

Direct Seed Mentoring Project Final Report

Submitted by:

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1. Project Summary

This pilot project will increase the adoption of direct seed operations through the use of a mentoring program, an on-farm demonstration of direct seeding and the case study of a side-by-side comparison with conventionally tilled ground. The pilot program will take place in Spokane and Whitman Counties in Eastern Washington.

Direct seed operations have numerous agricultural, economic and environmental benefits compared to conventional tillage systems. Traditional farming practices typically involve aggressive soil disturbance through numerous passes over the field. Direct seeding practices plant and fertilize directly into the residue from previous crops, disturbing only a narrow strip of soil. The benefits of direct seeding include:

- Reduces operating costs: Fewer passes over the field means lower fuel and labor costs. In many cases, fuel use can be as low as 1 gallon per acre, compared to 8 or more gallons using conventional practices. Producers also benefit from reduced maintenance costs and fewer costs associated with erosion.
- Increased production and profitability: These can be increased as soil tilth, organic matter, fertility and microbial activity improve, and due to increased moisture available in the soil. Producers will also benefit from less crop loss from erosion.
- Reduces soil erosion: Crop residues on the soil surface reduce erosion by water and wind.
- Improves water quality: Crop residue helps hold soil along with associated nutrients (particularly phosphorous) and pesticides on the field to reduce runoff into surface water.
- Traps soil moisture: Keeping crop residue on the surface traps water in the soil and acts as tiny dams, slowing runoff and allowing water to soak into the soil. Minimal soil disturbance also means minimal evaporation from the soil.
- Improves soil tilth: Soil aggregation (small clumps) is increased, making it easier for plants to establish roots and minimizing compaction.
- Improves air quality: Crop residue reduces wind erosion and thus air particulates. Air quality is also improved due to fewer emissions from farm tractors making fewer trips across the field.

Unfortunately, the adoption rate of direct seeding in the Pacific Northwest is low compared to the rest of the United States and internationally, where direct seeding is the standard farming method. The adoption rate of direct seeding in Whitman County is

approximately 10% and Spokane County is approximately 40%. The low adoption rate is primarily due to the lack of expertise and support available to those transitioning to direct seed systems, the high cost of new equipment, and concern about potential yield losses. This project addresses these barriers by providing mentors to educate new direct seed operators, providing equipment and custom seeding as a first step in transitioning to direct seeding, and providing a side-by-side comparison of direct seed and conventional tillage operations.

The goal is to successfully put direct seed systems on the ground while disproving the perceptions of yield loss and high transition costs. A particular focus will be placed on helping producers through the transition period as the grower becomes familiar with the details of the system and as the condition of the soil improves.

This project will identify four influential tillage farmers in Spokane and Whitman counties and pair them with one of two to four direct seed mentors. Mentors will be sought based in part on providing the participating farmers with a choice of direct seed equipment (e.g., Cross-Slot, John Deere, and Horsch). This will also allow for some comparison of crop yield, soil quality and other factors between the different equipment.

The participating producers will be asked to implement, with the mentors help, a side-by-side 50 to 100 acre direct seed trial on their farm. The producer will select their mentor from among those signed-up for the project. A producer's decision will be based on the type of direct seed equipment desired and the producers' willingness to work with the mentor. The mentor will provide education, as well as custom seeding using his own equipment. This will expose the novice direct seeding farmers to the intricacies of a direct seed system and give them the best chance of success by utilizing the experience of their mentor. This will also allow the farmer to experience direct seeding without the expense of purchasing his own equipment. The producer will supply all inputs, including but not limited to seed, fertilizer and fuel for the acreage being direct seeded. The producer will have the option of seeding additional acres, but will be responsible for those costs.

An Ag Economist from Washington State University will be hired to analyze the economics of both the conventional and the direct seed operations. Tours involving other producers, professionals, lenders and farmers will be used to advertise the results and increase knowledge about direct seeding. An aggressive social marketing program will also be developed to exchange information. For example, a local direct seed discussion group will be formed with interested producers to help identify barriers to the adoption of direct seeding and provide education about direct seeding and the case studies.



