Walking Your Fields®

Welcome to the first issue of *Walking Your Fields*® newsletter for the 2015 growing season. On behalf of your DuPont Pioneer Agronomy team, we will be producing this newsletter on a monthly basis through to October. For more detailed agronomic information please feel free to contact your local Pioneer Hi-Bred sales representative or check out ***www.pioneer.com***.

Seed Size and Emergence

Every spring the question of "what seeding rate do I need to maximize my net profits?" is the top of every grower's mind. The idea of using a flat rate pound per acre (ie. 5 pounds per acre (lb./ac.)) for seeding cannot be applied with today's hybrids as a result of variable seed size.

The thought process needs to be centered on targeting an "X" amount of seeds planted to obtain an average 7-14 plants/square foot (ft^2) 21 days after emergence. The Canola Growers Manual (Canola Council of Canada) suggests that the critical plant population in canola is 5 plants/ft^2 with recommended level of 7-12 plants/ft^2 to maximize yield (a minimum of 7 plants/ft^2 acts as a buffer for any in-season losses to protect yield potential). At these suggested levels, yield potential can be maintained despite common in-season stresses (heat stress, hail, insect damage etc.). An adequate plant stand also covers the ground quicker, which will help combat early season stressors like early emerging weeds and insects like flea beetles and cutworms.

As seed size can vary from seedlot to seedlot, calibration becomes part of the seeding process when thousand seed weight (TSW)

Inside this issue:

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Continued from page 1

varies by more than 1 gram (g). At any set seeding rate, the typical emergence rate is around 50-60%, depending on field conditions. The traditional seeding rate of 5lbs/ac at a 6 g TSW using 50% emergence will only potentially give you 4.3 plants/ft^2. Increasing emergence to 60% will give you 5.2 plants/ft^2 and 70% emergence will give you 6.1 plants/ft^2. This is above the acceptable threshold for emergence but still below the desired minimum of 7 plants/ft^2.

The shaded areas in Table 1 and Table 2 represent plant populations adequate to ensure optimum yields under average and optimal growing conditions.

Formula for Setting Canola Seeding Rate Based on Seed Size:

Use this formula to set a seeding rate based on seed size:

Seeding rate (lb/ac) = [9.6 x desired plant density (plants/ft^2) x TSW (grams)] ÷ estimated seed survival (%, expressed as a whole #)

Example: if seed is 4 grams per 1000 seeds (TSW), desired plant population is 10 plants per square foot, and estimated seed survival is 60%, then the seeding rate should be 6.4 lb/ac.
(9.6 x 10 plants/ft^2 x 4.0 g) ÷ 60 = 6.4 lb./ac (7.4 kg/ha)
Rates of survivability: A good starting point is 50-60%.

Table 1: Plants Per Square Foot Under GOOD Seeding Conditions

Seed Survival = 75%

Thousand Seed Weight (grams)	Seeding Rates (lb/ac)				
	3	4	5	6	7
2.5	9.4	12.5	15.6	18.8	21.9
3	7.8	10.4	13.0	15.6	18.2
3.5	6.7	8.9	11.2	13.4	15.6
4	5.9	7.8	9.8	11.7	13.7
4.5	5.2	6.9	8.7	10.4	12.2
5	4.7	6.3	7.8	9.4	10.9
5.5	4.3	5.7	7.1	8.5	9.9
6	3.9	5.2	6.5	7.8	9.1

Table 2: Plants Per Square Foot Under AVERAGE Seeding Conditions

Seed Survival = 50%

Thousand Seed Weight (grams)	Seeding Rates (lb/ac)				
	3	4	5	6	7
2.5	6.3	8.3	10.4	12.5	14.6
3	5.2	6.9	8.7	10.4	12.2
3.5	4.5	6.0	7.4	8.9	10.4
4	3.9	5.2	6.5	7.8	9.1
4.5	3.5	4.6	5.8	6.9	8.1
5	3.1	4.2	5.2	6.3	7.3
5.5	2.8	3.8	4.7	5.7	6.6
6	2.6	3.5	4.3	5.2	6.1

Canola Seed Rate Calculator

(Available for iPad® and iPhone®)

The Pioneer Canola Seed Rate Calculator can easily estimate canola seeding rates and final stand. It will help you calculate your target seeding rate in pounds per acre and allow you to make adjustments for seed size, germination, survivability and row spacing.

