project cooperators also have provided data on no-till yield levels, yield variability, and input requirements. Drs. Bill Schillinger and Frank Young have been especially helpful in providing data from their long run no-till and min-till cropping systems at Lind and Ralston in Adams County. Dr. Frank Young also provided valuable data for the site-specific weed management model. Dr. James Richardson, Texas A&M University, provided software for modeling the economic risk of no-till transition strategies over time.

PUBLICATIONS AND PRESENTATIONS:
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