Saskatchewan Agriculture and Food

# Varieties of grain crops for Saskatchewan 1994

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## Grain Crop Production Areas

The cropland of Saskatchewan has been divided into four areas based roughly on climate, vegetation and soil type. The relative yields of crop varieties tend to vary from area to area. In choosing a variety a farmer will want to consider the yields in his area and special requirements such as early maturity, disease resistance or sawfly resistance.

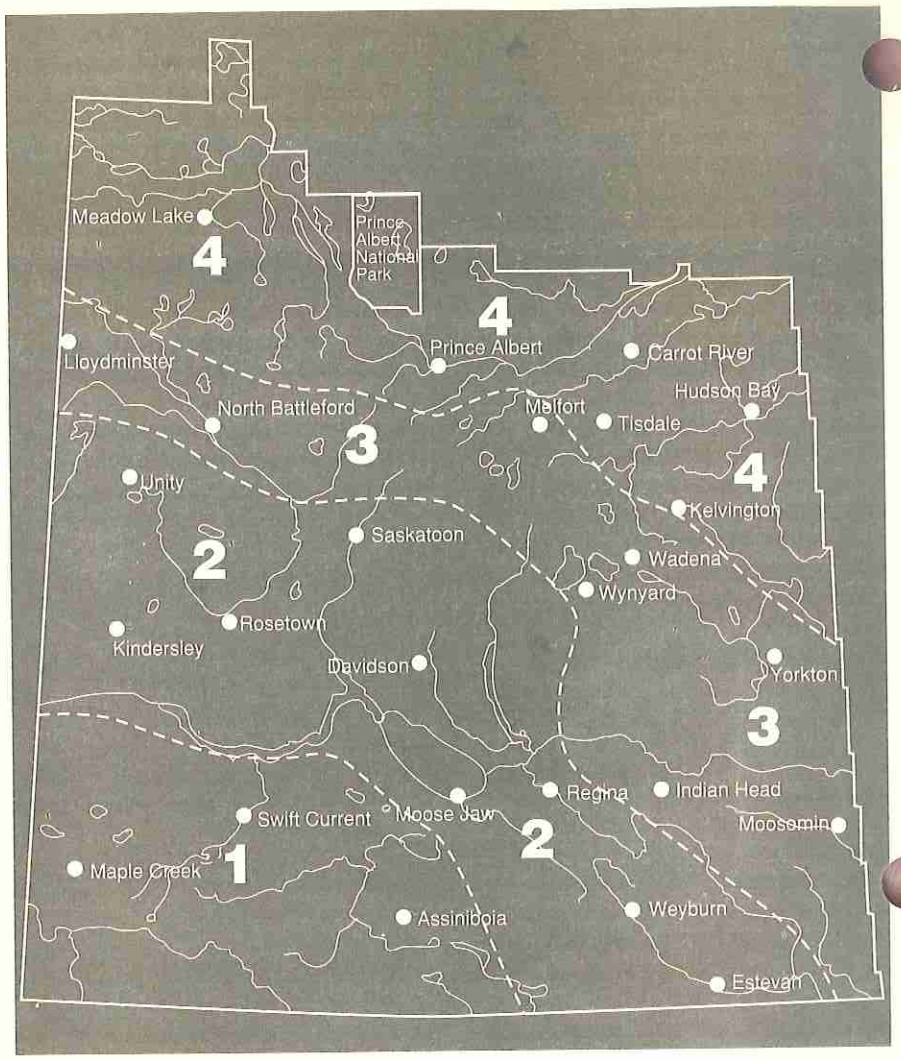
Area 1: Drought is a definite hazard and high winds are common. Sawfly outbreaks often occur in this area. Cereal rust may be a problem in the southeastern section.

Area 2: Drought and sawflies may be problems in the western and central sections of the area. Cereal rust may be a problem in the southeastern section.

Area 3: Drought is not as likely to be a problem in this area, particularly in the east. Cereal rust may occur in the eastern portion. The frost-free period can be fairly short in the northwestern and northeastern sections.

Area 4: Rainfall is usually adequate for crop production. However, early fall frosts and wet harvest weather are frequent problems.

The dividing lines do not represent distinct changes over a short distance. The change from one area to another is gradual.




**Relative maturity** ratings are average number of days from seeding to swathing ripeness. The actual number of days to reach maturity depends on local climate and to some extent management practices. In this pamphlet some crop tables express the Relative maturity in days while other tables use a new five category scale: **VE**, **E**, **M**, **L**, **VL** (very early, early, medium, late, very late). Medium applies to the most widely grown check variety which appears at the top of each table. The limits for each category vary from crop to crop. In barley, for example, Harrington would be medium with **L** and **E** varieties + or -, 1-2 days and **VL** and **VE** varieties beyond these, e.g. **VL** - Virden, **L** - Manley, **M** - Harrington, **E** - Bonanza, **VE** - Jackson. Please read the section **Weather and Environment Affect Crop Production** for more details.

**This publication does not have a complete list of varieties registered for production in Canada.**

# Cereal Crops

## Wheat

### Main Characteristics of Varieties

| Variety | Area 1 | Area 2 | Area 3 | Area 4 | Irr** | Relative*** Maturity Ratings | Resistance to* Lodging | Shattering | Stem Rust | Leaf Rust | Loose Smut | Bunt | Root Rot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yield as % of Katepwa | | | | | | | | | | | | |
| **Bread Wheat** | | | | | | | | | | | | | |
| Katepwa | 100 | 100 | 100 | 100 | 100 | E | G | G | VG | F | G | VG | F |
| Columbus | 98 | 101 | 101 | 97 | — | L | G | F | G | VG | F | VG | F |
| AC Domain | 91 | 92 | 98 | 98+ | 96 | E | VG | G | G | VG | G | G | F |
| AC Eatonia | 96 | 100 | — | — | — | M | F | G | G | F | F | VG | F |
| Invader | 102 | 103 | 101 | 101+ | 95 | M | VG | G | G | G | G | F | F |
| Kenyon++ | 97 | 96 | 97 | 95 | 98 | E | G | G | VG | VG | G | F | F |
| Lancer | 94 | 94 | — | — | — | M | F | VG | G | G | G | G | F |
| Laura | 103 | 105 | 105 | 104 | 90 | M | G | G | G | G | F | P | G |
| Leader++ | 95 | 95 | — | — | — | M | F | F | G | F | F | G | P |
| CDC Makwa | 102 | 103 | 100 | 101 | 100 | E | G | G | G | F | G | F | F |
| CDC Merlin | 96 | 101 | 103 | 106 | 96 | M | G | G | G | VG | G | G | F |
| AC Minto | 100 | 102 | 103 | 102 | 90 | M | G | G | VG | G | VG | G | F |
| Neepawa++ | 99 | 100 | 99 | 98 | — | E | G | VG | G | P | G | F | F |
| Pasqua | 102 | 101 | 101 | 100 | 90 | M | G | G | G | VG | F | F | F |
| Roblin++ | 91 | 92 | 95 | 93 | 99 | VE | VG | G | G | VG | G | P | G |
| CDC Teal | 99 | 98 | 103 | 102 | 96 | E | VG | G | VG | G | G | F | F |
| **Eligible for Experimental Grades** | | | | | | | | | | | | | |
| Grandin | 114 | 113 | 109 | 109+ | 98 | M | VG | G | G | G | G | G | F |
| **Canada Prairie Spring Wheat** | | | | | | | | | | | | | |
| AC Taber | 120 | 124 | 124 | 118 | 127 | VL | G | G | VG | G | P | G | F |
| Biggar | 123 | 121 | 123 | 121 | 121 | L | G | G | G | G | VP | VP | F |
| Cutler | 93 | 100 | 104 | 96 | — | E | G | G | G | P | F | VP | F |
| Genesis | 124 | 128 | 128 | 124 | 130 | L | F | VG | G | F | F | VP | F |
| Oslo++ | 97 | 102 | 103 | 96 | 98 | E | G | G | G | G | P | F | F |
| **Canada Western Extra Strong** | | | | | | | | | | | | | |
| Bluesky++ | 93 | 92 | 98 | 99 | — | E | G | G | G | F | VG | F | G |
| Glenlea | 95 | 105 | 108 | 110 | — | L | G | G | G | G | VG | F | G |
| Wildcat++ | 89 | 85 | 91 | 92 | — | E | G | G | G | P | VG | VP | G |
| | Yield as % of Kyle | | | | | | | | | | | | |
| **Durum Wheat** | | | | | | | | | | | | | |
| Kyle | 100 | 100 | 100 | 100 | 100 | VL | F | VG | VG | VG | P | VG | F |
| Medora | 96 | 96 | 97 | 97 | 107 | M | G | VG | VG | VG | F | VG | F |
| Plenty | 104 | 108 | 108 | 108 | 113 | L | G | VG | VG | VG | P | VG | G |
| Sceptre | 97 | 97 | 98 | 100 | 111 | M | G | VG | VG | VG | F | VG | G |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.
** Relative yields under irrigation are based on limited data.
*** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.
\+ Relative yield based on less than three years of data in Area 4.
++ This variety may not be described in 1995.
— No data available.

PBR Progress through Research

At time of printing: Protected by Breeders' Rights: Grandin.
Applied for protection: AC Eatonia, Invader.

*Refer to section "What is Plant Breeders' Rights".*

**Comments**

Seed of varieties rated poor and very poor to bunt and loose smut should be treated. Please refer to the Seed Treatment section of this pamphlet or **Seed Treatments and Foliar Fungicides, 1994** pamphlet. During wet harvest weather grades drop more rapidly due to sprouting in swathed than in standing crops.

**Grandin** was granted a one year interim registration which expires March 31, 1994. The future of **Grandin** will be announced by March 1, 1994. It is eligible for **Experimental Grades** only. **Grandin** has high yield potential in all areas. **Grandin** has an awned head, matures about two days later, and has shorter stronger straw than **Katepwa**.

## Canada Western Red Spring Wheat

**Invader** has good resistance to stem rust, leaf rust and loose smut, and fair resistance to common bunt and root rot. It has an awned head and strong straw. It yields more than **Katepwa** in all areas except under irrigated conditions and matures about two days later than **Katepwa**. Limited seed will be available in 1994.

**AC Domain** has shorter stronger straw than **Katepwa** and similar time to maturity. It has good resistance to sprouting and weathering. **AC Domain** is best adapted to conditions in Manitoba. Limited seed will be available in 1994.

**AC Eatonia** is resistant to the wheatstem sawfly and yields more than **Leader** and **Lancer**. **AC Eatonia** has good resistance to sprouting and weathering. Seed will not be available in 1994.

**AC Minto** is higher yielding and matures about two days later than **Katepwa**. It has very good resistance to stem rust and loose smut, good resistance to leaf rust and common bunt, and fair resistance to common root rot. It has taller and weaker straw than **Katepwa**.

**CDC Makwa** is higher yielding than **Katepwa** and is of a similar maturity. It has good resistance to stem rust and loose smut; and fair resistance to leaf rust, common bunt, and common root rot.

**CDC Merlin** has yielded well in Areas 3 and 4. It has good resistance to leaf rust, stem rust, loose smut and common bunt, and fair resistance to common root rot. It is later maturing, taller and weaker than **Katepwa**. Limited quantities of certified seed of **CDC Merlin** may be available in 1994.

**CDC Teal** has very good resistance to stem rust, good resistance to leaf rust and loose smut, and fair resistance to bunt. **CDC Teal** is intermediate to **Katepwa** and **Roblin** for maturity, height, and straw strength.

**Columbus** has good resistance to sprouting and weathering. **Columbus** is late maturing and must be sown early, particularly in Area 4.

**Laura** has high yield potential and matures about two days later than **Katepwa**. **Laura** has an awned head and good shattering resistance.

**Pasqua** has good resistance to leaf rust and stem rust; and fair resistance to loose smut, common bunt, and common root rot. **Pasqua** is slightly shorter and stronger strawed and slightly later maturing than **Katepwa**. It has sprouting tolerance intermediate to **Katepwa** and **Columbus**.

Under drought stress grain yield of **Roblin** can be reduced more than other varieties. **Roblin** is early maturing and has strong straw making it best suited to northern areas. Generally, **Roblin** has higher protein content than other cultivars.

**Leader** and **Lancer** are resistant to wheat stem sawfly. **Lancer** has better resistance to wheat stem sawfly, seed shattering and root rot than **Leader**.

## Canada Prairie Spring Wheat

**AC Taber, Biggar, Cutler,** and **Oslo** are red-seeded and **Genesis** is white-seeded.

**AC Taber** has very good resistance to stem rust, good resistance to leaf rust and common bunt. It is similar in many respects to **Biggar** except that it is slightly taller and later in maturity.

**Biggar** is a high yielding, awned, semi-dwarf wheat. Both **AC Taber** and **Biggar** are late maturing and must be sown early, particularly in Area 4.

**Cutler** has yield potential and time to maturity similar to **Katepwa**.

**Oslo** is similar in maturity to **Katepwa** and lower yielding than **Biggar**.

**Genesis** is white-seeded and is susceptible to sprouting under wet harvest conditions. It has high yield potential and is late maturing. **Genesis** is slightly taller and weaker strawed than **Katepwa.** It is best suited to Areas 1 and 2.

## Canada Western Amber Durum

All durum varieties are susceptible to two new races of loose smut. Seed can be treated to provide control. *See the "Seed Facts" section for details.*

**Medora** and **Sceptre** are early maturing and have strong straw.

**Kyle** has high yield potential and is best suited to the Brown and Dark Brown soil zones. **Kyle** receives good grades even under adverse harvesting conditions.