So what critical factors do we need to think about to maximize emergence?

- Start with your drill – is it ready to go, is it level and are all openers in good shape?
- Take a sample of the seed after it has passed through your seeding tool – is there visible damage? Then look at your wind speed.
- **Soil Temperature** – use a minimum 5ºC as the starting point at seed depth (if lower, increase your seeding rate)
- **Seed Depth** – target ½ inch to 1 inch below the press wheel furrow. Be sure to check your depth in the field as you seed and when you move to other fields.
- **Slow Down** – there is no "correct" speed but the ideal seeding speed is the one that consistently plants the majority of the seed at the ideal seeding depth. Slowing down allows for the openers to establish a seed shelf as well as maintain fertilizer and seed separation.
- **Fertility with the seed** – Phosphorous (P) is critical for early seedling growth. Place a small amount of starter P with the seed (5-7 lb./ac actual) to encourage early seedling growth and place the remaining in the fertilizer row. Minimize nitrogen and avoid potassium in the seed row as too much salt can cause toxicity and inhibit germination.
- **Scout** early and often for insects such as flea beetles and cutworms.
- **Apply a pre-seed herbicide application** for early emerging weeds to minimize weed pressure on the developing canola plants.

Remember, this is a very small seed going into a harsh environment and the quicker the plant can germinate and emerge the better the survival changes.

Any questions, please contact your local Pioneer Hi-Bred sales representative.

Source: Canola Council of Canada (tables and calculation)

Adequate canola emergence

Better canola emergence

Poor canola emergence

Soybean Stand Establishment and Seeding Rate Considerations

Introduction

Establishing healthy, uniform stands is important to maximize soybean profitability, even though soybeans respond to reduced stands better than many other crops.

Increased lateral branching can compensate for lower stands that are still relatively uniform (such as stand shown at right), but only partially for gaps.

Because of the numerous factors that affect soybean stand establishment, optimum seeding rates vary considerably by region, cropping practice and field.

Listing factors known to influence stands in each field, and adjusting seeding rates to account for potential stand losses is a practical way to make the best seeding rate decisions.

Use of seed treatments improves stand establishment and uniformity by protecting seeds and emerging seedlings from biotic causes of stand loss including disease infection and insect feeding.

Stand issues due to abiotic causes: crusting, residue interference, other seed-soil contact issues, cold water imbibition, hail, etc. are not remediated by seed treatments.

This article will discuss factors affecting soybean stand establishment and how to adjust seeding rates to compensate for common losses of stand.

Stands that emerge uniformly with no large gaps or skips have highest yield potential.

Western Canada Seeding Rate Distribution

Each year, DuPont Pioneer conducts a grower survey that documents soybean seeding rates used by customers on their soybean acres. Below are 2014 Western Canada results:

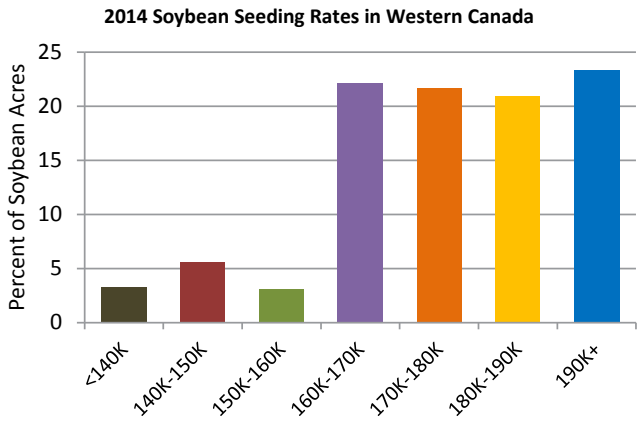


Figure 1. Seeding rate distribution by percent of soybean acres planted in Western Canada. Source: 2014 DuPont Pioneer brand concentration survey.

