

COST-BENEFIT ANALYSIS:

Direct Seeding and Conventional Tillage Systems

Foster Creek Conservation District's Direct Seed Program - Phase 1 (2016-2018)

Summary

Direct seeding has a number of very important benefits for this region, which is prone to both wind and water erosion that removes the rich topsoil necessary for producing healthy crops, which in turn pollutes the air and waterways. The producers are very enthusiastic about the benefits of direct seeding (DS) to their farms, as the soil has become increasingly easy to work and healthier in terms of organic matter content. Healthier soil is more resilient when growing conditions are less than optimal, for example, during moisture stress, a common condition in this low rainfall region.

In terms of costs, machinery costs are the main barrier to transitioning to direct seeding, as the no-till drills are very expensive and typically require larger, higher horsepower tractors. These two implements can easily cost several hundred thousand dollars, depending on the age of the equipment. However, this new technology has the potential for increasing profitability with just a fraction of the field operations and much higher precision in terms of steering and spraying agrichemicals. Producers in this study also expressed concern over increased pesticide costs, as herbicides replaced tillage operations.

While benefits of direct seeding are long term, ensuring healthy soils for the future, costs of transitioning are a cash-flow problem for producers. This study has allowed these producers to experience the benefits of direct seeding and compare results to their conventional systems. Once the direct seed system is in place, producers are often able to improve their profitability or, at minimum, have comparable returns from the DS system.

Cost Comparison

Since DS systems replace tillage with herbicide sprays, pesticide costs are much higher in these systems. In this study, pesticide costs were over 2.5 times higher, averaging \$26 per acre for DS compare to \$10 per acre for conventional tillage (CT) systems (Fig. 1). However, average machinery variable costs (VC), which include fuel, lubricants, repair, and machinery labor, are about two-thirds as expensive for the DS system, averaging \$25 per acre for all the producers, compared to an average of \$36 per acre for the CT system (Fig. 1). Machinery fixed costs (FC), which include depreciation, interest on capital invested in machinery, housing, taxes, and licenses, are less than half the cost of CT in the DS system, averaging \$14 per acre across producers, compared to an average of \$29 per acre for the CT systems. Although the DS machinery is more expensive, there are just a few pieces of machinery and they are used for much fewer hours. The typical CT machinery complement includes a plow, harrows, a rodweeder, a cultivator, and a chisel. In the DS system, all you need is a sprayer, a drill, and possibly a coulter to break up the soil during transition.

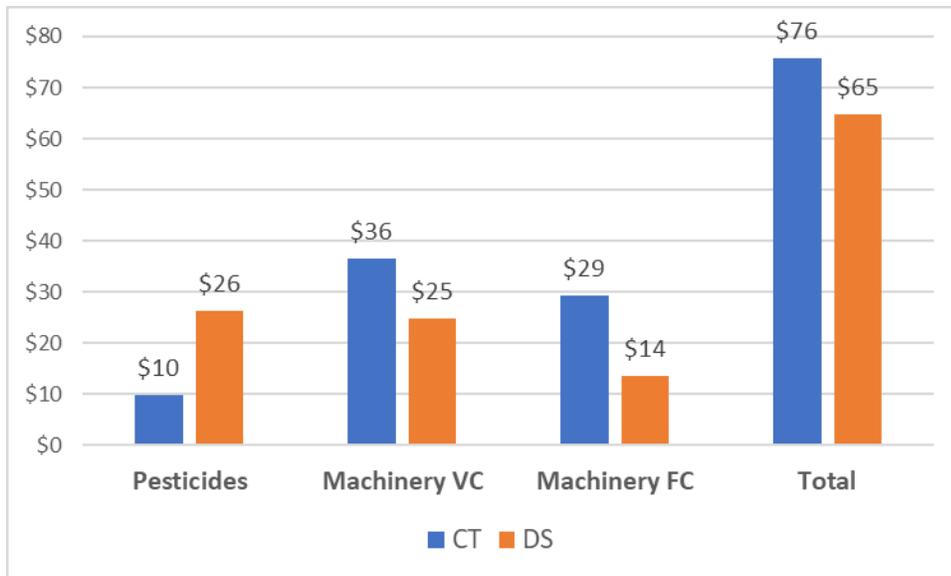


Figure 1. Cost Comparison by Category for Conventional Tillage (CT) compared to Direct Seed (DS).

Profitability Comparison

On average, returns over variable costs, which include fuel, lubricants, repairs, and machinery labor, were quite similar for the DS and CT systems, averaging \$136 per acre for CT and \$140 per for DS (Fig. 2). Higher fuel, lubricants, repairs, and machinery labor costs under CT were offset by lower pesticide costs.

Profitability varies by producer in this study for many reasons. Producer 4 hires a custom operator for both planting and harvesting, as he does not own a drill or a combine. He does trade labor to reduce the custom harvesting charges, but he still pays more for seeding than he would if he owned his own drill, and these custom charges make his DS variable costs higher and his DS fixed costs lower. This explains why his returns over variable costs are the lowest of all producers at \$91 per acre (Fig. 2). Producer 3 had much higher winter canola yields under his DS system, which directly impacted profitability for his DS system. The other producers did not experience an immediate yield increase under the DS system.

