Proposal for 2006-2007
Northwest Columbia Plateau PM$_{10}$ Project

Objective 7: Evaluating the Profitability and Social Benefits of Alternative Farming Systems for Air Quality Control

Title: Economics of Wind Erosion Control

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Accomplishments
No-till annual rotations are clearly a wind erosion control success. But 1997-2004 experimental results at Ritzville, WA showed that continuous no-till annual cropping systems significantly lagged tillage winter wheat/fallow in profitability. Furthermore, the spring cropping systems exhibited more downside risk in dry years. Using 2005 versus 1998 input prices in the economic analysis of a 1993-1999 WW-SF tillage experiment at Lind, WA strengthened the relative profitability advantage of two conservation tillage systems compared to traditional tillage. Sharp increases in diesel prices by 2005 penalized the traditional tillage WW-SF system due to more diesel consumption. The conservation tillage systems consumed more glyphosate herbicide, but that cost was cushioned by a decline in glyphosate prices. This comparison provides strong evidence for the relative profitability of conservation tillage for winter wheat-summer fallow farming in low precipitation regions of eastern Washington under current economic conditions. Government subsidies increased the profitability of all conservation and conventional cropping systems compared but had no effect on the profitability rankings of the various cropping systems. These economic results strongly favor further research and education to promote farmer adoption of conservation tillage wheat-fallow systems in the lower rainfall regions of eastern Washington. Such systems provide a “win-win” outcome for farm profitability and the environment.

Objectives
1. To continue economic analysis of wind erosion control cropping systems in eastern Washington at Ritzville, Ralston and Lind.
2. To examine the effects of government subsidies and crop insurance on the relative profitability of conservation and conventional cropping systems.
3. To evaluate the profitability impacts on conservation cropping systems of changing fuel, herbicide, and fertilizer prices.
4. As wind erosion forecasts are available from project engineers, to use these to compute the cost effectiveness of public cost sharing to promote conservation cropping systems.
5. To disseminate research results to growers and others through talks and published materials.

Recent Accomplishments

Economics of no-till spring cropping at Ritzville, WA: During 2005 we completed the economic analysis of the 1997-2004 Ritzville experiment conducted by Bill Schillinger. This experiment compared several no-till annual cropping rotations to the region’s dominant rotation of tilled winter wheat-fallow. No-till annual rotations are clearly an environmental success. Engineers’ have predicted that no-till continuous spring grains can reduce dust emissions by 94% during severe wind events compared to conventional wheat-fallow (WW-SF). But the full eight years experimental results at Ritzville have shown that the continuous no-till annual cropping systems significantly lagged tillage winter wheat/fallow in profitability. Continuous no-till soft white spring wheat (SWS) and SWS-spring barley (SB) were the only two no-till rotations grown over the entire eight years of the experiment. These rotations were compared economically to the results of growers within a five mile radius of the experiment who grew winter wheat-fallow under conventional tillage. As shown in Table 1, eight-year average net returns for the two no-till systems lagged conventional WW/SF net returns by $24 to $29 per acre. Furthermore, the spring cropping systems exhibited significantly more economic downside risk in dry years.

Table 1. Comparison of net returns over total cost by rotation and year for annual no-till soft white spring wheat (SWSW) and SWSW-spring barley (SB) and conventional tillage winter wheat-summer fallow (WW-SF), Ritzville, Adams County, WA, 1997-2004.

<table>
<thead>
<tr>
<th>Year</th>
<th>Continuous SWSW</th>
<th>SWSW-SB</th>
<th>WW-SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>63.43</td>
<td>57.40</td>
<td>39.31</td>
</tr>
<tr>
<td>1998</td>
<td>17.41</td>
<td>2.41</td>
<td>14.62</td>
</tr>
<tr>
<td>1999</td>
<td>-14.75</td>
<td>-22.44</td>
<td>14.95</td>
</tr>
<tr>
<td>2000</td>
<td>5.60</td>
<td>-4.88</td>
<td>19.99</td>
</tr>
<tr>
<td>2001</td>
<td>-57.42</td>
<td>-65.21</td>
<td>-12.68</td>
</tr>
<tr>
<td>2002</td>
<td>-46.91</td>
<td>-45.95</td>
<td>0.28</td>
</tr>
<tr>
<td>2003</td>
<td>-36.70</td>
<td>-36.21</td>
<td>10.00</td>
</tr>
<tr>
<td>2004</td>
<td>-36.10</td>
<td>-27.13</td>
<td>2.31</td>
</tr>
<tr>
<td>8-yr Avg.</td>
<td>-13.18b</td>
<td>-17.75b</td>
<td>11.10a</td>
</tr>
<tr>
<td>S.D.</td>
<td>40.24</td>
<td>37.26</td>
<td>15.42</td>
</tr>
</tbody>
</table>

† 1997-2000 results based on five-year average output prices of $3.36/bu for SWW and SWS and $84.10/ton for barley. 2001-2004 results are based on five -year average output prices of $3.24/bu for SWW and SWS and $89.94/ton ton for barley.
‡ 8-yr avg. values followed by the same lower case number are statistically equivalent at the p<.05 level.
LSD_{.05}=21.40.