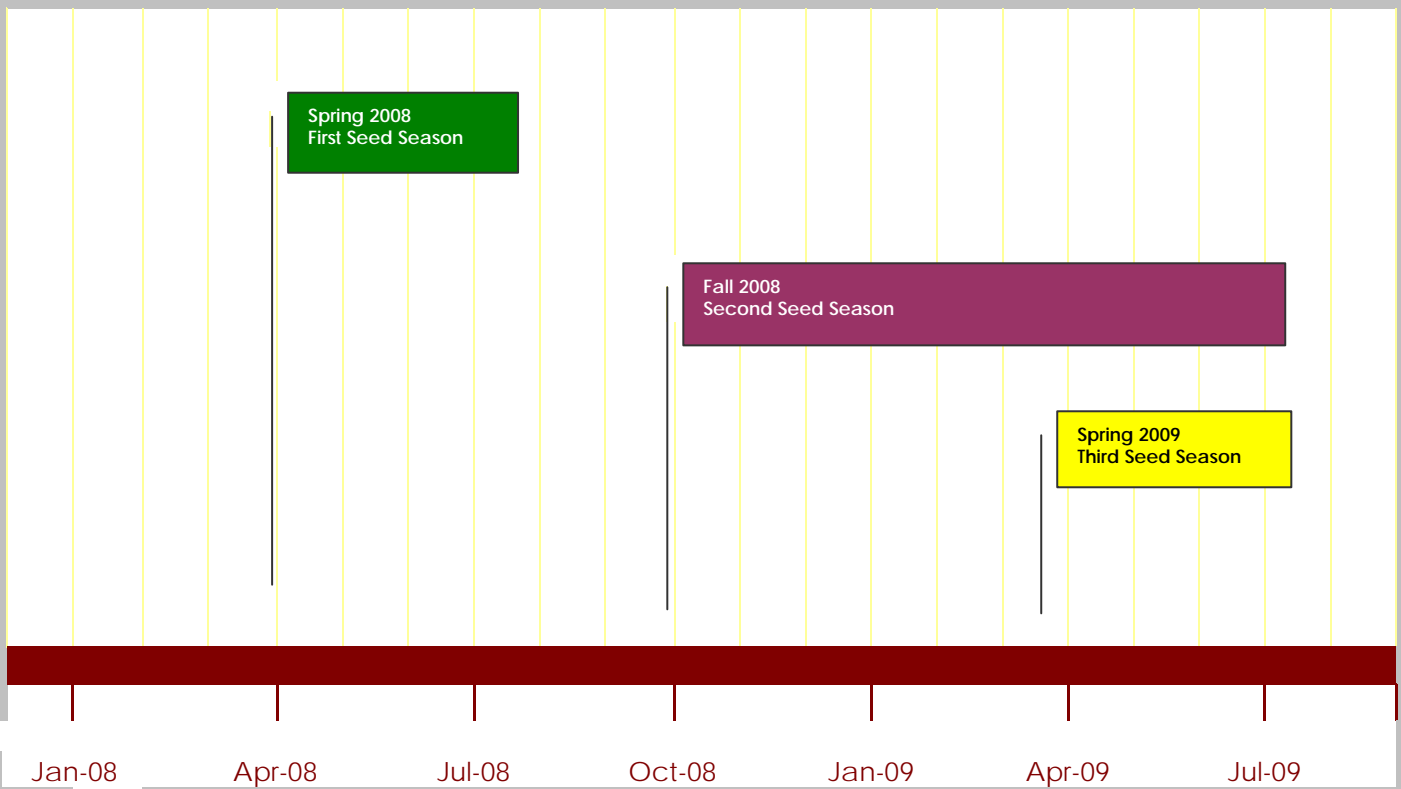
Agricultural Profitability - Direct seed practices can significantly improve agricultural productivity and profitability. Input costs are reduced as less fuel and labor is required due to fewer trips across the field compared to conventional farming techniques. In many cases, fuel use can be 3 gallons per acres (as low as 1 gallon per acre in some cases), compared to 8 or more gallons using conventional practices. Maintenance and labor costs are also reduced. Producers will also benefit from fewer costs associated with erosion, including dredging streams and installing erosion control measures. Production and profitability can be increased as soil tilth, organic matter, fertility and microbial activity improve, and due to increased moisture available in the soil. Producers will also benefit from less crop loss from erosion.

