Saskatchewan
Agriculture
and Food

Varieties of grain crops 1995

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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.

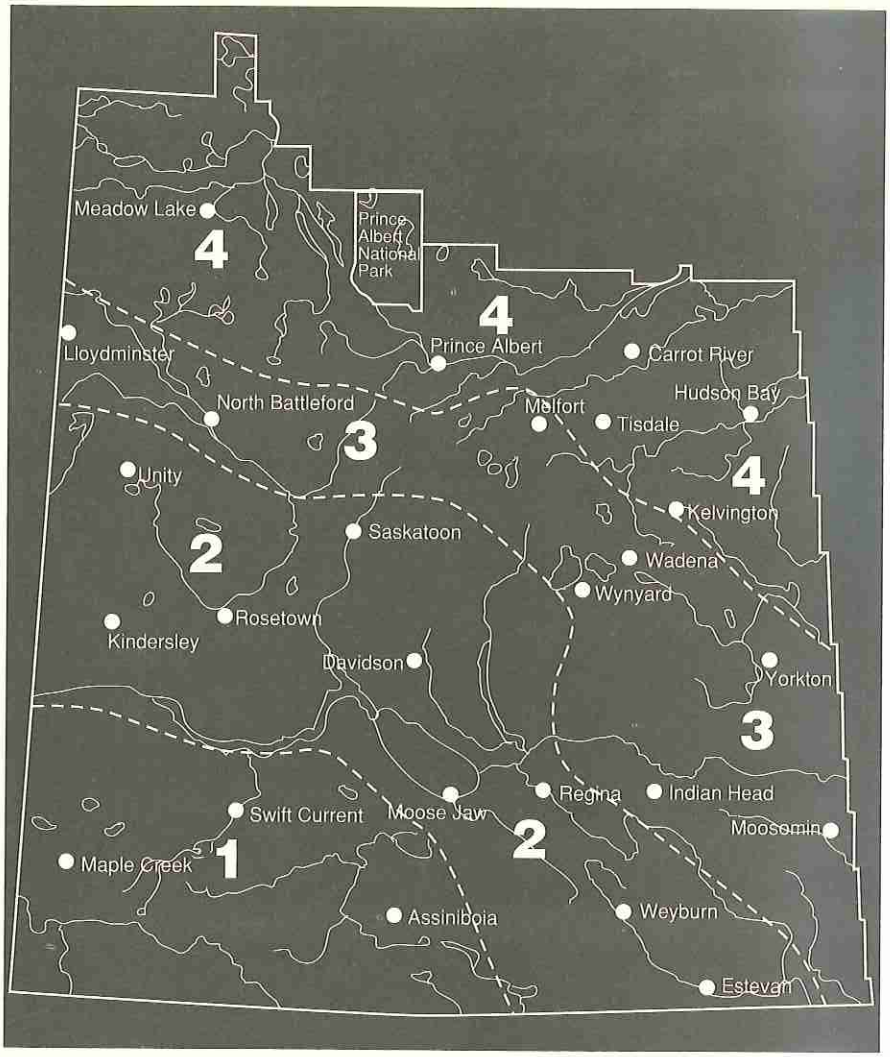
Area 1: Drought is a definite hazard and high winds are common. Sawfly outbreaks often occur in this area. Cereal rust may be a problem in the southeastern section.

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.