Figure 1 shows that 23% of soybean acres in Western Canada are planted at 190,000 seeds/acre or above, and an additional 65% of acres are planted at 160,000 to 190,000 seeds/acre.

Differences in soil type, tillage/residue cover, planting equipment/row width, planting date, variety/maturity group, local disease risks, grower preferences, etc., lead to this diversity of rates within provinces or regions.

Factors Affecting Soybean Seeding Rate

The primary factors affecting soybean seeding rate in Western Canada are listed below. Agronomists suggest increasing seeding rates by 5% to 10% for factors that reduce stand.

Soil type. Soils with high clay content are much more likely to crust and restrict soybean emergence. Low-lying clay soils (i.e. "lake-bed clays") often remain wet in the spring, favoring certain seedling diseases, most notably Phytophthora and Pythium.

Tillage / residue cover. No-till systems provide a less hospitable environment for soybean emergence due to colder soils, higher residue levels , and a rougher surface for planters to navigate.

Planter or drill. Planters have traditionally done a better job of seed singulation and placement, increasing plant counts and stand uniformity. Growers using drills may need higher seeding rates to establish equally productive stands.

Soybean stand reduced by a soil crust at emergence.

Row width. Higher seeding rates have traditionally been recommended for narrow-row soybeans.

Planting date. Early planting usually means colder, wetter soils and slower emergence. These factors commonly reduce stands. Soybeans planted very late, including double-crop beans, require higher rates because they are destined to be shorter and consequently produce fewer pods.

Soybean maturity group. Studies have shown that very early soybean varieties (MG 00, 0 and 1) require higher populations to optimize yield.

Iron deficiency chlorosis risk. Recent research studies have shown that increasing seeding rates can result in reduced chlorosis symptoms.

Seedling disease risk. Some region have higher seedling disease risk due to soil types, weather patterns, and pathogen race shifts. Higher seeding rates are needed to establish target stands in areas or fields with a history of higher disease risk. In fields with a high risk of white mould, very high seeding rates are not recommended.

Calculating Seeding Rate

After deciding on a final stand target, the grower must account for non-germinating and non-emerging seeds to calculate his seeding rate, according to the following equation:

$$\text{Seeding rate} = \frac{\text{Targeted final stand}}{(\%\ \text{germination} \times \%\ \text{emergence})}$$

Example 1

In order to reduce gaps, maximize profitability and minimize replant risk, a grower planting a maturity group 00 soybean variety in 15-inch rows in a well-tilled seedbed in mid May targets a final stand of 160,000 plants/acre.

The seed tag indicates that germination is 90%, and because he is planting under relatively good conditions, he estimates emergence at 90%. His seeding rate is calculated as:

160,000 / (.90 x.90) = 160,000 / 0.81 = **197,500 seeds/acre**

Example 2

A grower drilling a maturity group 006 soybean variety in 7.5-inch rows in a no-till field in mid May targets a final stand of 170,000 plants/acre.

Because he is planting early in a no-till system, he anticipates cool soils and potential seedling disease challenges. Consequently, he estimates % emergence at 85%.

The seed tag show that germination is 90%. Thus, his seeding rate calculation is:

170,000 / (.90 x.85) = 170,000 / 0.765 = **222,000 seeds/acre**

Agronomic Advantages of Maintaining Moderate to High Seeding Rates

Thicker seeding rates can enhance plant and pod height, which is especially important on sandy soils or with late-planted or earlier maturity soybeans that tend to have shorter plants.

Quicker canopy closure due to higher seeding rates can also benefit in weed control strategies by providing shade to slow down or inhibit weed emergence and early growth.

Higher seeding rates can provide a buffer against the need to replant due to light to moderate stand reduction events such as hail.

Higher seeding rates enable quicker canopy closure, which can be a benefit in drought and/or heat prone environments. High levels of heat reflected from the soil surface can reduce early vegetative growth.

Soybeans emerging uniformly even though conditions are less than ideal in this dry, cloddy seedbed.

1 Pioneer® brand products are provided subject to the terms and conditions of purchase which are part of the labeling and purchase documents.

