No-till Winter Canola Considerations

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Success of direct seeding winter canola into wheat stubble has received criticism during the last two to three years due to winter stand loss. The decrease in stand may be due to several factors related to soil, micro-climate differences at the surface in no-till, crown height of canola plants, etc. Many producers cannot consider tillage due to conservation programs, or just simply do not want to disturb the residue on the surface. This publication will provide some general guidelines/recommendations about canola production in a no-till system.

From research during the last several growing seasons, we have identified that stand establishment is not the problem as long as equipment is set correctly at planting. In general, over the years the rate of emergence and total percent emergence (based on 5 lb/ac seeding rate) has been similar between no-till and traditional seeding. In some cases, we have observed a higher rate of emergence in no-till systems due to higher soil moisture content near the soil surface. Higher soil moisture is a characteristic of no-till systems. We generally found 40 percent to 60 percent total emergence in our studies regardless of treatment, which is common, especially with a small seeded crop such as canola. Achieving a stand in no-till is not difficult, but keeping it is more challenging. As a rule of thumb, winter survival will decrease 10 percent to 20 percent in no-till fields where the stubble is retained and not removed or burned.

Figure 1. No-till winter canola following winter wheat.

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Based on Oklahoma studies, winter survival seems to be affected by the following properties in no-till:

- Seed placement and residue thickness
- Crown height of winter canola plants going into winter dormancy
- Soil temperatures in the fall
- Soil bulk density

Seed placement and residue thickness

Getting good seed to soil contact is important, especially in heavier residue. Placing the seed too shallow and not penetrating the soil surface will result in a shallow-rooted canola plant. Often the roots may not even penetrate the soil surface and simply develop underneath the residue. Achieving uniform seeding depth is more easily done when residue has been evenly distributed the width of the combine header

Figure 2. Winter canola emerging through wheat residue. Hypocotyls are 0.5 inch to 1 inch longer than normal.

at wheat harvest. The use of a harrow (if possible) or burning the residue are useful management options, if residue is not evenly distributed or too thick. If burning is deemed your best option, burn just prior to seeding to help conserve soil moisture.

Crown Height

Often in heavy residue, elongation of the canola hypocotyl is observed. The hypocotyl is defined as the part of the plant that is below the cotyledons and above the seed. An elongation in the hypocotyl will increase the crown height of the plant. The crown height is important because this is directly related to winter survival. The closer the crown is to the soil surface, the better your chances for winter survival. Crown height is a plant characteristic that should be selected for when choosing a variety/hybrid. Most companies have good information or ratings for crown height.

Soil Temperature

Soil temperatures in no-till fields will be lower compared to conventional till fields with no residue on the surface. Wheat residue buffers soil temperature fluctuations at the 0.5-inch to 1.5-inch depth. Lower soil temperatures in soil with residue may reduce crop growth. For this reason planting in the early part of the "planting window" would be recommended. If possible, removing just a little of the residue from the row will instantly increase soil temperature in that area. Using a more aggressive coulter or row cleaners may move enough residue to increase soil temperature in the seed zone.

Soil bulk density

Differences in yield between no-till and conventional tilled fields seem to be influenced by bulk density. Bulk density is the mass of soil divided by the total volume it occupies. A compacted soil has a very high bulk density. In a greenhouse study, to determine the effect of soil bulk density on winter canola root growth, root biomass decreased linearly with increasing bulk density for both sandy and clay soils. This means that higher bulk densities could reduce winter canola root mass, which may reduce winter survival. Canola plants rely on carbohydrates stored in the root mass to survive the winter months. What this means is that careful attention needs to be paid to soil physical properties in no-till fields, especially young no-till fields (less than three years no-till) before seeding canola. It is common for bulk densities in young no-till fields to be 1.4 to 1.5 g cm^{-3}. Caution should be used when seeding into a no-till field with a high bulk density. It takes several years (more than three years) for good soil structure to develop in no-till fields.

Yield of no-till winter canola is often influenced by the factors mentioned above. Yield can be competitive with conventional till fields once you gain experience with no-till canola production, however, the risk for stand loss and yield loss is greater in no-till fields compared with conventionally tilled fields. **Producers can be successful planting no-till winter canola, but careful attention must be paid at planting time.**

Tips for no-till winter canola production

- Special attention should be given to seeding depth. Seed should be placed from half of an inch to 1 inch deep. If seedbed is uneven, err on the side of caution and place seed at 1 inch to make sure you always get good seed to soil contact. Do not place seed in residue.
- If residue is not evenly distributed across the soil surface (i.e. windrow behind the combine), do not attempt to plant in these conditions. This makes residue distribution at harvest important. Perform a light tillage operation or burn residue.
- Plant a winter canola variety/hybrid that has excellent winter hardiness and low crown development (http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7141/PSS-2150.pdf.)
- Burning immediately prior to seeding will increase winter survival but may not be an option for producers who value residue.
- Increase your seeding rate by 15 percent to 20 percent. This is often recommended for most crops when a heavy amount of residue is present.
- Remove as much residue from the seed row as possible. Switching to a "wavy" coulter may increase soil disturbance and remove residue from the seed row.
- Make sure you have sufficient down force on row units so they function correctly.
- Get off the tractor often to check seeding rate and seeding depth as conditions often change within a field.
- Pay careful attention to planting date and plant early in the "planting window" for your region (http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2594/PSS-2131web.pdf.)
- Avoid seeding winter canola into young no-till fields. Older fields (less than three years) will have better soil structure and lower bulk densities that will promote root growth.

These suggestions do not guarantee successful no-till winter canola production but they should improve the chances of success if you have no other options and want to plant canola this fall in no-till conditions.

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