Environmental Improvements - This project will focus on the Hangman Creek and Palouse River watersheds in Eastern Washington. Hangman Creek has been shown to contribute significant sediment loads to the Spokane River system. Over a four-year study, the annual suspended sediment loads from Hangman Creek varied from 3,430 tons in a low flow year (annual flow of 83.7 cfs) to 175,000 tons at an annual flow of 315 cfs. The Conservation District has estimated that over the past 50 years, Hangman Creek has delivered approximately 27.6 million tons of suspended sediment to the Spokane River/Lake Spokane system. The Palouse River drainage in Whitman County is facing similar issues with erosion and sediment loading. Water quality violations and habitat degradation within each of these water systems can be at least partially attributed to the sediment loads and the nutrients that attach to the fine sediment particles. A main source of the sediment loads is agricultural, in particular, annual conventional tillage plowing and lack of residue that result in overland erosion that pollutes surface waters.

Direct seed operations are one method to help significantly reduce the sediment runoff and water pollution from agricultural lands compared to conventional tillage methods. The U.S. Department of Agriculture and Washington State University have conducted long-term research on the amount of sediment reduced, which has been confirmed by the Natural Resources Conservation Service (NRCS). The incorporation of additional direct seed systems in the region should help reduce the nutrient loading by reducing the amount of erosion and runoff from agricultural land into the regional streams. Annual soil losses from cereal grain cropland in Spokane County average 12.3 tons/acre with conventional tillage, 5.8 tons/acre with minimum conservation tillage and 2.4 tons/acre using no-till or direct seeding (depending on slope and soil conditions). By averaging the annual soil loss per acre for each of the three categories, the countywide average is 6.8 tons/acre. At least 30% of the eroded soil is deposited in Spokane County perennial streams each year. Therefore, the total amount of stream sediment loading can be reduced through the incorporation of direct seeding. In addition, direct seeding provides carbon sequestration, offsetting the harmful impacts of green house gasses. Several direct seed farmers in the State of Washington currently have carbon sequestration contracts. Air quality benefits will also accrue from reduced emissions as the tractors take fewer trips across the direct seeded fields and from reduced particulates due to wind erosion.

2. Project Timeline

Direct Seed Mentoring Timeline



Initial Proposal Submitted:
Project Selected for funding:
Project Details submitted:
Notice of Project Approval Forthcoming
First Project Activity Completed at PNDSA Mtg.
Contracts Signed by SCCD
Contract signed by Commission
Initial Notice of Fiscal Year 2008 funding Issues
Final Notice of FY 08 funding Lost

September 2007
October 2007
November 2007
December 2007
January 2008
May 14, 2008
May 18, 2008
July 28, 2008
August 2008

- Project Inception – January 2008
 - SCCD purchased booth space at Pacific Northwest Direct Seed Association annual meeting in Kennewick, WA. Booth was dedicated to the advertisement and promotion of the upcoming Ag Pilots direct seed mentor program.
- Project Contracts received May 2008
- Spring 2008 seeding phase dropped due to contract process.
- July/August 2008 – Notified that 2008 funding was lost after having only 6 weeks of fiscal year remaining once contract was signed.
- September 2008 – Potential project participants backed out of fall seed season due to uncertain project funding and late harvest season.
- Fall 2008 – Worked on revising budget and preparing for spring 2009 seed season.
- October 2008 –March 2009 – Mentor Program Direct Seed workshops in Colfax. (Averaged 35 attendees at each meeting)
- November 2008 – Ag Pilots presentation made at the Clearwater Direct Seeders Meeting in Lewiston, ID.
- December 2008 - Ag Pilots presentation made at the Colfax-Palouse Direct Seeders Meeting in Colfax, WA.
- Pacific Northwest Direct Seed Association Meeting in Kennewick, WA. – Special breakfast session outlining the mentor program. Potential participants were taken to the conference.
- Spring 2009 Mentor Consulting and Custom Seeding
- Spring 2009 Economic Analysis of operations
- June 2009 Direct Seed field Day

3.

A) Were project goals met?