2 Product responses are variable and subject to a variety of environmental, disease and pest pressures. Individual results may vary.

Corn Planter Tune up

Long before the demands of early spring materialize, growers should have their planters tuned and ready to go. This involves going completely through the planter and inspecting all moving parts for wear, damage or rust. The seed meters, seed monitors and seed drop tubes, row units, drive train and other systems should all be carefully examined.

Seed Meters

Finger pick-up type

Finger pick-up meters should be disassembled, cleaned, inspected and calibrated every year, or every other year with low use. The backplate, brush and fingers should be carefully examined and replaced if worn. The seed conveyor belt should be checked for wear, brittleness and cracks. When re-assembling, it is important to set the proper tension on the fingers as described in the owner's manual.

Pioneer's MeterMax operators offer professional meter maintenance and calibration using a planter meter test stand. MeterMax service includes pre-testing of finger meter accuracy, then completely disassembling, cleaning and inspecting each part. Operators will carefully examine the backplate, fingers, brush and conveyor belt for wear. Worn-out parts are replaced, and the meters are re-assembled and tested. Adjustments continue until exacting standards for seed drop accuracy are met.

Vacuum or air type

John Deere VacuMeter and White air planters require the proper seed disk and pressure setting based on the weight of the seed (expressed as seeds/lb.). To calculate seeds/lb., divide the number of kernels in the bag by the weight of the bag (both are on seed tag). Use the owner's manual to identify the proper disk and pressure for the seed weight. Double-check the vacuum setting.

Seed weight can differ between lots of the same hybrid, especially when seed is produced under stress conditions. Keep seed lots separate and be aware of seed weight when switching hybrids or seed lots.

MeterMax technicians can calibrate the vacuum or air pressure setting of your planter and match specific seed weights to proper air pressure settings.

Seed Monitors and Seed Drop Tubes

Seed monitors should be cleaned and checked thoroughly. A bottle brush may be the best tool to rid seed sensors of dirt and seed treatment buildup.

Check seed drop tubes to be sure they are clear and free of obstructions, and not worn by disk openers. Rough edges caused by wear can alter seed drop accuracy. Any hindrance or obstruction that interferes with seed drop can result in poorly placed seeds, even though meters are functioning perfectly. If seed tubes are worn, they may need replacing.

Row Units

In addition to the seed meters, monitors and drop tubes, the other parts that comprise the row unit or affect its function need to be maintained. This includes the tool bar, parallel arms, down-pressure springs, coulters and other attachments, double-disk openers, depth gauge wheels and closing wheels.

Proper function of the row units is critical to achieve good seed to soil contact and help ensure even emergence. Very uneven emergence results in competition of late emerging plants with larger established plants, reducing the yield of late plants considerably. In tough seedbed conditions, including high residue, and hard, dry or cloddy fields, achieving good seed to soil contact is especially challenging.

Row units occasionally receive punishment and may become bent, twisted or misaligned. To check alignment, mark the center point of the row unit on the tool bar. Go out a set distance each way from the center point and then measure the distance to the back corner of the seed box on each side (Fig. 1).To help prevent future misalignment, lift the planter completely out of the ground before turning.

Tool bar. Be sure the toolbar and attached row units are level. The coulters, double-disk openers and closing wheels are all designed to run level, so this setting is very important. Set the toolbar height at 20 inches for correct down-pressure on springs and to help ensure that row units run level and work as designed.

Parallel arms. The parallel arms should be checked routinely, as the bushings and bolts do wear and may need replacing. Down pressure springs are often ignored so check these parts as well. Proper down pressure is needed for uniform seed depth, especially in hard or variable fields. See the owner's manual for correct down-pressure settings.

Coulters and other attachments can impact seed to soil contact, especially with high residue on the field. Coulter depth is important to cut residue cleanly rather than crimping it and pushing it into the seed furrow. Most coulters should be set to run about 1/4 inch above the depth of the double-disk openers. Be sure that coulters and residue attachments are aligned properly with the double-disk openers.