**Plenty** has high yield potential in all areas. It is similar to **Kyle** in height, but is stronger strawed and slightly earlier maturing.

**Sceptre** is the shortest, strongest-strawed durum variety.

## Soft White Spring Wheat

**AC Reed** has similiar yield potential to **Fielder** and matures about 2 days earlier than **Fielder**. **AC Reed** has moderate resistance to shattering, powdery mildew, and common root rot.

**SWS-52** is about 5 days later maturing and stronger strawed than **Fielder. SWS-52** has moderate resistance to black point, bunt, powdery mildew and shattering. They are both susceptible to loose smut and sprouting of the grain before harvest. **Fielder** is susceptible to bunt. **SWS-52 will be deregistered in 1994 and after that time will be eligible only for Canada Feed grade.**

*Continued*

## Canada Western Extra Strong

The Canada Western Utility class has been replaced by the Canada Western Extra Strong Red Spring class. Tighter grade specifications which came into effect August 1, 1993 are intended to enhance the market potential of this class of wheat which has extra strong gluten.

The varieties of wheat eligible for the Extra Strong class are the same as those which qualified for the former Canada Western Utility class, namely, **Glenlea**, **Bluesky**, and **Wildcat**.

**Bluesky** and **Wildcat** are earlier maturing than **Glenlea** and lower yielding. These varieties perform poorly under droughty conditions. There is growing interest in Extra Strong wheat because of its unique gluten properties. Demand for this class has risen significantly due to its ability to "carry" weaker wheats in a blend. Commercial experience has also shown that Canada Western Extra Strong red spring wheat performs exceptionally well in frozen dough products, a rapidly expanding segment of the baking industry. The Canadian Wheat Board will be offering an expanded guaranteed contract program. Details will be available from the Canadian Wheat Board, elevator agents, Extension Agrologists, and local Agriculture Canada Research Stations.

## Winter Wheat

**Main Characteristics of Varieties**

| Variety | Grain Yield (% Norstar) | | Height | Straw Strength | Winter Survival |
|---|---|---|---|---|---|
| | Dryland | Irrigation | | | |
| Norstar | 100 | 100 | Tall | Poor | Good |
| Norwin | 94 | 137 | Short | Fair | Fair |
| AC Readymade | 85 | — | Intermediate | Fair | Poor |
| CDC Kestrel | 105 | 144 | Intermediate | Fair | Good |

**Comments:**

**Norstar** is the dominant winter wheat cultivar in western Canada. It is the most winter hardy cultivar available and it is particularly well adapted to regions that experience frequent early spring drought stress.

**Norwin** is a semi-dwarf cultivar with very short straw. Its winter hardiness is inferior to **Norstar**. **Norwin** is sensitive to drought stress and should only be grown under high moisture conditions where lodging and excessive straw production are problems.

**AC Readymade** is a medium tall cultivar with fair straw strength and excellent grain protein concentration. It has performed best under favorable moisture conditions. Poor winter hardiness will restrict production of this cultivar to southern Alberta.

**CDC Kestrel** is a tall semi-dwarf cultivar. Its yield has been similar to **Norstar** under drought conditions. Shorter, stronger straw makes **CDC Kestrel** better adapted than **Norstar** to high moisture environments and irrigation. Under rust conditions **CDC Kestrel** and **Norwin** perform better than **Norstar** while **AC Readymade** does not.

## Use of Variety Names

The Canada Seeds Act and Regulations state that when seed is advertised or sold by variety name, the variety must be registered (licensed) and the seed must be from a field which has received a certificate of pedigree from the Canadian Seed Growers' Association.

Farmers may phone Agriculture Canada for further information:
**Saskatoon 306-975-4240**

## Testing Varieties in Saskatchewan

Information in the pamphlet "Varieties of Grain Crops in Saskatchewan" is based on the performance of varieties at a number of locations across the province. Data from these trials are summarized and interpreted by the Saskatchewan Advisory Council on Grain Crops.

These trials are conducted by researchers from the University of Saskatchewan and Agriculture Canada. The most recently registered varieties and promising experimental lines that might become registered are compared to standard varieties. Wheat, oat, barley and flax varieties are grown at all locations, whereas canola, mustard, field pea, lentil and minor crops are tested in those regions in which they are best adapted. Information on sunflower production is received from trials conducted under the auspices of the Saskatchewan Sunflower Committee. The reaction of varieties to diseases and seed treatment recommendations are updated and forwarded to the Grain Crops Council by pathologists who meet as members of the Plant Disease Sub-council of the Council on Crop Protection.

Variety trials are grown both on farmers' fields and Research Stations. Multiple small plots (30 ft.$^2$ to 45 ft.$^2$) of the various varieties are sown and harvested with miniature press-drills and combines.

Grain yield results from the interplay of genetic factors and non-genetic factors. Variety trials are designed to measure the differences among varieties that are due to genetic causes. It is important to minimize variability due to non-genetic factors such as soil type, nutrients, moisture, weeds, diseases, and other pests. Experimental designs using replication (repeated plantings of the varieties) and randomization (the position of the varieties within the test are assigned by chance) are then used to estimate the precision with which the genetic factors can be measured. Yield potential of a variety is estimated by measuring the weight of grain produced per unit area. Comparisons among varieties for yield potential involves an evaluation of both their absolute amounts of grain and their relative yield. Relative yield is the yield of one variety expressed as a percentage of a second variety.

Yields obtained in these trials are not identical to those obtained under commercial production conditions. However, the average yield for these varieties, obtained over a number of years at several locations, would remain in relatively the same ratio regardless of whether the grain yields were measured in small plots or large-scale fields. **Relative yields** presented in this pamphlet are the best estimates of expected yield advantage in the areas indicated. They are considerably more relative than estimates based on data from a single test or from a single location. Farmers should be aware, however, that actual yields within an area, or in a particular year, may vary substantially from the average figures reported because of natural variability. For example, Laura wheat is expected to outyield Katepwa by 4% in Area 2. A farmer in this area may find that Laura will yield anywhere in the range of about 7 percent less than Katepwa to about 16 percent more than Katepwa.

One out of three times, Laura may even yield outside this range. Similar variation in relative yields can be expected for most crops.

# Barley

## Main Characteristics of Varieties

| Type & Variety | 2 or 6 row | Rough or Smooth Awns | Yield as % of Harrington: Area 1 | Area 2 | Area 3 | Area 4 | Relative*** Maturity Ratings | Resistance to*: Lodging | Shattering | Leaf spots: Net Blotch | Leaf spots: Scald | Loose Smut | Other Smuts | Root Rot | Stem Rust |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Malting** | | | | | | | | | | | | | | | |
| Harrington | 2 | R | 100 | 100 | 100 | 100 | M | G | VG | P | P | P | VP | G | P |
| Argyle | 6 | S | 92 | 93 | 96 | 95 | E | VG | VP | F | P | P | VP | G | G |
| Bonanza | 6 | S | 93 | 91 | 93 | 93 | E | G | VP | F | P | P | P | G | G |
| B1215 | 2 | R | 103 | 103 | 106 | 106 | L | G | G | P | P | P | P | P | P |
| B1602 | 6 | R | 90 | 96 | 97 | 89 | E | G | P | F | P | P | F | VG | G |
| Duel | 6 | R | 95 | 99 | 100 | 96 | M | G | VP | G | P | P | P | G | G |
| Manley | 2 | R | 102 | 109 | 108 | 108 | L | G | VG | F | P | P | P | G | G |
| AC Oxbow | 2 | R | 95 | 97 | 101 | 103 | M | VG | VG | F | P | VG | G | F | G |
| Stein | 2 | R | 102 | 107 | 105 | 106 | M | F | VG | F | P | P | F | G | G |
| Tankard | 6 | S | 100 | 104 | 104 | 100 | M | G | VP | F | P | P | P | G | G |
| **Feed** | | | | | | | | | | | | | | | |
| Bridge | 2 | R | 106 | 105 | 107 | 103 | L | G | VG | P | P | P | P | F | F |
| Brier | 6 | S | 115 | 111 | 113 | 110 | M | F | F | G | VG | P | G | VP | G |
| Bronco** | 6 | R | 95 | 108 | 107 | 108 | L | G | F | P | P | P | F | F | G |
| CDC Guardian | 2 | R | 98 | 104 | 105 | 109 | L | F | G | G | VG | P | VG | F | G |
| AC Lacombe | 6 | S | 102 | 106 | 109 | 105 | M | G | F | F | P | P | VG | F | G |
| Noble | 6 | S | 100 | 102 | 103 | 100 | M | G | G | F | P | P | F | P | G |
| Prospect** | 2 | R | 103 | 108 | 109 | 111 | L | F | G | P | P | P | F | F | P |
| Seebe** | 2 | R | 98 | 105 | 105 | 109 | VL | G | G | P | F | P | VG | P | P |
| Virden | 6 | S | 107 | 105 | 107 | 109 | VL | VG | G | F | P | P | F | VG | G |
| **Hulless** | | | | | | | | | | | | | | | |
| CDC Buck | 6 | R | 82 | 89 | 86 | 85 | E | G | F | F | P | P | F | G | G |
| Condor | 2 | R | 85 | 83 | 82 | 79 | M | G | G | P | P | P | P | G | F |
| Phoenix** | 2 | R | 73 | 88 | 94 | 90 | M | G | G | P | P | P | F | G | P |
| CDC Richard | 2 | R | 82 | 93 | 92 | 87 | E | F | F | P | VG | F | P | G | G |
| **Intensive Management** | | | | | | | | | | | | | | | |
| Duke | 6 | R | 91 | 94 | 94 | 89 | L | VG | F | F | VG | P | F | G | G |
| CDC Earl** | 6 | R | 93 | 121 | 111 | 97 | L | VG | F | G | VG | P | VG | G | G |
| Tukwa** | 6 | S | 84 | 117 | 115 | 111 | E | VG | F | G | G | P | VG | F | G |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.

** Limited data.

*** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.

## Environment Canada Weather Information (24 hours each day, seven days a week)

**Recorded weather information**

- Regina 780-5744
- Saskatoon 975-4266
- Prince Albert 929-2114
- Swift Current 773-5599
- Yorkton 782-1511
- North Battleford 445-7000
- Hudson Bay 865-2721

**Weatheradio**

- continuous up-to-the-minute forecasts and information
- broadcast on VHF radio band using frequencies: 162.400 MHz, 162.475 MHz and162.550 MHz
- there are presently 9 Weatheradio stations: call your nearest Environment Canada office for more details
- 2 new Weatheradio stations to be added in 1994; one at Elbow, one to be announced

**Public phone numbers**

- Regina 780-6674 (24 hrs)
- Saskatoon 975-4255 (24 hrs)
- Prince Albert 953-8640 (Mon-Sat, 5 a.m.-6:30 p.m. Sun, 8 a.m.-4 p.m.)
- Broadview 696-2229 (24 hrs)
- Estevan 634-2833 (24 hrs)

**Comments**

A new race of stem rust which attacks all of our previously resistant varieties has appeared in the eastern prairies and the northern great plains. It is not yet clear how persistent this race will be over time. **Early sowing is the only practical measure which can be taken at this time.**

None of the current two-rowed varieties have good field resistance to all races of net blotch. Therefore, growers who must plant barley on barley stubble should select six-rowed varieties which are more tolerant.

Most of the available varieties are susceptible to one or more types of smut. Therefore, seed should be treated on a regular basis. See the Seed Facts section for details.

In hulless varieties the hull is left in the field, therefore, comparable yields are 10-15% lower. Hulless seed is more susceptible to damage than hulled seed, so handling should be minimized. Markets for hulless barley have not been clearly defined but it should be valuable for hog feed, pet food and human consumption.

**CDC Guardian** is a new two-rowed feed variety with excellent disease resistance. It combines resistance to the old races of stem rust, net blotch, scald and surface borne smuts. It has moderate resistance to root rot and is susceptible to loose smut.

**Seebe** is a new two-rowed feed variety. It is similar in yield to **Bridge** and **CDC Guardian** but is very late maturing. It is not as disease resistant as **CDC Guardian**.

**Prospect** is a new two-rowed feed variety with similar yield potential to **Manley**. It has poor resistance to diseases.

**Phoenix** is a new hulless variety with good lodging resistance but poor disease resistance.

**AC Lacombe** is a new six-rowed feed variety with excellent yield, good straw strength and disease resistance.

**Noble** is a six-rowed variety. It has yielded well in drier locations. It has good lodging and shattering resistance. **Virden** is a six-rowed feed variety. It has a very high yield potential but is very late. It has very good straw strength. **Brier** is a six-rowed feed variety. It has very good yield potential and good disease resistance. **AC Stacey** is a new early maturing 6-row feed variety. While it is slightly better than **Jackson**, it is still 10-20% lower yielding than **Harrington. Bridge** is a new two-rowed feed variety with good yielding ability; it is slightly later than **Harrington** with similar disease resistance.

**Manley** is a two-rowed malting variety with very good yield potential and better disease resistance than **Harrington**. It has moderate resistance to the spot-form of net blotch. **Manley** is later maturing than **Harrington** and should be sown early. **Manley** has completed plant scale malting and brewing trials and has been rated as acceptable by the Brewing and Malting Barley Research Institute. **Stein** is a new two-rowed malting variety with superior yield and better disease resistance than **Harrington**. It is earlier maturing but weaker strawed than **Manley**.