- The first goal of teaming successful mentors with interested producers was highly successful. The original concept was to find four mentors and four producers interested in participating in the program. The ultimate outcome was the participation of 8 mentors and 10 producers; a tremendous turn of events for the program and for the success of the pilot.
 - Funding for the program was limited and the inclusion of the extra teams meant that additional funding was needed. The Spokane County Conservation District and the Washington State Department of Ecology each allowed the use of other project funds for the mentoring project. This was a huge success for the pilot as the mentoring program was recognized as a tool for moving the adoption of direct seed forward in the region.
- The second goal of having the teams in place for 3 consecutive seeding seasons was only partially successful. As mentioned in the project timeline above, seed season 1 and 2 were both removed from the pilot due to funding and contract

- difficulties. The final seed season was a great success once stable funding was established.
- The third goal of performing economic analysis on each operation has proven to be the biggest and most important part of the project. Interviews were conducted with each operation and University of Idaho Ag Economist Kate Painter has performed the analysis. The economic results can be seen in the Profitability section below.

B) Sustainability, Partnerships, and Profitability

Sustainability

The sustainability of the direct seed mentor project has a very positive future on the Palouse. It will, however encounter several obstacles that have the potential to slow the progress of the program.

Some of the barriers farmers face when making the decision to transition to direct seed systems are: tradition, resistance to change, landlord resistance, lack of federal funding for conservation programs, cost of machinery and perceived loss of yield.

When evaluating the potential of continuing the direct seed mentor program, the biggest challenge facing the program is finding a consistent funding mechanism. Without a source of funds, the program loses its incentive for some individuals to try direct seeding.

One solution to the problem is to set up a network of direct seed mentors that are willing, under the right circumstances, to perform custom seeding for others using their own equipment. This service would be performed at a cost of somewhere in the neighborhood of \$25-\$30/acre to the producer. The Pacific Northwest Direct Seed Association is developing a similar network for farmers to share information and work with each other on a voluntary basis if desired.

There is no doubt that with the success of the program to date it will continue if funding is established.

Project Partnerships Established

The direct seed mentor program had some great successes one of which was the partnerships that were established throughout the program.

Dr. Hans Kok, Associate Professor and Extension Specialist for Conservation Tillage for Washington State University and the University of Idaho, was an integral part of the pilot program. He had past experience running mentoring programs in the mid-west and provided invaluable knowledge to the program as it was implemented.

The Pacific Northwest Direct Seed Association is the main trade group for the direct seed industry in the Pacific Northwest. Russ and Patt Evans, Co-Directors of the PNDSA, provided marketing and outreach expertise to the program which helped us educate producers and find the teams that ultimately participated in the program. They also organize the PNDSA Annual Convention in Kennewick, WA that some of our program participants attended as an educational opportunity.

The Palouse-Rock Lake Conservation District and the Palouse Conservation District both provided participants to the program and a direct seed tour was held in St. John, WA that featured the Mentoring Program participants in their area.

The Washington State Department of Ecology and the Spokane County Conservation District Water Resources staff both provided additional funding for the mentoring project. DOE has recognized the importance of the mentoring program and allowed the use of funds for the participation of two additional teams in the Latah Creek watershed in Spokane County.

Profitability

The profitability of each producer in the program will be dependent on their decision making process if and when they decided to implement a direct seed system on their farm. What we know from our project is that each operation has its own philosophy on how to handle and manage their equipment fleet. There are wide variations in the cost of machinery depending on whether the producer purchases or leases new equipment on a yearly basis or if they own older equipment that they maintain with very little capital costs attributed to the operation.

In addition to the cost of machinery, producers that are leasing land on a crop share basis are faced with the reality that a landlord's income is based on gross revenue. This means that each operation must maximize the landlord's revenue by producing high yields. The landlords are sometimes skeptical about allowing a producer to transition their farm to direct seed if there is any chance of a reduction in yield potential. Although direct seed technology has evolved greatly over the last 20 years, there are still memories of direct seed and no-till farming failures that cost some producers in the region their farms.

If the producer is dedicated to Direct Seed, they understand that profitability is driven by reduced costs versus increased yields or stated another way *direct seed puts the emphasis on net income versus gross income*.

