Back to the Basics: Cereal Stand Establishment

PRODUCTION BASICS ARE EVOLVING AT AN ACCELERATED PACE

Cereals, like wheat and barley, are a common staple on Prairie farms because of their excellent fit with our climate, our soils and crop rotation practices. Generations of cereal growers have amassed an unparalleled depth of experience in how to grow these crops successfully.

With such a long history and breadth of skills and knowledge in growing cereals, stand establishment practices may sometimes be taken for granted or overlooked. There are two reasons why we need to get back to the basics when it comes to best management practices for cereal stand establishment.

1. With cereal crops, individual growers have a much greater responsibility for ensuring seed quality. Because the use of common or bin-run seed is the normal practice for many growers, they take ownership of issues such as germination, emergence and vigour.

2. The landscape of cereal production has changed considerably over the years. New production techniques and agronomic challenges make this a good time to revisit best management practices for cereal crops to ensure that what we’re doing in the field is keeping up with the times. These changes include:

- **Farming larger areas with less labour**: less time to get everything done, especially on more and more acres with lesser-known management histories.
- **Reduced tillage**: has rapidly increased in the last decade alone, creating field environments that may be more conducive to disease and insect survival, and leaving cooler soils for seeding.
- **Rapid introduction of higher yielding varieties**: new crosses may require changes in production practices to reap the full benefit.
- **Phase out of some traditional seed treatments**: lindane treatments are gone, and new seed treatments bring more to the table in terms of insect and disease control.
Earlier seeding: seeding early to maximize crop competition and lengthen the growing season window can also increase pressure from seed- and soil-borne disease and early season insects.

Faster seeding with bigger machinery: small misjudgments at seeding time can mean big problems later on.

Resistant weeds: the presence of herbicide resistant weeds is increasing in economic importance to cereal growers.

These factors can impact every element of production from rotations to variety selection to fertility plans to seed treatment choice to pest scouting and more. A thoughtful re-examination of how we manage and handle cereal crops at seeding time can help us all better achieve robust, uniform stands that are better able to face early season challenges such as seedling diseases or weed competition. And with a well-established, competitive crop you are much more likely to get the yields, quality, harvestability and rotational advantages you’re aiming for.

This Cereal Stand Establishment Guide examines the production practices that can have an impact on early season cereal crop success. The Guide outlines the best management practices in three main areas of stand establishment:

- seeding practices
- disease management
- insect management

At the back, you’ll also find a list of references where you can get further information on cereal production, a field scouting guide to help you more accurately assess early season disease risk, and an at-a-glance risk assessment guide to help you make seed treatment and seeding decisions.

At Syngenta, we’re committed to helping you grow the best cereal crops. Use this guide to help build an integrated cereal management plan that works best for your farm.
Factors That Affect Cereal Stand Establishment

Achieving strong stand establishment is the result of an integrated crop management plan that focuses on maximizing those factors that help young seedlings survive and succeed, and minimizing those that can set them back.

Best management practices for cereal stand establishment centre around three main themes: seeding practices, disease management and insect management. Within these three main groups, there are many factors that can affect cereal stand establishment:

1. Crop rotations
2. Seed quality (germination, vigour)
3. Seedbed quality
4. Seeding date
5. Seeding rate and depth
6. Fertility
7. Weather
8. Herbicide carryover
9. Seed and soil-borne diseases
10. Soil insects
11. Weed competition

Of course, growers can’t control the weather. But they can exercise influence over all the other factors on this list, and when they do that, they do much to buffer the effects of weather on a young crop.

A truly integrated cereal stand establishment management plan recognizes that when cereal seedlings are weakened by one of the above factors, the effects of the others are magnified. For example, even mildly diseased seed will struggle to emerge and grow rapidly. The effect of weed competition or frost on a struggling plant like this are much more severe than on the same seed that was treated with a fungicidal seed treatment. Seeding too deep or into an ill-prepared seedbed can also leave plants struggling to catch up. All factors need to be taken into account when making your seeding plans.
Seeding Practices
If they’re well executed, basic, proper seeding practices can have a huge impact on whether or not a healthy, competitive cereal crop emerges and establishes itself in the field.