**Tankard** is a new six-rowed blue aleurone malting variety. It is higher yielding than **Argyle** and similar in straw strength and disease resistance. It has been rated acceptable by the industry. **Duel** is a blue aleurone six-rowed malting variety with higher yield potential than **Bonanza** and **Argyle**. **B1602** has also been judged to have suitable malting and brewing quality. It is a six-rowed white aleurone variety and thus cannot be distinguished from feed varieties. Therefore, it should only be grown under contract. **B1602** is generally higher yielding than **Bonanza** in the traditional barley growing areas of the province, otherwise it is similar to it.

**B1215** is a new two-rowed malting variety with higher yield than **Harrington**. It is slightly later maturing than **Harrington** with similar disease and lodging resistance.

**AC Oxbow** has limited yield potential, but has good straw strength and disease resistance. It has loose smut resistance.

Growers are reminded that the industry is very cautious about moving into the use of new varieties.

Growers are cautioned that malting varieties, especially two rows, are very susceptible to sprouting.

Harvesting grain over 16% moisture and then using aeration bins for drying can lead to sprouting and embryo death. Seed with reduced germination is undesirable for seeding or malting purposes.

## Irrigation

Under irrigation, disease resistance, straw strength and maturity are more critical. Growers should select early, strong-strawed, disease resistant varieties.

Semi-dwarf varieties like **Duke** should be grown only under high moisture, high fertility conditions which would cause severe lodging of conventional varieties. High productivity tests in Saskatchewan have shown **Duke** to outyield other available varieties under lodging conditions.

**Tukwa** is a new semi-dwarf, similar to **Duke** in yield but 2-3 days earlier. It is not as disease resistant or as strong strawed as **Duke**.

**CDC Earl** is a new semi-dwarf with better yield potential and disease resistance than **Duke**.

## Lines under Interim Registration for Evaluation of Malting and Brewing Quality

Small scale tests are a good measure of malting potential but are not sufficient to determine the commercial acceptability of malting varieties. Final acceptance is given only after two years of successful plant scale evaluation. Several carload lots of barley are malted and subsequently brewed. The beer is then given the ultimate test — a taste panel. This process will normally take a minimum of three years. A crop grown in 1993 will be malted in January-February, 1994. It will be brewed in May-June, 1994, aged and tasted in October-November, 1994. A crop grown in 1994 will be tasted in October-November, 1995. To facilitate this testing "Interim Registration" has been established as a special category. This registration is granted for up to three years. It allows seed increase and marketing in a normal manner but automatically expires if performance of the line is not satisfactory. If performance is satisfactory then a full registration is granted. Production of the carload lots for evaluation is done by contract through the Canadian Wheat Board. **The following lines are currently under test:**

## Malting Barley Lines under Interim Registration

**Main Characteristics of Lines**

| Type and Line | Yield as % of Harrington | | | | Relative** Maturity Ratings | Resistance to* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Leaf spots | | | | | |
| | Area 1 | Area 2 | Area 3 | Area 4 | | Lodging | Shattering | Net Blotch | Scald | Loose Smut | Other Smuts | Root Rot | Stem Rust |
| **Two Row** | | | | | | | | | | | | | |
| TR118 | 97 | 103 | 102 | 104 | M | VG | G | F | P | P | F | F | G |
| TR229 | 105 | 116 | 111 | 119 | L | G | VG | F | P | VG | G | F | G |
| **Six Row** | | | | | | | | | | | | | |
| BT926 | 91 | 94 | 99 | 93 | E | G | F | P | P | VP | G | G | G |
| BT930 | 92 | 107 | 102 | 113 | L | F | F | F | P | VP | G | G | P |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.
** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.

**Comments:**

**TR118** is a new two-rowed malting variety. Its performance and quality are similar to **Harrington**. It has strong straw. Its most interesting feature is sprouting resistance.
**TR229** is a new two-rowed malting variety with performance similar to **Manley**. It has loose smut resistance.
**BT926** is a short, strong early six-row with white aleurone.
**BT930** is a white aleurone malting variety. It is higher yielding than **B1602** but later maturing.

## Rye

**Main Characteristics of Varieties**

| Variety | Yield as % of Musketeer | | | | Relative** Maturity Rating | Resistance to* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | Area 2 | Area 3 | Area 4 | | Winter Killing | Shattering | Lodging | Stem Smut |
| Musketeer | 100 | 100 | 100 | 100 | M | G | G | G | G |
| Prima | 110 | 108 | 105 | 108 | L | G | G | F | G |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.
** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.

**Comments:**

**Gazelle** is the only registered variety of spring rye.
**Danko** and **Kodiak** are very susceptible to winter killing in Saskatchewan and therefore should only be considered for production using direct seeding technology that leaves the stubble standing.

## Triticale

### Main Characteristics of Varieties

| Variety | Yield as % of Frank | | | | Relative** Maturity Ratings | Resistance to* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | Area 2 | Area 3 | Area 4 | | Lodging | Stem Rust | Leaf Rust | Bunt | Root Rot |
| Frank | 100 | 100 | 100 | 100 | M | G | VG | VG | VG | F |
| Banjo | 95 | 100 | 100 | 95 | L | G | VG | VG | VG | G |
| AC Copia | 102 | 103 | 96 | — | M | G | VG | VG | VG | G |
| Wapiti | 97 | 104 | 98 | 83 | L | G | VG | VG | VG | G |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.
** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.

**Comments:**

**Triticale** matures 3-5 days later than **Biggar** wheat, therefore, should be seeded as early as possible. Triticale matures very late in Area 4. **Triticale** is large seeded so seeding rates must be increased about 25 percent as compared to bread wheat. Seed of **AC Copia** will not be generally available in 1994.

## Oat

### Main Characteristics of Varieties

| Variety | Yield as % of Calibre | | | | Test wt. (kg/hl) | % Hull | % Plump | Relative** Maturity Ratings | Resistance to* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | Area 2 | Area 3 | Area 4 | | | | | Lodging | Stem Rust | Leaf Rust | Smut |
| Calibre | 100 | 100 | 100 | 100 | 50.0 | 22.9 | 44 | M | G | VP | VP | P |
| Cascade++ | 104 | 99 | 99 | 98 | 47.4 | 26.0 | 48 | E | G | VP | VP | P |
| Derby | 101 | 99 | 100 | 103 | 50.1 | 22.2 | 74 | M | G | VP | VP | F |
| Dumont | 96 | 98 | 96 | 95 | 48.8 | 23.5 | 64 | M | F | VG | VG | G |
| AC Marie | 99 | 100 | 99 | 96 | 45.5 | 20.7 | 35 | L | F | VG | G | G |
| AC Preakness+ | 97 | 104 | 101 | 98 | 48.8 | 22.6 | 66 | L | G | VG | VG | G |
| Waldern | 96 | 101 | 105 | 105 | 45.7 | 25.0 | 74 | VL | G | VP | VG | F |

* Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.
** Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.
\+ Less than three years of data for Area 4.
++ This variety may not be described in 1995.

**Comments**

**AC Preakness** is a new variety with excellent disease resistance for the rust area of south-east Saskatchewan. It has good yield potential and kernel quality, with low hull content and good % plumpness. It is later maturing than **Calibre**.

**Calibre** has high yield potential and excellent kernel quality, having high test weight and low percent hull.

**Cascade** has high yield potential but poorer kernel quality being lower in test weight with higher hull content. **Cascade** is earlier maturing than **Calibre**.

**Derby** has high yield potential and test weight, plumper grain and lower hull content than **Calibre**. It is slightly earlier than **Calibre** but not as early as **Cascade**.

**Dumont** has excellent disease resistance and good kernel quality, however it has weaker straw and lower yield potential and is later maturing than **Calibre**. **Dumont** should be considered for the oat rust-area of southeast Saskatchewan.

**AC Marie** is a new variety with excellent disease resistance and is adapted to southeast Saskatchewan. It has good yield potential and very low hull content, however it has low test weight and poor grain plumpness. It is later maturing than **Calibre**.

**Waldern** has high yield potential and large grain size. Its low test weight and high hull content make it less desirable for milling and specialty markets. It is also later maturing than **Calibre**.

**Calibre, Cascade, Derby** and **Waldern** are susceptible to oat-rusts and may be at risk if grown in the oat-rust area of southeast Saskatchewan.

**HULLESS OAT: AC Belmont** is a new hulless oat cultivar with improved yield and disease resistance compared with **Terra**. Since the hull is part of yield in normal oat, hulless oat are expected to yield less. Producers should be aware that hulless oat can be difficult to handle and store and should be stored only at a moisture content less than 12%.

# Oilseed Crops

## Canola

### Main Characteristics of Varieties

| Type & Variety | Area 2 | Area 3 | Area 4 | % Oil | Average Maturity in days | Resistance to* Lodging | White Rust | Blackleg** |
|---|---|---|---|---|---|---|---|---|
| | Yield as % of Legend (see comments section) | | | | | | | |
| **Argentine** | | | | | | | | |
| Legend | 100 | 100 | 100 | 42.6 | 98 | F | VG | F |
| Bounty | 109 | 107 | 101 | 42.7 | 98 | P | VG | P-F |
| Celebra | 98 | 95 | 100 | 43.4 | 101 | G | VG | F |
| Crusher | 108 | 99 | 107 | 44.5 | 101 | VG | VG | F |
| Cyclone | 120 | 112 | 115 | 43.1 | 99 | G | VG | G |
| Delta | 107 | 103 | 111 | 42.0 | 100 | G | VG | F |
| AC Elect | 100 | 98 | 113 | 44.2 | 98 | F | VG | P-F |
| AC Excel | 99 | 95 | 99 | 43.8 | 98 | F | VG | F |
| Garrison | 115 | 111 | 124 | 42.7 | 100 | VG | VG | F-G |
| Hyola 401 | 112 | 112 | 98 | 42.2 | 100 | G | VG | P |
| Hyola 417 | 105 | 108 | 113 | 42.6 | 99 | G | VG | F |
| Impact | 106 | 102 | 115 | 42.8 | 99 | G | VG | F |
| Jackpot | 105 | 104 | 121 | 43.3 | 99 | G | VG | P |
| Legacy | 110 | 107 | 118 | 43.6 | 99 | G | VG | F |
| Mari | 93 | 85 | 84 | 43.6 | 100 | F | VG | G |
| Seville | 112 | 102 | 109 | 42.6 | 100 | VG | VG | F |
| Trojan | 108 | 102 | 115 | 42.8 | 100 | VG | VG | F |
| Vanguard | 99 | 94 | 99 | 43.1 | 99 | F | VG | F |
| Stallion (TT) | 77 | 80 | 72 | 40.7 | 99 | F | VG | F |
| AC Tristar (TT) | 70 | 76 | 68 | 41.7 | 97 | VP | VG | VP |
| **Industrial Oil Rapeseed** | | | | | | | | |
| Hero (HE) | 83 | 84 | 79 | 43.6 | 97 | F | VG | G |
| Mercury (HE) | 91 | 83 | 92 | 44.0 | 96 | F | VG | G |
| | Yield as % of Tobin | | | | | | | |
| **Polish** | | | | | | | | |
| Tobin | 100 | 100 | 100 | 41.7 | 85 | F | G | P |
| Colt | 101 | 99 | 100 | 42.5 | 87 | F | VP | P |
| Eclipse | 95 | 94 | 94 | 43.0 | 87 | F | F | P |
| Eldorado | 99 | 102 | 99 | 42.9 | 87 | F | P | P |
| Goldrush | 92 | 97 | 88 | 41.6 | 89 | G | G | P |
| Horizon | 102 | 102 | 102 | 42.4 | 87 | F | VP | P |
| Klondike | 96 | 104 | 111 | 42.2 | 89 | F | VP | P |
| AC Parkland | 96 | 101 | 103 | 43.2 | 87 | F | VG | P |
| Reward | 97 | 101 | 99 | 43.2 | 86 | F | VG | P |
| AC Sunshine | 94 | 97 | 99 | 43.2 | 87 | F | VG | P |

TT = Triazine tolerant; HE = High erucic acid.

* Resistance ratings: **VG** — very good; **G** — good; **F-G** — fair to good; **F** — fair; **P-F** — poor to fair; **P** — poor; **VP** — very poor.

** **A minimum of 3 years between canola crops (4 year rotation) is essential to reduce the incidence of blackleg.**

PBR Progress through Research

At time of printing: Protected by Plant Breeders' Rights: Crusher, Cyclone.
Applied for protection: Garrison, Goldrush, Impact, Jackpot, Klondike, Legacy, Seville, Trojan.

*Refer to section "What is Plant Breeders' Rights".*

**Comments:**

**Argentine** varieties yield, on average, 10% more seed than **Polish** varieties, and mature in 97 to 101 days. These varieties are best suited to the longer season growing areas of central Saskatchewan. **Polish** varieties mature 10 to 14 days earlier than **Argentine** varieties, and are therefore well adapted to the short season growing areas of northern Saskatchewan. Under conditions of drought or early fall frost, which shorten the growing period, the yield of **Polish** varieties can be equal to or greater than that of **Argentine** varieties. **Polish** varieties are also less likely to produce green seed. All canola varieties are susceptible to Sclerotinia stem rot.

## Argentine canola

**Argentine** varieties are black seeded and have very good white rust resistance. **Blackleg, which is now widespread in Saskatchewan, can cause severe yield losses in Argentine varieties that have very poor or poor resistance when grown in blackleg prone areas. Argentine** varieties are susceptible to seed shattering when left standing for straight combining at full maturity.

