SASKATCHEWAN pulse Growers

SASKATCHEWAN PULSE CROPS

Seeding and Variety Guide

2018

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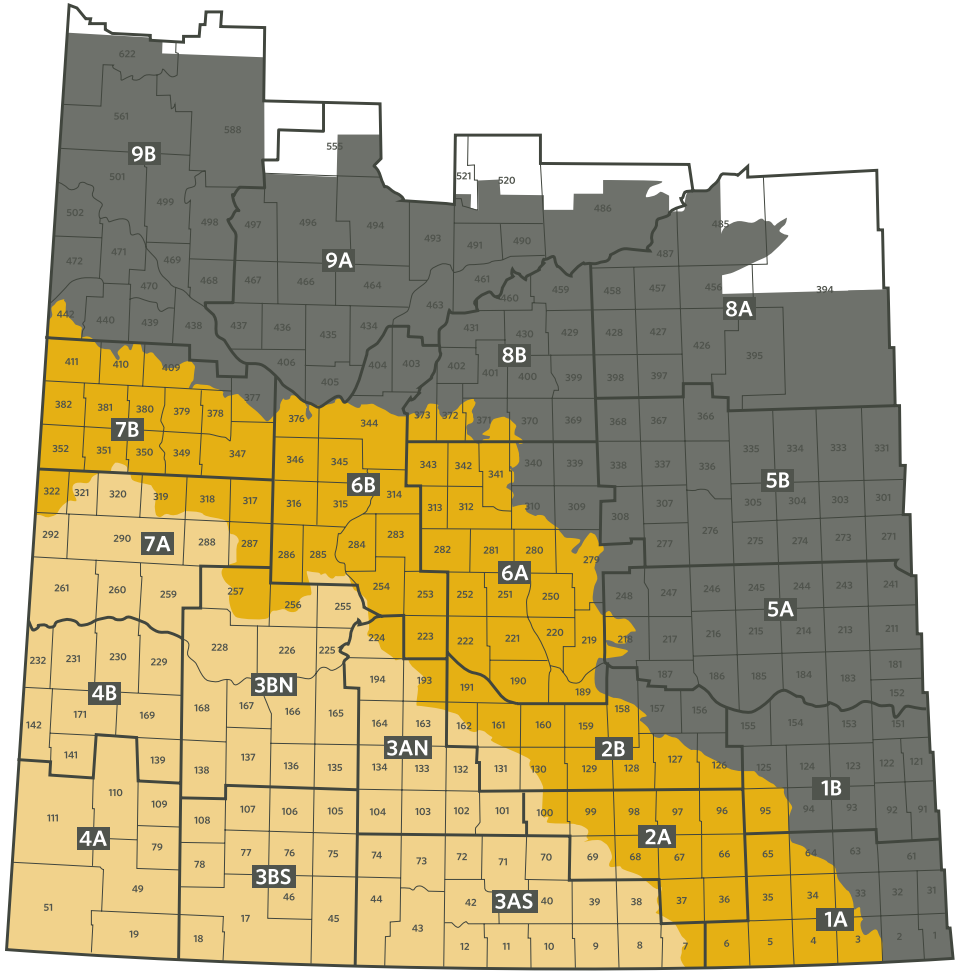
PULSE CROP ADAPTATION IN SASKATCHEWAN

Choosing the right pulse crop for your area and appropriate seeding dates

When choosing the right pulse crop for your area, consider the soil and climatic zone where the crop will be planted, and local growing conditions. Use suitability maps as a guide, such as Saskatchewan Crop Insurance Corporation maps and varietal information.



Soil Zones in Southern Saskatchewan

Brown ***Dark Brown*** ***Black/Grey***

Source: Saskatchewan Crop Insurance Corporation

Field Peas

Field peas can be grown across Saskatchewan, but do not like excess moisture or salt-affected soils. Choose fields that drain well. Peas and lentils are more susceptible to *Aphanomyces* root rot compared to faba beans, chickpeas, and soybeans.

Lentils

Lentils are better adapted to the southern and west central part of the province in the Brown and Dark Brown soil zones. The introduction of new market classes and breeding for more determinate varieties (red and small green), has extended lentil production into the Thin Black and Black soil zones. In the moist Black and Grey soil zones, it is often too wet for consistent production of high quality lentils. Excess moisture aggravates disease problems and delays maturity.

Chickpeas

Chickpeas are best adapted to the Black and Dark Brown soil zones in Saskatchewan. They are not well adapted to saline soils, high moisture areas, soils with high clay content, or soils that are slow to warm in the spring. Chickpeas grow best on well-drained soils with about 15 to 25 centimetres of seasonal rainfall. The long growing season and indeterminate growth habit of Kabuli chickpeas limits production in other areas of the province. Desi chickpea varieties have a shorter growing season and mature earlier than Kabuli varieties. They be extended into the moist Dark Brown soil zones if grown on stubble or lighter textured soils. Chickpeas are deep rooted and can access water from a greater depth than other pulse crops. Disease resistance, specifically to *Ascochyta* blight, is an important factor in variety selection.

Faba Beans

Faba beans do best on medium textured soils that are well drained, but are able to maintain soil moisture. They are best adapted to the Black soil zones and the northern portions of the Dark Brown soil zones of Saskatchewan. Faba beans respond well to irrigation and can tolerate flooding better than peas, lentils, or chickpeas. The crop is highly resistant to lodging, can provide stubble over the winter months, and can provide more reliable production than field peas in regions that are too moist for peas.

Faba beans require good moisture during germination, as well as flowering and pod fill stages, and therefore are not suited to drier parts of the province. They also prefer cooler temperatures (optimum range for growth is 18–27 degrees Celsius), and pod set can be reduced when temperatures exceed 27 degrees Celsius.

Dry Beans

Dry bean production in Saskatchewan occurs primarily in irrigated areas near Lake Diefenbaker. Beans are best suited to medium-textured loam soils in regions that are not prone to late-spring or early-fall frosts. Because the crop has no frost tolerance, areas that are prone to spring frost should be avoided. Beans require warm, moist soil conditions for germination and emergence, and are very sensitive to salinity, soil structure problems, and saturated soils. Choose level fields with good drainage and low levels of soil salinity.

Soybeans

Soybeans are grown mainly in the Dark Brown and Black soil zones in Saskatchewan on medium-textured loam soils. They can be grown on clay soils under favourable conditions for emergence. Soybeans do not perform well under dry conditions, so sandy soils are not ideal. Moisture during pod-set in August is important for maximizing yield. Soybeans are susceptible to spring frost and require warm, moist soils for quick germination and emergence.

Spring Frost Tolerance

Lentils, peas, and faba beans have growing points below the soil surface during early stages of growth, which means the plants can recover from frosts that damage the above-ground portion of the plants. With regrowth, expect delays in crop staging and maturity, and avoid herbicide applications until plants have had a chance to regrow. Lentil and pea seedlings can survive temperatures of -4°C to -6°C. Dry beans and soybeans have main growing points above-ground and can be severely damaged or killed by spring frosts. Chickpeas do have growing points below soil surface during early growth similar to peas and lentils. However, chickpeas require warmer soil which means seeding dates are later than they are for peas and for lentils, which reduces the risk of spring frosts.

Temperature Requirements for Seeding for Various Pulses

CROP	RECOMMENDED MINIMUM AVERAGE SOIL TEMPERATURE AT SEEDING DEPTH (°C)	ESTIMATED SEEDING DATES FOR SASKATCHEWAN	RECOMMENDED SEEDING DEPTH IN CM (IN.)
Peas	5°	Mid-April to Mid-May	3–8 cm (1.2–3.2")
Lentils	5°	Mid-April to May	2.5–7.5 cm (1–3")
Chickpeas	7° (Desi) 10° (Kabuli)	Prior to May 25	3.5–6 cm (1.5–2.5")
Faba Beans	3°–5°	Mid-April to Mid-May	5.1–7.6 cm (2–3")
Dry Beans	12°	May 25 to June 5	5–6 cm (2–2.5")
Soybeans	10°	May 10 to May 25	1.9–3.8 cm (0.75–1.5")

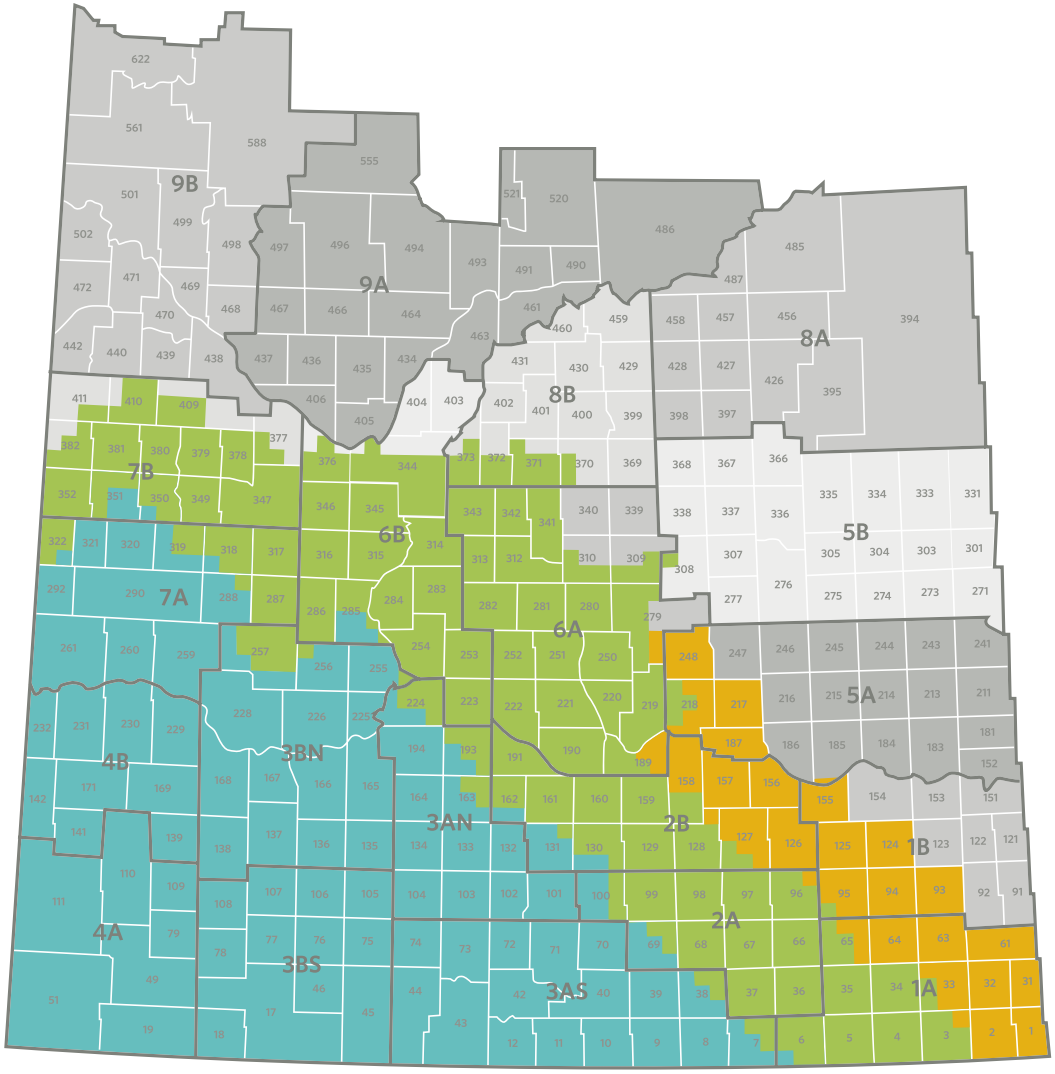
Source: Saskatchewan Ministry of Agriculture