**Seed quality.** Best management starts with taking ownership of the seed quality choices available. Buying Certified cereal seed remains an excellent management choice, especially for newer varieties of wheat and barley, because certification guarantees seed quality in terms of germination and varietal purity.

But the typical practice is to use one’s own common wheat and barley seed. In this case, growers should always have their seed tested at an accredited seed lab for germination, vigour and the presence of seed-borne diseases – consider it part of your input costs. It’s usually not enough to simply clean up seed from a crop that grew well last year, or to rely on a home germination test. Sprouting in a home test does not necessarily mean the seed has sufficient vigour to perform well when seeded in difficult conditions such as cold soils, or soils with elevated levels of soil-borne diseases or insects, such as wireworms.

The previous year’s seed storage conditions must be considered, too. Seed lab test results on many samples from the 2004 crop year indicate extensive cereal seed damage as the result of a late harvest in difficult weather conditions, including frost. In many cases, a rushed harvest meant crops were binned before they were completely stable, meaning that seed that germinates well in a fall test may have a significant decrease in germination by the time it’s used in the spring. A variety of moulds can also attack seed that is damaged or stored without proper drying or aeration. Treating seed early can be a good management strategy to prevent quality loss to moulds during storage, but be cautious of how long you store the treated seed. Some seed treatments can cause loss of germination if stored for too long, so be sure to check product labels for proper storage guidelines.

Careful records of pre-harvest glyphosate applications are also essential to evaluating seed quality. If you cannot reliably recall which cereal fields received a pre-harvest glyphosate treatment, it becomes even more essential to test the quality of common seed to ensure there has been no impact on germination.

Seed quality is one of the most critical factors in cereal stand establishment. The high use of common seed means seed quality in any given year is all over the map. Always have your seed tested at an accredited seed lab, or buy quality-tested Certified seed.
**Seedbed quality.** One of the most common causes of seed failing to germinate properly is poor seed-to-soil contact, which comes down to seedbed preparation. Preparing the seedbed properly is a challenge, particularly with minimum or zero-till systems – stubble and surface trash help preserve moisture, but it can also make proper seed-to-soil contact difficult. As much as possible, the seedbed should be level, uniform, well packed and warm (5 C or higher), with the previous crop's residue well spread at harvest or by harrowing. Clumps of chaff or straw will certainly reduce or delay stand establishment.

Today’s larger seeding equipment means more acres can be seeded in less time. But since most farms are now also much larger, often with widely separated parcels of land, there is still as much or more pressure to finish seeding in the time available, or extend operations into the night, when it’s harder to monitor conditions. These pressures can also lead to increasing tractor speed during seeding operations. It’s important to remember that seeding at too high a speed can result in uneven seed and fertilizer placement and could reduce seed-to-soil contact. A conscientious effort during seeding operations will result in improved, even germination and contribute to optimal stand establishment.

**Seeding date.** Seeding early is a good practice, but seeding too early can mean delayed or reduced emergence due to cold weather conditions; and cold soils, whether moist or dry, are not conducive to rapid germination and emergence. This kind of delay leaves the crop vulnerable to disease and insect attack for a longer than normal period of time. Picking the right date is always difficult because no one knows what Mother Nature will do, but exerting influence over seeding practices (like proper rotations, seed quality, the seeding operation itself and use of seed treatments) can give early-seeded crops a better chance at becoming established even if early season weather turns sour.

**Seeding rate.** Optimal seeding rates will vary with new varieties, different soil types, fertilizer use and target yields. That's why the old rules of thumb may not be as reliable as they once were. Reduced seeding rates leave no margin for error in the event of unexpected pressures, such as spring frost or heavy weed competition, and can lead to significant yield and quality losses. One advantage with cereal crops is the lower cost of good quality seed compared to crops such as peas or canola, so recommended cereal seeding rates can be maintained without incurring additional expense.
Maintaining recommended seeding rates helps establish the optimum number of viable plants per unit of area – that is, plants per square foot or per foot of row. For cereals, optimum plant population is considerably higher than for broadleaf crops, ranging from 18 to 29 plants per square foot, compared to 10 to 17 for canola, and only 7 to 9 for peas. Under reduced moisture conditions, as are typical in the brown and dark brown soil zones, plant population can be reduced to prevent rapid depletion of available moisture.