It should be noted that late and very late maturing **Argentine** varieties tend to produce higher levels of green seed under cool and wet conditions at harvest, which can cause substantial grade reductions. Late and very late maturing **Argentine** varieties should be planted early to reduce green seed counts.

**Impact**, **Legacy** and **Trojan** are three new high yielding varieties with good lodging resistance. They are medium to late in maturity and have fair blackleg resistance, oil contents are medium.

**Jackpot** is a new high yielding, medium maturing variety; but has poor blackleg resistance.

**Mari** is a new, late maturing variety with good resistance to blackleg. It is low yielding.

**Hyola 417** is a new, medium maturing hybrid variety with good lodging and fair blackleg resistance. It is an improvement over the hybrid variety **Hyola 401** which is later maturing and has poor blackleg resistance.

**Cyclone** and **Garrison** are high yielding varieties with good and fair to good blackleg and good and very good lodging resistance, respectively. Both varieties are late maturing.

**AC Elect** is higher yielding than **AC Excel**, both varieties have high oil content and are early to medium in maturity. **AC Excel** has fair blackleg resistance while **AC Elect** has poor to fair resistance.

**Seville** is high yielding, has very good straw strength, fair blackleg resistance; but is late maturing.

**Crusher** has excellent straw strength and high oil content but is very late maturing.

**Bounty** has good yield and poor to fair blackleg resistance.

**Celebra** and **Vanguard** are lower yielding and have fair blackleg resistance.

**Delta** is late maturing with fair blackleg resistance and low oil content.

**Legend** has medium maturity and fair blackleg resistance.

## Irrigation

**Argentine** varieties respond well to irrigation. Strong strawed, blackleg resistant varieties should be used, since irrigation may increase the incidence of blackleg. Irrigation might also delay maturity by one week or more under cooler conditions at harvest.

## Triazine tolerant canola

Seed yields of Argentine type triazine tolerant (TT) varieties, under weed free conditions, are substantially lower than those of other Argentine varieties. They also have significantly lower oil contents. These varieties should only be considered for planting on fields where severe infestation of stinkweed and/or wild mustard are expected. For registered herbicides, consult "Weed Control in Field and Forage Crops 1994". **Stallion** and **AC Tristar** are triazine tolerant varieties, they are late to medium in maturity. **Stallion** has fair blackleg and fair lodging resistance while **AC Tristar** is highly susceptible to blackleg, and has very poor lodging resistance.

## Polish canola

**Polish** varieties are yellow-brown seeded. They all have poor blackleg resistance. However, blackleg is less of a threat in **Polish** canola because of its early maturity which tends to reduce the incidence of blackleg.

**Klondike** is a new high yielding variety, it is late maturing, has very poor white rust resistance, and low oil content.

**AC Sunshine** is a new variety that has very good resistance to white rust and high oil content, and is similar to **AC Parkland** and **Reward**.

**Colt** and **Horizon** have very poor white rust resistance.

**Eldorado** has poor white rust resistance.

**Goldrush** and **Eclipse** are lower yielding varieties, **Goldrush** has low oil content.

**Tobin** is an early maturing variety with good white rust resistance, it's oil content is low.

A new race of white rust, found in 1988, can attack all Polish type varieties.

## Industrial oil rapeseed

For special industrial oil markets a high erucic acid oil is needed. **Hero** and **Mercury** are **Argentine** type high erucic (HE) acid varieties that have high oil content, good blackleg resistance and very good straw strength. Information on the contract production of **Hero** and **Mercury** should be obtained from companies which contract such production.

## Flax

### Main Characteristics of Varieties

| Variety | Yield as % of NorLin | | | | | Relative+ Maturity Ratings | Seed Size | Resistance to++ | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | Area 2 | Area 3 | Area 4 | Irr. | | | Rust | Wilt | Lodging |
| NorLin | 100 | 100 | 100 | 100 | 100 | M | Medium | VG | G | G |
| Andro | 99 | 90 | 95 | 90 | 89 | E | Medium | VG | F | G |
| Flanders | 104 | 105 | 99 | 97 | 113 | L | Small | VG | G | VG |
| AC Linora | 88 | 89 | 94 | 87 | 110 | L | Medium | VG | G | VG |
| AC McDuff | 102* | 102** | 103 | — | — | VL | Medium | VG | G | VG |
| Somme | 104 | 100 | 103 | 98 | 96 | M | Medium | VG | G | F-G |
| Vimy | 114 | 105 | 103 | 99 | 86 | M | Large | VG | G | F |

### Low Linolenic Flax

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Linola™ 947 | 100** | 105** | 95 | — | — | VL | Small | VG | G | VG |

* Less than three years of data.
** Limited data.
— Insufficient data or no datum.
+ Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.
++ Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.

PBR Progress through Research

At time of printing: Applied for protection: Linola™ 947.
*Refer to section "What is Plant Breeders' Rights".*

**Comments:**

**Andro** is an early-maturing, rust-resistant variety that should replace the old rust-susceptible variety **Noralta.**

**Flanders** is a variety that is a higher yielding and earlier maturing replacement for **McGregor**.

**Linola™ 947** is the first low linolenic acid flax variety registered in Canada. Since **Linola™ 947** produces a food quality oil it cannot be sold in traditional flax markets. **Linola™ 947** will only be available for contract production.

**Linola™ 947** is later maturing than **Flanders** and so is better suited to the southern Areas 1 and 2.

**AC Linora** is a new late maturing variety that is best adapted to Manitoba. Seed will not be available in 1994.

**AC McDuff** another new late maturing variety from Agriculture Canada. It has a high oil content, very good straw strength but is later maturing than **Flanders**. Seed will not be available in 1994.

**NorLin** is a high yielding, medium-early variety most suited to Area 3 and 4.

**Somme** is a new medium-early maturing variety released as a replacement for **NorLin**. It performs very well in Area 3.

**Vimy** is a medium-early variety with large seed that is very well adapted to Areas 1, 2, and the southern portion of Area 3.

Frozen flax should be analyzed by the Saskatchewan Feed Testing Laboratory to determine that it is free of prussic acid before using it as a livestock feed.

## Sunflower (oilseed)

### Main Characteristics of Varieties

| Variety | Yield as % of IS 7111 | Average Maturity in days | Oil % |
|---|---|---|---|
| IS 7111 | 100 | 121 | 47.7 |
| IS 7000 | 101 | 120 | 47.0 |
| IS 6111 | 120 | 121 | 43.7 |
| DO 707 | 117 | 123 | 45.0 |
| 6322 | 116 | 122 | 45.0 |

**Comments:**

Sunflower requires 120-125 days to mature, depending on the cultivar and the growing season. Oilseed sunflower has traditionally been grown in the Dark Brown and Black soil zones in southeastern Saskatchewan. Extremely early maturing Sunola type cultivars **AC Aurora** and **AC Sierra**, as well as the early maturing hybrid cultivars **Sunwheat 101** and **Sunwheat 103** are adapted to production in all areas of Saskatchewan.

## Condiment Mustard

**Main Characteristics of Varieties**

| Type & Variety | Yield as % of Cutlass | Average Maturity in days |
|---|---|---|
| **Oriental** | | |
| Cutlass | 100 | 92 |
| Forge | 97 | 94 |
| Lethbridge 22A | 88 | 93 |
| **Brown** | | |
| Commercial | 89 | 94 |
| | **Yield as % of Ochre** | |
| **Yellow** | | |
| Ochre | 100 | 93 |
| Gisilba | 96 | 93 |
| Tilney | 99 | 94 |

**Comments:**

Mustard is grown in the drier regions of the province because of the better seed quality obtained under these conditions. Oriental and Brown mustards are usually swathed, but straight combining is also possible. Yellow mustard should be straight combined because of possible losses due to wind damage to the fluffy swath. Any mixtures of rapeseed or canola in mustard, due to volunteer plants in the field or to improper handling on the farm, cause substantial losses through grade reductions.

Oriental mustard varieties are yellow seeded. **Cutlass** is high yielding and early maturing. **Forge** has good yield and superior seed quality. **Lethbridge 22A** is low yielding and susceptible to lodging. **Cutlass** and **Lethbridge 22A** are resistant to white rust, while **Forge** is highly susceptible.

**Commercial Brown** mustard is brown seeded. It yields 10% less than **Cutlass** and is highly susceptible to white rust.

Yellow mustard varieties are large seeded and the seed is light yellow in colour. They yield, on average, 30% less than the Oriental mustard variety **Cutlass**. **Ochre** is high yielding while **Gisilba** and **Tilney** yield less.

All mustard varieties are resistant to blackleg.

Differences in yield between the types is normally compensated for by price.

# What is *Plant Breeders' Rights*

The *Plant Breeders' Rights (PBR) Act* allows the developers of new varieties control over the multiplication and sale of reproductive material of a new variety. The holder of the right may pursue legal action to claim damages for infringement of the right. Should someone fail to meet the conditions set out by the protected party, they are liable under the *Plant Breeders' Rights Act*. According to the *Act*, the court may restrict the perpetrator from using the propagating material, dispose of any offending material, and order compensation for the plant breeder or his agent.

A new variety must be approved by the federal Plant Breeders' Rights Office to receive protection. The variety must also have the appropriate registration under the federal Seeds Act and Regulations to ensure it meets Canadian standards for quality and performance. Farmers may save some production for seeding the following year on their own farm, but sales of the crop as seed for propagation purposes are not allowed.

## PBR Logo

"Progress Through Research", symbolizes a plant variety protected by Plant Breeders' Rights (PBR). PBR provides the developers of plant varieties with an opportunity to recover investment in reseach. The rights include the ability to charge a royalty and to control the sale of propagating material. Users who do not remit royalties or sell a protected variety for propagating purposes may be prosecuted by the holder of the right or their agent.

PBR

Progress through Research

Varieties protected under Plant Breeders' Rights will be identified with the above logo, within each crop table; in a list below each crop table and within the Breeding Institutions and Seed Distributors list.

# Pulse Crops

## Field Pea

**Main Characteristics of Varieties grown in the Regional trials**

| Type and Variety | Area 2 and Southern 3 | Area 4 and Northern 3 | Relative*** Maturity Ratings | Vine length (cm) | Resistance to** Ascochyta Blight | Powdery Mildew | Seed Coat Breakage | Seed Weight (g/1000) |
|---|---|---|---|---|---|---|---|---|
| | Yield as % of Express | | | | | | | |
| **Food Type Yellow Seeded** | | | | | | | | |
| Express | 100 | 100 | M | 62 | P | VP | P | 240 |
| AC Tamor | 90 | 70 | L | 57 | VP | VG | G | 280 |
| Bellevue | 79 | 82 | VL | 87 | P | P | G | 180 |
| Bohatyr | 93 | 89 | M | 73 | F | VP | G | 270 |
| Carneval (SL) | 95* | 98* | E | 72 | P | P | P | 250 |
| Celeste | 87* | 79* | E | 65 | P | VP | F | 270 |
| Century | 83 | 74 | L | 106 | P | P | F | 230 |
| Highlight (SL) | 96* | 100* | E | 66 | P | VG | G | 210 |
| MIKO (SL) | 92 | 91 | M | 75 | P | P | F | 260 |
| Miranda | 76* | 76 | M | 44 | P | VP | P | 350 |
| Patriot (SL) | 89* | 86 | E | 67 | F | VP | F | 200 |
| Richmond | 98 | 101 | M | 67 | F | VP | F | 210 |
| Titan | 80 | 78 | L | 109 | P | P | G | 250 |
| Topper | 86 | 82 | M | 102 | VP | P | F | 290 |
| Trapper | 80 | 84 | L | 95 | P | P | F | 140 |
| Victoria | 87 | 94 | M | 84 | P | VP | F | 190 |
| | Yield as % of Radley (Radley yields 80% of Express) | | | | | | Bleaching Resistance | |
| **Food Type Green Seeded** | | | | | | | | |
| Radley (SL) | 100 | 100 | M | 57 | F | VP | F | 210 |
| Danto (SL) | 98* | 62* | M | 52 | P | P | F | 290 |
| Emerald | 102 | 112 | M | 75 | P | P | F | 250 |
| Keoma (SL) | 108* | 116* | M | 53 | P | P | P | 240 |
| Orb (SL) | 93 | 101 | M | 55 | P | VP | P | 240 |
| Princess | 92* | 83 | VE | 58 | P | P | G | 200 |
| Ricardo | 106* | 93* | M | 52 | F | VP | F | 280 |
| Trump | 111* | 98 | L | 63 | P | VP | F | 250 |
| | Yield as % of Express | | | | | | Seed Coat Breakage | |
| **Feed Type** | | | | | | | | |
| Baroness (SL) | 96 | 100 | E | 71 | P | P | F | 290 |
| FLUO(SL) | 90 | 97 | VE | 85 | P | P | F | 320 |
| Impala(SL) | 92* | 89* | M | 65 | P | P | F | 270 |
| Montana(SL) | 91* | 95* | VE | 55 | P | VP | F | 300 |
| Spring D | 92* | 94 | E | 62 | P | P | F | 240 |
| Tara | 86 | 91 | L | 96 | F | VG | F | 210 |

(SL) indicates semi-leafless variety.

* Limited data.

** Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.

*** Relative maturity ratings; **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.

PBR Progress through Research

At time of printing: Applied for protection: Carneval, Highlight, Orb, Patriot, Richmond, Topper, Trump.
*Refer to section "What is Plant Breeders' Rights".*

**Comments:**

Field pea is best adapted to the more northerly Black and Gray soil zones. Production in the Dark Brown soil zone is possible if moisture is not limiting and the crop is seeded very early. Early seeding will usually result in late August maturity and increase the likelihood of harvesting quality seed. Seed splitting may be reduced by harvesting tough and drying in an aeration bin. The recommended seeding rate for **Trapper** is 135 kg/ha (120 lb/ac). Other varieties should be sown at higher rates in proportion to seed weight.