During the drought years of 2001 to 2004, the no-till rotations incurred substantial losses every year, but WW-SF did so only in 2001.
The 1997-2004 results of the Ritzville experiment show that no-till rotations fell short in terms of profitability and income stability when compared to the traditional WW/SF system in this low precipitation region. The more promising results from 1997-2001 appear to have been dependent upon favorable weather. The eight-year results are consistent with previous multi-year experiments in east-central Washington that found no-till hard red spring wheat (HRS) lagged WW/SF by about $40/ac/yr. Furthermore, the spring cropping systems at other low precipitation sites in Benton and Adams County also exposed growers to significantly more economic risk in dry years.

Some farmers might be able to trim the cost of production for no-till annual cropping, but closing the entire profitability gap is not likely. Other research has shown significant public valuation for higher levels of air quality provided by soil conserving cropping systems. Dust emissions from excessively tilled fields can harm human respiratory health, cause traffic accidents during dust storms, and increase household and industrial cleaning costs. Public cost sharing for no-till annual spring cropping would assist growers attempting to adopt these systems. However, Congress has not been inclined to substitute “green payments” for conventional commodity subsidies. No-till cropping systems might provide a cost effective alternative to large government conservation programs like the Conservation Reserve Program (CRP). The CRP payment to farmers in east-central Washington is about $45/ac plus 75% cost sharing during establishment. The 1997-2004 results for the Ritzville experiment showed a $24-$29 per acre profit shortfall for no-till systems compared to traditional WW-SF. If the government were to provide conservation incentives to cover this average annual loss, no-till annual cropping might breakeven with WW-SF at about 60% of the cost to the government of current CRP rents. However, political support for CRP would likely continue as growers might perceive it to provide a higher and completely stable return relative to cropping.

**Glyphosate and diesel price changes benefit conservation tillage:** In general, using 2005 versus 1998 input prices in the economic analysis of a 1993-1999 winter wheat-summer fallow tillage system experiment at Lind strengthened the relative profitability advantage of two conservation tillage systems compared to traditional tillage. Sharp increases in diesel prices by 2005 penalized the traditional tillage (TT) WW-SF system due to more diesel consumption. However, all three WW-SF systems in this experiment used fairly similar quantities of diesel. In areas where zero-tillage direct-seeding is feasible, relative cost savings would be even greater. The conservation tillage systems consumed more glyphosate herbicide, but that cost was cushioned by a decline in glyphosate prices. Use of aqueous NH₃-N instead of anhydrous NH₃-N also favored the conservation tillage systems as aqueous NH₃-N experienced a more moderate price increase between 1998 and 2005. Using the same N fertilizer source for all three tillage systems would have narrowed the profitability advantage for the conservation tillage systems, but they would have still remained significantly more profitable than TT. The updated economic results in this comparison provide strong evidence for the relative profitability of conservation tillage for winter wheat-summer fallow farming in low precipitation regions of eastern Washington under current economic conditions.
How do government crop subsidies and crop insurance influence the profitability of conservation cropping systems? Government subsidies had no effect on the profitability rankings of the various cropping systems during either Phase I (1997-2000) or Phase II (2001-2004) of the Ritzville experiment. Including crop insurance effects altered the profitability rankings of the six cropping systems in Phase II of the Ritzville experiment slightly. SWS-SB shifted rank from third to second, continuous annual SWS dropped from second to fourth, and SWW-SWW-SWS-SWS moved from fourth to third place. However, these crop rotations were relatively close in profitability without subsidies and insurance. Even with the inclusion of government subsidies and crop insurance, none of the six annual no-till crop rotations in Phase II of the Ritzville experiment generated sufficient returns to cover total costs, nor did any approach the profitability of the WW-SF which averaged $16.93 per rotational acre with subsidies and insurance despite the dry climatic conditions during Phase II. The analysis reflects the proverb that “a rising tide raises all ships.” During 2001-2004, subsidies and insurance boosted the highest ranked annual no-till crop rotation, SWS-SB, by $24 per rotational acre, increased the lowest ranked SWW-SB-YM-SWS rotation by $17.26 per rotational acre, but also lifted the traditional WW-SF system by $16.88 per rotational acre. A similar comparison for an experiment in the Horse Heaven Hills of Benton County also showed no reversals of rankings between annual no-till hard red spring wheat and traditional WW-SF with and without subsidies and crop insurance.

If Congress reverts to subsidies that are coupled to current production, their inclusion will be an essential part of accurate economic comparisons. But present World Trade Organization rules discourage coupled payments. Also, where specific environmental “green payments” are available from state or federal agencies for conservation farming systems, their inclusion in economic assessments would be crucial for valid private profitability comparisons. To date, however, most farm programs enacted by Congress have been tied to historic or current crop production rather than to environmental practices.

Planned Research for 2006-2007
1. Compute costs and profitability of innovative farmer conservation tillage systems for WW/SF, such as the undercutter system.
2. Update economic analysis of the Ralston Project’s conservation cropping systems research.
3. Evaluate the profitability impacts of recent changes in fuel, herbicide, and fertilizer prices on additional conservation cropping systems.
4. Disseminate results to growers and others through talks and published outlets.