The recommended plant populations per square foot are:

- HRS and CPS wheat, oats, and rye: 23 to 28
- SWS wheat: 20
- Barley: 20 to 24.

To develop a seeding rate that will achieve the optimum plant population, two more pieces of information are needed:

1. **Thousand Kernal Weight (TKW).** This may be available from the seed seller, or from the seed lab where you have seed tested. TKW can vary widely for any crop type. Barley, for example, can have a TKW of 30 to 40 grams.
2. **Expected seedling survival rate.** Calculate this by reducing the germination rate by a factor that accounts for the number of germinated seeds that may not survive to produce a plant. Seedling survival is typically 80% to 90%, but under adverse conditions, it may fall anywhere from 40% to 50%.

Using your numbers for desired population, TKW and expected seedling survival, seeding rate can be determined as:

\[
\text{Seeding rate (lb./ac.)} = 10 \times (\text{population per square foot}) \times \frac{\text{TKW (grams)}}{\% \text{ seedling survival}}
\]

Here’s an example: HRS wheat with a TKW of 30 grams and a desired population of 25 plants/square foot (to maximize crop competition with weeds). Expected seedling survival is 75% due to suspect conditions of newly rented land.

\[
\text{Seeding rate} = 10 \times 25 \times 30 = 100 \text{ lb./ac.}
\]

\[
\frac{75}{75}
\]
**Seeding depth.** The goal at seeding is always to place seed where there is adequate soil moisture to initiate germination. But the deeper you plant, generally the colder the soil, which will slow germination and may allow shallower germinating weeds to get ahead of the crop. Deep seeding also means a seedling will take longer to push through the soil and emerge, and that means more time and energy has been expended to get the crop out of the ground, leaving seeds and shoots more vulnerable to disease attack, and increasing the risk of thin or less vigorous stands.

In general, optimum seeding depth for cereals is about one to two inches, pending soil moisture; slightly less for semi-dwarf varieties. A general rule of thumb is that for every unnecessary inch of seeding depth, yield will be reduced by about 10%. Best practices for controlling seeding depth include:

- Before the seeding operation, verify that the drill is set to seed to the desired depth across its full width.
- In the field, make frequent checks on actual depth achieved, especially if the equipment is operated by others.
- Use field speeds that do not cause the drill to throw soil onto rows from adjacent shanks.
- On-row packing can help manage the distance between seed and surface. For example, while moisture may be 4 inches below undisturbed soil, packing on the seed row can leave final soil depth above the seed at a much more desirable 1.5 inches.
- If very deep seeding to moisture appears necessary, investigate special openers available to place seed in a deep trench and cover it lightly.

**Fertility.** Natural soil fertility can vary over the years and throughout a field. A complete soil test of macro and micro nutrients should be done every three to four years, but check annually for N and K, which are key nutrients for cereals, and refine your fertility program accordingly.

Also check that seed-placed fertilizer rates are not excessive, and ensure that any fertilizer going down with the seed has a safe separation (at least one inch) from the seed. With the trend to minimum tillage and one-pass seeding, more fertilizer is being placed at seeding time, and cereal seedlings can be very sensitive to seed-placed N.
Disease Management
Soils and crop residues on the Prairies normally contain a complex of disease pathogens – various species of *Fusarium*, *Pythium* and *Septoria*, plus *Cochliobolus sativus* and *Gaeumannomyces graminis* – that can lead to stand reducing diseases such as fusarium crown and foot rot, damping-off, seedling blight, common root rot and take-all.

Cereal seeds themselves can carry disease pathogens such as seed rots, seed-borne fusarium, seed-borne septoria and loose smut. These diseases often reduce germination and emergence and, if left unchecked, allow the disease to continue its life cycle, reducing grain yield and quality at later growth stages.

Many pathogens can survive in the soil for years, so it takes long-term observation and planning to defend against them.