Under dry conditions, short vine types (< 80 cm) and semi-leafless varieties may provide poor weed competition and be difficult to harvest. On the other hand, the semi-leafless characteristic may facilitate harvest, as vines do not lie as flat on the ground if a good stand is achieved.

**Green seeded varieties are generally lower-yielding than yellow seeded varieties**. Green types may bleach if weather is moist during and immediately preceding harvest.

Certified seed of **Keoma**, **Ricardo**, **AC Tamor**, **Carneval**, **Celeste**, **Patriot**, **Highlight**, **MIKO**, **Richmond**, **Topper**, **Trump** and some other recently registered varieties will not be available in large quantities for 1994 planting. **Yellowhead** is distributed exclusively by Woodstone Foods Ltd. of Portage La Prairie and can only be grown under contract with this company.

Damaged and uncleaned seed of all varieties is considered low quality and only suitable for the feed market. When growing field pea for feed, select a high-yielding variety. **Sirius**, **Stehgolt** and **Whero** are registered feed varieties but only limited regional yield data are available. Small seed size is desirable for reducing the cost of seeding feed varieties.

Provided that adequate moisture is available, the field pea, like other legumes, offers considerable benefit when grown in rotation with other crops. Proper seed inoculation results in symbiotic nitrogen fixation which reduces input costs by supplying most of the nitrogen required by a productive pea crop. In addition, succeeding crops require less nitrogen fertilizer to attain high yields. See seed inoculation section.

## Lentil

**Main Characteristics of Varieties**

| Variety | Yield as % of Laird | Height (cm) | Days to First Flower | Relative* Maturity Ratings | Resistance to ** Ascochyta Blight | Resistance to ** Anthracnose | Seed Size | Seeding Rates kg/ha(lb/A) |
|---|---|---|---|---|---|---|---|---|
| Laird | 100 | 41 | 53 | VL | F | VP | Large | 90-100 (80-90) |
| CDC Richlea | 115 | 35 | 50 | M | VP | VP | Medium | 60-70 (53-62) |
| Eston | 114 | 30 | 48 | E | VP | VP | Small | 45-50 (40-45) |
| Rose | 105 | 32 | 47 | M | VP | VP | Medium | 60-70 (53-62) |

* Relative maturity ratings: **VE** — very early; **E** — early; **M** — medium; **L** — late; **VL** — very late.
** Resistance ratings: **VG** — very good; **G** — good; **F** — fair; **P** — poor; **VP** — very poor.

**Comments:**

Lentil is best adapted to the Brown, Dark Brown and southernmost areas of the Black soil zones. It has about the same growing season requirement as durum wheat. However, lentil has an indeterminate growth habit and some stress is required during flowering to stimulate heavy pod set. A nitrogen stress can be induced by seeding early on cereal stubble. A drought stress occurs naturally during most years in the Brown and Dark Brown soil zones or can be induced by early seeding on light soils in the Black soil zone.

Young lentil plants can tolerate a light frost; a heavier frost will kill the tops, but they will regrow from axillary buds at or below the soil surface. Thus lentil can and should be seeded early, even earlier than wheat and as soon as the soil temperature at seeding depth exceeds 5°C. Early seeding is also important from the standpoint of reducing the hazard from early fall frosts which severely damage immature seeds. Lentil will not tolerate flooding or salt-affected soils.

Lentil plants are short (30-45 cm) and must be swathed close to the ground using a pick-up reel. Alternatively, lentils may be desiccated and direct combined using a flex header. Thus, they should be seeded on a smooth, rock-free seedbed or rolled before the 8-node stage to facilitate swathing.

Five lentil varieties have been developed for western Canada. **Laird** is a tall, late-maturing variety with extra-large seeds and has become the industry standard for quality. **Laird** has fair resistance to ascochyta leaf, stem and pod blight. **Eston** is a short, erect, early-maturing variety with small seeds and is highly susceptible to ascochyta blight. **CDC Richlea** is a high yielding Chilean-type lentil and is highly susceptible to ascochyta blight. A limited supply of seed of **CDC Richlea** will be available in 1994.

**Laird**, **Eston** and **CDC Richlea** have yellow cotyledons, while **Rose** has red cotyledons. **Rose** seed is flat and splits poorly, limiting its use in the red split lentil market.

**Indianhead**, a black seeded lentil, is very late maturing and was developed as a green manure lentil. It has small seed which reduces the cost of establishment. The seeding rate is 39 - 44 kg/ha (35-40lbs/A). **Indianhead** will produce an average seed yield if planted early and subjected to a drought stress in July and August.

Lentil producers should plant lentil seed that has been tested for seed-borne ascochyta and avoid planting next to the previous year's lentil residues. Growers from northern areas and pedigreed seed producers should use only disease-free seed (none-detected). In the drier areas up to 4% seed-borne ascochyta does not normally cause a problem.

## Faba Bean

**Main Characteristics of Varieties**

| Variety | Yield as % of Outlook (Northeast) Dryland | Yield as % of Outlook (South-central) Irrigated | Average Maturity in Days | Seed Size |
|---|---|---|---|---|
| Outlook | 100 | 100 | 109 | Small |
| Aladin | 106 | 103 | 112 | Large |
| Orion | 70 | 91* | 102 | Small |
| Pegasus | 101 | 98 | 111 | Small |

* Limited data.

**Comments:**

Faba bean should be seeded early (late April to early May). It is best adapted to irrigated areas in the Dark Brown Soil Zone and to that portion of the Black Soil Zone with the longest growing season.

**Aladin** is the highest yielding variety under irrigated production. **Orion** is the earliest maturing variety and is a good performer in areas with a short growing season.

Faba bean is a legume and thus is able to use nitrogen from the air provided the seed is inoculated with the proper bacteria prior to planting. Faba bean requires a special strain of inoculum which is different from other pulse crops.

## Pinto Bean

Pinto bean can be grown under irrigation in Saskatchewan in regions that have a warm, long growing season (110 days). **Topaz, Fiesta** and **Othello** are registered varieties. For dryland production on summerfallow in the Dark Brown soil zone, **Othello** is recommended.

The crop does not tolerate frost, flooding or salt-affected soils. Seed in late May at 80-100 kg/ha (70-100 lb/A). Plant seed at 6cm depth in a firm, moist seedbed. Minimize seed damage by using a hoe or press drill with a metering mechanism suitable for large seeds.

The plants are short and pods may hang to ground level. The field should be smooth, level and rock-free to facilitate swathing or direct harvesting with a flex header equipped with an air reel. Seed should be free of common bacterial blight.

# Other Crops

## Canary Seed

The seed of annual canarygrass, more commonly called canary seed, is used as food for caged and wild birds. It is generally grown under contract with the contracting companies providing the seed. Two registered varieties are available. **Elias** and **Keet** are similar in yield, but **Keet** is earlier maturing and more resistant to lodging. The maturity requirements are equal to wheat. Canary seed plants have a dense shallow root system and thus growing the crop on sandy soils is not recommended. Summerfallow is generally used, but canary seed may be grown successfully on well-prepared stubble, providing adequate moisture is available for rapid germination and emergence.

Sow early in May at 34 kg/ha (30 lb/A) (germination greater than 85 percent). Plant the seed 3.5 to 5 cm deep into a firm seedbed. A grain drill is recommended.

Fertilizer recommendations are similar to those for cereal crops.

Canary seed is subject to colonization by English grain aphid and bird cherry-oat Aphid. Aphid populations build up rapidly on leaves, stems and head of the plant in August and may require an insecticide application to prevent yield loss. An application of Malathion or Cygon is recommended if aphid densities exceed 20 - 30 aphids per stem. Damage may occur at populations below these levels; data do not exist to support the suggested action threshold.

Canary seed leaf mottle is a foliar disease that caused yield losses in 1993. Leaf mottle is caused by a fungus, *Septoria triseti,* that only affects canary seed. The disease is inconspicuous because there is so little visual contrast between healthy and diseased leaf area. It can, however, reduce yield and bushel weight. Stubble borne inoculum is the source of infection, thus crop rotation is key in limiting the severity of leaf mottle.

Canary seed is very sensitive to diclofop methyl and trifluralin. It should not be seeded on land that was treated with trifluralin or ethalfluralin the previous year.

Canary seed is resistant to shattering. It may be straight-combined or swathed when fully matured.

## Borage

Borage seed contains about 30% oil which consists of about 22% gamma linolenic acid (GLA). Delayed seeding (June 1 to 15) and swathing immediately after the first fall frost results in a high GLA concentration and an average seed yield, usually about 80 kg/ha (75 lb/ac). It has an indeterminate growth habit and honey bees are required for pollination. Contract production is advised. Seed shatters very badly.

## Buckwheat

Buckwheat is sensitive to high temperatures and dry weather conditions in the blossom stage which can reduce seed set and yields. Pollination is required to maximize yield. Buckwheat is very susceptible to frost at all stages of growth. Delayed seeding is advisable to avoid spring frost.

## Caraway

Caraway is a biennial spice crop, producing seed in the second year and some in the third year. Seedlings are small, slow in developing and compete poorly with weeds. The crop is usually swathed because of its indeterminate growth habit and seed shattering.

## Coriander

Coriander is a spice crop commonly grown for its seed. Coriander seedlings are harvested as an herb crop called cilantro. Seedlings are slow developing and non competitive. The large seeded type is early maturing and low yielding.

The small seeded type is late maturing and higher yielding (if it matures). The late maturing type should be seeded before May 1 in order to increase the probability of ripe seed. The crop is usually swathed, because of its indeterminate growth habit and seed shattering.

## Fenugreek

Fenugreek is a leguminous spice crop adapted to dryland conditions in the Dark Brown and Brown soil zones. The crop should be seeded early to avoid quality loss from fall frost. Contract production is advisable, as markets are extremely limited.

## Safflower

Safflower is an annual oilseed or birdseed crop which can be grown successfully in the Brown soil zone. Safflower must be sown early (late April). **Saffire** matures in about 119 days. Seed shallow but into a firm moist seedbed at about 27 lbs/A. **Saffire** has moderate resistance to Sclerotinia head rot and Alternaria leaf spot. Contract production is advisable.

**AC Stirling** is a newly registered variety with acceptable birdfeed quality and higher oil content compared to **Saffire**. Certified seed is in limited supply for 1994.

# Seed Facts

Pedigreed Seed

Use certified seed regularly, and especially when changing to a different variety. This assures that the seed has high genetic purity, high germination and is relatively free from weeds and other crop seeds. Pedigreed seed may be paid for by an over-quota delivery of commercial grain. Ask your elevator agent or seed dealer for details.

**Seed Cleaning**

Seed should be carefully cleaned to remove weed seeds, trash, small or broken kernels, ergot and sclerotia. **Country grain elevators are not equipped to clean grain to seed standards, and the risk of mixing varieties and types of grain is very high.**

**Seed Treatment**

Smuts that attack wheat, barley, oat and rye can be controlled by chemical seed treatments. If bunt or smut was observed in a crop which is being used for seed it should be treated. Seed of susceptible varieties known to be free of smut or resistant cultivars should not require treatment. **If the presence of smut is uncertain then varieties rated VERY POOR should be treated every year, POOR every second year, and FAIR every third year.**

Only systemic fungicides (ie. containing carbathiin) will control true loose smut of barley, and wheat and stem smut of rye because the pathogens are harbored within the seed. The other types of smut (covered, false loose, oat, and bunt) may be controlled by non-systemic seed treatments because the pathogen is borne on the outside of the seed. Examples of active ingredients of non-systemic seed treatments are maneb and formaldehyde. Formaldehyde may result in reduced seed germination. **Read the provincial publication "Disease control in field crops 1993" for detailed instructions and recommended rates.**

The virulent form of blackleg is now widespread on canola in Saskatchewan. Treatment of seed with a recommended fungicide can be beneficial to reduce the risk of disease and the risk of introducing the disease into unaffected areas. Growers with carryover stocks of treated seed should have these tested for germination.

Coating of canola with the appropriate seed dressing is a convenient alternative to on farm seed treatment.

Various fungicides have been registered for the control of seedling disease. Flax, canola, rye, and winter wheat seed should be treated to promote good seedling growth.

Wireworms, which attack all grain crops and flea beetles, which attack canola and mustard, can be controlled by seed treatment with insecticides. Read the label carefully and follow all directions.

**Treated seed must not be allowed to contaminate grain delivered to an elevator or used for feed.**

**Ergot**

Ergot attacks all varieties of rye, triticale, wheat and barley, as well as most common species of grass. Oat is rarely attacked and all broadleaved species are immune. Grain containing 0.1% ergot is considered poisonous and should not be used as food. For details on the disease obtain a copy of 'Ergot of Grains and Grasses'. Publ. 1438.

**Seed Inoculation**

Legume crops are able to take much of their nitrogen (N) requirement from the atmosphere by forming a symbiotic association with soil bacteria called **Rhizobium**. These rhizobia colonize the legume plant roots and live in structures called nodules and fix nitrogen for the legume plant. In order for the nitrogen fixing process to occur, the legume crop seed must be inoculated immediately before seeding with the proper strain of bacteria specific to that crop. The use of a sticker such as a syrup or powdered milk solution will ensure the inoculant is properly adhered to the seed. Some inoculants are produced with self adhesives.

