

***Proposal for 2008-2009
Northwest Columbia Plateau PM₁₀ Project***

Objective 7: **Identify Sustainable Farming Practices for the Columbia Plateau
by Measuring Changes in Soil Quality**

Title: ***Evaluation of the Effectiveness of WAWG's Pacific Northwest
Undercutter Project***

Personnel: **Principal investigator: Douglas Young, School of Economic
Sciences, WSU;
Co-investigator: William Schillinger, Crop and Soil Sciences,
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Cooperator and lead survey enumerator: Harry Schafer,
Washington Association of Wheat Grower's PNW Undercutter
Project Manager.**

Project Objectives for Current Proposal

1. To conduct an economic and agronomic evaluation of the on-farm performance of the Washington Association of Wheat Growers (WAWG) undercutter project to promote conservation fallow tillage.
2. To disseminate results to growers and others through talks and published materials.

Recent Accomplishments

During the past years, four journal articles (Nail, Young and Schillinger, 2007 a and 2007 b; Upadhyay and Young, 2007; Schillinger, Kennedy and Young, 2007) were published under this project. In addition, two Extension bulletins (Zaikin, Young and Schillinger, 2007; Zaikin, Young and Schillinger, 2008) were completed. Also, several abstracts, proceedings papers, and popular articles were released. Most of this research has been summarized in previous reports and will not be repeated here.

New research showed a minimum tillage wheat-fallow system using the undercutter on a case study Ritzville, WA farm could boost profitability compared to traditional fallow tillage (Zaikin, Young and Schillinger, 2007). Other research revealed that no-till diversified rotations with improved stubble management did not compete profitably with irrigated monoculture wheat with plowing and burning of stubble at Lind, WA (Zaikin, Young and Schillinger, 2008). Difficulties in obtaining stand establishment and competitive yields for canola, and with administering crop specific irrigation, hurt the diversified rotation. Some details of these results are presented in the tables below.

Undercutter project

Table 1. Comparing gross and net returns with total costs for traditional versus undercutter tillage on a Ritzville, WA wheat farm using WW-SF with and without conservation payments

	Unit ^a	Undercutter Method	Traditional Method ^b
Gross Returns:			
Wheat yield	bu/ac	46	46
Wheat price	\$/bu	3.32	3.32
Market return (yield x price)	\$/2 ac	152.72	152.72
Direct government payments	\$/2 ac	13.50	13.50
Gross return	\$/2 ac	166.22	166.22
Total Costs	\$/2 ac	155.30	158.61
Net Return (without conservation payments):			
Net return over total costs (TC)	\$/2 ac	10.92	7.61
Net return to operator labor	\$/2 ac	18.68	15.62
Net return to operator labor & machinery equity	\$/2 ac	29.52	27.77
Conservation Payments			
EQIP	\$/2 ac	20.40	NA ^b
Net Return over TC (with conservation payments)	\$/2 ac	31.32	NA ^b

^a Values/2 ac include both the SF and WW years. If desired, values per rotational acre (0.5 acre of WW and 0.5 acre of SF) could be obtained by dividing by two.

^b The traditional tillage method does not qualify for conservation payments.

Irrigated Cropping Systems and Stubble Management Project

Table 2. Average Production Costs, Gross Returns, and Net Returns over Total Costs (\$/rotational acre) by Rotation and Treatment. Irrigated Cropping Systems Experiment, Lind, WA, 2001-2006.

Crop and Treatment	Fixed costs	Variable costs	Total costs	Gross Return	Net returns over total costs
No-till WW, SB, Canola					
Stubble Burned	93.11	307.34	400.45	245.90	-154.55
Stubble Baled	87.56	307.34	394.90	235.69	-159.21
Stubble Standing	91.13	309.07	395.38	235.06	-160.31
Cont. WW Burn & Plow	84.62	356.81	441.43	296.60	-144.84

NOTES: Rotational acre equals 1/3 ac wheat + 1/3 ac barley + 1/3 ac canola for the 3-crop rotation. Returns are based on 2001-2005 average crop prices of \$3.51/bu for wheat, \$89.16/ton for barley, and \$0.12/lb for canola. Average net returns did not differ statistically over treatments at the 0.05 level using year as the variate.

Planned Research for 2008-2011

Phase I (April 2008-March 2009)

Design a questionnaire and analytical procedures for an economic and agronomic evaluation of the of Washington Association of Wheat Growers (WAWG) undercutter project.

