

Making Direct Seeding Work

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Congratulations!! Whether you are embarking on the change to a low disturbance, direct seeding system, or trying to fine tune your seeding system: **You are Making a Positive Change.** Reducing or eliminating tillage is a more cost effective, environmentally sound, and sustainable way of farming.

Controlling wind and water erosion is a popular reason for getting into a direct seeding system. Trash—in the form of stubble and crop residue—slows wind speed and reduces the amount of runoff and the effect of hard rains. As organic matter builds up, the soil becomes more stable. This reduces the amount of wind erosion. Water erosion is also decreased through the creation of more stable soil aggregates. Soil with higher organic matter is less susceptible to dissolve in raindrops or running water. Runoff and rainfall is much more likely to be transferred down into the soil profile with increased organic matter. Higher organic matter increases the porosity of the soil which increases the water infiltration rates. More water in the soil profile translates into higher plant available water.

Direct seeding is a cost effective production system. The cost of production under zero-tillage will be lower both immediately and in the long term. In the first year of conversion to a direct seeding system, benefits will accrue from lower fuel and labour costs. Replacing tillage operations with a pre-seed burndown using glyphosate is both cheaper and does a better job of weed control.

Over time, soil quality will improve as organic matter builds up. With increases in organic matter comes improved soil structure and improved soil dynamics. Soil organisms will increase in population, nutrient cycling will improve, soil chemical properties will improve and the physical properties of the soil will be more conducive for plant growth.

Soil organic matter is created from decomposed plant residue. Soil microorganisms breakdown the crop residue into organic carbon which in turn combines with nitrogen and other materials to form organic matter. The soil organic matter will increase as long as residue and nutrient accumulation is greater than decomposition. Tillage facilitates decomposition. Decomposition of organic matter releases nutrients. This is why tillage creates a short term yield advantage over under fertilized crops on stubble. However, if decomposition occurs at a rate faster than accumulation, then mining occurs. Mining uses soil resources at a rate faster than they are being replaced.

Building organic matter levels may require higher fertilizer additions until natural nutrient cycling can occur. Increasing the ability of a soil to cycle nutrients will facilitate a continuous release of nutrients throughout the growing season. Ultimately this reduces the crops requirements on chemical fertilizer additions and maintains a supply of nutrients throughout the growing season.

Making the transition into a direct seeding system is not difficult, but there is a checklist that must be met to ensure success. This checklist is often referred to as the **5 Pillars of Direct Seeding**. These pillars provide the foundation for the successful implementation of zero-tillage. Whether you're just getting into direct seeding or are looking to improve certain problems encountered, establishing the 5 Pillars is essential for success.

The **Five Pillars** of Direct Seeding are:

Residue Management

Weed Control

Rotations

Fertility Management

Crop Establishment

Residue Management

Residue must be managed to ensure good seed placement and germination. Chopping and spreading will also allow the seeding implement to go through residue without plugging.

The best place to manage residue is at the back of the combine. Adequate dispersal of the straw and chaff will eliminate the need for any further operation. Good dispersal of straw is considered to be 80% of the width of cut. Chaff spread should be 50% of the width of cut. Ideal spread is 100% of the width of cut. Harrowing can disperse straw but won't affect the chaff spread.

The type of opener and row spacing will affect an implement's ability to go through residue. Disc openers are able to go through tall stubble, but comparatively less surface residue. Shank openers can go through more surface residue, but require shorter stubble heights. Sweeps or shank mounted packers require shorter stubble than knife openers and gang mounted packers.

Weed Control

All seeding systems select certain weeds. Weed pressure under direct seeding will be different than min-till or conventional tillage. Weed seed are not mixed into the soil profile under minimal disturbance seeding. This prevents many weed seeds from germinating or breaking dormancy. Generally, under direct seeding there is a shift towards perennial weeds. An integrated approach to weed management is the best way to control weeds. Pre-emergent application of glyphosate is one of the keys to successful direct seeding.