The tables below show the costs of machinery ownership and variable costs associated with the production of a spring grain crop.

Producer #1

Machinery costs by implement:

Operation	Power Unit	Implement	Repair	Fuel & Lube	Fuel	Lube (\$/acre)	Labor (\$/acre)	Capital Recovery (\$/acre)	THI (\$/acre)	Total Cost (\$/acre)	Fuel Usage (gal/ac)	Labor (hr/ac)
Seed	Cat 75C	36' JD Drill	\$ 0.62	\$ 1.64	\$ 1.40	\$ 0.25	\$ 1.10	\$ 0.56	\$ 0.06	\$ 3.98	\$ 0.70	\$ 0.06
Harrow	Cat 75C	60' Harrow	\$ 0.37	\$ 1.10	\$ 0.93	\$ 0.16	\$ 0.73	\$ 0.52	\$ 0.06	\$ 2.78	\$ 0.47	\$ 0.04
Cultivate	Cat 75C	Caulking 36' Cultivator	\$ 0.65	\$ 2.19	\$ 1.86	\$ 0.33	\$ 1.47	\$ 0.83	\$ 0.09	\$ 5.23	\$ 0.93	\$ 0.07
Harrow	Cat 75C	60' Harrow	\$ 0.37	\$ 1.10	\$ 0.93	\$ 0.16	\$ 0.73	\$ 0.52	\$ 0.06	\$ 2.78	\$ 0.47	\$ 0.04
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Disk winter wheat stubble	Cat 75C	Krause 30' disk	\$ 0.72	\$ 2.19	\$ 1.86	\$ 0.33	\$ 1.47	\$ 0.93	\$ 0.10	\$ 5.40	\$ 0.93	\$ 0.07
Spray Roundup	Cat 75C	Rented sprayer	\$ 0.15	\$ 0.82	\$ 0.70	\$ 0.12	\$ 0.55	\$ 0.26	\$ 0.03	\$ 1.81	\$ 0.35	\$ 0.03
Harvest	Combine SP unit	none	\$ 1.67	\$ 3.86	\$ 3.28	\$ 0.58	\$ 2.75	\$ 7.48	\$ 0.56	\$ 16.31	\$ 1.64	\$ 0.14

Machine operations for spring wheat:

Yield: 40bu/ac

Seed	Cat 75C	36' JD Drill	\$ 0.62	\$ 1.64	\$ 1.40	\$ 0.25	\$ 1.10	\$ 0.56	\$ 0.06	\$ 3.98	\$ 0.70	\$ 0.06
Harrow	Cat 75C	60' Harrow	\$ 0.37	\$ 1.10	\$ 0.93	\$ 0.16	\$ 0.73	\$ 0.52	\$ 0.06	\$ 2.78	\$ 0.47	\$ 0.04
Cultivate	Cat 75C	Caulking 36' Cultivator	\$ 0.65	\$ 2.19	\$ 1.86	\$ 0.33	\$ 1.47	\$ 0.83	\$ 0.09	\$ 5.23	\$ 0.93	\$ 0.07
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Spray Roundup	Cat 75C	Rented sprayer	\$ 0.15	\$ 0.82	\$ 0.70	\$ 0.12	\$ 0.55	\$ 0.26	\$ 0.03	\$ 1.81	\$ 0.35	\$ 0.03
Harvest	Combine SP unit	none	\$ 1.67	\$ 3.86	\$ 3.28	\$ 0.58	\$ 2.75	\$ 7.48	\$ 0.56	\$ 16.31	\$ 1.64	\$ 0.14
Total:			\$ 4.93	\$ 14.00	\$ 11.90	\$ 2.10	\$ 9.53	\$ 11.61	\$ 1.00	\$ 41.07	\$ 5.95	\$ 0.48