Economic Evaluation Methods: The analytical procedure for the economic evaluation will use “partial budgeting.” This methodology will include questions to elicit how the undercutter method has *changed* the farmer’s costs and returns. In turn, the answers to these questions will permit computing whether and by how much the undercutter method of fallowing has increased or decreased the farmer’s average bottom line profit over three years compared to his/her traditional fallow system. First, the questionnaire will track effects on variable costs. For example, if the undercutter method has increased herbicide use, but decreased labor and diesel use, these changes will be carefully monitored in the survey questionnaire. Second, the questionnaire will track effects on fixed costs. For example, has the undercutter method permitted the farmer to reduce or increase his machinery complement? These changes alter the fixed costs of depreciation, interest, taxes, housing, and insurance on machinery. For example, the addition of an undercutter or bigger tractor will add to the machinery complement and fixed costs. But selling some tillage implements could decrease fixed costs.

On the revenue side, the questionnaire will elicit changes in grain yield over the three years of the project with the undercutter system versus the traditional system. If the farmer has maintained both systems on comparable fields each year, the farmer will be able to make a direct comparison. If these comparisons are not available, the farmer will make comparisons based on his own subjective judgement or by comparisons with neighbors. In some regions, yield comparisons may be available from on-farm trials conducted by WSU Extension. It is critical that this information be collected over three years in order (1) to avoid misleading conclusions that are due to confounding between particular weather events and a system and (2) to provide some limited information on the economic riskiness of the undercutter and fallow systems over time.

Agronomic Evaluation Methods: The P.I. will consult with the project co-investigator and other scientists as necessary to collect key questions on discerning why the undercutter system did or did not work. These questions will relate to efficacy of weed control, disease incidence, timing of seeding, stand establishment, stubble management, timing of field operations, and nutrient management for the undercutter and traditional fallow systems. Open ended questions which permit farmer participants to key in on unique problems or successes will be useful in this section.

Field Proofing the Questionnaire: The draft questionnaire will be reviewed with a small sample of growers to ensure that the questions are relevant and understandable. It will be important to focus on a limited number of key questions to ensure the survey is not overly burdensome for participating farmers and the lead enumerator. The draft questionnaire will be revised following this field proofing.

Phase II (2009- 2011)

1. Conduct the survey: The 50 undercutter project farmer participants will have completed three harvests (2008, 2009, and 2010) by July 2010. During late autumn of 2010 each of these participants will be surveyed personally by the lead enumerator using the questionnaire developed in Phase I. The P.I. will accompany the lead enumerator on four to eight of these interviews in order to establish consistent survey procedures. The P.I. will also monitor

survey results for consistency and completeness as they are collected. The P.I. and lead enumerator will also communicate by mail or other means with the farmer participants in 2008 to alert them about the type of information on costs, yields, and agronomic issues that they should record over the three years of the project.

2. Analyze the economic data: The partial budgeting method will be employed to determine changes in bottom line profitability by farm with the undercutter system versus the traditional system. Final profitability information will be computed both with and without subsidies for the undercutter in order to determine if this farming system will be sustainable without continuing subsidies. If subsidies are necessary, breakeven subsidies will be computed. Results will be reported as averages for the entire project and by region.

Analyze the agronomic data: The co-investigator will be involved in this task. Questions that will be addressed include why has the project been agronomically successful or a failure on some farms? In what subregions? To what extent have efficacy of weed control, disease incidence, timing of seeding, stand establishment, stubble management, timing of field operations, and nutrient management for the undercutter system provided explanations for successes and failures? What has been learned to improve the prospects for success of undercutter farming systems in the future?

3. Report the results. The P.I. and Co-Investigator will disseminate results to growers and others through talks and published materials.

References Cited

Journal Articles

Nail, E.L., D.L. Young, and W.F. Schillinger. 2007. Government subsidies and crop insurance effects on the economics of conservation farming systems in eastern Washington. *Agronomy Journal* 99:614-620.

Nail, E.L., D.L. Young, and W.F. Schillinger. 2007. Diesel and glyphosate price changes benefit the economics of conservation tillage versus traditional tillage. *Soil & Tillage Research* 94:321-327.

Schillinger, W.F. A. Kennedy and D.L. Young. 2007. Eight years of annual no-till cropping in Washington's winter wheat summer fallow region. *Agriculture, Ecosystems and Environment* 120:345-358.

Upadhyay, B.M. and D.L. Young. 2007. Stochastic Breakeven Yields for Investment Risk Analysis. *Journal of Financial Risk Management*, ICAFI University Press, 4(2):26-36.

Extension Bulletins

Zaikin, A.A., D.L. Young, and W.F. Schillinger. 2007. Economic Comparison of Undercutter and Traditional Tillage Systems for Winter Wheat-Summer Fallow Farming. EB2022E, Cooperative Extension, Washington State University.

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