Rotations

Rotations play an integral part in a direct seeding production system. Rotations are a primary factor for influencing disease pressure, weed infestation, residue and fertility. Establishing diverse and complimentary rotations will help crop yield and quality while minimizing inputs.

Rotations will be determined by the soil zone, markets, farmers personal cropping choice and other variables. A typical 4 year rotation is cereal-pulse-cereal-oilseed. Winter cereals are a simple and effective way to increase the length of a rotation, thus providing another tool to break weed and disease cycles.

Including forages in a rotation will dramatically improve the soil quality. Crops that follow a forage crop will have significant yield and quality improvements over rotations not including forages. Growing forages is the quickest way to improve a degraded soil.

Fertility Management

Meeting the crops fertilizer requirements without damaging the germination or developing seedling is one of the biggest challenges in direct seeding. Fertilizer can be placed with the seed, applied in a separate application or banded in a row separate from the seed row.

The seed row is a simple and effective place to put the fertilizer. However, rates are limited. Rates in the *Guidelines for Safe Rates of Fertilizer Applied with the Seed* Fact Sheet published by Saskatchewan Agriculture, Food and Rural Revitalization should be followed.

Providing separation between the seed and fertilizer is often required to prevent damage to the developing crop. This is accomplished by applying the fertilizer in a separate application or by providing separation between the seed row and the fertilizer row. Numerous openers and seeding systems are available to accomplish this. There isn't one best system. Side or mid-row banders, double shoot openers, post-emergent dribble banding and pre seed banding are all good options for meeting your fertilizer needs.

When looking at options for fertilizer application, maintaining good seedbed quality is the primary consideration. Seedbed quality should not be sacrificed to apply fertilizer. A separate fertilizer application is better than compromising your seed bed. Two passes with a low disturbance opener is still considered low disturbance seeding.

Crop Establishment

The ability to seed shallow in moist soil is one of the advantages of direct seeding. Seeding at about an inch deep gets the crop off to a quick, uniform start. Residue and higher organic matter that accumulates in soils under direct seeding make the soil cooler than conventionally tilled soil. However, this doesn't impede germination. Disturbance caused in the seeding operation provides good conditions for germination.

Providing a good environment for germination is the goal of the seeding operation. This means uniform seed placement, good soil to seed contact (packing) and good seed and fertilizer separation.

Undisturbed soil below the seed with packed soil above and around the seed is the objective. There are numerous types and designs of openers. Choice of openers is often an individual one. There isn't one right opener. The function of openers is to precisely place the seed while allowing the soil to flow in over top of the seed row so it can be packed.

Packing assists germination by providing good soil to seed contact. This allows seed access to soil moisture necessary for germination.

Packing should cover the entire seed row. Therefore, packing width should be the same as or greater than the seed row width.

The packers should also match the type of opener. Flat packers are suitable for single shoot openers, but rounded or v-shaped packers should be used for side band or paired row openers. These shaped packers maintain the integrity of the seed bed by exerting packing pressure to the sides as well as downwards.

Positioning of packers is also very important. It is the seed that needs to be packed, not the fertilizer. Improperly placed packers can cause seed placement to be altered.

Packing isn't rocket science. Packing pressure should be as much as is required, but not much more. A slight downward pressure is often all that is required. Excessive packing can create crusting on clay soils.

Successful direct seeding doesn't require getting a new air drill and combine. Modifying existing equipment is often all that is required to successfully implement the five pillars. Many manufacturers cater to the after-market conversion business. Equipment needs vary with location, especially in clay soils. Consult with your neighbours and local agrologists for more help in modifying and selecting equipment.

Conclusion

The greatest barrier in the transition to a direct seeding system is often mental. Believing that the system will work without tillage may take a couple of years, but it will happen. Production will initially be stable and then slowly improve as soil conditions improve. Costs will be lower and a satisfaction will be garnered from knowing you are participating in a sustainable farming system.

Successful direct seeding starts and ends with the Five Pillars to Direct Seeding: residue management, weed control, rotations, fertility, and seed establishment. You will already be doing many of these practices. Fine tuning these production variables will assist in your success.