

## Eastern Washington diesel emission reduction program: A collaborative program for multiple environmental benefits

Katherine Williams and Gary Mitchell

**N**o-till/direct seeding manages the amount, orientation, and distribution of crops and other residue on soil surfaces, while growing crops in narrow slots or residue-free strips in soil previously untilled by full-width implements. In both methods, the number of passes needed for tilling and planting is decreased, saving both fuel and time spent in the field. Both methods have many additional benefits beyond a reduction in diesel fuel. Machinery wear-and-tear is reduced due to fewer passes across the field. They also reduce soil, wind, and water erosion, which sees a corresponding decrease in particulate matter (dust) in the air.

In September 2006, EnSave, Inc. and the Upper Columbia and Blue Mountain Resource Conservation and Development Councils (RC&Ds) initiated the Eastern Washington Diesel Emission Reduction Program, funded by a grant from the United States Environmental Protection Agency (USEPA). The goal of the program was to reduce atmospheric pollutants, soil erosion, and compaction; increase soil moisture and organic matter; and reduce the amount of sediment and nutrient run-off entering local water sources by encouraging area farmers to convert over 16,900 acres to no-till/direct seeding.

The program enrolled 21 Eastern Washington farmers in six counties. The program offered cash incentives to farmers who made the switch, reducing the farmers' financial risk in making the conversion. Both tilling options were made available to participating farmers, who chose which method would best suit their operation. The participating farmers were excited to have an opportunity to explore conservation tillage.

"Government programs are offering cost-share options," said Scot Anderson, a participating farmer. "The local conservation district has a low-interest loan

program and the Upper Columbia RC&D Council is offering cost-share to convert additional acres to no-till/direct seeding. Why wouldn't I invest in direct-seed equipment with this kind of support?"

Upper Columbia and Blue Mountain RC&Ds implemented the program, with EnSave providing program design, marketing, and technical assistance in calculating the pollution reduction from the no-till/direct seeding practice. The RC&Ds and EnSave also partnered with area conservation districts, including Spokane County, Palouse, Palouse-Rock Lake, Pine Creek, Whitman, Asotin County, Columbia, Pomeroy, and Walla Walla County, as well as the Washington Department of Ecology. The conservation districts in particular proved to be a valuable tool in enrolling farmers in the program.

Prior to enrollment into the program, farmers were asked to complete an application form, which was used as a ranking guide to determine eligibility for the program. Farmers were also asked to provide their tractor model, equipment used, miles and gallons per hour for each operation, gallons of fuel per acre (if known), and the number of acres to be direct seeded for the program. Farmers were informed that they would need to provide verification of their actions in order to receive payment.

Many farmers in the program area were already receiving incentive payments from the USDA Natural Resources Conservation Service (NRCS) for using no-till or reduced till practices on up to 500 acres. Farmers were allowed to participate in both programs as long as acreage was not duplicated. In each case, the farmers were required to meet the NRCS Conservation Practice Standard for Residue and Tillage Management No Till/Strip Till/Direct Seed.

By participating in both programs, the farmers were able to convert more acres to conservation tillage than they might have otherwise. Through NRCS, farmers received incentive payments for no more than 500 acres. In this program, the farm-

ers dictated the amount of acres enrolled in the program.

Once enrolled, a cost-share contract was developed with the farmer, indicating their commitment to the program and the manner of tilling to be used on their farm. Once crops were planted, the farmer agreed to provide verification of their operation, including equipment used, mph and gal/hour for each operation, gallons of fuel used per acre, total acres completed of the contracted acres, and any available photos. Once the documentation was received, the farmer was reimbursed at \$4 per tilled acre. Spot checks were performed on 13 farms following planting to ensure that NRCS standards were met and that the farmers were planting in the manner specified in their contract.

Final emission reductions were calculated using data collected over the course of the program and made using the USEPA NONROAD 2005 model. They are detailed in table 1. Varying degrees of efficiency are due to farmer variations in previous tilling practices, equipment, and direct seed experience.

During the course of the program, total fuel consumption—and thus pollutant emissions—was reduced by 58%, and hours in the field were reduced by 61%. While an overall drop in diesel emissions was seen across the board, the most intriguing was the amount of carbon dioxide saved over the course of the program. Of all the emissions decreased, CO<sub>2</sub> made up 97% of the savings.

