



agronomy corner

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The First 48: A Seed's Life After Planting

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If one takes a few moments to put Spring Planting into perspective, it really is a complex exercise. There are so many factors – most revolving around field conditions and planter set-up – all of which dovetail into one another. If all factors are optimized, the resulting effort in the field is reflected with a well-established crop. But if one small element is sacrificed, the negative impact on stand establishment can be huge.

Much is made of the planting process as it relates to field readiness and equipment set-up. As a result, the majority of Ontario corn and soybean fields are planted properly, with all elements in place and under control, and the desired full stand is achieved. Growers are very good at making the best of the conditions and variables that they can control.

When planting is done, and the grower leaves the field, it's then up to Mother Nature to establish the crop. Most of the time, she cooperates...however it is nature's way to throw a curve ball at our crops every once in a while. Proper stand establishment is about more than how nicely a field will work and how well the planter performs. It's vitally important to understand what happens to a seed after planting, and the management decisions growers can make to give their new plantings the best opportunity not just to grow, but to thrive and prosper.

The Earlier Planting Trend

There is no doubting the trend towards early planting, although there is such a thing as “too early”...



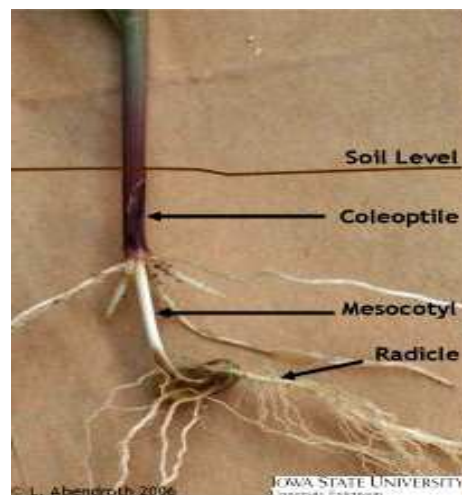
What has fueled the earlier planting trend? A higher percentage of corn acres are planted earlier every year. The need to get started early and spread workload is undeniable, as many farm operations have expanded rapidly in the recent years. Improved genetics offer growers better cold tolerance and spring vigour characteristics, and increased yield potential to reward early planting. Advancements in seed treatments have also enabled growers to plant earlier, and in some cases in less ideal conditions than what would have sufficed in the past. Better farming practices & equipment advancements have also facilitated earlier planting; we prepare better seed beds than 20 years ago, and do a better job planting into it, which allows for quicker germination and stand establishment.

Planting Date: How Early is “Too Early”? Many industry sources cite April 20 – May 5 as the “sweet spot” for planting dates to optimize yield (this may be a few days earlier for longer-season areas of Ontario, and vice versa for short-season regions). Planting earlier than this window can be successful if conditions are good, and most importantly if trend-line temperatures are forecasted to be above normal. If this is the case, the opportunity may be there for increased yields from early planting.

Soil Conditions and Germination Rates

There are two key critical factors that influence the germination rate of a seed:

- **Seed-to-Soil Contact.** Regardless of soil moisture levels, seed-to-soil contact rules the day when it comes to achieving quick, even germination of a crop stand. Seeds with good soil contact can find soil water, even in dry soils. Seeds with minimal soil contact generally have to wait for moisture to come to them, particularly in dry conditions.
- **Soil Temperature.** Better stated, **soil water temperature.** The temperature of the seed’s first drink of water is absolutely critical to the next 2 – 4 weeks of plant development. Generally, soybeans are more sensitive than corn when it comes to this factor. Even if today is beautiful, look at the forecast and relate it to the investment you are putting in the ground.
- **Corn Seedling Development** begins with germination of the seed at a minimum soil temperature of 46°F. This is why Agronomists recommend planting corn at minimum soil temperatures of 50°F, especially with early planting as it doesn’t take long to lose a few degrees from the required soil temperatures. Once the kernel has absorbed 30% of its weight in water, germination and emergence of the radicle root from the bottom (tip) of the seed corn kernel occurs.



While germination and radicle root (downward growth) begin at 46°F, development of the sprout components, the mesocotyl and coleoptile (upward growth) do not begin until soil temperatures reach 60°F. Most of us have seen corn fields that experienced 10 – 14 days of cool temperatures after planting, and found seeds germinated with plenty of radicle root development, but no upward sprouting activity. Many producers will assume a problem with seed quality in this case. However, the reason this is occurring is because soil temperatures hovered above 46°F for germination, but never reached 60°F to achieve sprouting and emergence.

What happens if soil water temperature changes dramatically and rapidly? First and foremost, a soil water temperature reduction of as much as 27°F does not affect germination rate. This confirms the

importance of that first drink of water available to the seed. Such temperature swings will not distort the rate or visual appearance of the germination process.

However, this same temperature swing dramatically impacts the development of the mesocotyl and coleoptile. A rapid drop in soil temperature, such as those induced by near-frost conditions within 2 weeks of planting, can result in distorted development of the seedling. This condition is referred to as Cold Water Imbibitional Injury or Chilling Injury, depicted in the photos below.