Mentor #1

Machinery Costs by Implement

Operation	Power Unit	Implement	Repair	Fuel & Lube	Fuel	Lube (\$/acre)	Labor (\$/acre)	Capital Recovery (\$/acre)	THI (\$/acre)	Total Cost (\$/acre)	Fuel Usage (gal/ac)	Labor (hr/ac)
Harvest	JD 9770		\$1.50	\$4.66	3.96	0.70	\$2.20	\$23.12	\$1.85	\$33.33	1.98	0.11
Harvest	JD 9760		\$2.50	\$4.45	3.78	0.67	\$2.20	\$14.22	\$1.15	\$24.53	1.89	0.11
Spray	STX 385 HD WT	Raven 100' Sprayer	\$0.14	\$0.65	0.55	0.10	\$0.37	\$1.06	\$0.11	\$2.33	0.28	0.02
Seed	STX 535 PRO Quadtrac	Eagle 5015	\$1.00	2.71	2.30	0.41	\$1.10	\$7.21	\$0.77	\$12.79	1.15	0.06

Machine operations for spring grain:

Spray	STX 385 HD WT	Raven 100' Sprayer	\$0.14	\$0.65	\$0.55	\$0.10	\$0.37	\$1.06	\$0.11	\$2.33	\$0.28	\$0.02
Spray	STX 385 HD WT	Raven 100' Sprayer	\$0.14	\$0.65	\$0.55	\$0.10	\$0.37	\$1.06	\$0.11	\$2.33	\$0.28	\$0.02
Spray	STX 385 HD WT	Raven 100' Sprayer	\$0.14	\$0.65	\$0.55	\$0.10	\$0.37	\$1.06	\$0.11	\$2.33	\$0.28	\$0.02
Seed	STX 535 PRO Quadtrac	Eagle 5015	\$1.00	\$2.71	\$2.30	\$0.41	\$1.10	\$7.21	\$0.77	\$12.79	\$1.15	\$0.06
Harvest	JD 9760		\$1.25	\$2.23	\$1.89	\$0.33	\$1.10	\$7.11	\$0.58	\$12.27	\$0.95	\$0.06
Harvest	JD 9770		\$0.75	\$2.33	\$1.98	\$0.35	\$1.10	\$11.56	\$0.93	\$16.67	\$0.99	\$0.06
Total			\$3.42	\$9.21	\$7.83	\$1.38	\$4.40	\$29.06	\$2.60	\$48.71	\$3.92	\$0.22

The two operations show some interesting results. Producer #1 has a conventional farming operation that is utilizing slightly older machinery. His operation has a total variable cost of \$28.46/acre (Includes Fuel and Lube, Repairs, and Labor). Mentor #1's operation has a variable cost of \$17.03/acre or \$11.43/acre savings. The economic challenge for most producers is evident when looking at the capital recovery costs associated with these operations. Producer #1 has a \$17.45/acre savings over the direct seed operation when comparing the cost of the equipment being used.

The cost of harvest has proven to be a pivotal part of the evaluation. This provides a particular challenge since every farm, conventional or direct seed, needs to harvest their crops. In terms of evaluating the capital recovery cost of each farm, it is difficult to say that a high capital recovery cost is attributed to a direct seed operation when the largest capital cost they have is tied up in combines that do nothing more than harvest the crop.

In the examples above, Producer #1 has a capital recovery cost of \$11.61/acre of which \$7.48/acre is attributed to the harvest or combine ownership. Mentor #1 has a much higher capital recovery cost of \$29.06/acre of which \$18.67/acre is attributed to the combines he runs. The \$17.45/acre savings Producer #1 enjoys over Mentor #1's operation would be reduced by \$11.19/acre if we take the harvest operation out of the calculations.

On a project wide basis the economics of direct seed versus conventional farming comparisons show the following results:

- Direct Seed Cost savings of:
 - \$.95/acre on Machinery Repairs
 - \$4.32/acre on Fuel & Lube
 - \$4.47/acre on Labor
- Conventional Operation Savings of:
 - \$5.12/acre on Capital Recovery or Machinery Ownership Costs
 - \$.36/acre on Taxes, Housing and Insurance Costs

After other miscellaneous cost savings are figured into each operation, the final results show a cost savings to Direct Seed Operations of \$9.02/acre.

To quote Dr. Kate Painter, Ag Economist for the University of Idaho, "Overall, total costs are \$9.00 less per acre for the direct seed group. Investment in direct seed machinery may represent one barrier for farmers wishing to switch to this technology. While it would improve profitability, they may not be able to cash-flow purchases of powerful tractors and direct seed drills."