It is common to observe lower levels of nodule formation in fields with no previous history of inoculation of the same crop. Soil and weather conditions can also affect the level of successful colonization. Cool, dry soils are detrimental to the process. **Read and follow inoculant label directions.**

High soil nitrogen levels (over 60 kg N/ha) inhibit N fixation since the legume plant will preferentially use the soil nitrogen rather than fix nitrogen. If the specific legume (pea or lentil for example) has never been grown in a field before, and the soil test N level is less than 30 kg N/ha, the producer should apply 30 kg N/ha prior to seeding as a precaution against poor inoculation and low nitrogen fixation.

Rhizobium bacteria can live in the soil for a number of years. However, the most efficient nitrogen fixing bacteria may not be among those that survive. For this reason, experienced legume producers inoculate every year.

**Seed-borne Diseases of Lentil**

Lentil producers should plant lentil seed that has been tested for seedborne ascochyta and avoid planting next to the previous year's lentil residue. See lentil section for suggested tolerances.

**Damp and Frozen Seed**

**Seed which is stored damp or tough may be low in germination.** Grain which is being saved for seed should be dried if necessary, soon after harvest. Drying temperature should be kept below 37°C for batchdriers, or 43°C for recirculating and continuous driers. Frozen grain should never be sown without a laboratory germination test. There is frequently a high percentage of abnormal seedlings which may be unnoticed by an inexperienced observer.

**Production Notes**

All classes of wheat including durum and triticale are susceptible to wheat midge. Farmers in the infested areas should be prepared to spray these fields with recommended insecticides if necessary. Refer to **Orange Wheat Blossom Midge** Publication.

Residue of infected crops may harbour disease agents. Seeding into stubble of the same crop kind may increase disease risk, particularly in the higher rainfall areas.

Inspect fields weekly for the presence of Russian wheat aphid. Infested plants will show white or purple longitudinal stripes. Biology and control of this aphid are described in the leaflet "Russian Wheat Aphid".

# Weather and Environment Affect Crop Production

## Introduction

Weather is the most dynamic factor affecting crop production. Under natural conditions the characteristics of soil, crop, and landforms change slowly over periods of many years, while weather commonly undergoes agriculturally significant changes in periods as short as a few minutes. In common with other interior continental areas, the arable part of Saskatchewan is noted for its extreme and variable weather conditions.

## Crop Production

Light, heat, moisture, oxygen and carbon dioxide are essential to plant growth. Different combinations of these environmental factors are required by different plant species and the importance of each factor differs during the life of particular plants. These factors are governed by climatic conditions.

## Light

Green plants are unique in their ability to convert solar energy into chemical energy in a form useful as food to animals. Sunlight provides energy to warm the soil and trigger germination before leaves develop to begin photosynthesis. After photosynthesis is complete, sunlight continues to be useful in drying the crop.

Intensity, duration, and quality (color) of light are important to plant development. When the intensity of light is below a critical level, all the sites available for photosynthesis are not efficiently used. In a higher range, growth is directly proportional to light intensity. At still higher light intensities, the leaf surface becomes light-saturated and higher intensities do not produce further gains. Availability of sufficient light intensity is a factor in selecting the type and variety of crops grown in a particular area.

As far as duration of light (photo period) is concerned, plants may be classified as daylength sensitive and daylength insensitive (day neutral). Daylength sensitive plants are either long-day plants or short-day plants and require long days or short days respectively, to initiate (induce) the development of flower buds. The rate of development of these flowers, once they have been induced, is largely a function of temperature (growing degree days). Some crops, such as lentil, are quantitative long day plants in that they require certain long daylength to initiate flower development and longer days only hasten flower development similar to the effect of higher temperatures (below the cardinal high temperature).

Daylength insensitive (day neutral) crops or varieties will flower regardless of day length.

Within a crop species both daylength neutral and sensitive varieties may occur. In the case of spring wheat the following varieties are daylength neutral: Biggar, Cutler, CDC Teal, Genesis, Glenlea, Lancer, Laura, Leader, Oslo, Roblin. The following to require long days to ensure timely flowering: AC Minto, CDC Makwa, Columbus, Conway, Katepwa, Kenyon and Neepawa. During the last 15 years emphasis has shifted from breeding long-day spring wheat varieties to breeding day-neutral varieties. Under Saskatchewan growing conditions the two types of wheat do not appear to differ significantly in days to head or maturity.

The color of light also affects plant growth rates. This is of practical importance in establishing greenhouses, where various types of lighting can be used to obtain an optimum color balance. Experiments have shown, for instance, that at moderately low light levels tomato plants produce more than twice as much growth under blue light than under red light of equal intensity.

TABLE I
**Cardinal Growth Temperatures in °C**

| | Wheat | Flax | Barley, Oats | Sweet Corn | Tomatoes | Potatoes |
|---|---|---|---|---|---|---|
| Lower limit | 0 | 4 | 2 | 10 | 15 | 7 |
| Optimum range | 29 | 18-24 | 24-26 | 24-32 | 21-24 | 15-18 |
| Upper limit | 35 | 29 | 30 | 35 | 26 | 21-24 |

## Heat and Temperature

Both air temperature and soil temperature influence plant growth. Each crop has a restricted temperature range over which growth and development can occur. These limits are called the lower and upper cardinal temperatures. Outside this range, severe environmental stress limits plant growth and, with further temperature change, death occurs. Most efficient growth is obtained in the optimum temperature range. Cardinal air temperatures for some common field and garden crops appear in Table I.

Temperature variation is also important to some plants. Sugar beets grow most rapidly when temperatures at night remain near 20°C, but these beets have a lower sugar content than beets that experience overnight temperatures near freezing.

In spring, soil temperatures at seeding depth must be adequate to promote germination. Where seed lies dormant, due to low soil temperature, it is vulnerable to attack by soil-borne organisms. As well as having a direct effect on the plants, soil temperature influences chemical reaction rates in the soil. The availability of some nutrients can be influenced by the annual climactic cycle.

Since the sun's heat provides the driving force for plant growth, accumulated air temperature is a good index of plant development. Base temperatures, characteristic to various plants, are the lowest values for which significant growth occurs. The base temperature for spring wheat and a number of horticultural crops is 5.0°C. If the day after a wheat crop is planted, the **average** temperature (calculated

**TABLE II**
**Estimated Growing Degree-Days at Selected Stations**

| Location | May[1] GDD | June[1] GDD | July[1] GDD | Aug.[1] GDD | Sept.[1] GDD | Year[2] GDD |
|---|---|---|---|---|---|---|
| Broadview | 170 | 302 | 401 | 360 | 180 | 1520 |
| Estevan | 206 | 346 | 461 | 421 | 228 | 1817 |
| Hudson Bay | 156 | 288 | 381 | 336 | 153 | 1389 |
| Moose Jaw | 210 | 349 | 455 | 420 | 230 | 1822 |
| North Battleford | 197 | 314 | 405 | 366 | 187 | 1581 |
| Prince Albert | 166 | 289 | 385 | 337 | 158 | 1412 |
| Regina | 196 | 327 | 432 | 398 | 206 | 1677 |
| Saskatoon | 197 | 320 | 418 | 378 | 193 | 1620 |
| Swift Current | 182 | 304 | 412 | 386 | 209 | 1637 |
| Yorkton | 178 | 316 | 411 | 368 | 184 | 1558 |

[1] Estimated growing degree-days above a 5°C base.
[2] Total growing degree-days for the year, defined as above. Note that growing degree-days can accumulate before the frost-free season begins, after it ends, and even when there is snow on the ground. Only growing degree-days after the crop is planted are effective.

from the day's high temperature plus the day's low temperature divided by 2) is 15.5°C, the crop has received an input of 15.5 - 5.0 = 10.5 growing degree-days (GDD). See Table II.

Experiments carried out at six Agriculture Canada Research Stations in the province indicate that, on average, spring wheat requires the following heat unit accumulations to reach the indicated stages:

Sown to headed ..... 531 GDD
Headed to ripe ..... 540 GDD
Total ..... 1,071 GDD

These figures vary somewhat with location in the province. Some localities may require about 3 percent more heat units than the specified average to reach a given stage of maturity; others may require 3 percent less.

Based on studies conducted at the University of Saskatchewan's Crop Development Centre at Saskatoon, CWRS wheat varieties such as Neepawa and Katepwa require approximately 1080 GDD to reach maturity while CPS wheat varieties such as Biggar and Genesis require about 1,130 GDD or, about 5% more heat in order to reach maturity. In a growing season with high daily temperatures resulting in rapid GDD accumulation the 5% difference in GDD requirement may translate into a 2 to 3 day difference in maturity. Slow GDD accumulation (as occurred in 1992 and 1993) will translate into a 7 to 10 day difference in maturity between the same pairs of varieties. Daily GDD accumulation is greatest in July when the average temperature is the highest. Daily GDD starts dropping off rapidly after mid-August. It is this drop-off that results in large maturity differences among varieties although they may differ by only 5% in total heat requirement.

The last two years (1992 and 1993) have seen significantly lower than average seasonal (May to September) GDD accumulations. At Saskatoon for instance, 1992 and 1993 were 18% and 16% below the long-term average, respectively. The two previous years (1990, 1991) were both within 3% of the long-term average. In contrast, the 1988 seasonal GDD accumulation was 10% above the average.

Official air temperature measurements are made in special, well-ventilated enclosures (or screens) that do not permit sunlight to fall on the thermometers. These enclosures are about 1.2 m above a short-grass surface. While this procedure permits easy temperature comparisons between sites, enclosure temperatures do not necessarily represent conditions at the soil surface or the top of a crop canopy. Official measurements of daily high and low temperatures are made at several hundred sites in the province. Hourly or continuous temperature measurements are made at government weather stations, research sites, and airports.

The temperature at which freezing injury occurs varies with the type of plant, its state of maturity, as well as other factors. This and previously noted variability of temperatures near the ground make it very difficult to provide a good estimate of freeze damage from measurements of air temperature. For simplicity, temperatures of 0°C or less at this level are accepted as constituting a frost. Actually, leaf- and ground-level temperatures may be much lower than the recorded value, and freezing of plants has occurred when 1.2 m height temperature was 4.5°C.

The duration of the freeze period is important. A very short frost may not hurt crops, while one that lasts all night may damage them severely. The rate at which the temperature drops and rises is important. Several days of near-freezing temperatures may harden plants and help prevent serious damage.

Most late-spring and early-fall frosts result from the cooling of the ground when skies are clear and winds light. The air in contact with the ground may then become several degrees colder than the air several metres above ground. Under these conditions, the colder air will follow the natural drainage of the land, and accumulate in pockets or frost-hollows. These pockets are favored locations for unseasonal frosts.

## Vernalization

Vernalization, or low-temperature promotion of flowering, is common in winter annuals such as winter wheat and fall rye. These types of plants need to be exposed to cold temperatures (0-4°C for 6-8 weeks) during the seedling stage in order to switch from the vegetative (leaf production) to the reproductive (flower production) phase. This cold temperature requirement ensures that the fall-seeded crop does not flower too early in the spring, putting it at risk from late winter cold snaps and late spring frosts. Although not as strong as in winter cereals, vernalization requirement is present in some spring wheat varieties. Varieties which are known to have a moderate vernalization requirement include Fielder, Biggar and Genesis. Varieties such as Neepawa, Katepwa and Glenlea have a slight vernalization requirement. Early maturing varieties generally have no detectable vernalization requirement. Varieties which require vernalization should be seeded early in order to avoid delayed heading.

## Moisture

Both precipitation (rainfall and snowfall) and transpiration, as the primary input and output respectively, are of great importance to the water economy of a growing crop.

During an average growing season, 175 mm to 280 mm of precipitation falls, depending on location. Evaporation during the growing season frequently exceeds 300 mm, so storage of water that falls in the non-growing season is essential to successful crop production. Soil factors profoundly influence the utilization of moisture by crops. Soils have different moisture-holding capacities. Sandy soils, which hold little water, tend to be dry. Clay soils, which hold much more water, tend to be productive even in dry periods. Crops grown in cooler, more humid areas may require somewhat less moisture than those of equal yield grown in warmer, drier areas. High winds during the growing season also increases water loss through increased evapotranspiration.

On average, winter snowfall ranges from 75 cm in the southwest to 155 cm in the northeast. The amount of snow that melts and goes into the soil, or runs off into dugouts, depends not only on the amount of snow present, but also on the melting rate and the state of the soil at the time.

Snow is an excellent insulator, and a good snow cover may prevent winter kill from extreme temperatures. However, snow also protects insects and molds which may damage crops.

**TABLE III**
**Frost-Free Season at Selected Stations**

| Location | Last[1] Spring Frost | First[1] Fall Frost | Frost[1] Free Season | Longest[2] Season | Shortest[2] Season |
|---|---|---|---|---|---|
| Broadview | May 25 | Sept. 3 | 100 | 129 | 72 |
| Estevan | May 19 | Sept. 21 | 124 | 161 | 95 |
| Hudson Bay | May 30 | Sept. 8 | 100 | 144 | 31 |
| Moose Jaw | May 23 | Sept. 18 | 117 | 162 | 63 |
| North Battleford | May 18 | Sept. 19 | 123 | 150 | 76 |
| Prince Albert | June 1 | Sept. 5 | 95 | 117 | 66 |
| Regina | May 24 | Sept. 11 | 109 | 163 | 69 |
| Saskatoon | May 21 | Sept. 16 | 117 | 149 | 72 |
| Swift Current | May 23 | Sept. 19 | 118 | 151 | 71 |
| Yorkton | May 22 | Sept. 11 | 111 | 142 | 85 |

[1] Data from Atmospheric Environment Service records averaged, in most cases, over the period 1951-1980.
[2] From the beginning of AES records to the fall of 1980.