Symptoms of this injury are corkscrewing of the mesocotyl and coleoptile, leafing out underground, and generally a mottled or twisting of the sprouted seedling as it approaches the soil surface.

Any delays in mesocotyl and coleoptile development result in delayed emergence. This leaves the corn seed and seedling prone to attacks from insect pests such as wireworm, white grubs, European Chafer, and millipedes. These seedlings are also susceptible to fungal disease infection, although recent advancements in Seed Treatments have resulted in longer-term viability of seeds under these circumstances.

Soybean Seedling Development by its very nature is totally different from corn. A soybean seed requires a soil water temperature of 55°F – 60°F and must uptake 50% of its weight in water to begin germination. With this increase in water uptake, you can understand the increased importance of the temperature of the first drink of water. Ideally, the soybean seed will absorb this water within 6 hours of planting, a remarkable fact in itself. Given this condition, the seed germinates and the radicle root emerges within 2 days.

We stated earlier that dramatic swings in soil temperature do not affect the germination rate of seed corn. However, the same temperature swing wreaks havoc on soybean seed germination rates. A rapid drop in soil temperature stalls or ceases germination, and the process will not resume until soil temperatures sustain the critical 55°F – 60°F range or better.

Delayed germination can substantially reduce stand development depending on field conditions. These delays provide insect pests such as seed corn maggot and wireworm the opportunity to consume and destroy germinating seeds. Likewise, fungal pests such as Pythium, Phytophthora, and Rhizoctonia take advantage of this opportunity to infect seedlings as well, resulting in plant mortality and reduced stand populations and plant vigour.

Management Options to Optimize Germination & Emergence

- **Plant into soils that have achieved and will retain suitable temperatures.** Early planting opportunities are often followed by conditions that drop the seedbed temperature below what is required for rapid emergence. Remember the importance of the first drink of water. Seeds planted into soils with temperatures greater than 50°F within 2 – 3 days prior to the onset of cooler conditions may actually have a better opportunity to thrive than those planted within 12 hours of a cold rain. If you have a suitable percentage (20% perhaps?) of your crop in the ground, consider parking the planter if cooler temperatures and rains are forecast within 24 – 48 hours.
- **Mechanical Activity can increase soil temperature.** In some cases, coulter action from the planter by itself can result in a 2°F – 4°F increase compared to undisturbed soil. Cultivation may warm the seedbed even further.
- **Work the Afternoon Shift.** This is particularly important during soybean planting, if overnight temperatures have been in the low single-digits. Park the planter for the morning, and start during the afternoon when soils have warmed to the required levels. Your soybean seed will appreciate the much warmer first drink of water!
- **Check planting depth and seed placement** several times across the field – especially important in the first few acres planted. Avoid planting too deep early in the season – 1 ½” – 2” (min.) for corn and 1” – 1 ½” (min.) for beans. REMEMBER – seed-to-soil contact rules the day when it comes to achieving quick, even germination of a crop stand. Stopping the planter to ensure the planter is set right will pay more than any other action during the growing season (same goes for stopping to set tillage equipment).
- **Seed Treatments are a must!** For corn, Poncho 250 and Acceleron™ – available on PRIDE G8 hybrids with Genuity™ SmartStax™ technology – provide maximum protection from a broad spectrum of insect and fungal pests. This protection is absolutely critical when emergence is delayed. Likewise for soybeans. CruiserMaxx® Beans offers the most complete broad-spectrum fungicide and insecticide protection package available for soybean producers, and can pay huge dividends in delayed-emergence situations.
- **The PRIDE FX2 System – the combination of Genuity™ Roundup Ready 2Yield™ genetics with CruiserMaxx® Beans seed treatment and HiStick N/T inoculant,** is the soybean grower's best opportunity to achieve success when planting within the “prior-to-May-20th” maximum yield potential window. Genuity™ Roundup Ready 2Yield Technology™ provides unprecedented plant health for more even plant stands when crop establishment is challenged. CruiserMaxx beans offers complete seedling protection including the 60-day window of Soybean Aphid control. Adding HiStick N/T inoculant, with BioStacked technology, ensures the soybean seedling adequate nodulation potential during cold-stress periods, optimizing Nitrogen uptake and plant potential. This package offers the grower the opportunity to plant in the high-yield window, with the proven potential to achieve 15% more yield.

Remember patience is critical – critical in waiting until your soils are fit, critical in stopping the planter if the forecast is for cold weather within a day and critical in stopping to properly set your equipment.

Early Planting opportunities can provide big dividends if the proper investments in genetics, traits, treatments, and cultural practices are utilized. Keeping these points in mind and talking to your PRIDE SEEDS Seed Professional or Agronomist regarding the best recommendations for early planting will go a long way to a successful crop establishment.

Happy Planting, and Warm Growing!

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