Pulse Seeding Reminders

- Target a seeding rate based on the final plant population desired.
- Consider factors that could reduce emergence and adjust seeding rates accordingly: soil temperature, seed quality, environmental conditions, moisture availability, and soil type.
- Ensure you do not exceed the maximum safe rates of seed-placed fertilizers.
- Handle pulses with care as seed coats are susceptible to damage – run augers full and slow, and watch fan speeds on airseeders.
- Base seeding rates on actual thousand kernel weight (TKW), as seed sizes can vary significantly.
- Calculate soybean seeding rates based on number of seeds per acre. Soybeans are sold by seed count.
- Seeding soybeans with a drill versus a planter can affect the starting seeding rate. Start with a higher seeding rate if using a drill versus a planter so that desired plant stand can be achieved.
- Use a seed treatment if seed has a high level of disease, seeds show signs of mechanical damage, or the forecast is for wet, cool environmental conditions that may delay emergence.
- A seed treatment is recommended for all Kabuli chickpea varieties for good emergence and vigour.
- Avoid using chickpea seed if more than 0.3 per cent seed-borne *Ascochyta* is present.
- Seed peas and faba beans early and into moisture.
- Seed chickpeas into warmer soil temperatures to allow for good seed germination (7°C for Desi and 10°C for Kabuli).
- Seed soybeans into warm, moist soils (10°C). Cold soil moisture can reduce soybean germination.

SUITABILITY FOR AREAS OF SASKATCHEWAN

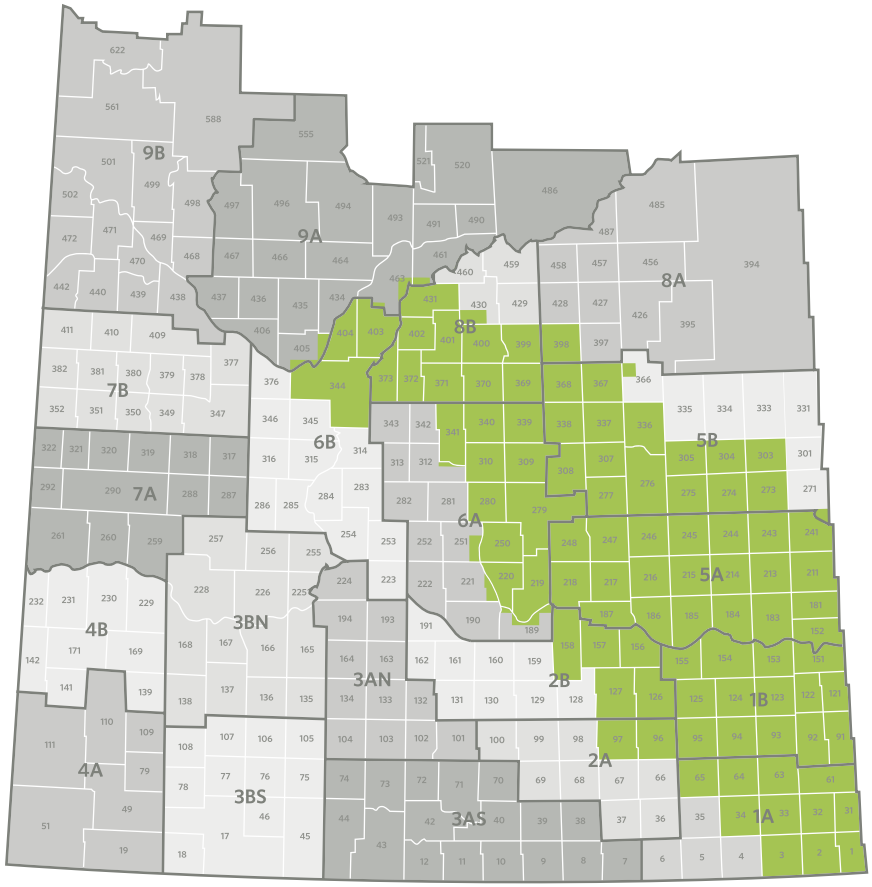
Saskatchewan Crop Insurance Corporation (SCIC) offers insurance for all pulse crops. Maps to the right outline areas of the province where coverage for a particular crop is available. Risk zones may differ in coverage levels so please check with your local SCIC office.



Chickpea Insurable Area

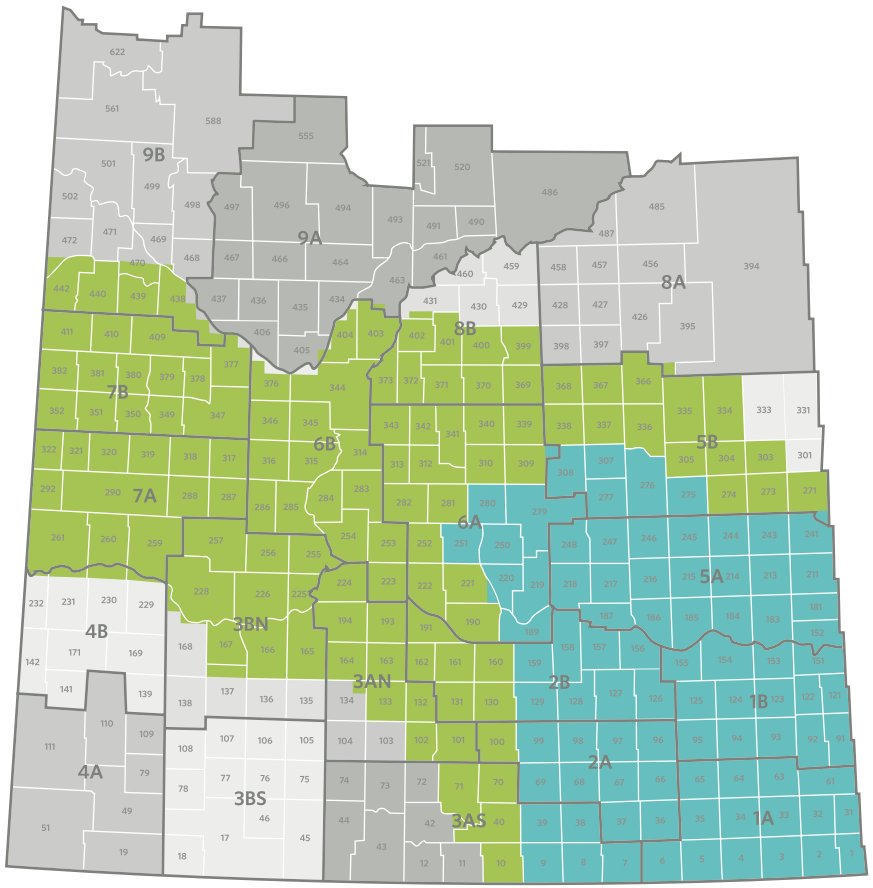
Risk Zone 1 ***Risk Zone 2*** ***Risk Zone 3***

Source: Saskatchewan Crop Insurance Corporation



Dryland Dry Bean Insurable Area

Dryland Dry Bean



Soybean Insurable Area

Soybean Zone 1 ***Soybean Zone 2***

Source: Saskatchewan Crop Insurance Corporation

CALCULATING SEEDING RATES AND PLANT STANDS

Plant population sets the stage for the yield potential of a crop. Research has shown that each crop has an optimum plant density range that producers should target when seeding their crop. Rates may be adjusted depending on the conditions in the field, date of seeding, weed pressure, seed placed fertilizer, and other pressures that may affect emergence or plant stand.

Calculating Seeding Rates

Pulses vary significantly in seed size and not knowing your thousand kernel weight (TKW) could mean seeding too heavy and spending more on seed than needed, or seeding too light and limiting yield potential. Both TKW and germination rate can be obtained with a seed test or measured at home. Emergence rate is more difficult to estimate as it is dependent on germination and environmental conditions. There are also other factors that can affect establishment, such as damage during handling. For pulses, the emergence rates are typically 5–15 per cent lower than the germination rates.

Seeding rates for organic production are much higher than typical conventional seeding rates. Most pulses grown organically are suggested to be seeded at 1.5–2 times the recommended seeding rates to increase competition with weeds. To calculate seeding rates for organic production, use the target plant populations table and multiply the seeding rate by 1.5–2 to determine the seeding rate to target under organic systems.

The following formula will assist you in determining the target seeding rate for pulse crops:

$$\text{Seeding Rate: Kilograms per hectare (kg/ha)} = \frac{\text{(target population per square metre x TKW* in grams)}}{\text{\% field emergence or survival (in whole number, i.e. 85)}}$$

To convert to pounds per acre, multiply the seeding rate (in kg/ha) by 0.89.
**TKW = Thousand Kernel Weight*

Target Plant Populations for Pulse Crops

CROP	TARGET PLANT POPULATION PER SQUARE METRE	TARGET PLANT POPULATION PER SQUARE FOOT
Peas	75–85	7–9
Lentils	130	12
Chickpeas	33–44	3–4
Faba Beans	45	4-5
Dry Beans	33–44 (dryland) 25–30 (irrigated)	3–4 (dryland) 2.3–2.8 (irrigated)
Soybeans	40 (395,360 seeds per hectare)	4 (160,000 seeds per acre)

Calculating Plant Stands

Stand density can be determined after the crop emerges by counting the number of plants in a predetermined area or length of row. A row length of one metre is often used with multiple measurements taken randomly over an area or field. Five measurements per 20 acres is a suggested minimum. Problem areas should be evaluated separately.

Other measurements can be taken using a square or circle of predetermined area such as a metre square, ¼ metre square, (½ m x ½ m), or hoop. In this case the plants within the hoop or square need to be converted to density per square metre or per square foot.