## Frost

Frost risks are increased uphill from a barrier to natural airflow, and lessened below the barrier. Both trees and land may form barriers that create frost pockets.

Winds reduce the risk of frosts by mixing cold air near the ground with warmer air from above. In addition, clouds act as a blanket and reduce the loss of heat from the ground. A layer of moist air near the ground may be almost as effective as cloud cover. Moist air also favors dew formation, which releases heat. The flow of heat from the ground may also offset a frost.

Soils that are light in color reflect sunlight, remain cooler during the day and therefore, have a relatively low heat content; porous soils also are unable to transfer heat rapidly to the surface increasing the probability of frost damage in these areas.

The main conditions that favor frost are: (1) Shelter from the sun by day, open exposure to night sky; (2) Cloud cover by day, clear skies at night; (3) Dry air, relative humidity below 40 percent at 6 p.m.; (4) Calm or light winds, possibly by sustained strong northerly wind; (5) Dry or peat soils.

For many crop plants, the frost-free season is barely long enough for them to reach maturity. Tabulated values of frost-free season are, as shown in Table III, typical of their area. However, large variations may occur within areas. For example, places enclosed by hedges or trees may be 3 to 6°C colder on a frosty night than places exposed to the wind, and frosts are lighter on the slopes than on the valley floor.

The following may be used to protect against frost damage: 1. Take notice of frost warnings on radio and television. 2. Use early maturing varieties. 3. Avoid placing gardens in low areas and frost pockets, and avoid cultivation practices which may favor occurrence of frost. 4. Use cover materials. (Many plastics are useful only with a heater, since they are relatively transparent to heat radiation.) 5. Undertake timely swathing of crops. 6. Fill irrigation furrows with water, or use sprinkler irrigation. (Sprinklers are more effective than furrow irrigation, but may create other problems, such as damage from ice accumulation.) 7. Follow phosphate fertilizer recommendation and proper seeding practices to ensure maximum seedling vigor and earlier crop maturity.

Since the areas affected by frosts are highly variable, forecasts or warnings cannot cover all possibilities; the general area forecasts must, therefore, be interpreted to meet the needs of your own farm.

## Drought

Drought is generally defined as a period of dry weather of sufficient length and severity to cause at least a partial crop failure. While drought is common to most parts of the world, it is perhaps most critical in semi-arid regions like the Prairies. It may result not only in partial or total crop failure, but also in reduced fodder for livestock, water shortages, poor water quality, excessive heat, and wind erosion of the soil. It also causes loss of wildlife and favours an increase in the grasshopper population. Droughts are most frequent and their effects most apparent in the drier southwestern part of the Prairies.

Drought has been recognized as a feature of the prairie climate since the days when Capt. J. Palliser investigated the potential of the area for settlement. Repeated exposure to drought has led to the practice of soil and moisture conservation. This is particularly true of the period following the drought of the 1930s.

Droughts can be both regional and local. Much of our summer rainfall comes from thunderstorms, which may repeatedly miss a certain area. When this happens, a community may experience drought when its neighbors have ample or possibly excessive moisture. Regional drought occurs when large-scale atmospheric systems maintain a dry circulation over the region for extended periods.

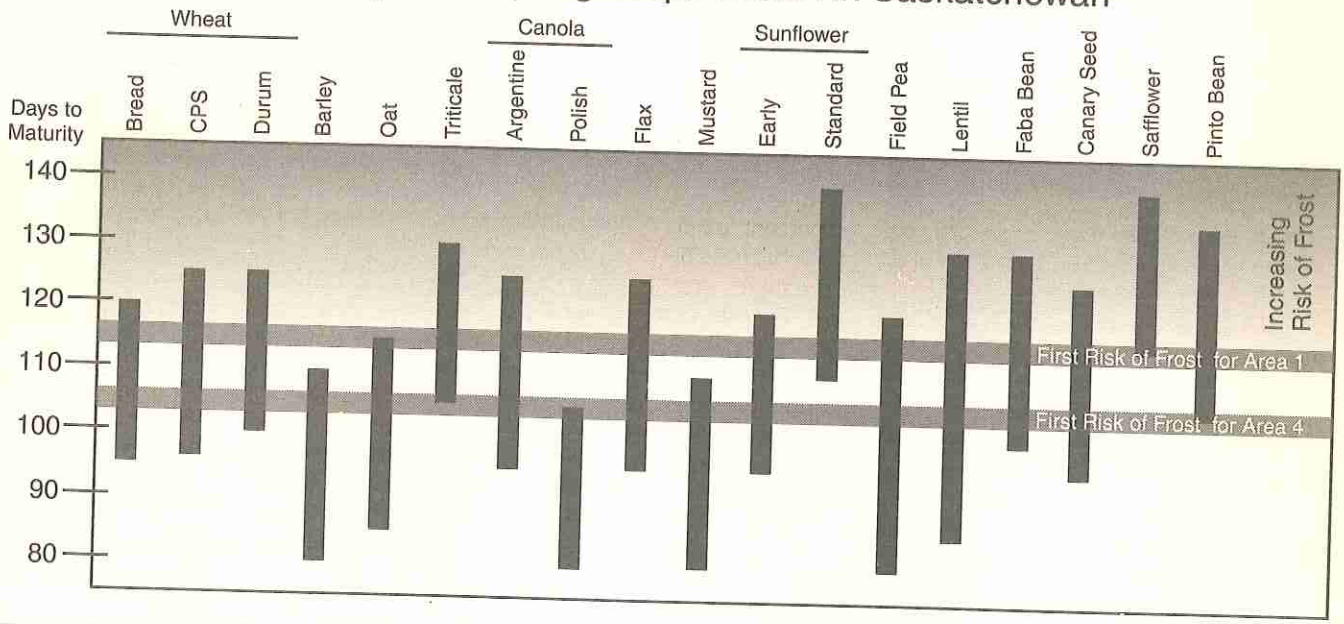
The impact of drought may be minimized by changing the use of unsuitable lands, breeding drought-tolerant crop varieties, and practicing soil and moisture conservation. Managing the snow pack to obtain maximum catch and infiltration is one way of practicing conservation. The use of direct seeding technology to reduce evaporation loss and increase infiltration during periods of excess moisture is another.

Serious drought usually results from 2 or more consecutive dry years, which deplete supplies of surface and soil moisture. There is, therefore, time to reduce risks by taking such actions as avoiding the buildup of excessive livestock herds, ensuring adequate water supplies after the first year of drought, and conserving soil moisture through snow-pack management and other prescribed operations.

## Maturity Comparisons

The relative maturity of varieties of different crops is important when making plans for seeding. Figure I compares the relative maturity ranges for crops grown in Saskatchewan. Maturity is measured from seeding to swathing ripeness. Within each crop there are early and late maturing varieties. Whether a crop matures before the first killing frost depends on date of seeding as well as environment factors. Not all crops have a wide area of adaptation. For example, safflower is somewhat adapted to the southern-most area of the province and must be seeded very early. More information on crops and varieties is found in the tables within this publication and in fact sheets available from Extension Agrologists. *See the section called "Reading Material".*

Figure I
Relative Maturity Ranges for Spring Crops Grown in Saskatchewan




# Reading Material

**Agriculture Canada**
Ergot of Grains and Grasses, Publ. 1438.
Growing Buckwheat, Publ. 1986-7E.
Heated Air Grain Driers. Publ. 1700.
Insects and Mites of Farm-Stored Grain, Publ. 1595.

**Canadian Grain Commission**
Insect Control in Stored Grain, A Producers Guide.

**Canola Council of Canada**
Canola Production Manual.
Fertilizer Practices for Canola.

**Flax Council**
Growing Flax.

**Saskatchewan Agriculture & Food**
Aeration of Grain in Storage.
Blackleg: A Disease of Canola.
Canaryseed Production in Saskatchewan.
Control of Canada Thistle.
Dry Pea Production in Saskatchewan.
Disease control in field crops 1993.
Durum Production.
Fababean Production in Saskatchewan.
Forage Crop Recommendations.
Grasshopper Control.
Hulless Barley Production.
Insect Control in Field Crops.
Irrigation Handi-Facts; Sask. Water Corp.
Legume Inoculation.
Lentil Production in Western Canada.
Malting Barley
Milling & Race Horse Oat Production.
Mustard Growers Manual.
Natural Air Grain Drying.
Orange Wheat Blossom Midge.
Russian Wheat Aphid.
Safflower Production on the Canadian Prairies.
Saskatchewan Fertilizer Practices.
Septoria Leaf and Glume Blotch of Wheat.
Soft White Spring Wheat, Sask. Water Corp.
Tan Spot of Wheat.
To Spray or Not to Spray.
Weed Control in field and forage crops, 1994.
Weed Identification Series.
Weed Seedling Identification.
Winter Wheat Production; Series.

**Saskatchewan Seed Grower's Association**
Seed Guide, 1994.

# Breeding Institutions and Seed Distributors of Varieties Listed in This Publication

| Crop Kind, Class & Variety | Breeding Institution | Distributor |
|---|---|---|
| **Wheat** | | |
| ***Bread Wheat*** | | |
| Columbus | Ag Canada (Winnipeg) | SeCan Members |
| AC Domain | Ag Canada (Winnipeg) | SeCan Members |
| AC Eatonia | Ag Canada (Swift Current) | Proven Seed |
| Invader | Agri Pro Bio Sciences & UGG | Proven Seed |
| Katepwa | Ag Canada (Winnipeg) | SeCan Members |
| Kenyon | Univ. of Sask. — Crop Development Centre | SeCan Members |
| Lancer | Ag Canada (Swift Current) | SeCan Members |
| Laura | Ag Canada (Swift Current) | SeCan Members |
| Leader | Ag Canada (Swift Current) | SeCan Members |
| CDC Makwa | Univ. of Sask. — Crop Development Centre | SeCan Members |
| CDC Merlin | Univ. of Sask.— Crop Development Centre | SeCan Members |
| AC Minto | Ag Canada (Winnipeg) | SeCan Members |
| Neepawa | Ag Canada (Winnipeg) | public |
| Pasqua | Ag Canada (Winnipeg) | SeCan Members |
| Roblin | Ag Canada (Winnipeg) | SeCan Members |
| CDC Teal | Univ. of Sask. — Crop Development Centre | Value Added Seeds |
| ***Eligible for Experimental Grades*** | | |
| Grandin | NDSU & Ag Canada (Winnipeg) | SeCan Members |
| ***Canada Prairie Spring Wheat*** | | |
| Biggar | Ag Canada (Swift Current) | SeCan Members |
| Cutler | Univ. of Alberta | Proven Seed |
| Genesis | Ag Canada (Swift Current) | SeCan Members |
| Oslo | NAPB; Sask Wheat Pool | Sask Wheat Pool |
| AC Taber | Ag Canada (Swift Current) | SeCan Members |
| ***Canada Western Extra Strong*** | | |
| Bluesky | Ag Canada (Beaverlodge) | SeCan Members |
| Glenlea | Univ. of Manitoba | public |
| Wildcat | Ag Canada (Beaverlodge) | SeCan Members |
| ***Durum*** | | |
| Kyle | Ag Canada (Swift Current) | SeCan Members |
| Medora | Ag Canada (Winnipeg) | SeCan Members |
| Plenty | Univ. of Sask. — Crop Development Centre | SeCan Members |
| Sceptre | Univ. of Sask. — Crop Development Centre | SeCan Members |
| ***Soft White Spring Wheat*** | | |
| Fielder | Univ. of Idaho & USDA; Ag Canada (Lethbridge) | public |
| SWS-52 | Ag Canada (Lethbridge) | SeCan Members |
| AC Reed | Ag Canada (Lethbridge) | SeCan Members |
| ***Winter Wheat*** | | |
| CDC Kestrel | Univ. of Sask — Crop Development Centre | SeCan Members |
| Norstar | Ag Canada (Lethbridge) | public |
| Norwin | Montana Ag Exp. Station & USDA (Aberdeen); Univ. of Sask. — Crop Development Centre | public |
| AC Readymade | Ag Canada(Lethbridge) | SeCan Members |
| **Winter Rye** | | |
| Danko | | Alberta Wheat Pool |
| Musketeer | Ag Canada (Swift Current) | SeCan Members |
| Prima | Ag Canada (Swift Current) | SeCan Members |
| **Spring Rye** | | |
| Gazelle | Univ. of Sask. | public |

