Objective 10: Evaluating the Profitability and Social Benefits of Alternative Farming Systems for Air Quality Control

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Economics of Reduced Tillage Winter Wheat-Fallow Systems

- Modeling show that reduced tillage fallow systems can reduce predicted dust emissions by 54% during severe wind events compared to traditional soft white winter wheat-fallow (WW-F). These systems may provide a cost effective conservation system for the intermediate future (Lee, 1998 cited in: Young, D. and F. Young, 2003).

- Two reduced tillage WW-F systems at Lind produced equivalent yields, profits, and risk over five years compared to a conventional tillage WW-F system. Because there is no economic sacrifice, no subsidies should be required to entice farmers to switch from conventional to reduced tillage fallow. Education and extension programs are recommended (Janosky, Young, and Schillinger, 2002a).

- The profitable WW-F system at Ralston used significantly less fallow tillage and associated expense than observed on most farms in the region (Young, D. and F. Young, 2003).

Economics of No-Till Spring Crops versus Winter Wheat-Conventional Fallow

- No-till continuous spring grains are clearly an environmental success. Modeling has indicated that these systems can reduce predicted dust emissions by 94% during severe wind events compared to traditional soft white winter wheat-fallow (WW-F) (Lee, 1998 cited in: Young and Reppe, 2000; Schillinger and Young, 2004).

- A survey revealed a small number of farmers in the 8-13 inch ppt. zone in eastern WA had profitably survived the transition to no-till and (sometimes) spring crops. Tight fisted cost management was the key (Camara, Young, and Hinman, 1999a).

- Continuous no-till hard red spring wheat (HRSW) was not economically competitive with WW-F. It lagged traditional winter wheat-fallow (WW-F) in average profitability by about $40/ac both at Ralston in Adams County (7 years data) and at the Horse Heaven Hills in Benton County (6 years data). These results consider both yield and protein performance of HRSW (Young, D., Schillinger, and F. Young, 2002; Young, D. and F. Young, 2003; Schillinger and Young, 2004).

1 Often, several references could be cited. Only the most important or recent are listed.
• At the Horse Heaven Hills and Ralston, no-till HRSW displayed more annual income risk and greater economic vulnerability to drought than did WW-F (Young, D., Schillinger, and F. Young, 2002; Young, D. and F. Young, 2003; Schillinger and Young, 2004).

• In contrast to HRSW, six years continuous no-till soft white spring wheat (SWSW) at Ritzville achieved equivalent profitability with surveyed farmers’ WW-F system; however, SWSW exhibited higher annual income risk than WW-F (Juergens, Young, and Schillinger, 2004).

• At Ritzville, safflower and yellow mustard in a no-till rotation with SWSW were less profitable than continuous SWSW (Juergens, Young, and Schillinger, 2004).

• Development of appropriate cultivars and best management practices for spring crops in arid areas should increase yields and profitability of these systems in the long run. WW-F has a 100-year research lead in this region. Surveys also showed potential for cutting costs for spring cropping systems. Public cost sharing, justified by air quality improvements, would also make no-till spring grains more profitable, but this might not be affordable in some situations (Young, D., Schillinger, and F. Young, 2002).

**Profitable N Fertilization of Hard Red Spring Wheat for Yield and Protein**

• Yield and protein response functions were estimated for HRSW. The recommended profitable N fertilization rate for HRSW based on these functions was highly sensitive to the market premiums and discounts for protein above and below 14%. These market incentives have varied widely over time. Protein premiums and discounts had more influence on optimal N than did crop and N prices (Baker, Young, Huggins, and Pan, 2004).

• At the lowest protein premium-discount levels, it was most profitable to fertilize for slightly less than 14% protein (Baker, Young, Huggins, and Pan, 2004).

• Profit maximizing yields varied only modestly with changes in N price and wheat price (Baker, Young, Huggins, and Pan, 2004).

**Economics of Over-winter Cover Crops to Control Wind Erosion in Irrigated Croplands** (initiated before 1998)

• Use of over-winter cover crops—especially triticale—in irrigated sites in eastern WA was profitable because of the potential for providing livestock forage, recovering nitrogen, and reducing herbicides. Cover crops also were a cost effective practice for controlling wind erosion on irrigated cropland (Young, 1998).
Factors Associated with Adoption of Wind Erosion Control Practices by East-Central WA Farmers

- Statistical analysis of a survey of east-central WA farmers revealed simple perception of a wind erosion problem, or membership in a socioeconomic category, were not sufficient to motivate adoption of wind erosion control practices. Results supported using a targeted educational program which (a) highlighted the threats of wind erosion to human health and to soil productivity and (b) described specific profitable farming practices for solving the problem (Wang, Young, and Camara, 2000).

- Adopters of multiple conservation practices—such as min/no-till, spring cropping, and/or wind strips—had significantly more education, larger farms, and more wind erosion control education than adopters of zero or one practice. Results supported using innovative multiple-practice-adopters as leaders in conservation education programs (Upadhyay, Young, Wang, and Wandschneider, 2003).

Comparison of Canadian and U.S. Conservation Cropping Systems

- Canadian and U.S. plains farmers reduced summer fallow by about 45 percent from the mid-1960’s to the end of the century with large gains in soil conservation. Increased use of no-till, more spring cropping, and a declining real price of glyphosate herbicide were major contributors to this trend (Smith and Young, 2000a and 2000b).

- Canada has had greater success in profitably incorporating legumes and broadleaf oilseeds, especially canola, into rotations with grains. The Canadian prairies have higher no-till adoption rates than the U.S. Pacific Northwest, in part due to success with agronomically beneficial and profitable broadleaf crops in rotation. Some of these crops appear to be favored by agroclimatic factors in Canada (Young, 2004; Zentner...Young et al., 2002).

- Statistical analysis showed that differing policies had a modest effect on cropping diversity along the 800-mile U.S.-Canada plains border. Agroclimatic factors and common technology trends had greater influence (Smith and Young, 2003).