Stand Density
(number of plants per metre squared) = (number of plants per metre row)/(row spacing in centimetres) x 100
i.e. 25 plants per metre row with 10 inch row spacing = 25/25.4 x 100 = 98 plants/m^2

Stand Density
(number per square foot) = (number of plants per foot)/(row spacing in inches) x 12

ROW SPACING (INCHES)	8	10	12	14	16
Row spacing (cm)	20.32	25.4	30.48	35.56	40.64

NUTRIENT MANAGEMENT

Safe Rates of Seed-Placed Fertilizer

Maximum Safe Rates of Seed-Placed Phosphorus (P_2O_5) Fertilizer in Narrow Row Systems* (lbs/ac)

CROP	SAFE RATE (LBS/AC)
Peas	15
Chickpeas	20
Lentils	20
Soybeans	20
Dry Beans	30
Faba Beans	40

**15% seed bed utilization (calculated by dividing width of seed spread from the opener by row spacing)*

Source: Dr. Jeff Schoenau, Department of Plant Sciences, College of Agriculture and Bio Resources, University of Saskatchewan

Phosphorus Management

Phosphorus (P) is an important plant nutrient for pulse crops. Phosphorus promotes the development of extensive root systems and vigorous seedlings. Encouraging vigorous root growth is an important step in promoting good nodule development. It also plays an important role in nitrogen fixation and in promoting earlier and more uniform maturity.

Pulses can export significant phosphorus off the field in harvested grain. If this exported phosphorus is not replaced, soil-phosphorus levels will become depleted over time. Using the chart below, growers can calculate the amount of phosphorus pulse crops may remove in the harvested grain and use this as a guideline for the amount of phosphorus fertilizer to target for application. Phosphorus management for pulses is about replacing what is taken out of the soil and this can be done in the year prior to pulses, during the pulse crop year, after the pulse crop year, or a combination of timings.

Pulses are good scavengers of soil phosphorus due to their ability to alter rhizosphere chemistry and solubilize certain phosphorus compounds. Pulses also establish beneficial relationships with soil organisms like arbuscular mycorrhizal fungi that act to extend the root system and further increase phosphorus uptake. This explains why pulses sometimes do not show a large yield response to phosphorus fertilizer, but can draw down soil phosphorus reserves if not replaced.

Nutrient Removal Rates (Pounds per Bushel)

CROP	NITROGEN	PHOSPHORUS	POTASSIUM	SULPHUR
Peas	2.3	0.7	0.7	0.3
Lentils	2	0.6	1.1	0.2
Chickpeas	–	0.36	–	–
Faba Beans	3	1.2	0.9	0.1
Soybeans	3.8	0.85	1.4	0.2
Canola	1.6	0.8	1.4	0.25
Wheat	1.5	0.57	0.33	0.1

Source: Saskatchewan Ministry of Agriculture, Canadian Fertilizer Institute, Jeff Schoenau, University of Saskatchewan

Nitrogen Management

Although nitrogen fixation is usually sufficient to meet crop needs, soils that are very low in nitrogen, less than 15 pounds per acre (lbs/ac) in the top 12 inches, may benefit from 10 to 20 lbs/ac of nitrogen fertilizer. As a rule of thumb, if soil tests indicate more than 20 lbs/ac of nitrate nitrogen, then no additional nitrogen is needed with most pulse crops. However, dry bean is a relatively poor nodulator and can benefit from higher applications (50 lbs/ac) of starter nitrogen.

Nitrogen Fixation

Pulse crops differ in their ability to fix nitrogen and can be ranked accordingly: 1) faba beans, 2) peas, 3) chickpeas, 4) lentils, 5) soybeans, 6) dry beans. Nitrogen fixation is the process by which *Rhizobia* take nitrogen gas from the air within the soil pores and convert it to ammonium (NH_4), which is then available for use by plants.

Amount of Nitrogen Fixed in Western Canada

CROP	POUNDS (LBS) OF NITROGEN FIXED PER ACRE
Alfalfa	100–250
Faba Beans	80–160
Peas	50–150
Soybeans	40–140
Lentils	30–120
Chickpeas	20–100
Dry Beans	5–70

Source: Dr. Jeff Schoenau, Department of Plant Sciences, College of Agriculture and Bioresources, University of Saskatchewan

Actual amount depends on inoculation/nodulation, environmental conditions, soil available nitrogen, and availability of other nutrients such as phosphorus.

- All pulse and soybean crops require inoculant at the time of planting.
- Use an inoculant that is specific to the crop seeded.
- Scout for nodules between three node and bud formation.
- If nodules are not developed, or have poor development, consider a foliar nitrogen application.

Handling Inoculants

Inoculants are products that contain living organisms and should be handled accordingly. Avoid exposure to direct sunlight, heat, or freeze-thaw conditions. Inoculant formulations consist of seed applied technologies such as liquids, peats, and powders, as well as granular formulations. Single inoculant applications are effective for peas, lentils, chickpeas, and faba beans. For soybeans, it is recommended to use a double inoculation strategy such as a seed applied product in combination with a granular formation, on land where soybeans are being grown for the first time. To date, no benefit of double inoculation on other pulse crops has been identified. Consider application method when using in combination with seed treatments as fungicides can impact *Rhizobia* survival. Read inoculant and seed treatment labels for more information on seed compatibility. For best results, apply seed treatments first, allow the seed to dry, then apply the inoculant if using seed applied products (sequential application).

Rhizobium Species Required for Effective Nodulation Pulse Crops

CROP	RHIZOBIUM SPECIES REQUIRED FOR EFFECTIVE NODULATION
Peas, Lentils, Faba Beans	*Rhizobium leguminosarum*
Chickpeas	*Rhizobium ciceri*
Dry Beans	*Rhizobium phaseoli*
Soybeans	*Bradyrhizobium japonicum*

Source: Inoculation of Pulse Crops, Saskatchewan Ministry of Agriculture

Inoculation

Inoculants contain the nitrogen fixing *Rhizobium* species necessary to ensure nodulation and nitrogen fixation. *Rhizobium* species are specific to each pulse crop as outlined in the table. Pea, lentil, and faba bean inoculants contain the same *Rhizobium* species but the individual strain of that species (similar to varieties of crops) may be more effective on one crop or another.

SEED-BORNE AND SEEDLING DISEASES AND ACTIONS TO MINIMIZE IMPACT

CROPS	DISEASE/PATHOGEN	ECONOMIC THRESHOLD	ACTION IF OVER THRESHOLD
Field Peas **Lentils**	Root rot: *Aphanomyces euteiches*	Soil-borne only	Consider seed treatment if disease history
Field Peas	*Ascochyta* complex	10% on seed	Use seed treatment
Lentils	*Ascochyta lentis*	0% on seed (Black soil zone) 5% on seed (Brown & Dark Brown soil zones)	Use seed treatment
		10% on seed	Do not use seed
	Stemphylium blight	May be detected on seed tests	Unknown
	Anthracnose	May be detected on seed tests (0–0.3%)	Not considered high risk of seed-to-seedling transmission. Do not use infected seed in fields where lentils have never been grown
Chickpeas	*Ascochyta rabiei*	0.3% on seed	Use seed treatment. Do not use seed if over 0.3%
Faba Beans	Anthracnose	Unknown	Consider seed treatment if disease history
	Seed rot/damping off: *Fusarium, Pythium, Rhizoctonia*		
Soybeans	Seed rot/damping off: *Fusarium, Pythium, Rhizoctonia, Phomopsis, Phytophthora*	Unknown	Consider seed treatment if disease history
Field Peas **Chickpeas** **Lentils**	Seed rot/damping off: *Botrytis + Fusarium + Sclerotinia*	> 0 to 10% on seed	Use seed treatment. Do not use seed if over 10%
	Seed rot/damping off: *Rhizoctonia, Botrytis, Fusarium, Pythium*	Soil-borne only	Consider seed treatment if disease history and/or will be seeding under cool, moist soil conditions
Dry Beans	Bacterial Blight	0%	Use bacteria-free seed
	Seed rot/damping off: *Fusariam, Pythium, Rhizoctonia*	Unknown	Consider seed treatment if disease history

Source: Guideline for Seed-Borne Diseases of Pulse Crops, Saskatchewan Ministry of Agriculture

DISEASE MANAGEMENT

Disease resistance is an important trait to consider when selecting varieties. Ratings may be obtained from greenhouse or field evaluations and are based on a five-point scale: Susceptible (S), Moderately susceptible (MS), Intermediate (I), Moderately resistant (MR), and Resistant (R).

Disease Ratings for Varieties

These ratings are now applied across all crops and replace the old ratings of very poor, poor, fair, good, and very good. The ratings are relative as each new variety is compared to existing varieties, and ratings for the new variety are based on whether they show low or high incidence of disease as compared to the existing varieties. Disease pathogens can overcome resistance and variety selection should be combined with agronomic and integrated pest management practices to preserve effectiveness. The rotation of crops and varieties are examples of good management strategies. With diseases, environmental conditions can impact severity. Varieties rated as intermediate (I) can show disease symptoms under favourable conditions, however a variety rated as susceptible (S) would have much more disease under the same conditions. Some diseases are very aggressive and plant resistance to the disease can change over time.

Root Rots and *Aphanomyces*

Root rots can include a complex of pathogens such as *Fusarium spp*., *Rhizoctonia solani,* or *Pythium spp*., and more recently *Aphanomyces euteiches*. There is no indication of differences in susceptibility between varieties or pulse crops for most of the root rot pathogens with the exception of *Aphanomyces.* Currently all pea and lentil varieties are susceptible to *Aphanomyces* root rot. Current faba bean and chickpea varieties have partial resistance and should be considered for fields where *Aphanomyces* has been identified, as long as the crop is suited for that region. Soybeans are another nitrogen fixing crop that has partial resistance to *Aphanomyces.* Soybeans are susceptible to Phytophthora root rot. Best management practices for Phytophthora include selecting varieties with genetic resistance, as well as using a seed treatment that is labelled for control.

Seed Treatments

Seed treatments are registered for use with pulses and should be considered if seeding early into cool, wet soils or when the seed-borne disease levels are above thresholds. The degree of disease control with seed treatments depends on five factors: 1) fungicide active ingredients, 2) rate of application, 3) seed- and soil-borne fungal diseases present, 4) environmental conditions, and 5) quality of seed coverage. Check individual product labels for specifics. Adequate coverage is important to ensure each seed is protected and the seeds are completely covered (especially important with contact type seed treatments).

REGIONAL VARIETY TRIALS

Saskatchewan Pulse Growers and the University of Saskatchewan's Crop Development Centre (CDC) conduct the Pulse Regional Variety Trials in Saskatchewan.