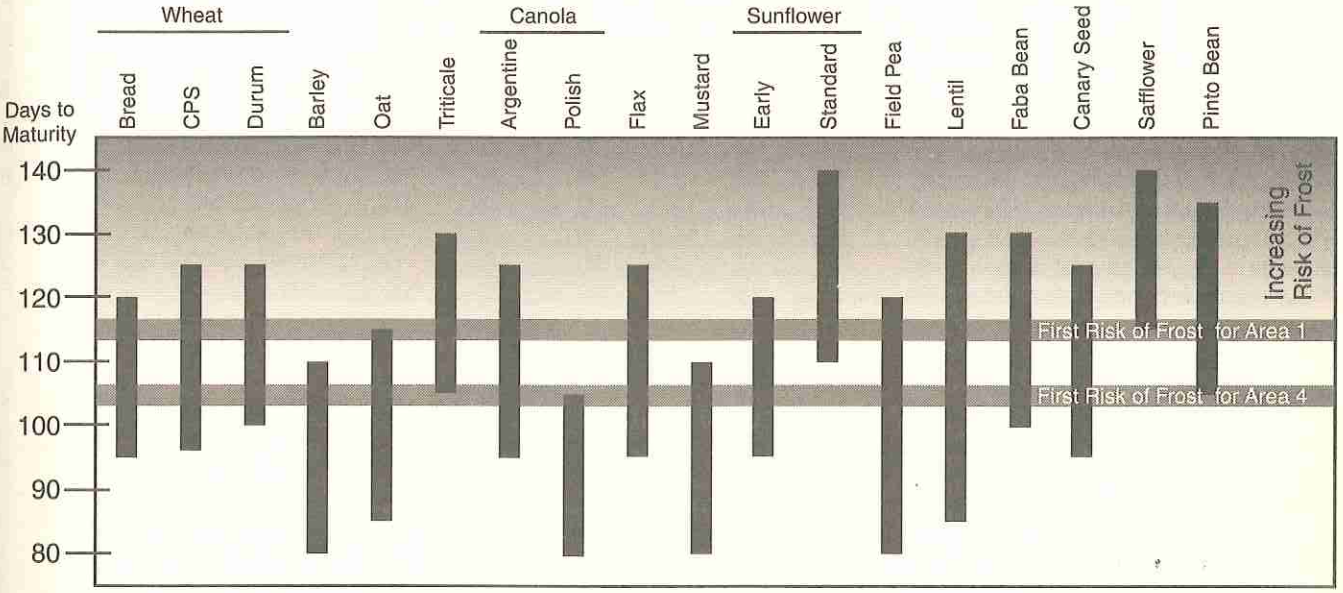
Relative maturity ratings are average number of days from seeding to swathing ripeness. The actual number of days to reach maturity depends on local climate and to some extent management practices. In this pamphlet some crop tables express the Relative maturity in days while other tables use a new five 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.

Maturity Comparisons

The relative maturity of varieties of different crops is important when making plans for seeding. Figure 1 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 southernmost 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



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.

Cereal Crops

Wheat

Main Characteristics of Varieties

Variety	Area 1	Area 2	Area 3	Area 4	Irr**	Ave Maturity in Days	Protein+	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	98	12.2	G	G	VG	F	G	VG	F
AC Barrie	102	108	114	116++	117	99	13.2	VG	G	G	G	F-G	VG	F
Columbus	99	101	101	96	—	102	12.9	G	F	G	VG	F	VG	F
AC Cora	100	102	103	102++	102	98	12.6	G	G	VG	VG	G	VG	F
AC Domain	93	94	100	98++	95	98	13.1	VG	G	G	VG	F-G	F	F
AC Eatonia	96	101	100	99	—	99	13.2	F	G	G	F	F	VG	F
Invader	102	105	105	103	97	100	12.7	VG	G	G	G	G	F	F
Lancer+++	94	94	—	—	—	99	12.7	F	VG	G	G	G	G	F
Laura	103	105	106	104	91	100	13.0	G	G	G	G	F	P	G
CDC Makwa	102	103	101	101	100	98	12.4	G	G	G	F	G	F	F
CDC Merlin	97	102	105	106	93	99	12.2	G	G	G	VG	G	G	F
AC Michael	103	103	99	101++	97	98	12.5	G	G	G	F	G	G	F
AC Minto	100	102	102	101	89	100	12.9	G	G	VG	G	VG	G	F
Pasqua	103	101	101	100	90	99	12.6	G	G	G	VG	F	F	F
Roblin+++	92	93	95	96	99	97	12.9	VG	G	G	VG	G	P	G
CDC Teal	100	100	106	104	97	98	13.1	VG	G	VG	G	G	F	F
Canada Prairie Spring Wheat														
Biggar+++	123	122	123	121	120	102		G	G	G	G	VP	VP	F
Cutler	93	100	104	96	—	98		G	G	G	P	F	VP	F
Genesis	124	129	130	125	130	102		F	VG	G	F	F	VP	F
AC Karma	120	135	134	138++	117	101		G	VG	G	G	G	G	F
AC Taber	120	128	130	123	127	103		G	G	VG	G	P	G	F
Canada Western Extra Strong														
Bluesky+++	93	92	98	99	—	99		G	G	G	F	VG	F	G
Glenlea	95	105	108	110	—	101		G	G	G	G	VG	F	G
Wildcat+++	89	85	91	92	—	98		G	G	G	P	VG	VP	G
	Yield as % of Kyle													
Durum Wheat														
Kyle	100	100	100	100	100	103	12.7	F	VG	VG	VG	P	VG	F
Medora+++	96	96	97	97	107	100	12.7	G	VG	VG	VG	F	VG	F
AC Melita	95	95	97	100++	140	101	12.6	G	VG	VG	VG	P	VG	F
Plenty	102	107	108	108	113	102	12.7	G	VG	VG	VG	P	VG	G
Sceptre	97	97	99	100	111	100	11.8	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.