As can be seen by comparing these operations, there are many variables that will ultimately impact the decision making process and the profitability of a producer interested in transitioning to direct seed.

C. Successes and Challenges

The Ag Pilots Direct Seed Mentoring Project was a great success. In the beginning it appeared that the biggest challenge would be finding program participants. In the end the biggest challenge was funding the number of teams that wanted in the program. Our goal was to have four teams and we finished the project with 8 mentors and 10 producers.

Early in the project we faced several challenges related to the funding cycle and the loss of FY 2008 funds. Since this was the startup phase of the project, we had to re-evaluate the project and proceed without some of the necessary funds to start the project. The Spokane Conservation District funded the bulk of the startup phase that was lost in the contract process.

Outside of the contract issues, the project didn't experience any other challenges that threatened its completion. In fact, the majority of the project proved to be a valuable and rewarding experience for everyone involved. Additional funding was received to expand the project to its current size and the Spokane Conservation District and Dr. Painter from the University of Idaho have agreed to proceed with the completion of full farm budgets including harvest 2009 yield data. This will be available late fall 2009.

The meetings held throughout the winter of 2008-2009 in Colfax were a great success with an average of 35 people in attendance at each meeting. For this being the first year of the direct seed meetings, it was great seeing so many interested farmers attending. The outreach efforts at the Pacific Northwest Direct Seed Association Annual meeting also gave the project some much needed visibility in early January and resulted in several individuals signing up for the program.

D. Project Direction and Future

The Ag Pilots Direct Seed Mentoring project was completely dependent on the funds received from the State of Washington. With the funding cycle ending on June 30th, 2009 the project is looking for another source of funding to continue the program. The Spokane Conservation District is reviewing several options to fund the program and will be applying for funding through the Department of Ecology in late October. We will be working with the PNDSA and WSU/UofI to move the project forward and to continue marketing the concept of direct seed mentoring.

4. Final Project Summary

The Direct Seed Mentoring project had many great successes, few challenges, and an unbelievable response from the farm community in Eastern Washington.

The project included eight established direct seed mentors and 10 producers paying for 1,000 acres of direct seed on land not typically or currently being direct seeded. The economic analysis done showed a \$9.02/acre savings when transitioning to direct seed and one producer has indicated the desire to purchase a direct seed drill after just one season of being mentored due to a reduction in fertilizer costs of nearly \$11/acre.

The environmental benefits come in the form of reduce soil erosion and nutrient runoff into the regions streams. On a yearly basis, if the 1,000 acres is direct seeded, there will be a savings of over 4,400 tons of soil erosion and nutrient runoff in the region. This can be multiplied by the number of producers impacted by the success of this program that ultimately convert their operations to direct seed.

Though soil erosion is the most measurable environmental result of the program, there are large reductions in the amount of wind erosion on direct seed operations and the fuel consumption was reduced by 1/3 when converting to direct seed.



No-Till operation in standing wheat stubble. The stubble in the foreground was just seeded using the Cross-Slot drill. The ground is virtually undisturbed and is incapable of contributing to soil erosion and nutrient runoff.

The project brought several groups and agencies together to make it a success. Washington State University and the University of Idaho, the Pacific Northwest Direct Seed Association, the Washington State Department of Ecology, and the Spokane County Conservation District all worked together to complete the project. The value of the mentoring concept was proven to be high as additional funding was provided for the program by several of the entities above due to the potential effect on the adoption rate of direct seeding in the region.

When the final economic analysis is completed later this fall and all yield data is included in the study, I believe the mentoring project will have a great impact on the way producers view the transition to direct seeding systems. There will be many valuable lessons to learn from the economic study of each operation that will help producers across the region make better decisions related to machinery ownership and variable cost comparisons.

With current budget shortfalls, it is difficult to get the funding needed to perform comparisons such as these which make the mentoring project so valuable to the producers as well as the researchers in the region. It was an excellent opportunity to work with new producers willing to try a new system on their farms and to start a network of established direct seeders willing to do some custom seeding for those producers unable to cash flow the large capital investments sometimes required when making the transition to direct seeding.

Overall, the project was a great success and we hope to build off of the momentum created by the pilot project and continue the program well into the future.