The CDC collaborates with researchers at several locations, including Agriculture and Agri-Food Canada research stations, provincial Agriculture-Applied Research Management sites, and the Canada-Saskatchewan Irrigation Diversification Centre, in order to conduct the trials. The project collects data on varieties from the CDC program, as well as those arising from other public or private pulse breeding programs. Regional Variety Trials in 2017 included 14 pea, 10 lentil, nine dry bean, seven white flowered faba bean, six coloured faba bean, and four chickpea sites across Saskatchewan covering the Brown, Dark Brown, Thin Black, and Thick Black soil zones. The soybean regional trials are coordinated by Saskatchewan Pulse Growers and occurred at 10 Saskatchewan sites in 2017.

For results from the trials, visit **saskpulse.com**.

WHAT TO CONSIDER WHEN SELECTING NEW VARIETIES

There are various factors to consider when selecting a new variety, depending on priorities.

Some factors to consider include:

- **Market** – Identify your target market and make sure the variety selected matches the specifications and quality expected by your buyers, such as seed size, colour, functionality, and other attributes.
- **Maturity** – Identify realistic expectations on maturity needed to achieve optimum yield and quality in your region.
- **Disease resistance** – Select varieties with better resistance for high risk areas or fields. Resistance is a tool that helps with disease management, but may or may not reduce the reliance on fungicide application.
- **Herbicide tolerance** – Consider the weeds or volunteers that may be present in the field to determine if herbicide tolerant options are a good choice.
- **Seed size** – If seed size does not affect the market choice, then consider the seeding costs of the variety. Smaller seeded varieties are usually cheaper to seed and have fewer production issues with plugging seeding equipment and other operations. Faba beans are a good example where seed size may be an important consideration.
- **Crop growth habit and other physiological factors** – Factors such as growth habit (determinate or indeterminate), plant height, standability, harvest management, and quality parameters such as resistance to seed coat breakage and bleaching.
- **Yield** – This is often the highest priority as it directly relates to the ultimate goal of net return. In some cases, the advantages and higher performance of new varieties may not necessarily translate into higher yield, due to environment or management practices. If all other factors have been considered, then use yield potential as the deciding factor.

PLANT BREEDERS' RIGHTS

Plant Breeders' Rights (PBR) Legislation is intended to encourage investment in development and promotion of new, improved, and innovative plant varieties.

Protection of intellectual property rights through Plant Breeders' Rights (PBR) provides a mechanism to maintain control of valuable genetics and secure fair compensation for the investment in breeding. Amendments to the PBR Act came into force on February 27, 2015 and include provisions that bring it in line with the 1991 Act of the International Convention for the Protection of New Varieties of Plants (UPOV 91). This further extends PBR protection to harvested material, therefore liability for crops grown from seed obtained through unauthorized seed sales is extended to the buyer, seed conditioners, and grain buyers. If seed was obtained and used illegally, the breeder or licensed agent can choose to seek compensation, including lost royalty revenue, lost markets, and for court costs on delivered grain produced from that seed.

All stakeholders in the value chain should take precautions to ensure the seed was obtained legally. Purchasing certified seed is a good way to ensure compliance and the use of proper documentation, such as retaining the blue seed tags and signed declarations, is important.

The new PBR Act also takes into account the interest of producers through "Farmer's Privilege." Commercial producers will be able to save seed of PBR protected varieties for use on their own farm (i.e. farm-saved seed) if the original seed was obtained legitimately, however they are prohibited from advertising, selling or trading of seed.

For more information, visit the Canadian Food Inspection Agency and Canadian Seed Trade Association websites and **pbrfacts.com**.

PBR
Progress through Research

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For seed sales outside of Saskatchewan, the distribution agents are:

- SeCan
- SeedNet

International distribution agents are:

- CANTERRA SEEDS LTD. – Chickpeas, Dry Beans, Peas
- FP Genetics – Non-Clearfield® Lentils
- Pulse USA – Clearfield® Lentils, Faba Beans

PEA VARIETIES

Yellow peas are the most widely grown peas in Saskatchewan followed by green peas and then specialty types such as dun, maple, marrowfat, and forage peas. Varieties are suitable for human consumption or livestock feed markets. Nearly all varieties have a semi-leafless leaf type with tendrils instead of leaflets which help provide better standability.

Yellow Peas

CDC Meadow is the leading variety grown, while newer variety **CDC Amarillo**, is increasing in acres due to yield advantages. Amarillo has become the new standard check variety against which all other varieties are compared in co-op testing and regional variety trials (RVT). **CDC Saffron** is also gaining in popularity followed closely by **CDC Treasure**. The highest yielding yellow pea in the southern regions is **CDC Inca** released in 2015. Limited quantities of seed will be commercially available in 2018.

Green Peas

Green pea acres are largely using **CDC Striker**, a variety released in 2002. Newer varieties **CDC Raezer**, **CDC Patrick**, and **CDC Limerick** are increasing in acres. The highest yielding green pea is **CDC Greenwater**, released in 2014. This variety is just becoming commercially available.

Dun Peas

CDC Dakota is the top yielding Dun pea variety. Dun peas have purple flowers, pigmented seed coats, and yellow cotyledons. They are dehulled and sold in human consumption markets similar to yellow pea varieties. The pigmented seed coats provide natural protection against various root rot diseases, so typically dun (and maple) pea varieties are quick to emerge with good stand establishment.

Maple Peas

Maple pea varieties available in Western Canada include **CDC Acer**, **CDC Rocket**, and **CDC Mosaic**. CDC Mosaic has the best lodging resistance and both CDC Acer and CDC Mosaic have a small seed size. CDC Rocket has medium seed size and earlier maturity than CDC Acer and CDC Mosaic. The newest maple pea variety, **CDC Blazer**, was released in 2015 and seed should be widely available in 2019.

Marrowfat Peas

Marrowfat types are blocky, very large-seeded green cotyledon peas used in specialty snack food markets in Asia. They have white flowers and non-pigmented seed coats.

Forage Peas

CDC Tucker, **CDC Leroy**, and **CDC Horizon** are forage pea varieties with high biomass, powdery mildew resistance, good lodging resistance, and semi-leafless leaf type. These varieties produce on average four to five tonnes per acre of forage dry matter, similar to that of forage barley, but with greater protein concentration. Certified seed of all varieties is available.

Red Peas

A new class of red cotyledon peas has emerged and markets are being developed for this small market class. **Redbat 8** and **Redbat 88**, red pea varieties are grown exclusively under contract with ILTA Grain Inc. through Saskatchewan Pulse Growers' Tender Release Program.

CDC Dakota

CDC Blazer

Long-Term Pea Averages for Saskatchewan 2018

Main Characteristics of Varieties

			YIELD AS % CDC AMARILLO							RESISTANCE TO:								
MARKET CLASS	VARIETY	YEARS TESTED[1]	1, 2 & SOUTH 3	NORTH 3 & 4	IRRIGATION	LEAF TYPE[2]	RELATIVE MATURITY	LODGING (1-9)[3]	VINE LENGTH (CM)	MYCOSPHAE-RELLA BLIGHT[4]	POWDERY MILDEW	FUSARIUM WILT	SEED COAT BREAKAGE	BLEACH	SEED COAT DIMPLING[5]	GREENNESS[6]	SEED WEIGHT G/1000	PROTEIN VS. CDC AMARILLO
Yellow	CDC Amarillo	9	100	100	100	SL	M	3.5	85	4.5	R	MR	F	n/a	F	G	230	23.0
	Abarth	7	93	90	92	SL	E	3.5	75	5.0	R	I	F	n/a	G	G	280	-0.1
	Agassiz	9	98	93	100	SL	M	4.5	85	5.0	R	I	G	n/a	F	G	230	0.3
	AAC Ardill	7	102	99	87	SL	M	3.5	85	4.5	R	MR	G	n/a	G	G	230	-1.7
	CDC Athabasca	6	93	99	–	SL	M	3.0	85	4.5	R	I	F	n/a	F	G	300	0.8
	CDC Canary[7]	5	96	98	–	SL	E	3.5	85	4.5	R	I	G	n/a	F	F	230	0.0
	AAC Carver	4	103	101	–	SL	E	4.0	85	5.0	R	I	G	n/a	F	G	240	-1.6
	AAC Chrome	3	105	102	–	SL	M	4.5	75	4.5	R	I	G	n/a	G	G	240	-1.2
	Earlystar	5	92	91	–	SL	VE	5.0	80	5.0	R	I	F	n/a	G	G	210	-1.1
	CDC Golden	9	91	82	90	SL	E	4.5	75	5.0	R	I	G	n/a	G	G	230	0.7
	CDC Hornet	8	91	84	91	SL	M	4.0	85	4.5	R	I	F	n/a	G	G	220	-0.6
	Hyline	3	96	96	–	SL	E	4.5	75	5.0	R	I	G	n/a	G	G	240	-1.5
	CDC Inca	6	104	100	–	SL	M	4.0	85	4.5	R	I	G	n/a	G	F	230	-1.1
	AAC Lacombe	5	98	99	–	SL	M	3.5	85	5.0	R	I	F	n/a	F	F	250	-0.9
	CDC Meadow	9	91	89	90	SL	E	4.0	85	5.0	R	I	G	n/a	G	G	220	-0.6
	CDC Prosper[8]	8	84	79	73	SL	E	4.5	80	5.0	R	MR	G	n/a	F	G	150	-0.7
	CDC Saffron	9	98	91	91	SL	E	4.0	80	4.5	R	I	G	n/a	F	G	250	-0.3
	CDC Spectrum	6	104	102	–	SL	M	3.5	85	4.5	R	I	G	n/a	G	F	240	0.7
	Thunderbird	6	89	83	91	SL	M	4.0	85	5.0	R	I	G	n/a	G	F	220	–
	CDC Treasure	8	88	87	93	SL	E	4.0	80	5.0	R	I	F	n/a	F	G	210	-0.4
Green	AAC Comfort	3	91	99	–	SL	M	4.5	85	4.5	R	I	G	G	G	n/a	250	-0.4
	Cooper	8	89	80	85	SL	M	4.0	80	5.0	R	I	F	F	G	n/a	270	0.9
	CDC Forest[7]	5	100	101	–	SL	M	4.0	85	4.5	R	I	G	G	G	n/a	230	-0.2
	CDC Greenwater	8	99	92	86	SL	M	3.5	90	4.0	R	MR	F	G	F	n/a	230	-1.1
	CDC Limerick	9	95	89	90	SL	M	3.5	85	4.0	R	I	G	G	G	n/a	210	2.8
	CDC Patrick	9	87	85	87	SL	M	4.5	80	4.5	R	MR	G	G	G	n/a	190	-0.9
	CDC Pluto	7	93	83	91	SL	M	5.5	80	4.5	R	I	G	G	G	n/a	160	-0.2
	AAC Radius	6	77	77	–	SL	M	5.0	85	4.5	R	I	VG	G	G	n/a	230	0.5
	CDC Raezer	9	81	81	94	SL	E	3.5	85	5.0	R	MR	G	G	G	n/a	220	-0.3
	AAC Royce	5	92	84	–	SL	M	5.0	70	5.0	R	I	F	G	F	n/a	260	0.4

