

# Direct Seeding

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## Equipment Issues in Crop Residue Management for Direct Seeding

Uniform and wide distribution of straw and chaff residues is essential in direct seeding systems. You must spread residues evenly to avoid or reduce problems such as: equipment plugging; poor seed placement; disease, weed and insect infestations; nutrient tie-up; and cold soil under straw piles and heavy residue mats (see *Residue Management for Successful Direct Seeding*, Agdex 570-4, and *Handling Difficult Crop Residue Conditions*, Agdex 519-2).

Good residue distribution can be achieved for most crops with the equipment and options available for today's combines. Developing a residue management system to fit your overall farm operation requires careful consideration of various factors including:

- capability of the planter or other machines to handle the crop residue
- width of cut of the combine or windrower
- spreading of straw and chaff from the combine
- total crop residue and its condition, particularly after a heavy crop, or green and damp straw
- frequency of lodged or tangled crop conditions
- weed control methods used
- alternative uses for straw, where straw is plentiful (see *Estimating the Value of Crop Residues*, Agdex 519-25)

### Combining

**The most practical way to manage crop residue is with the combine.** It can cut the correct stubble height, and chop and spread the straw and chaff evenly across the field. Extra operations between harvesting and planting solely to manage crop residue are time-consuming and costly.

### Crop type considerations

The kind of residue and its condition determine how much attention is needed to manage it.

**Canola** produces a lot of fine material as chaff, which must be spread a long way from the combine's centre line to prevent obvious rows in the next crop. Heavy mats of canola residue will crust and push ahead of ground openers, resulting in plugging. A heavy harrow may be necessary to break this up (Figure 1).



Figure 1. Heavy harrow



**Pea** stubble is the most difficult residue to handle. All the vines must first be picked up by the cutter bar and then completely chopped and spread. Long vines are almost impossible to plant through, and harrows usually just bunch the pea stubble into piles.

**Cereals** are relatively easy to chop and spread. Special attention is needed when the straw is tough or damp and in low or lodged areas when the straw is green. Many knowledgeable farmers routinely harrow cereal stubble soon after combining to improve the spread of straw.

A lodged crop or stubble that is lying on the ground, as is often the case with peas, can be a problem. The addition of pick-up fingers on the windrower or straight header, dropping the header height and slowing downhill help to ensure that these conditions won't hinder the planter next spring.

### Stubble height considerations

Tall standing stubble reduces erosion risk and increases snow trapping but may cause plugging during planting. As a general rule, stubble height should be similar to the shank spacing of the equipment used in the next field operation.

For swath pick-up systems, low stubble height increases swath support but also decreases combine capacity because more crop residue enters the combine. Straight-cut and stripper-header gathering systems can leave tall standing stubble and so increase combine capacity to the limit of the separator.

Some low disturbance planters are virtually unaffected by stubble height. The coulters preceding hoe-type openers and several disc-type openers can cut the residue and place seed into moist soil even in tall stubble. For other planter types, however, stubble taller than 16 inches (400 mm) generally requires a subsequent field operation to chop and spread the residue.

Mulching, mowing, clipping and heavy harrowing are costly. At best, they can be justified only when combined with other field operations such as fertilizer or herbicide incorporation. Stubble mulchers and heavy harrows can chop and spread long stubble and long lodged stubble. They work best in dry stubble.

Leaving stubble over the winter allows the straw to break down and reduces power requirements for mulching.

## Spreading Residues

**Effective residue management requires both straw and chaff to be finely chopped and evenly spread over the entire width of the cut.**

Choosing the right equipment and adjusting it properly to achieve this result is important.

### Spreading straw

Straw choppers are available for all makes of combines as either factory or after-market options. Currently available chopper/spreaders can spread straw residues evenly over the entire cutting width for most Alberta conditions (Figure 2). Some can spread straw up to 50 feet (15 m) or more, but spreading over the entire cutting width for double 30-foot or double 40-foot windrows may be more difficult.



**Figure 2. Straw residues evenly spread over cutting width**



Finely chopped straw is desirable, but fine chopping can have significant power requirements. Many newer choppers have increased the number of knives (rotating and stationary) and/or increased chopper speeds to produce finely chopped straw. Aggressive straw chopping can require 30 to 40 hp. This level is typically 10 to 20 per cent of a combine's power and is noticeable for those who run their combine at or near its power limit.

Chopping tough or damp straw requires more power than chopping dry straw. Tough or damp straw may not be chopped as finely and may not be spread as far as dry straw. Worn hammers or dull knives also increase power requirements and reduce chopping effectiveness.

Chopper spreading problems have occasionally been traced to slow speed due to wrong drive pulleys or driving from a shaft that has a low speed setting. Deflector fins usually need to be set for maximum spread.

### Spreading chaff

Most spinning disc-type chaff spreaders do a good job of spreading chaff up to about 15 to 20 feet (4.5 to 6 m) and require only about 2 hp (Figure 3). For wider cutting widths, pneumatic chaff spreaders are needed. They induce a large air blast that can carry chaff up to 35 feet (11 m). Typically, these spreaders require 5 to 10 hp.

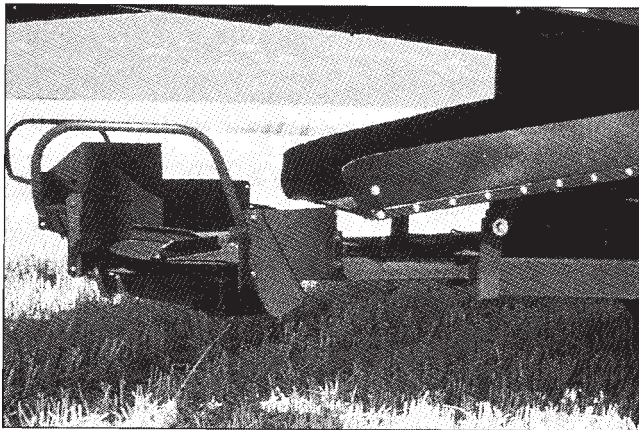


Figure 3. Spinning disc chaff spreader

### Spreading straw and chaff

Some types of chopper/spreaders can spread straw and chaff together. Mixing straw and chaff helps to provide a wide and uniform distribution of both (Figure 4).



Figure 4. Combination spreader

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Factsheets in the Direct Seeding Series are also available through Alberta Agriculture's Internet site at [http://www.agric.gov.ab.ca/agdex/500\\_ind.html](http://www.agric.gov.ab.ca/agdex/500_ind.html)