**Start with rotations.** Proper crop rotations are the best tool available to interrupt disease cycles, because they reduce the opportunity for pathogens to continue their life cycle. Shortening or ignoring rotations usually encourages disease inoculum to build up in the soil to levels where even treated seed cannot properly defend itself against the pressure.

Rotations of no less than four years are generally recommended to manage soil-borne diseases. Choose rotational crops such as pulses or canola that are not as susceptible to the diseases that affect wheat, barley and other grassy crops. Volunteer cereal grains, particularly wheat plants, can provide a “green bridge” for disease to survive and attack succeeding crops. A good practice is to eliminate all volunteer wheat and grassy weed plants from the soil surface with a pre-seed herbicide burn off treatment at least two weeks prior to planting a cereal crop.

Rotations are also important in managing herbicide carryover. If rotations are too short, particularly in dry years when herbicide breakdown is typically slower, you run the risk of damaging a new cereal crop with residual herbicides from previous years.

**Manage the Fusarium disease complex.** While all early season diseases can impact stand establishment, the ones with the most serious potential impact are those associated with the *Fusarium* complex. Be vigilant for both seed- and soil-borne *Fusarium* and break the cycle wherever you can. First, always test seed for seed-borne *Fusarium* to avoid planting the problem. Second, be aware that *Fusarium* spores
overwinter on the stubble and chaff of multiple crop kinds. In both situations, you can protect seed against infection by using a seed treatment that provides protection against *Fusarium* as well as other seed- and soil-borne pathogens.

In general, all seedling diseases, not just the *Fusarium* complex, are opportunistic. So, while early seeding may assist with workload management, seeding too early can lead to delayed or reduced emergence due to unfavourable weather and soil conditions, and this could leave young seedlings open to continual attack from soil-borne diseases. Seed treatments can only protect seeds and seedlings for so long before plants are able to outgrow the threat. That’s why it’s key to seed into as favourable conditions as possible – by reducing the time between seeding and emergence you also reduce the opportunities for diseases to attack.

**The role of seed treatments.** Today’s cereal seed treatments mainly contain combinations of contact and systemic fungicides designed to protect against seed and soil-borne diseases. The presence of disease is a given, so always use a seed treatment that provides protection against a wide range of seed- and soil-borne diseases.

The primary role of any cereal seed treatment is to improve germination and emergence, and get young seedlings established through to the two- to four-leaf stage. At that point, the plants should have developed root and stem structures strong enough to outgrow further seedling disease attack.

**Accurate diagnosis is key.** Diagnosing seed- and soil-borne disease cannot be done with the naked eye. It’s easy, for example, to mistake herbicide carryover damage for disease infection because some of the early physical symptoms are similar, like stunting, yellowing and rotting at the base of the stem. Conversely, many disease symptoms are often misdiagnosed as frost damage.

If you suspect disease damage in young seedlings, send samples to an accredited lab for accurate diagnosis. If the test results come back positive for disease, you will have a heads up on what to look for, and protect against, next year. If results come back negative for disease, you’ll know that you need to look back to agronomic practices to correctly identify what happened and how to rectify it for next year.
### MAJOR SEED-BORNE DISEASES OF CEREALS

<table>
<thead>
<tr>
<th>Disease</th>
<th>Pathogen</th>
<th>Description</th>
<th>Conditions</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed-borne fusarium</td>
<td><em>Fusarium</em> spp. <em>(F. graminearum, F. culmorum, F. avenaceum)</em></td>
<td>Infected seed can introduce the fungi into disease-free fields.</td>
<td>For every seed with visible <em>Fusarium</em> damage, there can be many more without visible symptoms.</td>
<td>Significant reduction in germination; poor emergence and overall growth, causing seedling death.</td>
</tr>
<tr>
<td>Seed rots</td>
<td><em>Aspergillus &amp; Penicillium</em> spp., <em>Pythium</em> spp., <em>Fusarium</em> spp.</td>
<td>Spores from soil and crop residues attach to the seed surface.</td>
<td>Poor storage conditions promote growth on or between the seeds.</td>
<td>Poor vigour and germination may result from infected seeds. Infected seeds can be discoloured.</td>
</tr>
<tr>
<td>Loose smut</td>
<td><em>Ustilago tritici</em></td>
<td>When infected seed germinates, mycelium begin to grow and penetrate the growing point.</td>
<td>Infected plants spread smut.</td>
<td>Complete loss of kernels on heads infected.</td>
</tr>
<tr>
<td>Seed-borne septoria</td>
<td><em>Septoria</em> spp.</td>
<td>Ovenwinters on seed (more common on winter wheat).</td>
<td>Favoured by wet weather.</td>
<td>Plant emergence and stands are reduced.</td>
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### MAJOR SOIL-BORNE DISEASES OF CEREALS