Long-Term Pea Averages for Saskatchewan 2018 *(continued)*

Main Characteristics of Varieties

			YIELD AS % CDC AMARILLO							RESISTANCE TO:								
MARKET CLASS	VARIETY	YEARS TESTED[1]	1, 2 & SOUTH 3	NORTH 3 & 4	IRRIGATION	LEAF TYPE[2]	RELATIVE MATURITY	LODGING (1–9)[3]	VINE LENGTH (CM)	MYCOSPHAE-RELLA BLIGHT[4]	POWDERY MILDEW	FUSARIUM WILT	SEED COAT BREAKAGE	BLEACH	SEED COAT DIMPLING[5]	GREENNESS[6]	SEED WEIGHT G/1000	PROTEIN VS. CDC AMARILLO
	CDC Sage	5	73	71	73	SL	M	4.0	80	5.0	R	MR	G	G	F	n/a	220	–
	CDC Spruce	6	95	99	–	SL	M	4.0	85	4.5	R	I	F	G	F	n/a	240	0.3
	CDC Striker	9	81	80	84	SL	M	3.5	80	4.5	S	MR	VG	G	G	n/a	240	2.0
	CDC Tetris	9	89	91	88	SL	M	4.0	85	4.5	R	MR	G	F	G	n/a	210	0.6
Red	Redbat 8	5	93	84	–	SL	M	5.0	85	5.0	R	–	G	n/a	G	n/a	200	1.3
	Redbat 88	4	92	91	–	SL	M	4.5	90	4.5	R	–	G	n/a	G	n/a	190	0.5
Maple	CDC Acer	3	84	73	–	SL	M	6.5	60	5.0	R	–	G	n/a	VG	n/a	170	–
	CDC Blazer[7]	3	100	97	–	SL	M	5.0	80	5.0	R	–	G	n/a	VG	n/a	190	1.9
	AAC Liscard	4	90	90	–	SL	M	4.0	85	5.0	R	–	G	n/a	VG	n/a	200	-0.7
	CDC Mosaic	4	81	74	58	SL	M	4.0	85	4.5	R	–	G	n/a	VG	n/a	180	–
Dun	CDC Dakota	8	103	99	95	SL	M	3.5	85	4.5	R	–	G	n/a	VG	n/a	205	1.7
Forage[9]	40-10	3	68	65	47	N	M	8.5	130	4.5	S	–	G	n/a	G	–	140	3.2
	CDC Horizon	4	88	78	63	SL	M	4.0	100	4.5	R	–	G	n/a	G	G	170	2.2
	CDC Jasper[7]	2	78	80	–	SL	M	4.5	105	4.5	R	–	G	n/a	G	G	180	2.6
	CDC Leroy[8]	3	82	75	75	SL	M	4.5	85	4.5	R	–	G	n/a	G	G	150	1.1
	CDC Tucker[8]	3	83	77	74	SL	M	4.0	90	4.5	R	–	G	n/a	G	F	170	2.1

[1] Co-op and Regional Trials in Saskatchewan
[2] N = normal leaf type; SL = semi-leafless
[3] Lodging score (1–9) where 1 = completely upright, 9 = completely lodged
[4] Mycosphaerella blight score (1-9) where 1 = no disease, 9 = completely blighted
[5] Seed coat dimpling: VG = 0-5%; G = 6-20%; F = 21-50%
[6] Greenness: Good = 0-15%; Fair = 16-40%
[7] Applied for PBR protection at time of printing (UPOV'91)
[8] Variety may not be described in 2019
[9] Forage dry matter biomass, as % of check 40-10 (100), CDC Jasper (111), CDC Horizon (108), CDC Leroy (104), and CDC Tucker (106)

The following varieties have purple flower colour and pigmented seed coats: CDC Acer, CDC Blazer, AAC Liscard, CDC Mosaic, CDC Dakota, and 40-10. CDC Acer, CDC Blazer, and CDC Mosaic have a maple patterned seed coat, AAC Liscard and 40-10 have a speckled seed coat, while CDC Dakota has a solid dun (tan) coloured seed coat. All other varieties have white flower colour and non-pigmented seed coats.

Additional Information

The relative maturity of the check variety CDC Amarillo is M (Medium), which is on average 95 days from seeding to swathing ripeness.

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

Lodging: How Ratings are Determined and What They Mean

Lodging ratings provide an indication of the standability of a particular variety under average conditions. Lodging can, in any given year, vary from what is stated in the guide, as different varieties can respond differently under certain environmental conditions. Lodging scores are based on visual ratings with a 9-point scale where 1 = completely upright and 9 = completely lodged. Ratings are developed for each variety at a time of year when differences in standability are noticeable, such as at physiological maturity or close to harvest. The numbers are based on relative comparisons to other varieties in a variety testing program. Lodging ratings are done at all stages of variety evaluations and over all years, therefore variety ratings may change over time.

Seed Coat Breakage

Seed coat breakage ratings are done on varieties during co-op testing. It is an abrasive test where seed coat damage is measured using a specific piece of equipment. This rating is a test of durability of the seed coat and is not a measure of seed coat thickness.

Greenness in Yellow Peas

Seed samples from variety evaluations of yellow peas are visually rated for green colouring after harvest by an experienced person. Ratings are expressed as a percentage of the seeds in a sample that have an obvious green tinge to the whole seed. The green colouring may be contained within the seed coat and/or cotyledons. A rating of Fair (F) means the variety averaged 16–40 per cent seeds with green colour, whereas a rating of Good (G) would have 0–15 per cent green tinged seeds. Greenness may be impacted by genetics, environmental conditions, and harvest dates. A later maturing variety may show more greenness in the seed sample due to less mature seed if harvested on the same date as an earlier maturing variety. The impact of greenness is visual and does not affect germination but could affect grade. The Canadian Grain Commission has colour as one of the grading factors for peas with "good natural colour" required for top grades. Too much green colouring could downgrade the sample due to a "fair colour" rating.

Seed Coat Dimpling

Seed coat dimpling refers to tiny depressions that give the seed a golfball-like appearance. Seed coat dimpling is a result of genetics and environment. Some varieties are more prone to dimpling than others. Dimpling can be found in many other pulse crops, in addition to peas. It appears to be more prevalent when cool temperatures occur during seed fill. Seed coat dimpling is a measure of the percentage of seed from a harvested sample that shows dimpling. Very Good (VG) ratings have between 0–5 per cent of seeds dimpled, Good (G) between 6–20 per cent, and Fair (F) between 21–50 per cent. Buyers prefer a smooth surface to peas and grading may be impacted. Shrivelled seed is a grading factor under the Canadian Grain Commission and includes seeds that have a severely dimpled surface.

Bleaching in Green Peas

Green peas are recognized and marketed for their uniform green cotyledon colour. The main pigment responsible for the green colour is chlorophyll. Under certain conditions the chlorophyll is degraded by enzymes which results in a lightening of the green colour which is considered bleaching. Under complete degradation of chlorophyll, the seed becomes yellow. Dr. Tom Warkentin with the University of Saskatchewan's Crop Development Centre (CDC) suggests growers can minimize bleaching by choosing varieties that have better tolerance to bleaching. As bleaching tolerance is a high priority in the CDC breeding program, most new varieties have good tolerance to bleaching.

LENTIL VARIETIES

Lentil types are classified by seed size and colour. Some varieties have been developed with tolerance to imidazolinone herbicides called Clearfield® and are designated as CL.

Red Lentils

Small red lentils are the most popular class grown in Saskatchewan. **CDC Maxim and CDC Dazil** were the top varieties in 2017, of which both are Clearfield® (CL) varieties. Newer high-yielding varieties gaining in acreage include Clearfield® varieties **CDC Impulse** and **CDC Proclaim.** Small red varieties such as **CDC Cherie** and **CDC Scarlet,** and the extra small red variety **CDC Roxy** are newer non-Clearfield® varieties. **CDC Redmoon** is the newest small red variety with further improved yield potential. Seed of **CDC Redmoon** will be available in 2018.

Large red lentils have red cotyledons with a much larger seed size compared to small red lentils. **CDC KR-1** (not imidazolinone tolerant) and **CDC KR-2** (CL) are higher yielding than CDC Maxim in lentil growing areas and are grown exclusively under contract with AGT Food and Ingredients, through Saskatchewan Pulse Growers' Tender Release Program.

Green Lentils

Green lentils are classified by seed size. They have green seed coats with a yellow cotyledon. The large green types represent the highest share of green lentil acres, with **CDC Greenland** and **CDC Impower** as the most widely grown varieties. **CDC Imvincible** and **CDC Viceroy** are the most widely grown small green lentils.

CDC Kermit (small green), **CDC Greenstar** (large green), and **CDC Asterix** (extra small green) are the newest green lentil varieties. They have high yield potential but are not imidazolinone tolerant.

CDC Imvincible (small green), **CDC Imigreen** (medium green), and **CDC Impower** (large green) are the newest greens with the Clearfield® trait, which offers herbicide tolerance to imidazolinone herbicides.

Specialty Lentils

French green lentils have a green marbled seed coat with yellow cotyledons. Seed size is small, most similar to small red lentils. French green lentils retain their shape better than small reds or greens upon cooking. **CDC Peridot** is the only Clearfield® variety available, which is imidazolinone tolerant, but it is a lower yielding variety than conventional variety of CDC Marble. **CDC Marble** is the newest variety in the French green market class and combines high yield with good *Ascochyta* resistance and improved lodging tolerance. CDC Marble also has a slightly lighter colour pattern than other French green varieties.

Green cotyledon lentils have a green or marbled seed coat with green cotyledons and a small-to-medium seed size. **CDC QG-2** is the highest yielding variety with the earliest maturity. Green cotyledon lentils are grown exclusively under contract with AGT Food and Ingredients, through Saskatchewan Pulse Growers' Tender Release Program.

Spanish brown lentils have a grey dotted seed coat with yellow cotyledons. This market class is sold primarily into Spain. Seed size is small, most similar to small reds. **CDC SB-3** is the latest Clearfield® variety, which is higher yielding and has improved disease resistance. Spanish brown varieties are grown exclusively under contract with Simpson Seeds, through Saskatchewan Pulse Growers' Tender Release Program.

