



Getting Started in Direct Seeding

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The most important thing for farmers to understand when they are reducing tillage and getting started in direct seeding is that they are making a fundamental change to their farming system. Tillage has traditionally been used to manage a wide range of agronomic and equipment issues and therefore removing tillage from the equation affects all aspects of a crop production system. Experience has shown that successful adoption of direct seeding requires systems thinking and advanced planning on the part of the farm manager.

Benefits of Direct Seeding

- **Soil Conservation:** standing and anchored stubble minimizes wind and water erosion. In addition to soil losses, erosion can also damage newly emerged crops
- **Moisture Conservation:** standing stubble increases snow catch, dramatically improves infiltration and reduces moisture lost to evapo-transpiration
- **Soil Quality:** soil organic matter increases, infiltration rates and moisture holding capacity increases, soil tilth improves, aggregate size and biological activity increases
- **Economics:** less machinery is required so repair, maintenance, fuel and labour costs decrease, and the opportunity to farm more acres or take on custom work increases
- **Production:** ability to seed shallow into moisture, improve fertilizer efficiency with precision placement, opportunity to increase cropping diversity and intensity, and increase net returns
- **Greenhouse Gas Mitigation:** less fossil fuel is consumed, fertilizer efficiency is increased, nitrous oxide emissions are decreased, and carbon is sequestered in the soil

This paper can only outline the numerous aspects of a cropping system that must be considered when getting started in direct seeding. Six issues that will be discussed are:

1. Crop Rotations
2. Residue Management
3. Weed Management
4. Disease Management
5. Fertility Management
6. Machinery Selection

1. Crop Rotations

The long term success and profitability of a direct seeding system depends on a diverse and dynamic cropping system. Creating diversity in a cropping system will help in the management of weeds, diseases and insects. It allows for different products and practices to be employed at different timings, which will help to keep crop pests off guard and in check. Diverse rotations will also help balance crop residues, soil moisture and fertility requirements over time. Crop diversity lends itself to operational diversity, which helps in the management of labour and equipment.

Dynamic crop rotations are those that allow a producer to maintain diversity, while responding to external forces that include weather and markets.

There are numerous examples, verified by research, that clearly show that short crop rotations and reduced tillage are a dangerous combination. Diverse crop rotations and direct seeding go hand in hand, and both require long range planning and increased management skills.



2. Residue Management

Making the move to direct seeding requires a residue management strategy that will allow you to seed easily into the stubble left behind at harvest and ensure good crop establishment. Residue management is best done in the fall, and as much as possible with the combine. Seeding equipment should be matched to your residue management. Do not rely on your seed drill for residue management.

- Standing stubble is easier to seed through than unanchored stubble
- Cutting stubble shorter than your drill's row spacing helps
- Whenever possible, chop the straw at the combine and spread over the cut width
- Chaff should also be spread or collected to reduce emergence problems
- Chaff is very difficult to move with a harrow
- When combining, pull out of the swath to wait for a truck or unload on the go to minimize residue piles
- Keep in mind that tough straw is harder to chop and harder to spread
- Poorly maintained choppers and spreaders do a poor job of managing heavy residue
- Collecting chaff removes many weed seeds and volunteers
- Baling can be an option for straw management, just be sure to recognize the value of the organic matter and nutrients being removed
- Using semi-dwarf varieties is an excellent way to manage straw levels
- Diverse rotations with low residue crops like pulses and oilseeds help manage straw levels
- Heavy harrowing will break up and redistribute straw but requires an additional field pass with high horsepower to maintain high groundspeed
- Heavy harrowing requires good conditions with dry straw so the fall is often the best time before the straw has settled
- Pea vines are virtually impossible to manage with a harrow
- Mowing is an option for badly lodged straw but is a very labour and horsepower intensive

3. Weed Management

Changing the cropping environment will change the weed species and population in your fields. Tillage was traditionally the big hammer in weed control, both in the fall and the spring. An integrated approach to weed management is required in a direct seeding system.

Competition

The best form of weed control has always been a competitive crop. Direct seeding allows producers to seed shallow into moisture and get the crop out of the ground quickly to provide competition. On row packing systems and precision placed fertilizer give the crop an advantage over weed seeds left undisturbed, unpacked, and unfertilized between the seed rows. Research has also shown that growing more competitive varieties or increasing seeding rates can reduce weed pressures.

Crop Rotations

A diverse crop rotation allows a producer to vary seeding dates, spraying dates, and harvest dates. Individual problem weeds have a hard time adapting to a constantly changing environment. For example, introducing a



winter cereal into the rotation can provide enough early season competition to eliminate a wild oat herbicide application. Diverse crop rotations also lead to a diverse herbicide rotation, which helps prevent the development of herbicide resistance.