Double-disk openers must be functioning properly to achieve good seed to soil contact. As disks wear, they become shorter and may no longer meet at the bottom. This results in an irregular furrow, shaped like a "W" instead of a "V" (Figure 4.) This can result in variable placement of the seed and improper closing of the furrow by the closing wheels. If disks measure less than 14 ½ inches in diameter, they should be replaced with new disks measuring 15 inches. Determine if disks are meeting properly at the bottom and adjust if necessary.

Depth-gauge wheels. Check depth-gauge wheels to be sure they turn and move up and down freely. Also, be sure the wheels are properly positioned against the opening disks, as this adjustment is overlooked on many planters.

Closing wheels must be centered on the seed furrow. Be sure the wheels turn freely and check the down-pressure exerted on the soil to be sure it is appropriate for the field type (e.g., notill). Drive Train and Other Systems

Because the seed meters are driven by the planter wheels, it is critical that the tires are properly inflated and in good condition. Replacement tires must be similar to the originals, or the population charts in the owner's manual will not be accurate. Check the manual for recommended tire pressure.

Check the planter transmission to verify sprocket settings for your desired plant population. Check all chains for wear and be sure they are properly lubricated and tensioned with no stiff or frozen links.

Figure 1. Checking for bent or twisted row unit.

Figure 2. Set the bar at a ht. of 20" for level planter.

Figure 3. Down-pressure springs hold units in ground.

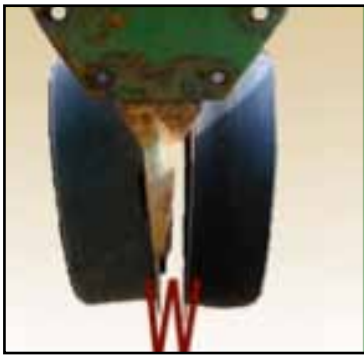


Figure 4. Worn disks affect furrow shape.

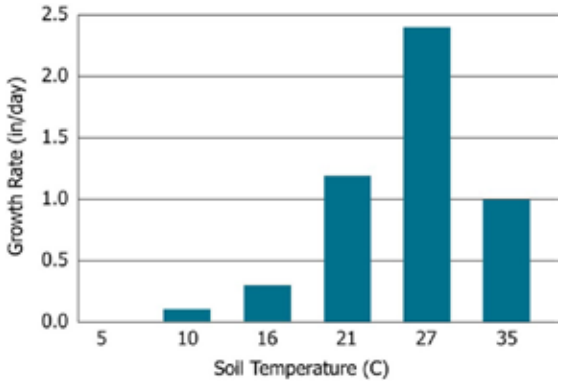
Planter hydraulic hoses and cylinders should be thoroughly inspected for leaks or wear. Planter markers should be inspected and calibrated. Also check planter electrical systems and tractor voltage.

Early Corn Planting Considerations

Factors to Consider Before Planting Corn

1. Soil temperature of at least 10° C at 2-inch depth and preferably a warming trend in the 3-5 day forecast.

- Germination and root development will not occur below 10° C (root growth will be extremely slow even in the low teens's).
- Prolonged exposure to low temperatures reduces seed and plant metabolism and vigor and increases sensitivity to herbicides and seedling blights.
- The risk of chilling injury decreases incrementally as the soil temperature increases above 10° C during the initial imbibition (water uptake).
- Sustained temperatures of -4° C or below can penetrate the soil enough to damage the coleoptile, mesocotyl, or the growing point and cause plant death in seedlings that haven't emerged from the soil.



Prolonged exposure to soil temperatures below 10° C promotes seed deterioration and seedling disease.

Soil temperature at planting is a key environmental component of stand establishment; however, soil conditions after planting are also critical.

2. Minimum of 24-hours of rain-free following planting.

- When a dry seed imbibes cold water (typically 10° C or below), imbibitional chilling injury may result (causing corkscrewed shoots, fused coleoptiles, premature leaf emergence underground & other germination oddities).
- Cold water can also cause cell walls in the germinating seed to rupture. Ruptured cells can have ill-effects developing seedlings and can also attract disease pathogens and insects.

Coleoptile injury from freezing temperatures.