\+ Protein content based on only one year of data. See comments section.

++ Relative yields based on less than three years of data in area 4.

+++ This variety might not be described in 1996.

— No data available.

Progress through Research

AT TIME OF PRINTING:

Protected by Breeders' Rights: Invader.

Applied for Protection: AC Barrie, AC Eatonia, AC Karma.

Refer to Section "What is Plant Breeders' Rights".

Comments:

The 10 year average protein content from the Saskatchewan Crop tests was 13.6 percent for both CWRS and CWAD. But due to weather and lower nitrogen applications the available nitrogen has decreased and contributed to lower protein of the last four years.

Seed of varieties rated poor and very poor for bunt and loose smut should be treated. Please refer to the **Seed Treatment** section of this pamphlet or **Crop Protection Guide 1995**. During wet harvest weather grades drop more rapidly due to sprouting in swathed than in standing crops.

The registration for **Grandin** expired March 31, 1994 and is eligible for EXPERIMENTAL GRADES only to 31 July 1995. Thereafter it will probably be eligible for Canada Feed only.

Canada Western Red Spring Wheat

AC Barrie is higher yielding and generally, produces higher protein than **Katepwa**. It has good disease resistance and has slightly shorter stronger straw than **Katepwa.** It has sprouting tolerance intermediate to **Katepwa** and **Columbus**. Seed will not be available in 1995.

AC Cora is very similar to **Katepwa** and has improved leaf rust resistance and slightly better yield. Seed will not be available in 1995.

AC Domain has shorter, stronger straw than **Katepwa** and similar time to maturity. It has good resistance to sprouting and weathering. **AC Domain** is adapted to conditions in Manitoba.

AC Michael is higher yielding than **Katepwa** and has similar time to maturity and height, but slightly lower test weight. Limited seed will be available in 1995.

AC Eatonia is resistant to wheatstem sawfly and yields more than **Lancer**. **AC Eatonia** has good resistance to preharvest sprouting and stronger straw than **Lancer**. Limited seed will be available in 1995.

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

Invader has good disease resistance, an awned head and strong straw. It yields more than **Katepwa** and matures about two days later.

Lancer is resistant to wheat stem sawfly and has good sprouting and weather resistance.

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

CDC Makwa is higher yielding and has similar time to maturity to **Katepwa**. It has good disease resistance.

CDC Merlin has yielded well in Areas 3 and 4. It has good disease resistance, is later maturing, and has taller and weaker straw than **Katepwa**.

AC Minto is slightly higher yielding and matures about two days later than **Katepwa**. It has good disease resistance and slightly taller weaker straw than **Katepwa**.

Pasqua has good disease resistance, slightly shorter, stronger straw, and slightly later time to maturity 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.

CDC Teal yields well in Areas 3 and 4 and has good disease resistance. It is intermediate to **Katepwa** and **Roblin** for maturity, height, and straw strength.

Canada Prairie Spring Wheat

AC Karma and **Genesis** are white-seeded; **AC Taber**, **Biggar**,and **Cutler** are red-seeded. All current CPS cultivars are awned.

AC Karma has good disease resistance and does not require a seed treatment for loose smut and bunt. It has shorter and stronger straw than **Genesis**. Even though it is earlier maturing than **Genesis** it should be sown early, particularly in Area 4. It is white-seeded and susceptible to sprouting under wet harvest conditions. Seed will not be available in 1995.

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.**

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

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.

AC Melita has higher protein content than **Sceptre**. It has strong straw and is similar to **Medora** in many respects. Seed will not be available in 1995.

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

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

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 similar yield potential to **Fielder** and matures about 2 days earlier than **Fielder**. **AC Reed** is moderately resistance to shattering, powdery mildew, and common root rot, moderately susceptible to leaf and stem rust, and susceptible to common bunt.

AC Phil is similar to **AC Reed**. Seed will not be available in 1995.

Under wet harvest conditions soft-white spring wheats are susceptible to sprouting. Straight combining will provide some grade-protection.

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 1 August 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 ones 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.

Winter Wheat

Main Characteristics of Varieties

Variety	Grain Yield (% Norstar) Dryland	Irrigation	Height	Straw Strength	Winter Survival
Norstar	100	100	Tall	F	Good
Norwin	93	134	Short	VG	Fair
AC Readymade	84	–	Intermediate	G	Poor
CDC Kestrel	106	140	Intermediate	G	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.

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.

Ducks Unlimited

Winter Wheat Production Manual.