Pre-seeding Herbicide Applications

In direct seeding systems, a pre-seeding herbicide application is an excellent tool for controlling weeds that will not be mechanically controlled by a separate tillage operation. This will allow the crop to get off to a clean start with minimal competition. Field scouting and weed identification is critical to determine the correct product(s) to use and the application rate. Scouting for weeds in direct seeding involves getting down on your hands and knees and looking in the crop residue. Pre-seeding is the ideal time to control early emerging annual weeds.

Perennial Weed Control

Prior to harvest is often the best time to control most perennial weeds in direct seeding. At this time of the year the flow of nutrients in perennial weeds is down to the roots, and killing the roots is the key to killing these persistent weeds. Glyphosate products, such as Roundup Transorb and Vantage Plus, applied pre-harvest at the recommended rate is the most economical solution to controlling most perennial weeds. Controlling perennial weeds is essential in the year prior to growing less competitive crops with limited in-crop herbicide choice like field peas. Pre-harvest treatments will also help eliminate green material to improve combining operations.

Post-harvest glyphosate applications can also provide effective control of perennial weeds if there is sufficient active plant regrowth. Post-harvest glyphosate often provides better control of dandelions and established foxtail barley than in-crop strategies.

Winter Annual Weed Control

The best time to control winter annual weeds is in the late in the fall. Applying herbicides like 2,4-D, MCPA or glyphosate is both effective and economical. Research has shown that the closer to freeze-up the better. Because of their adaptation to cool temperatures, winter annuals continue to grow after the first frost, usually until the soil is frozen. Also, the longer you wait, the more winter annual seeds will have germinated and the more seedlings will have emerged through crop residues. The best time for a fall application is from late September to mid or even late October.

Winter annuals can also be controlled with an early spring herbicide application, however to achieve effective and economical spring control, the winter annuals must be sprayed as early as possible and prior to bolting.

4. Disease Management

There are several practices that will help reduce the incidence of crop disease in a direct seeding system. Seed borne diseases are best controlled by using clean seed and seed treating. Direct seeders often find that soil borne diseases decrease. This is often a result of several factors including the use of seed treatments, shallow seeding, variety selection and good crop rotations.

Residue borne diseases are sometimes attributed to the adoption of direct seeding. It would be more accurate to say that residue borne disease often increases when short crop rotations are grown in a direct seeding system. The recent appearance of club root, a serious soil borne disease in canola, appears to be very closely linked to short crop rotations where canola was grown every other year.

Following a diverse crop rotation allows infected crop residues to break down and pathogens to die off before seeding a susceptible crop. For example a crop rotation of canola-barley-winter wheat-peas-wheat ensures that canola crops are separated by five years. Selecting varieties with disease resistance and good standability, along with a good fertility program and timely fungicide applications when necessary will reduce the risk of a major crop disease problem.



5. Fertility Management

If switching to direct seeding also involves adopting continuous cropping practices, you will most likely need to increase the amount of crop fertilizer applied. This is necessary to make up for the absence of a fallow year where the crop residues have already decomposed prior to re-cropping that field. Fertility management includes the use of nitrogen fixing pulse crops within your crop rotation and the use of manure or compost. The biggest fertility question to consider when switching to direct seeding is what product will you use and how will you apply it at seeding time.

Seed Placed Fertilizer

Inorganic fertilizers (purchased products) can effect germination and reduce emergence. For example, the amount of dry fertilizer that can be safely placed with the seed depends on a number of key factors:

1. Seed Bed Utilization (SBU) – the greater the percentage used, the more fertilizer that you can safely place.

$$\text{SBU} = \text{width of seedrow spread} / \text{row spacing} \times 100$$
 example: 5 inch spread tip / 12 inch rows x 100 = 42% SBU
2. Soil Moisture – safety increases with increased soil moisture
3. Soil Organic Matter - safety increases with increased soil organic matter
4. Soil Texture – clay soils have a greater buffering capacity than sandy soils
5. Crop Type – small seeded crops like oilseeds are more sensitive to seed placed fertilizer
6. Fertilizer Blends – keep in mind that it is the total fertilizer placed and not just the nitrogen. Keep that in mind when you are applying N-P-K-S blends – you may need to adjust your rates down from the guidelines listed on the following table.