<table>
<thead>
<tr>
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<th>Pathogen</th>
<th>Description</th>
<th>Conditions</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crown &amp; foot rot</td>
<td><em>Fusarium</em> spp. <em>(F. graminearum, F. culmorum, F. avenaceum)</em></td>
<td>Fungus overwinters in soil and residues. Infection of crown and root can occur throughout growing season.</td>
<td>Warm and dry soils favour early infection.</td>
<td>Poor root development and early seedling death.</td>
</tr>
<tr>
<td>Common bunt</td>
<td><em>Tilletia</em> spp. <em>(T. caries, T. foetida)</em></td>
<td>Seed- and soil-borne spores attack during emergence.</td>
<td>Favoured by cool soil temperatures.</td>
<td>Significant impact on seed quality at harvest as spores spread from diseased to healthy seeds. Reduced emergence; soil-borne spores can last for decades.</td>
</tr>
<tr>
<td>Common root rot</td>
<td><em>Cochliobolus sativus</em></td>
<td>Can survive for years on crop residue and in soil.</td>
<td>Dry, warm soil conditions important for infection. Nutrient stressed plants also vulnerable.</td>
<td>Severe infection kills seedlings outright. Less severe infection weakens plants and tillers.</td>
</tr>
<tr>
<td>Take-all</td>
<td><em>Gaeumannomyces graminis</em></td>
<td>Survives on crop residue. Roots can be infected any time during season as they grow through infected residue.</td>
<td>Most prevalent on wheat seeded 2 to 4 years in a row. Favoured by cool, wet conditions, alkaline soils and nutrient deficiency.</td>
<td>Once symptoms become obvious, yields can be reduced by 50%.</td>
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Insect Management
The most significant insect pests affecting cereal stand establishment on the Prairies are wireworms and cutworms. As with most insect pests, infestations are very hard to predict because of changing weather conditions. No-till fields can also be very amenable to buildup of soil insects because they offer a diverse range of food sources and less tillage to expose larvae to predators, or simply drying out.

An effective insect management plan is based on several factors:

1. **Proper identification of the pest at various stages of its life cycles.** For example, large numbers of click beetles, the adult stage of the wireworm, were observed in the western Prairies in 2004. This indicates a potential for increased risk of damaging levels of wireworm larvae.

2. **Accurate diagnosis of damage.** For example, low level cutworm or wireworm damage, which results in reduced emergence, is often mistaken for poor seed quality or drought. Only digging into the soil will tell you definitively if insects or weather are the problem.

3. **Understand what control measures are possible.** Cutworms, for example, can be controlled with a foliar insecticide application once damage becomes visible. But the only defence against wireworms is seed treatment. By the time wireworms are found in an emerging crop, there is no “quick fix”, only a need to consider management options in the following years.

4. **Stay current with new information.** New research from Agriculture and Agri-Food Canada is providing a better understanding of wireworms, their life cycle, factors influencing their outbreak, and their response to the new seed treatments.
CUTWORMS

Identification. The pale western cutworm larvae are about 1 1/4-inches long, greenish or slate-grey, with a brown head. Red-backed cutworm larvae are about 1 1/2-inches long, dark grey with two broad, dull red stripes down the back. Cutworm larvae curl up when disturbed.

Lifecycle. These species of cutworm overwinter as eggs, which hatch in April and early May. The larvae feed on the young crop until June, then burrow into the soil to pupate. Adult moths emerge from August to September and lay eggs either in the soil (pale western) or in stubble (red-backed).