CDC Redmoon

CDC Marble

Long-Term Lentil Averages for Saskatchewan 2018

Main Characteristics of Varieties

				YIELD % CDC MAXIM					RESISTANCE TO[4]:				
MARKET CLASS	VARIETY	HERBICIDE TOLERANCE[1]	YEARS TESTED[2]	AREA 1 & 2	AREA 3 & 4	HEIGHT (CM)	DAYS TO FLOWER	MATURITY RATING[3]	ASCOCHYTA BLIGHT	ANTHRACNOSE RACE 1	SEED COAT COLOUR	COTYLEDON COLOUR	SEED WEIGHT (G/1000)
Small red	CDC Maxim	CL	11	100	100	34	51	E/M	MR	MR	grey	red	40
	CDC Cherie[5]		5	109	106	32	51	E/M	MR	I	grey	red	39
	CDC Dazil	CL	6	97	93	33	53	E/M	MR	I	grey	red	35
	CDC Imax	CL	6	92	78	35	51	E/M	MR	I	grey	red	45
	CDC Impact	CL	6	80	76	30	47	E	MR	MS	grey	red	34
	CDC Impulse	CL	8	108	95	37	52	E/M	MR	MR	grey	red	44
	CDC Proclaim	CL	7	105	102	34	51	E/M	MR	MR	grey	red	40
	CDC Red Rider[5]		6	95	85	34	52	E/M	MR	I	gray	red	45
	CDC Redberry		6	97	99	34	50	E/M	MR	MR	grey	red	42
	CDC Redcliff[5]		7	107	103	35	51	E/M	MR	I	grey	red	38
	CDC Redcoat[5]		6	105	93	33	50	E/M	MR	MR	grey	red	39
	CDC Redmoon		7	114	106	33	52	E/M	MR	MR	grey	red	41
	CDC Scarlet		9	104	104	35	53	E/M	MR	I	grey	red	36
Extra small red	CDC Impala	CL	7	80	90	30	51	E	MR	MR	grey	red	31
	CDC Imperial	CL	6	84	79	30	49	E	MR	MR	grey	red	30
	CDC Redbow[5]		6	102	99	30	49	E	MR	MR	grey	red	32
	CDC Rosebud[5]		6	100	99	30	50	E	MR	MR	tan	red	31
	CDC Rosie[5]		7	92	90	33	52	E/M	MR	MR	grey	red	30
	CDC Roxy[5,6]		7	102	98	34	53	E/M	MR	MR	grey	red	32
Large red	CDC KR-1		10	110	92	37	52	M	MR	MR	grey	red	56
	CDC KR-2	CL	7	102	90	37	52	M	MR	MR	grey	red	55
Small green	CDC Imvincible	CL	11	92	80	33	49	E	MR	MR	green	yellow	34
	CDC Viceroy		8	104	99	36	49	E/M	MR	MR	green	yellow	34
	CDC Kermit		6	97	98	34	49	E	MR	MR	green	yellow	33
Extra small green	CDC Asterix[5]		9	96	93	30	48	E	MR	I	green	yellow	26
Medium green	CDC Impress	CL	7	78	71	44	50	M	MR	S	green	yellow	57
	CDC Imigreen	CL	6	87	71	34	50	M	MR	MS	green	yellow	52
	CDC Meteor[5]		6	102	89	34	50	M	MR	S	green	yellow	51
	CDC Richlea		6	93	80	35	50	M	S	S	green	yellow	51

Long-Term Lentil Averages for Saskatchewan 2018 *(continued)*

Main Characteristics of Varieties

				YIELD % CDC MAXIM					RESISTANCE TO[4]:				
MARKET CLASS	VARIETY	HERBICIDE TOLERANCE[1]	YEARS TESTED[2]	AREA 1 & 2	AREA 3 & 4	HEIGHT (CM)	DAYS TO FLOWER	MATURITY RATING[3]	ASCOCHYTA BLIGHT	ANTHRACNOSE RACE 1	SEED COAT COLOUR	COTYLEDON COLOUR	SEED WEIGHT (G/1000)
Large green	CDC Greenland		7	89	70	38	52	M/L	MR	S	green	yellow	64
	CDC Greenstar		8	97	81	40	52	M/L	MR	I	green	yellow	73
	CDC Impower	CL	6	79	63	41	52	M/L	MR	S	green	yellow	64
	CDC Sovereign		6	83	77	40	52	L	MR	MS	green	yellow	66
French green	CDC Marble		7	102	98	36	49	E	MR	I	green marble	yellow	34
	CDC Peridot	CL	6	84	94	37	48	E	I	MS	green marble	yellow	38
Green cotyledon	CDC QG-1		5	80	65	42	51	M	I	I	green	green	49
	CDC QG-2		7	88	90	40	48	E	I	I	green marble	green	32
	CDC QG-3	CL	7	73	63	38	53	E/M	I	MR	green	green	46
Spanish brown	CDC SB-3	CL	6	88	87	35	51	E	I	MR	grey dotted	yellow	38

[1] CL indicates Clearfield® variety
[2] Co-op and Regional Trials in Saskatchewan since 2006. Comparisons to the check variety, small red lentil **CDC Maxim**
[3] Maturity ratings: Normal maturity range in days based on May 1 seeding is E = 100, VL = 110 but maturity can be much earlier in dry years, much later in cool wet years
[4] Resistance ratings: R = Resistant; MR = Moderately Resistant; I = Intermediate Resistance; MS = Moderately Susceptible; S = Susceptible
[5] Variety may not be described in 2019
[6] Applied for PBR protection at time of printing (UPOV'91)

Additional Information

Seed supplies may be limited for **CDC Impulse, CDC Roxy, CDC Proclaim, CDC Redmoon,** and **CDC Kermit.**

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

CHICKPEA VARIETIES

Chickpeas occupied approximately 135,000 acres in Saskatchewan in 2017. The majority of chickpeas grown are Kabuli-type, with Desi chickpeas also grown. Desi chickpeas have purple flowers while Kabuli chickpeas are white flowered.

Kabuli Chickpeas

The leading Kabuli chickpea varieties grown in Saskatchewan are **CDC Leader** and **CDC Orion**. Both are high yielding, with medium-to-large seed size and earlier maturity than check variety CDC Amit. **CDC Palmer**, released in 2014, is well-suited to all current chickpea growing areas in the Dark Brown and Brown soil zones of southern Saskatchewan and south eastern Alberta. It has a large seed size, similar to CDC Orion, but is earlier maturing.

Desi Chickpeas

CDC Consul is a high-yielding Desi variety with good resistance to *Ascochyta* blight, which was released in 2013.

IMI Tolerance a New Trait in Chickpeas

Imidazolinone (IMI) tolerance has been developed in chickpeas through work done by Dr. Bunyamin Tar'an at the Crop Development Centre, University of Saskatchewan. **CDC Alma** (Kabuli) and **CDC Cory** (Desi) are two varieties currently available with tolerance to IMI-type herbicides. New IMI-type chickpea varieties are being developed, and releases are expected in 2019.

Long-Term Chickpea Averages for Saskatchewan 2018

Main Characteristics of Varieties

			YIELD (% AMIT)								
MARKET CLASS	VARIETY	YEARS TESTED	AREA 1[1]	AREA 2[1]	ASCOCHYTA BLIGHT[2]	HEIGHT (CM)	DAYS TO FLOWER	MATURITY	SEED WEIGHT (G/1000)	SEED SHAPE[3]	SEED OR SEED COAT COLOUR[4]
Kabuli	Amit (B-90)	16	100	100	4.4	47	56	L	258	Ro	B
	CDC Alma	9	92	92	6.1	42	54	L	365	RH	B
	CDC Frontier	16	108	104	4.5	45	55	L	349	RH	B
	CDC Leader	12	109	108	4.4	42	54	M	392	RH	B
	CDC Luna	15	98	100	5.7	40	54	ML	370	RH	B
	CDC Orion	11	108	106	5.0	44	51	L	435	RH	B
	CDC Palmer	7	107	105	4.8	42	53	ML	420	RH	B
Desi	CDC Consul	10	107	110	3.9	46	53	M	303	P	LT
	CDC Cory	9	114	107	4.2	48	57	M	271	A/P	T

[1] Area 1: Brown soil zone; Area 2: Dark brown soil zone
[2] *Ascochyta* blight at pod filling period: 0–9 scale; 0 = no symptom; 9 = plants are completely blighted. Scores 4–6 are considered intermediate
[3] Seed shape: Ro = Round; RH = Ram-Head; P = Plump; A = Angular
[4] Seed or seed coat colour: B = Beige; LT = Light Tan; T = Tan

Additional Information
Please refer to SaskSeed 2018 guide for pedigreed seed availability.

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

FABA BEAN VARIETIES AND SEEDING TIPS

Faba bean varieties are classified by their tannin levels, which correspond to flower colour. Tannin type varieties have coloured flowers and are usually larger seeded. These are generally targeted for human consumption but can also be fed to livestock or processed.

CDC SSNS-1 is a small seeded tannin type that is grown in Saskatchewan and is well-suited for green manure or use in silage mixtures. Zero-tannin type varieties have white flowers and are used in the feed market industry, but can also be sold into other markets. The smaller seeded zero-tannin variety **CDC Snowdrop** continues to occupy similar number of acres as its main competitor **Snowbird**. **FB9-4** has the largest seed size for the tannin types and was the most widely grown in Saskatchewan, followed by the variety **Taboar**.

Seeding Tips for Faba Beans

- Tannin and zero-tannin faba bean types should be separated by up to 500 metres, to prevent cross pollination.
- Faba beans have a high requirement for phosphorus (P) and can tolerate up to 40 pounds per acre (lbs/ac) of seed-placed phosphorus (P_2O_5).
- Seed as early as you can get in the field, as faba beans have good tolerance to spring frosts and are later maturing.
- Seed into moisture as the large seeds require adequate moisture to germinate.
- Tannin varieties do not require seed treatments unless there is a high level of seed-borne disease.

Seeding large-seeded faba beans can be difficult due to plugging, and growers may experience difficulty reaching the targeted seeding rates. A study conducted by the Prairie Agricultural Machinery Institute has identified the following tips and tricks for seeding large seed faba beans:

1. Know the thousand kernel weight of your seed and target 45 plants per metre squared when calculating seeding rates.
2. To reach high seeding rates, consider metering from multiple tanks or changing augers/rollers.
3. To minimize plugging:
   - Slow down.
   - Increase clearance from metering rollers or augers to the metering housings.
   - Ensure there are no tight radiuses or sags in the distribution hoses.
   - Eliminate flow obstructions, such as screws, in the distribution hoses.
   - Ensure hose clamps are not overtightened resulting in hose restrictions.
   - Use openers with large-diametre seed openings and minimal change in seed flow direction or seed tube shape.
   - Avoid sharp turns with the drill.