Maximum Seed Placed Rates of Nitrogen (lb/acre of N as Urea)							
SBU	Moisture	Cereals			Oilseeds		
		Light Texture	Medium Texture	Heavy Texture	Light Texture	Medium Texture	Heavy Texture
10%	dry	5	10	15	0	5	5
	wet	15	25	30	5	10	15
30%	dry	15	20	25	10	15	20
	wet	30	45	50	20	25	35
50%	dry	25	30	35	20	25	30
	wet	45	60	70	35	45	55
70%	dry	35	40	45	30	35	40
	wet	65	75	90	45	65	75

Source: Westco Fertilizers

Double Shooting Fertilizer

Double shoot fertilizer systems allow for either granular, liquid, or anhydrous ammonia to be delivered and placed separately from the seed in a single pass seeding system. It is critical to make certain these products are placed away from the seed to ensure seed safety. Mid row banding systems guarantee separation with additional ground openers to place fertilizer between every second seed row. Side banding maintains fertilizer in close proximity to the seed, placing it to the side and usually below seed depth. Most paired-row designs achieve separation with a single opener by creating a band of fertilizer between, and usually below, two adjacent rows of seed. There is a wide choice of double shoot opener systems available and they all work well in specific



conditions. Most double shoot ground openers are designed to work best at 5 mph or less, and increasing ground speed may compromise the precision placement of the seed and fertilizer products.

6. Machinery Selection

Direct seeding is a system, and the seeding implement is only one part of the system. There are farmers across the prairies successfully direct seeding with everything from hoe-type box drills to high disturbance air seeders or low disturbance air drills. There are hundreds of ground openers for direct seeding. The success of each design is very dependant on soil type and field conditions as well as the skill of the operator.

There is no one perfect seeder or opener for all direct seeding situations. For beginners, it is more important to select a machine that you are comfortable with and have confidence in, than to chase a dream machine. Many equipment manufacturers and dealers have demonstration programs that offer on-farm testing. Hiring a custom seeder will also provide an opportunity to assess machinery performance on your farm prior to making a large investment.

The absolute best source of information on direct seeding equipment is other farmers. Talking to someone who has operated a specific implement for a number of years will give you honest insight into how well it performs seeding various crops under a wide range of conditions.

Reduced Tillage LINKAGES

The Reduced Tillage LINKAGES program is here to help you. We have some excellent resources available to help ensure you are successful with direct seeding.

Agronomists

The agronomists will help you understand all the aspects of moving to direct seeding. Contact them to discuss your questions and ideas, to arrange for a farm visit or kitchen table meeting or to access the Farmer to Farmer Network

Central Region Rick Taillieu 780-679-1787 rick.taillieu@gov.ab.ca	North Region Ron Heller 780-853-8262 ron.heller@gov.ab.ca	Peace Region Nick Underwood 780-814-1232 uwilltd@telusplanet.net
South Region Don Wentz 403-381-5845 don.wentz@gov.ab.ca	West Region Roger Andreiuk 780-980-9815 roger.andreiuk@gov.ab.ca	Team Leader Peter Gamache 780-422-7922 peter.gamache@gov.ab.ca

Farmer to Farmer Network

Reduced Tillage LINKAGES has developed a database of reduced tillers called the Farmer to Farmer Network. How it works is really quite simple. Farmers complete a survey that tells us about where they farm and the equipment that they use.

Then when a farmer has a question about a certain type of equipment or practice, we will connect them with another farmer that can share his experience. For example, if you wanted to speak to someone using a paired row opener on 12" spacing and fertilizing with anhydrous ammonia on clay soils, we will search the database using those parameters and provide you with the phone numbers or e-mails of participating farmers. Then we step aside and let the two farmers discuss ideas and opportunities and most importantly share a wealth of knowledge and experience.

Only the RTL agronomists have access to the database and the information will not be shared unless you agree



to do so. We will be careful not to overwhelm any individuals with excessive inquiries. And when completing the survey farmers can request that their name and contact information not be given out. The Farmer to Farmer Network also serves as the contact list for the RTL program. This will ensure that you know about coming events including winter workshops and summer tours that will be of interest to Alberta farmers.

To become part of this exciting new network simply contact an RTL agronomist to obtain a form or download the PDF version from our website at www.reducedtillage.ca.

www.reducedtillage.ca

The Reduced Tillage LINKAGES website was designed with the help of direct seeding farmers. The site has been designed with minimum graphics to ensure that it will load quickly on slower speed dial up internet connections common to farm homes in rural areas.

- Coming Events
- Direct Seeding Feature Farmer Profiles
- Direct Seeding Factsheets
- Reduced Tillage News, Articles and Updates
- Reduced Tillage Research Results
- Discussion Forums