When both variable and fixed costs are included, the DS system is more profitable, at \$99 per acre averaged across all producers, than the CT system, which averages \$84 per acre across all producers (Fig. 3). These costs include machinery variable costs, including fuel lubricants, repairs and machinery labor, as well as machinery fixed costs (also referred to as ownership costs) including depreciation, interest on capital tied up in machinery, machinery housing, licenses, and taxes. Land costs are not included in this analysis. The largest profitability difference is experienced by Producer 3, due to a 24% increase in winter canola yield under the DS system. None of the other producers had higher returns under the DS system; yields were basically the same for both systems. The profitability differences ranged from 15% less for Producer 1 to 2% less for Producer 2, and these were due to cost differences

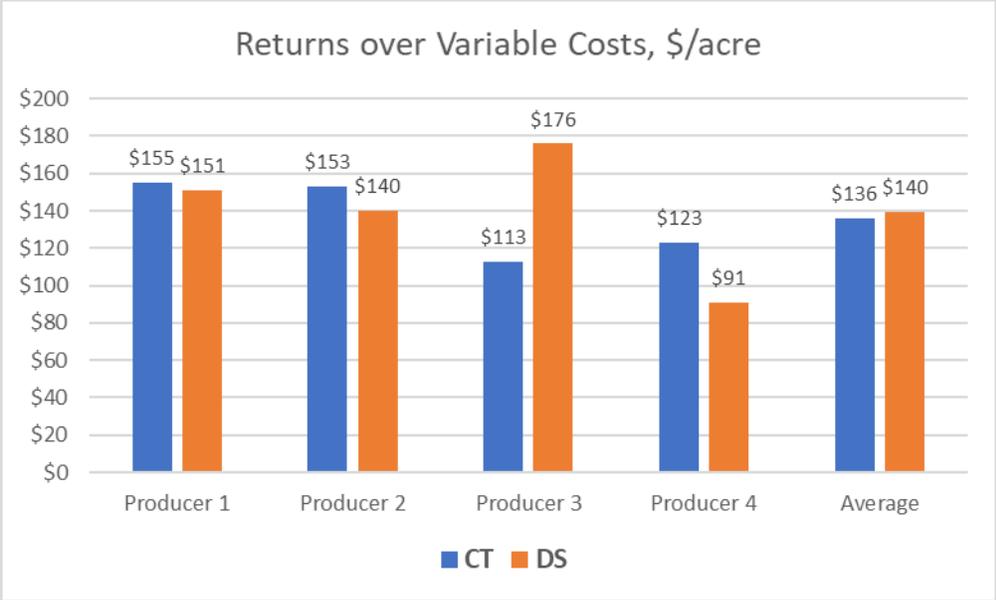


Figure 2. Average Returns over Variable Costs for Conventional Tillage (CT) compared to Direct Seed (DS) by Producer, \$/acre.

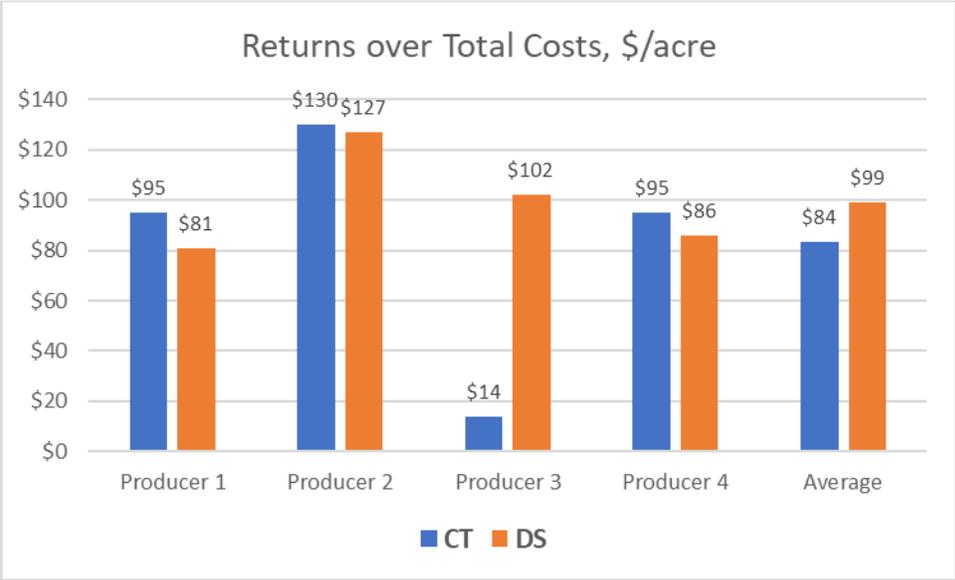


Figure 3. Average Returns over Total Costs for Conventional Tillage (CT) compared to Direct Seed (DS) by Producer, \$/acre.

between the two systems. In time, with increases in soil organic matter and less erosion, yield increases would be expected for the DS systems.

Transitioning to DS represents a cash-flow problem for producers, who cannot easily exchange a CT machinery complement for a DS system that is typically more than 50% more expensive. Once they have invested in a newer, more efficient and technically much more sophisticated machinery complement,

their operating costs will fall, in terms of labor, repairs, and fuel. Yields will typically increase. Thus, the DS systems offer long term benefits that exceed costs for individual producers as well as for society as a whole in terms of environmental benefits. It may not be feasible from a cash-flow standpoint for producers to change from a CT to a DS system, but it should be more profitable once they are able to transition to a DS system.