CDC Snowdrop

Long-Term Faba Bean Averages for Saskatchewan 2018

Main Characteristics of Varieties

MARKET CLASS	VARIETY	YEARS TESTED	YIELD (% CDC FATIMA)	HEIGHT (CM)	LODGING (1-9)[1]	MATURITY (DAYS)	SEED WEIGHT (G/1000)
Coloured flower	CDC Fatima	11	100	106	3.8	105	520
(normal tannin)	CDC Blitz	6	101	101	3.7	109	410
	Fabelle	5	105	104	2.4	105	533
	FB9-4	9	92	95	3.7	104	680
	Florent	4	112	102	2.3	107	660
	CDC SSNS-1	10	91	109	3.4	105	335
	Taboar	5	96	110	3.7	107	480
	Vertigo	4	110	107	3.0	106	571
	186S-11	6	106	105	3.1	106	749
	247-13	4	107	103	3.4	106	620
White flower	Imposa	4	110	99	2.4	107	695
(zero tannin)	Snowbird	11	104	96	2.6	104	495
	CDC Snowdrop	8	94	98	2.6	104	335
	Tabasco	5	101	96	2.3	106	530

[1] Lodging score (1–9) where 1 = completely upright, 9 = completely lodged

Additional Information

White-flowered types are zero-tannin. All coloured flower types have seed coats that contain tannins and may be suitable for export food markets if seed size and quality match customer demand. Maturity ratings are based on days until swathing maturity but will vary depending on seeding date.

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

DRY BEAN VARIETIES AND SEEDING TIPS

Dry bean production in Saskatchewan occurs primarily in the irrigation area near Lake Diefenbaker but there are limited acres of dryland production. The majority of the dry beans produced are pinto beans, followed by navy, black, and small red beans. Dry bean acreage has been fairly stable, around 10,000 acres annually.

Pinto beans are the main type of dry beans grown in Saskatchewan. The highest yielding pinto bean variety is **Island** followed closely by **WM-2** which is an early maturing variety that has slow-darkening traits sought after in the marketplace. A new yellow bean variety is showing promise with much earlier maturity than its predecessor **CDC Sol**. Equally promising is the black bean variety **CDC Blackstrap** which combines early maturity with good pod clearance, and has shown potential for dryland production.

Dry Bean Seeding Tips

- Baldhead is where mechanical damage occurs. Only the cotyledons and seedling stem emerge and no leaf development occurs. To reduce baldhead, consider the following:
  - Reduce airseeder fan and ground speed as much as possible.
  - Utilize deflector pads within the seed delivery manifolds where option exists.
  - Use belt conveyors.
  - Use seed with 14 per cent moisture or higher.
- Roll the field immediately after seeding, or up to three days after, to push any stones into the soil and to reduce risk of earth tag. Do not roll after emergence.

Method for Soaking Seed

- Run water into top of minibulk until excess runs out the bottom of the bag.
- Repeat after eight hours.
- Allow to temper for at least 24 hours.
- Apply seed treatment or inoculant after the process has completed.

Pinto Bean

Long-Term Dry Bean Averages for Saskatchewan 2018

Main Characteristics of Varieties

TYPE	VARIETY	YEARS TESTED[1]	YIELD (% CDC PINTIUM)		DAYS TO FLOWER	MATURITY RATING[2]	% POD CLEARANCE[3]	SEED WEIGHT (G/1000)	GROWTH HABIT[4]
			IRRIGATION	DRYLAND					
Pinto	CDC Pintium	16	100	100	50	E	85	350	I
	Island	10	120	110	55	M	79	355	II
	Mariah	5	114	103	55	L	82	293	II
	CDC Marmot	8	109	108	50	E	80	367	I
	Medicine Hat	4	139	112	58	M	72	360	II
	Winchester	5	116	110	52	M	82	352	II
	CDC WM-2	11	116	106	52	E	79	365	II
Navy	Envoy	16	96	84	53	M	77	184	I
	Bolt	4	114	104	58	L	82	190	II
	Lightning	7	109	92	60	L	85	175	II
	Portage	6	101	99	52	M	85	175	II
	Skyline	5	74	91	57	L	80	163	I
	OAC Spark	7	90	102	55	L	81	163	I
Small red	AC Redbond	8	98	100	51	M	65	290	II
Black	CDC Blackcomb	7	115	95	56	M	85	167	II
	CDC Blackstrap	7	119	116	53	M	85	195	II
	Carman Black	5	125	113	59	M	88	180	II
	CDC Jet	16	100	97	58	L	85	170	II
	CDC Superjet	6	125	107	58	L	85	170	II
Shiny black	AC Black Diamond	7	102	94	54	M	70	250	II
Flor de Junio	CDC Ray[5]	6	146	127	56	L	70	300	III
Yellow	CDC Sol	10	104	95	55	L	78	399	I

[1] Co-op and Regional Trials grown in narrow rows. Direct comparison to **CDC Pintium** since 2002
[2] Maturity Ratings based on E = 100 days; L = 110 days for May 20 planting to swathing maturity
[3] Pod Clearance: Percentage of pods that completely clear the cutterbar at time of swathing (~4 cm)
[4] Growth Habit: I = Determinate bush; II = Indeterminate bush; III = Indeterminate vine
[5] Applied for PBR protection at time of printing (UPOV'91)

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

SOYBEAN VARIETIES

Saskatchewan Soybean Variety Trial – Long-Term Means

Main Characteristics of Varieties

VARIETY	COMPANY MATURITY GROUPING[1]	TYPE[2]	HILUM COLOUR[3]	YEARS TESTED	YIELD (% TH33003R2Y)[4]		DAYS TO MATURITY	CANADIAN MARKETING AGENT
					SOUTH	NORTH		
TH 33003R2Y	00.3	RR2	BR	3	100	100	121	Thunder Seeds
NSC LEROY RR2Y	000.6	RR2	Y	2	89	92	111	NorthStar Genetics
NSC Watson RR2Y	000.8	RR2	IY	3	88	100	115	NorthStar Genetics
P002T04R	00.2	RR1	TN	3	86	97	116	DuPont Pioneer
S0009-M2	000.9	RR2	IY	3	97	103	116	Syngenta Canada Inc.
S003-L3	00.3	RR2	BR	2	102	107	117	Syngenta Canada Inc.
22-60 RY	000.9	RR2	BL	3	104	103	118	DEKALB
S001-B1	00.1	RR2	Y	2	96	101	119	Syngenta Canada Inc.
Bishop R2	00.2	RR2	IY	3	96	98	119	SeCan
LS Northwester	00.1	RR2	BL	3	101	96	119	Delmar Commodities
23-60RY	00.2	RR2	BL	2	106	101	120	DEKALB
P006T46R[5]	00.6	RR1	BR	2	103	110	120	DuPont Pioneer
NSC RESTON RR2Y	00.1	RR2	BL	2	107	103	120	NorthStar Genetics
TH 37004 R2Y	00.4	RR2	BL	2	103	102	120	Thunder Seeds
McLeod R2	00.4	RR2	BL	3	105	102	121	SeCan
Mahony R2	00.3	RR2	BL	3	107	107	121	SeCan
S007-Y4	00.5	RR2	IY	3	106	107	121	Syngenta Canada Inc.
Lono R2[5]	00.5	RR2	Y	3	109	107	121	Brett Young/Elite Seeds
PS 0035 NR2	00.3	RR2	BL	3	103	95	122	PRIDE Seeds
LS 002R24N	00.2	RR2	BL	3	105	100	122	Delmar Commodities
23-11RY	000.9	RR2	BL	2	106	102	122	DEKALB
Akras R2	00.3	RR2	IB	3	112	110	122	Brett Young/Elite Seeds
TH 35002R2Y	00.2	RR2	BL	2	103	104	123	Thunder Seeds
P006T78R[5]	00.6	RR1	BR	2	111	105	124	DuPont Pioneer
HS 006RYS24	00.6	RR2	BL	3	107	96	124	Dow Seeds
TH 33005R2Y	00.5	RR2	BL	2	113	105	124	Thunder Seeds
NSC TILSTON RR2Y	00.4	RR2	BL	2	102	99	124	NorthStar Genetics
TH 32004R2Y	00.4	RR2	BL	3	108	103	125	Thunder Seeds
Hero R2	00.4	RR2	BL	2	115	101	127	SeCan

[1] In North America, soybean varieties are classified into maturity groupings from 9 in southern USA, to 1 or 0 in southern Ontario. 00 refers to shorter season varieties than 0 types, while 000 refers to shorter season varieties than 00 types. The decimal point notation refers to differences within a class, for example, 00.1 should be a shorter season variety than 00.2

[2] All varieties in this table are either Roundup Ready® or Genuity® Roundup Ready 2 Yield®

[3] Hilum is the point where a seed attaches to the pod. BR = Brown, Y = Yellow, IY = Imperfect Yellow, BL = Black, IB = Imperfect Black

[4] South: Redvers, Halbrite, Swift Current, and Indian Head; North: Outlook (irrigated and dryland), Saskatoon, Floral, Kamsack, Rosthern, Melfort, and Scott

[5] Applied for PBR protection at time of printing (UPOV'91)

Source: Saskatchewan Variety of Grain Crops 2018, Saskatchewan Advisory Council on Grain Crops