Feeding damage. Both species of cutworm go through about six growth stages in the larval period from April to June. Holes and notches eaten into plant leaves are typical of feeding damage caused by small, young larvae; older cutworms eat into plant stems, literally cutting seedlings off at the soil level. Bare patches in the field, particularly on hills and south-facing slopes, are a key indicator of cutworm damage, and can be easily mistaken for poor germination. If you suspect cutworms, dig around the roots of plants on the edge of a bare patch, and look for larvae in the first two inches of soil.

Cutworm damage vs. wireworm damage

Cutworms: plants are usually cut off completely at or near the soil surface.
Wireworms: plant is wilted and discoloured but remains attached to the root.

Geography. Pale western cutworms are a concern in southern growing regions, while the red-backed species are more prevalent in northern areas.

Control. Pesticide sprays can be used locally in those areas of the field where cutworms are still actively feeding. Spraying is most effective when done in the evening as cutworms feed most actively at night. Today’s seed treatments will not control cutworms.
**WIREWORM**

**Identification.** Larvae have hard, smooth, slender jointed bodies. They are usually dark coloured, though some are yellow or white. They have three pairs of legs behind the head, and the last abdominal segment is flattened with a keyhole-shaped notch. Full-grown larvae range from ½ inch to 1½ inch in length. Adult wireworms are known as click beetles because of the distinct clicking sound they make as they flip into the air after being overturned.

**Life cycle.** Wireworms overwinter as larvae. Adult beetles emerge in the spring, from late May through June. Female beetles lay 200 to 1,400 eggs in loose or cracked soil and under lumps of soil. Larvae hatch, then spend the next two to six years feeding on the roots of host plants.

**Feeding damage.** Seeds are often hollowed out and seedlings killed. Stems of young seedlings are shredded, usually causing the central leaves to die. Damaged plants soon wilt and die, resulting in thin stands. Wireworms tend to feed along a crop row, so if a section of a single row is damaged, dig to check for wireworms. The feeding damage is mainly underground and leaving wounds where disease pathogens can enter and attack plants.

**Wireworm damage vs. cutworm damage**

Wireworms: plant is wilted and discoloured but remains attached to the root.

Cutworms: plants are usually cut off completely at or near the soil surface.

**Geography.** Wireworm pest species can be found across the Prairies. However, infestation may vary considerably, even over a single field or farm, since larvae tend to remain where they hatch. There are usually wireworms in all stages of development in an infested field, since the larval stage can take several years to develop.

**Control.** An action threshold of about 32 wireworms per square metre is often recommended. If wireworms are found at this or a higher density, a dual-purpose seed treatment is usually warranted in following years.
APPENDIX I – SEED TREATMENT CHOICE

The primary factor in selecting a seed treatment is usually seed- and soil-borne disease control. Since one or more diseases are almost always present, treating cereal seed with a product that provides broad spectrum protection is a basic step in ensuring strong stand establishment.

You also need to consider if you need a seed treatment that includes wireworm protection or not. To make this decision, an accurate diagnosis of the pest in the previous year is required. Ask yourself the following questions:

1. Have you experienced wireworm pressure in previous cereal rotations? □ Yes □ No
2. Are cereal crops being seeded into recently broken sod? □ Yes □ No
3. Are cereal crops being seeded into cereal stubble? □ Yes □ No
4. Do cereal crops sometimes show areas of unexplained poorer plant stands? □ Yes □ No
5. Are you now farming land where information on previous management is sketchy? □ Yes □ No
6. Do you typically seed early (late April, early May) when environmental conditions can slow plant growth? □ Yes □ No

HIGHER RISK. If you answered “yes” to most of these questions, you may be at higher risk of reduced stand establishment due to wireworm damage in the coming spring and you should consider a cereal seed treatment that includes an insecticide.