| Crop Kind, Class & Variety | Breeding Institution | Distributor |
|---|---|---|
| **Triticale** | | |
| Banjo | Univ. of Manitoba | Value Added Seeds |
| AC Copia | Ag Canada (Swift Current) | Value Added Seeds |
| Frank | Ag Canada (Swift Current) | SeCan Members |
| Wapiti | CIMMYT; Alta Ag | SeCan Members |
| **Barley** | | |
| ***Malting*** | | |
| Argyle | Univ. of Manitoba | SeCan Members |
| Bonanza | Ag Canada (Brandon) | public |
| B1215 | Busch Ag. Res. Inc. | Sask Wheat Pool |
| B1602 | Busch Ag. Res. Inc. | Sask Wheat Pool |
| BT926 | Busch Ag Res. Inc. | Sask Wheat Pool |
| BT930 | Busch Ag Res. Inc. | Sask Wheat Pool |
| Duel | Busch Ag. Res. Inc. | Sask Wheat Pool |
| Harrington | Univ. of Sask. — Crop Development Centre | SeCan Members |
| Manley | Univ. of Sask. — Crop Development Centre | SeCan Members |
| AC Oxbow | Ag Canada (Winnipeg, Brandon) | SeCan Members |
| Stein | Univ. of Sask. — Crop Development Centre | Proven Seed |
| Tankard | Univ. of Sask. — Crop Development Centre | SeCan members |
| TR 118 | Univ. of Sask. — Crop Development Centre | SeCan Members |
| TR229 | Ag Canada (Brandon) | SeCan Members |
| ***Feed*** | | |
| Bridge | Ag Canada (Lethbridge) | SeCan Members |
| Brier | Univ. of Sask. — Crop Development Centre | SeCan Members |
| Bronco | W.G. Thompson & Sons Ltd. | Value Added Seeds |
| CDC Guardian | Univ. of Sask. — Crop Develoment Centre | SeCan Members |
| AC Lacombe | Ag Canada (Lacombe) | SeCan Members |
| Noble | FCDC (Lacombe) | SeCan Members |
| Prospect | W.G. Thompson & Sons Ltd. | Value Added Seeds |
| Seebe | FCDC (Lacombe) | SeCan Members |
| Virden | Ag Canada (Brandon) | SeCan Members |
| ***Hulless*** | | |
| CDC Buck | Univ. of Sask. — Crop Development Centre | Proven Seed |
| Condor | FCDC (Lacombe) | SeCan Members |
| Phoenix | FCDC (Lacombe) | SeCan Members |
| CDC Richard | Univ. of Sask. — Crop Development Centre | Proven Seed |
| ***Intensive Management*** | | |
| Duke | Univ. of Sask. — Crop Development Centre | SeCan Members |
| CDC Earl | Univ. or Sask. — Crop Development Centre | SeCan Members |
| Tukwa | FCDC (Lacombe) | SeCan Members |
| **Oat** | | |
| AC Belmont | Ag Canada (Winnipeg) | Proven Seed |
| Calibre | Univ. of Sask — Crop Development Centre | SeCan Members |
| Cascade | Ag Canada (Lacombe) | SeCan Members |
| Derby | Univ. of Sask. — Crop Development Centre | Proven Seed |
| Dumont | Ag Canada (Winnipeg) | SeCan Members |
| AC Marie | Ag Canada (Winnipeg) | SeCan Members |
| AC Preakness | Ag Canada (Winnipeg) | Proven Seed |
| Waldern | Ag Canada (Lacombe) | SeCan Members |

# Breeding Institutions and Seed Distributors of Varieties Listed in This Publication

| Crop Kind, Class & Variety | Breeding Institution | Distributor |
|---|---|---|
| **Canola** | | |
| ***Argentine*** | | |
| Bounty | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| Celebra | Svalöf Weibull AB | Newfield Seeds, Canadian Seed Coaters |
| Crusher ◬ | Svalöf Weibull AB | Brett-Young Seeds Ltd. |
| Cyclone ◬ | Prodana, Oseco-King Agro | Pride Dealers |
| Delta | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| AC Elect | Ag Canada (Saskatoon) | SeCan Members |
| AC Excel | Ag Canada (Saskatoon) | SeCan Members |
| Garrison ◬ | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| Hyola 401 | Zeneca Seeds | Zeneca Seeds |
| Hyola 417 | Zeneca Seeds | Zeneca Seeds |
| Impact ◬ | Svalöf Weibull AB | SeCan Members |
| Jackpot ◬ | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| Legacy ◬ | Svalöf Weibull AB | Sask Wheat Pool |
| Legend | Svalöf Weibull AB | Sask Wheat Pool |
| Mari | Maribo, Mycogen | Mycogen Canada Inc. |
| Seville ◬ | Svalöf Weibull AB, Pioneer Hybrid | Prairie Seed |
| Trojan ◬ | Svalöf Weibull AB | Newfield Seeds Canadian Seed Coaters |
| Stallion (TT) | Svalöf Weibull AB | Sask Wheat Pool |
| AC Tristar (TT) | Ag Canada (Saskatoon) | SeCan Members |
| Vanguard | Svalöf Weibull AB | Newfield Seeds, Canadian Seed Coaters |
| ***Industrial Rapeseed*** | | |
| Hero (HE) | Univ. of Manitoba | CanAmera |
| Mercury (HE) | Univ. of Manitoba | CanAmera |
| ***Polish*** | | |
| Colt | Svalöf Weibull AB | Newfield Seeds, |
| Eclipse | Univ. of Alberta | Alta. Wheat Pool |
| Eldorado | Univ. of Alberta | Proven Seed |
| Goldrush ◬ | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| Horizon | Svalöf Weibull AB | Sask Wheat Pool |
| Klondike ◬ | Svalöf Weibull AB, Pioneer Hybrid | Proven Seed |
| AC Parkland | Ag Canada (Saskatoon) | SeCan Members |
| Reward | Univ. of Manitoba | SeCan Members |
| AC Sunshine | Ag Canada (Beaverlodge) | Western Grower Seed Corp. |
| Tobin | Ag Canada (Saskatoon) | SeCan Members |
| **Flax** | | |
| Andro | U. of S. – Crop Dev. Centre | SeCan Members |
| Flanders | U. of S. – Crop Dev. Centre | SeCan Members |
| Linola™ 947 ◬ | United Grain Growers | Proven Seed |
| AC Linora | Ag Canada (Morden) | SeCan Members |
| AC McDuff | Ag Canada (Morden) | Proven Seed |
| NorLin | Ag Canada (Morden) | SeCan Members |
| Somme | U. of S. – Crop Dev. Centre | SeCan Members |
| Vimy | U. of S. – Crop Dev. Centre | SeCan Members |
| **Mustard (Condiment)** | | |
| ***Brown*** | | |
| Commercial | | Trade |
| ***Oriental*** | | |
| Cutlass | Ag Canada (Saskatoon) | Trade |
| Forge | Colman's of Norwich | Humboldt Flour Mills |
| Lethbridge 22A | Ag Canada (Saskatoon) | Trade |
| ***Yellow*** | | |
| Gisilba | Kurt Behm GMBH | Northern Sales |
| Ochre | Ag Canada (Saskatoon) | Trade |
| Tilney | Colman's of Norwich | Proven Seed |
| **Sunflower** | | |
| DO-707 | Dahlgren and Company | farmer dealers |
| IS 7000 | Interstate Seeds | Sask. Wheat Pool |
| IS 7111 | Interstate Seeds | Sask. Wheat Pool |
| IS6111 | Interstate Seeds | Sask Wheat Pool |
| 6322 | Pioneer Hybrid | Pioneer |
| AC Aurora | Ag Canada (Saskatoon) | Western Grower Seed Corp. |
| AC Sierra | Ag Canada (Saskatoon) | Western Grower Seed Corp. |
| Sunwheat 103 | Seed Tec International | Proven Seed |
| Sunwheat 101 | Seed Tec International | Proven Seed |
| **Field Pea** | | |
| Baroness | Sharpes Int. | Columbia Seeds (AB) |
| Bellevue | U. of S. – Crop Dev. Centre | SeCan Members |
| Bohatyr | Selgen-Oseva | Sask. Wheat Pool |
| Carneval ◬ | Svalöf Weibull AB | Sask Wheat Pool |
| Celeste | Nickerson S.A. | Man. Pool Elevators |
| Century | Ag Canada (Morden) | public |
| Danto | L. Dsenfeldt | Brett Young Seeds |
| Emerald | Selgen-OSWA | Sask. Wheat Pool |
| Express | Svalöf Weibull AB | Newfield Seeds |
| FLUO | Andre Blondeau | Columbia Seeds (AB) |
| Highlight ◬ | Svalöf Weibull AB | Newfield Seeds |
| Impala | Cebeco | St. Denis Seed Farm (AB) |
| Keoma | Anttila P.B. Farm | Alberta Wheat Pool |
| MIKO | PBAI, Poland | Sask. Wheat Pool |
| Miranda | Cebeco; Manitoba Pool | Manitoba Pool |
| Montana | Cebeco | Canseed (AB) |
| Orb ◬ | Sharpes | Proven Seed |
| Patriot ◬ | Svalöf Weibull AB | Newfield Seeds |
| Princess | Wilbur Ellis Co; CanMar Grain | Ron McKinnon Stu Robson |
| Radley | Booker Seeds Ltd; Columbia Seeds | Columbia Seeds (AB) |
| Ricardo | Cebeco | Brett-Young Seeds |
| Richmond ◬ | Svalöf Weibull AB | Wheat City Seeds |
| Spring D | Maribo | Brett-Young Seeds |
| AC Tamor | Ag Canada (Morden) | Euro-Can Seeds Ltd. Walker Seeds (SK) |
| Tara | Ag Canada (Morden) | SeCan Members |
| Tipu | Ag Canada (Morden) | SeCan Members |
| Titan | Ag Canada (Morden) | SeCan Members |
| Topper ◬ | Ag Canada (Morden) | SeCan Members |
| Trapper | Ag Canada (Morden) | public |
| Trump ◬ | Ag Canada (Morden) | SeCan Members |
| Victoria | Svalöf Weibull AB | Newfield Seeds |
| Yellowhead | Ad Canada (Morden) | Woodstone Foods Ltd |
| **Lentil** | | |
| Eston | U. of S. – Crop Dev. Centre | SeCan Members |
| Indianhead | U. of S. – Crop Dev. Centre | SeCan Members |
| Laird | U. of S. – Crop Dev. Centre | SeCan Members |
| Rose | U. of S. – Crop Dev. Centre | Proven Seed |
| CDC Richlea | U. of S. – Crop Dev. Centre | SeCan Members |
| **Faba Bean** | | |
| Aladin | Univ. of Manitoba | public |
| Orion | Ag Canada (Lacombe) | Roger Lee (AB) Lyster Farms Ltd (AB) |
| Outllook | U. of S. – Crop Dev. Centre | SeCan Members |
| Pegasus | Univ. of Manitoba | Roy Legumex (MB) |
| **Pinto Bean** | | |
| Othello | USDA/ARS (Prosser, WA) | WA & ID seed dealers |
| **Canary Seed** | | |
| Elias | Univ. of Minnesota; U. of S. – Crop Dev. Centre | public |
| Keet | Univ. of Minnesota; U. of S. – Crop Dev. Centre | public |
| **Safflower** | | |
| Saffire | Ag Canada (Lethbridge) | Jerry Kubic (AB) |
| AC Stirling | Ag Canada (Lethbridge) | SeCan Members |

## Saskatchewan Agricultural Services Coordinating Committee

**The Saskatchewan Agricultural Services Coordinating Committee (SASCC)** coordinates agricultural research and extension activities in the province.

SASCC uses a system of advisory councils which represent the major subject areas such as extension, soils and agronomy, grain crops, animal production, and food production and marketing.

**The Advisory Council on Grain Crops** supervises, coordinates, and reviews the collection, analysis, and reporting of information in this pamphlet.

Membership of the Advisory Council on Grain Crops consists of representatives from:

- Agriculture Canada
- Saskatchewan Agriculture and Food
- University of Saskatchewan
- Crop Development Centre
- Saskatchewan Wheat Pool
- Canadian Seed Trade Association
- Saskatchewan Seed Growers' Association
- Saskatchewan Association of Rural Municipalities
- Farmers
- Saskatchewan Irrigation Development Centre
- Representatives from Saskatchewan Seed Distributing Companies

The Advisory Council on Grain Crops gratefully acknowledges the contributions of Agriculture Canada, the University of Saskatchewan, the Crop Development Centre, Western Grower Seed Corp. and all others who were involved in the research and analysis which led to the recommendations made in this publication.

## ADF

**Saskatchewan Agriculture Development Fund**

**The mission of the Agriculture Development Fund (ADF) is to keep Saskatchewan's agri-food industries competitive in the world marketplace.**

**Through the Saskatchewan Agriculture Development Fund (ADF)** the provincial government funds agri-food research, development and new technology projects carried on in the province. The fund, which is directed by members of the Saskatchewan agriculture and food industry who serve on its Board of Directors, is administered by the Agriculture Research Branch.

The Agriculture Research Branch coordinates funding and facilitates initiatives related to all facets of agriculture research and the food industry. Projects are carried out in the areas of livestock; crops; pest, weed and disease control; soils and water; engineering; food processing; agri-processing; biotechnology; and human resource development.

Crop producers will be especially interested in ADF support for crop variety development activities. These are carried out at the University of Saskatchewan Crop Development Centre under the Strategic Research Program. Funding for this initiative is provided under a five-year agreement.

In 1993, ADF contributed $238,660 for Regional Spring Grains Variety Trials, conducted across the province by the University of Saskatchewan.

Reports on completed projects are made available to the agri-food community. This enables project findings and data to be applied to greatest advantage by producers and processors. All available reports are catalogued in the *Publications List*, which may be obtained from any Rural Service Centre or the Publication Distribution Centre, Saskatchewan Department of Agriculture and Food, B5 3085 Albert Street, Regina S4S 0B1.

For further information on any aspect of ADF, please contact:

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S4S 0B1

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## Contributing Agencies

Agriculture Canada

Saskatchewan Agriculture and Food

Sustainable Production Branch

University of Saskatchewan

**Funding for printing and distribution of this publication is provided by the Saskatchewan Agriculture Development Fund**

**ISSN 0382-3601**
85M/94/01

**Supplement to The Western Producer**