Saskatchewan Soybean Regional Variety Trial Results

Main Characteristics of Varieties

					2017 YIELDS AS % OF TH33003 R2Y (CHECK) BY LOCATION											
					RELATIVE DAYS TO MATURITY[1]			CENTRAL DARK BROWN SOIL ZONES			SOUTH EAST BLACK SOIL ZONES			NORTHERN BLACK & GREY SOIL ZONES		
VARIETY	TRAITS	COMPANY MATURITY GROUPING	YIELD % CHECK	SITE YEARS TESTED	2017	2016	2015	OUTLOOK (IRRIGATED)	OUTLOOK (DRYLAND)	SASKATOON	INDIAN HEAD	REDVERS A	REDVERS B	ROSTHERN	MELFORT	KAMSACK
P0007A43R	RR1	000.7	80	8	104	-	-	64	71	63	81	88	-	96	82	91
NSC Leroy RR2Y	R2Y	000.6	92	18	108	114	-	79	85	71	87	97	-	107	92	89
S0009-D6	R2Y	000.9	93	8	109	-	-	85	88	75	91	90	-	119	96	100
NSC Watson RR2Y	R2Y	000.8	97	29	109	119	119	109	81	82	91	88	-	116	105	104
Nacoma R2	R2Y	000.8	96	8	110	-	-	80	85	82	99	110	-	113	108	94
S0009-M2	R2Y	000.9	102	29	110	119	119	95	94	73	95	100	-	122	104	101
P002T04R	RR1	00.2	94	29	111	116	119	106	81	76	85	98	-	118	95	97
LS TRI7XT	R2X	000.7	88	8	111	-	-	87	78	76	90	87	-	112	95	101
LS TRI9R2Y	R2Y	000.9	92	8	111	-	-	91	82	75	81	103	-	113	112	95
Torro R2	R2Y	000.8	98	8	111	-	-	85	101	91	95	110	-	105	98	97
NSC Star City RR2X	R2X	000.8	91	8	111	-	-	93	89	81	81	90	-	113	89	90
PS 00095 R2	R2Y	000.9	98	17	111	-	-	90	110	82	107	109	-	109	98	104
Barron R2X	R2X	000.8	94	8	111	-	-	87	100	78	86	92	-	116	96	94
P002A63R	RR1	00.2	107	8	112	-	-	119	113	99	92	105	-	120	101	108
S003-L3	R2Y	00.3	106	18	112	122	-	105	91	84	114	-	98	125	106	118
Dario R2X	R2X	000.8	92	8	112	-	-	96	113	76	83	81	-	103	93	88
TH 87000 R2YX	R2X	000.8	89	8	112	-	-	92	88	82	86	82	-	98	93	90
PV 11S001 RR2	R2Y	00.1	90	7	113	-	-	100	83	75	-	95	-	97	94	85
S006-W5	R2Y	00.5	106	8	113	-	-	121	109	93	96	-	98	125	106	103
S001-B1	R2Y	00.1	101	18	113	119	-	101	111	81	96	99	-	108	100	86
Bishop R2	R2Y	00.2	98	29	113	121	124	92	91	80	97	-	90	106	104	88
22-60 RY	R2Y	000.9	104	29	114	120	121	99	89	84	106	107	-	134	110	104
23-60 RY	R2Y	00.2	103	29	114	122	123	111	106	96	103	-	98	107	110	102
DKB003-29	R2X	00.3	106	8	115	-	-	112	119	90	107	-	106	110	105	99
Lono R2	R2Y	00.5	108	29	115	122	127	100	102	100	110	105	-	120	110	108
LS Northwester	RR2	00.1	97	29	115	120	124	93	96	89	98	-	86	105	91	91
LS 002R24N	R2Y	00.2	102	29	115	126	125	109	101	95	107	-	105	108	110	87
NSC Newton RR2X	R2X	00.3	87	8	115	-	-	102	80	67	95	-	92	82	94	85
PS 0044 XRN	R2X	00.4	100	8	115	-	-	107	94	89	105	-	88	113	109	98
PS 0035 NR2	R2Y	00.3	97	29	115	125	125	103	99	69	94	-	95	112	106	98
TH 33003 R2Y	R2Y	00.3	100	30	115	123	125	100	100	100	100	100	100	100	100	100
TH 32004 R2Y	R2Y	00.4	104	29	115	125	125	109	92	91	93	-	95	118	114	106
P006T46R	RR1	00.6	109	18	116	125	-	109	117	85	104	-	100	116	108	103
S007-Y4	R2Y	00.5	107	29	116	123	125	108	126	93	110	-	97	118	111	97

Saskatchewan Soybean Regional Variety Trial Results *(continued)*

Main Characteristics of Varieties

								2017 YIELDS AS % OF TH33003 R2Y (CHECK) BY LOCATION								
					RELATIVE DAYS TO MATURITY[1]			CENTRAL DARK BROWN SOIL ZONES			SOUTH EAST BLACK SOIL ZONES			NORTHERN BLACK & GREY SOIL ZONES		
VARIETY	TRAITS	COMPANY MATURITY GROUPING	YIELD % CHECK	SITE YEARS TESTED	2017	2016	2015	OUTLOOK (IRRIGATED)	OUTLOOK (DRYLAND)	SASKATOON	INDIAN HEAD	REDVERS A	REDVERS B	ROSTHERN	MELFORT	KAMSACK
Kosmo R2	R2Y	00.3	91	8	116	-	-	103	78	74	94	-	84	105	100	91
TH 87003 R2X	R2X	00.3	102	8	116	-	-	101	96	85	98	-	105	121	107	102
Mahony R2	R2Y	00.3	107	29	116	123	125	100	98	90	109	-	93	118	115	103
McLeod R2	R2Y	00.3	103	29	116	123	124	115	103	100	103	-	109	111	107	95
Marduk R2X	R2X	00.4	95	8	117	-	-	99	92	68	102	100	-	108	102	93
Akras R2	R2Y	00.3	111	29	117	124	127	105	102	100	113	105	-	122	124	111
Mani R2X	R2X	00.4	99	8	117	-	-	98	109	94	89	-	88	113	106	95
Dylano R2X	R2X	00.4	85	8	117	-	-	95	88	64	95	-	80	85	83	91
TH 37004 R2Y	R2Y	00.4	102	18	117	124	-	103	109	70	100	-	92	95	99	105
DS0067Z1	R2Y	00.6	95	7	118	-	-	93	101	78	-	-	97	101	101	95
HS 006RYS24	R2Y	00.6	99	29	118	126	128	89	84	80	112	-	98	115	101	98
Foote R2	R2Y	00.5	104	7	118	-	-	111	101	94	-	-	88	112	112	111
TH 88005 R2XN	R2X	00.5	93	8	120	-	-	105	78	91	109	-	85	108	101	101
TH 33003 R2Y (Check variety) Yield (bu/ac)			47					74	56	45	31	40	45	30	50	26
						CV%[2]		9	15	15	11	9	8	9	6	9
						LSD%[3]		15	33	21	17	15	13	16	10	14
						Sign Diff.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
						Seeding Date		May 20	May 20	May 17	Jun 1	May 23	May 23	May 21	May 16	May 20
						Harvest Date		Oct 10	Oct 10	Sep 26	Oct 11	Oct 6	Oct 6	Sep 27	Sep 29	Sep 12

[1] Relative Days to Maturity – Days from seeding to brown pod stage (physiological maturity).

[2] CV = Coefficient of variation is a measure of relative variability. It is the ratio of the standard deviation to the mean (or average). It shows the extent of variability in relation to the mean or average of a population. For variety trials, a CV of 15% is usually the maximum allowed for a site to be included in the analysis. Higher CVs mean there is too much variability in the data. The lower the CV the less variability in the data.

[3] LSD – Least Significant Difference allows comparisons between the means of two varieties. For two varieties to be statistically different, the difference in their means must be larger than the LSD. For example, with an LSD at 10% and a yield difference between two varieties of 5% equate to no statistical difference between those two varieties. If the yield difference was 15% then there would be a statistical difference and one variety would be ranked higher than another.

Average yields based on 2015 to 2017 results (some varieties may only have one year of data).

In 2017 data was used from trials located at Redvers, Melfort, Outlook (irrigation and dryland), Saskatoon, Kamsack, and Indian Head.

RR1 = Roundup Ready® 1 soybeans with glyphosate herbicide tolerance.

R2Y = Genuity®Roundup Ready 2 Yield® soybeans with glyphosate herbicide tolerance.

R2X = Roundup Ready 2 Xtend® soybeans with dicamba and glyphosate herbicide tolerance.

Seeding Tips for Soybeans

- Soybeans require warm soils (10°C) for optimum germination and emergence.
- Trash management to encourage some blackening of the soil can be advantageous to speed soil warming.
- Soybeans are sensitive to late spring frosts once the growing point is above ground.
- Delay seeding until at least May 10 or later if conditions remain cool.
- Soybeans are sensitive to cold water at the time of germination.
- Seed when there is a warming trend in the forecast and a low risk of cold rainwater until after soybeans have germinated.
- Soybeans are susceptible to several seed and seedling diseases so seed treatments should be considered.

Soybeans are prone to iron chlorosis particularly when grown on saturated soils, soils high in calcium carbonates, or on soils with salinity problems. Choose your fields and soybean varieties accordingly.

The maximum amount of phosphate plus potassium fertilizer that can be safely placed with the seed is 20 pounds per acre (lbs/ac). Amounts higher than 20 lbs/ac should be banded.

Pre-emergence herbicides should be considered as part of the weed control program. Soybeans are poor competitors with weeds, so keeping soybean fields free of weeds from emergence through early growth may enhance yield.

Soybean Varieties

S0009-M2 was the most widely grown soybean variety in Saskatchewan in 2017 followed by 23-11RY, 23-60RY, NSC Warren RR, 22-60RY, Akras R2, and P002T04R according to data from the Saskatchewan Crop Insurance Corporation (SCIC).

New varieties to watch for in 2018 include:

- Nacoma R2
- Notus R2
- Akras R2
- P0007A4R3
- P000A87R
- P002A19X
- P002A63R
- P005A27X
- P007A90R
- PS 0044 XRN
- DKB003-29
- LS TR17XT
- LS TR19R2Y
- PV 11S001RR2
- PV 12S007R2X
- S0009-D6
- TH88005R2X

Additional Information

The soybean variety trial is coordinated by Saskatchewan Pulse Growers. Mean yield of the check variety TH 33003R2Y was 46 bu/ac in 2017, 44 bu/ac in 2016, and 51 bu/ac in 2015. Typical on-farm yields are 25-30 bu/ac. Soybean is not native to the Canadian Prairies and so must be inoculated with soybean inoculant that contains *Bradyrhizobium japonicum* bacteria.

UNDERSTANDING MATURITY IN PULSES

Days to Maturity

Maturity is affected by growing conditions. Values presented represent a guide developed based on average conditions. This data provides a relative comparison for crops and varieties that are grown under similar conditions and planted at the same time. As maturity is delayed into the fall, differences in maturity can be heightened as the days are shorter and temperatures cooler. Under warm, dry years maturity may be shortened and under cool, wet years longer days to maturity could be expected.

Understanding Soybean Maturity Ratings

Soybean maturity ratings are currently based on three approaches: corn heat units, maturity groupings, and days to maturity. The preferred ways to measure soybean maturities are through maturity group classifications or days to maturity. The maturity group (MG) rating system classifies soybean varieties from MG 000 in northern areas, to MG IX in southern areas of North America, based on latitude ranges and photoperiod sensitivity. Each MG region covers one or two degrees of latitude, or about 200 to 300 kilometres from north to south. For Saskatchewan, soybeans are most suited with 00 and 000 MG. Each MG can have subgroupings with a 0 to 9 decimal number following the group (or zone) number and these decimal places equate to slight increases in maturity. In the 00 maturity ratings, a subgroup of 00.1 would be earlier maturing than 00.9. Note that these MG ratings are not entirely standardized between seed companies. Check with your seed supplier to better understand MG ratings. Days to maturity is a direct measure of the days each variety takes to reach physiological maturity and is averaged across locations. The lower the number the earlier maturing the variety was across the sites tested. This value is obtained through the Regional Variety Testing Program and is an independent rating. Growers are advised to use all maturity information available to choose appropriate varieties for their area.

Average Days from Seeding to Swathing Ripeness

Peas	Medium (M) = 90 days; Add three to four days for each rating beyond medium
Lentils	Early (E) = 100 days; Very Late (VL) = 110 days based on May 1 seeding
Chickpeas	Kabuli 110–120 days; Desi 110 days
Faba Beans	104–107 days
Dry Beans	E = 100 days; Late (L) = 110 days based on May 20 seeding
Soybeans	118–128 days

Source: Saskatchewan Variety of Grain Crops 2017, Saskatchewan Advisory Council on Grain Crop

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