DUAL-PURPOSE SEED TREATMENT OPTIONS. Dividend Supreme™ Pak, contains a new generation insecticide thiamethoxam that provides protection against early season wireworm attack in wheat and barley, resulting in stronger plant stands and the potential for bigger yields. Dividend Supreme Pak is only available from certified commercial treaters in western Canada.
APPENDIX II – APPLICATION CHOICES FOR SEED TREATMENTS

Since most wheat and barley seed is treated on-farm, wheat and barley growers have a major influence on the application accuracy of their seed treatments. Today’s treating systems have significantly improved over the old method of dripping seed treatment into the auger, which often resulted in spotty coverage and significant waste of product. However, even with improved equipment, operator skill remains by far the largest factor in achieving optimal loading and uniform coverage of seed during on-farm treatment operations.

With cereal grains, the primary application may typically only coat about 30% to 40% of seeds. Coverage of the remaining seed is the result of mixing the treated seed as it travels from the treater through an auger. Run the auger at full speed, keeping the grain flow at 50% to 75% capacity to ensure adequate mixing. Increased mixing by aggressive augering is usually not an option due to increased risk of mechanical damage to seed. Instead, focus on ways to improve initial loading and coverage.

On-the-go seed treaters are another option. By applying seed treatment on the seeds’ way through the air drill, you only treat as much seed as is actually needed for that crop, so there are no “leftovers”. The seed coverage achieved by these units is typically very good, but another issue, daily equipment maintenance, becomes the key factor in achieving proper coverage. The peristaltic pumps used in these units operate best when kept free of product residue, so units should be drained and flushed every night to ensure effective seed coverage.
APPENDIX III – SEEDING DECISIONS

The bottom line with cereal stand establishment is that the healthier and more vigorous the plants are at the beginning of the season, the better able they are to outgrow early season stresses. The slower young cereal seedlings grow, the more vulnerable they are to environmental conditions. The seeding decisions you make in the spring can have a significant impact on whether or not your crop gets out of the ground quickly and off to a great start. Use the chart below to quickly assess low risk vs. high risk seeding practices. Choose as many practices as possible from the left hand column to improve cereal stand establishment and, therefore, your crop’s potential for success.

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>High Risk</th>
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<tbody>
<tr>
<td>- Long rotations (cereal every four years)</td>
<td>- Short rotations (cereal every two years or less)</td>
</tr>
<tr>
<td>- Soil temperature 5 C or higher</td>
<td>- Soil temperature less than 5 C</td>
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<tr>
<td>- Seed early (mid-May)</td>
<td>- Seed very early (late April, early May)</td>
</tr>
<tr>
<td>- Seeding rate set according to seed size and quality</td>
<td>- Traditional seeding rate</td>
</tr>
<tr>
<td>- Optimum seeding depth of 1 to 2 inches</td>
<td>- Deep seeding (greater than 3 inches)</td>
</tr>
<tr>
<td>- Uniform seed/fertilizer placement</td>
<td>- Variable seed/fertilizer placement</td>
</tr>
<tr>
<td>- Balanced fertility</td>
<td>- Unbalanced or poor fertility</td>
</tr>
<tr>
<td>- Herbicide rotation practices that minimize risk of carryover</td>
<td>- Herbicide rotation practices that increase potential for carryover</td>
</tr>
<tr>
<td>- Appropriate seed treatment based on risk assessment</td>
<td>- No seed treatment, or inappropriate seed treatment</td>
</tr>
<tr>
<td>- Good knowledge of field history</td>
<td>- Incomplete knowledge of field history</td>
</tr>
<tr>
<td>- Careful diagnosis of emergence problems</td>
<td>- “Drive-by” diagnosis of emergence problems</td>
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IMPORTANT NOTE. Achieving strong stand establishment is the result of an integrated crop management plan that focuses equally on managing disease and insect cycles, minimizing herbicide carryover through proper rotations, managing for optimum plant population through proper seeding practices, optimizing fertility and knowing the long term history of the field. The more low-risk practices you use, the better your chances of achieving strong stand establishment and, ultimately, a high-quality, high-yielding cereal crop.
References

There are a vast number of resources for cereal growers in Western Canada to draw on for valuable, accurate production information. Our sincere thanks to those who assisted with the preparation of this guide – any errors or omissions are ours. If you have questions or concerns about your cereal crop, contact your local agronomic advisers or any one of these resources for help.

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