3. Avoid planting right before a period of large temperature swings.

- Even if the "average" soil temperatures are above optimum, seedlings can be adversely affected by wide swings in soil temperatures. Affected seedlings will have stunted and distorted leaves and may or may not emerge from the soil.
- Research has shown that a swing of soil temperatures of more than 15° C (soil high temperature minus soil low temp-erature > 15° C) may adversely affect mesocotyl growth.
- Sandier soils can often be planted earlier in the spring because they dry out faster than heavier soils; however, sandy soils tend to experience wider temperature fluctuations, especially on clear nights with cold air temperatures.
- The effect of adverse conditions can and does vary from seedling to seedling, causing erratic and uneven stands.

Cold-temperature induced "corkscrew" damage symptoms.

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Hanmer Seeds Ltd.
Govan (306) 725-7544

Headland Farm Solutions Ltd.
Grenfell (306) 541-3213

Murray Chutskoff
Kamsack (306) 542-7205

Mandziak Ag Corp.
Kelliher (306) 795-7510

Full Throttle Farms Ltd.
Kerrobert (306) 460-0078

Pearl Creek Ag Ltd.
Kilally (306) 720-0324

B & B Ag Solutions
Kindersley (306) 460-4903

Sproat Agro Ltd.
Kipling (306) 550-2247

Gerwing Ag Ventures Inc.
Lake Lenore (306) 231-9364

Andrew Monchuk
Lanigan (306) 365-7404

Looks Custom Spraying Ltd.
Lloydminster (780) 205-4068

Tennille Wakefield
Maidstone (306) 903-7333

Christopher Lincoln
Maryfield (306) 646-7661

Wilfing Farms Ltd.
Meadow Lake (306) 236-7797

Wyett Meyers
Meath Park (306) 940-7547

Kroeker Farm Seed & Sales Ltd.
Medstead (306) 883-9382

Vandertweel Holdings Ltd.
Melfort (306) 921-0124

Carlson Seed
Melville (306) 728-7848

Philip Mansiere Enterprises Ltd.
Meskanaw (306) 921-7901

Ryan Mansiere Enterprises Ltd.
Meskanaw (306) 229-8588

Annex Agro Ltd.
Milestone (306) 540-5858

RA Garland Agro Inc.
Moose Jaw (306) 690-7840

Terrance McKee
Moose Jaw (306) 631-1894

Skully Ag Corp.
Moosomin (306) 435-9083

Hickseed Ltd.
Mossbank (306) 354-7998

Hetland Seeds 1996 Ltd.
Naicam (306) 874-7815

Nachtegaele Agri Services
North Battleford (306) 441-6577

Troy Moroz
Pelly (306) 594-7679

Scott Klemp
Pense (306) 529-6658

DC Agro Ltd.
Plenty (306) 932-7244

Arrow Crop Management
Regina (306) 520-8202

RisRock Ag Services Inc.
Rockhaven (306) 843-7109

Soil Sense Inc.
Rosetown (306) 831-9949

Mountain View Ag Ventures Inc.
Ruthilda (306) 291-8744

Adam Littman
Saltcoats (306) 744-7708

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Saskatoon (306) 230-2552

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Shaunavon (306) 297-7475

Sebulsky Farms Inc.
Sheho (306) 269-8050

Cookson Ag Services Ltd.
Shellbrook (306) 747-9086

Pays De Dieux Seeds Ltd.
Spalding (306) 874-8194

MJM Ranches Ltd.
St. Walburg (306) 248-3356

Meridian Ventures Inc.
Tisdale (306) 873-8892

Mahussier Ag Ventures
Tisdale (306) 813-7799

Prairie Crop Resources Inc.
Unity (306) 228-8115

Ardell Ag Corp.
Vanscoy (306) 229-1224

Kenzie Seeds
Wadena (306) 338-8150

Stream Stick Farms Ltd.
Waldheim (306) 232-2206

Cam Stokke
Watrous (306) 946-8108

W M Hicks Farms Ltd.
Watrous (306) 946-8151

Red Sky Seed & Supply Ltd.
Webb (306) 774-9920

Quantum Agrology Services Inc.
Weyburn (306) 891-9757

Rod Sveinbjornson
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