Carbon dioxide (CO<sub>2</sub>) is a naturally occurring gas, and all manner of life forms emit it. It is also emitted during the combustion of fossil fuels such as oil, natural gas, and coal. It is an expected result of any fuel burning activity, and the most one can hope for is a clean burn which will minimize other toxic emissions, such as mono-nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>). The gas is not in and of itself a problem; it is only with extremely elevated emissions (which we see in today's industrial nations) that it affects atmo-

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**Table 1**

Final program details.

Pollutant	Area (acres)	No-till usage savings (gallons/acre)	Gallons saved	Emissions factor (lb/gallons)	Emissions (lbs/year)	Emissions (tons/year)
PM	16,911.1	1.54	26,045	0.0298	776	0.39
SO <sub>2</sub> <sup>3</sup>	16,911.1	1.54	26,045	0.0156	406	0.20
NO <sub>x</sub>	16,911.1	1.54	26,045	0.284	7,397	3.70
VOM <sup>4</sup>	16,911.1	1.54	26,045	0.0290	755	0.38
CO	16,911.1	1.54	26,045	0.156	4,063	2.03
CO <sub>2</sub>	16,911.1	1.54	26,045	22.42	583,932	291.97

**Table 2**

Final program savings.

	Conventional tillage	No-till	Savings	Percent savings
Gallons of diesel used	4,187	47%	\$79	6%
Gallons of diesel used per acre	3,283	37%	\$385	28%
Tractor time (hours)	791	9%	\$271	20%
Labor cost for crop preparation (\$12/hr)*	375	4%	\$253	19%
Diesel cost (\$2.60/gal)†	180	2%	\$375	27%

\* Source: Washington State employment Security Department, 1999 (figures adjusted for inflation).

† Source: Energy Information Administration, State Energy Profile for Washington, April 2007 (taxes added).

spheric conditions and contributes to the greenhouse effect. The only way to truly reduce the amount of CO<sub>2</sub> released into the atmosphere is to burn less fuel.

Over the course of this program, the farmers made fewer passes with their tractors, and the passes made were generally doing less work. This resulted in less fuel burned, thus significantly less CO<sub>2</sub> emitted into the atmosphere.

The project also calculated the reduction in time spent planting due to no-till/direct seeding, savings in labor costs, and savings in diesel usage and costs. Table 2 details the savings.

The Eastern Washington Diesel Emission Reduction Program was an excellent example of state, federal, and nonprofit agencies and private business working together to achieve conservation objectives. The program helped farmers achieve significant monetary and fuel savings, in addition to reductions in emissions. Many of the farmers expressed interest in future programs, and the lessons learned

with this program will help future undertakings succeed further.

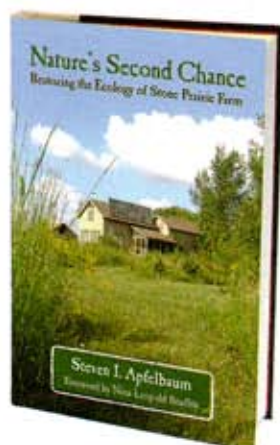
Scot Anderson, the farmer mentioned earlier, was just one example of a farmer who found success with the program. He saved over 200 hours of time during the spring planting alone and over 300 hours total of tractor time. He also saved over 3,400 gallons of diesel and over \$3,800 in labor costs. If Scot continues with the conservation tillage techniques he developed with this program, he could save, on average, \$9,000 annually in diesel fuel costs (calculated at \$2.60 per gallon).

While erosion rates were not a focus of this program, future endeavors should monitor soil, wind, and water erosion rates for additional benefits. Other fuel-saving practices such as auto-steer technology, retrofitting older diesel engines, and incentives for bio-diesel use should also be explored.

In the end, this program afforded its 21 participants significant savings in diesel fuel costs and usage, labor costs, and the

amount of time spent in the fields. Nearly seven tons of noxious gases and almost 300 tons of CO<sub>2</sub> were prevented from being emitted.

It would seem that a widespread, long-term version of this program could have a lasting impact not only on emission reductions, but also on soil and water erosion, global warming, and farming needs and practices in general. It is hoped that the program eventually be expanded to cover all of Eastern Washington, Northeast Oregon, and Western Idaho.



“Steeped in the tradition of Leopold’s land ethic, this volume chronicles the maturation of a young environmental idealist into a successful ecological entrepreneur. . . . This account of personal transformation confirms that we, the greater restoration community, can and must engage the greater economy while remaining true to our core ecological values.”

—John A. Shucy, Director of Conservation Science, Indiana Office of the Nature Conservancy

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