Flax Council

Growing Flax.

Saskatchewan Agriculture & Food

Aeration of Grain in Storage.
Blackleg: A Disease of Canola.
Bertha Armyworm.
Canaryseed Production in Saskatchewan.
Control of Canada Thistle.
Crop Protection Guide 1995.
Dry Pea Production in Saskatchewan.
Durum Production.
Fababean Production in Saskatchewan.
Forage Crop Recommendations.
Grasshopper Control.
Hulless Barley Production.
Insect Control in Fields Crops.
Irrigation Handi-Facts; Sask. Water.
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 Cdn. Prairies.
Saskatchewan Fertilizer Practices.
Septoria Leaf and Glume Blotch of Wheat.
Soft White Spring Wheat, Sask. Water.
Tan Spot of Wheat.
To Spray or Not to Spray.
Weed Identification Series.
Weed Seedling Identification.

Saskatchewan Seed Grower's Assoc.

Seed Guide.

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
• Swift Current (Ag)	773-5166
• Yorkton	782-1511
• North Battleford	445-7000
• Hudson Bay	865-2721
• Lanigan	365-3011
• Broadview	696-2229
• Estevan	634-2833

Information

• Regina	780-5277
• Saskatoon	975-6979
• Prince Albert	953-8888

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- broadcast on VHF radio band using frequencies: 162.400 MHz, 162.475 MHz and 162.550 MHz
- there are presently 12 Weatheradio Stations; call your nearest Environment Canada office for more details

Malting 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	Scald	Loose Smut	Other Smuts	Root Rot	Stem Rust
Two Row															
Harrington	2	R	100	100	100	100	M(91days)	F	VG	P	P	P	P	F	P
AC Oxbow	2	R	95	97	102	104	M	VG	VG	F	P	VG	G	P	G
B1215	2	R	103	105	108	110	L	G	G	P	P	P	P	P	P
Manley	2	R	103	110	110	111	L	G	VG	F	P	P	VG	F	G
Stein	2	R	102	108	107	110	M	F	VG	F	P	P	G	P	G
Six Row															
Argyle	6	S	92	93	96	95	E	VG	VP	F	P	P	P	F	G
B1602	6	R	90	99	99	95	E	G	P	F	P	P	G	VG	G
Duel	6	R	95	99	100	96	M	G	VP	F	P	P	G	G	G
Tankard	6	S	101	106	107	103	M	G	VP	F	P	P	P	G	G
Interim Registered															
Two Row															
TR118	2	R	97	103	102	104	M	VG	G	F	P	P	F	F	G
TR229	2	R	101	114	116	123	L	G	VG	F	P	VG	G	F	G
TR232**	2	R	104	111	111	131	M	G	G	F	P	VG	F	F	G
TR128**	2	R	103	119	116	125	M	G	G	F	P	F	F	F	G
Six Row															
B2912	6	R	91	97	102	103	E	G	F	P	P	VP	G	G	G
AC Buffalo**	6	R	86	112	111	108	M	G	F	F	P	P	G	G	G

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

** Limited data.

*** Relative maturity: The relative maturity of the check, Harrington is M (on average 91 days from seeding to swathing ripeness). **VE** -very early; **E** - early; **M** - medium; **L** - late; **VL** - very late.

Comments:

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 been rated as acceptable by the Brewing and Malting Barley Research Institute.

Stein is a two-rowed malting variety with superior yield and better disease resistance than **Harrington**. It is earlier maturing but weaker strawed than **Manley**.

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

B1215 is a two-row malting variety with similar yield to **Stein**. It is slightly later maturing than **Harrington** with similar disease and lodging resistance.

Tankard is a 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 is a well established white aleurone six-rowed malting variety which is higher yielding than Argyle otherwise it is similar to it.

Robust and **Excel** are American white aleurone six-rowed varieties granted interim registration to facilitate contract production. Both are well established in the USA. **Excel** is stronger and higher yielding than **Robust**. Both are similar to **Argyle**.

Six-rowed white aleurone varieties cannot be distinguished from feed varieties. Therefore, they should be grown under contract to ensure purity.

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.

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 1995 will be

malted in January-February, 1996. It will be brewed in May-June, 1996, aged and tasted in October-November, 1996. A crop grown in 1996 will be tasted in October-November, 1997. 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:

TR118 is a two-rowed malting variety. Its performance and quality are similar to **Harrington**. It has strong straw. Its most interesting feature is sprouting resistance.

TR128 is a two-rowed malting variety with good performance and earlier maturity than **Manley**.

TR229 is a two-rowed malting variety with performance similar to **Manley**. It has loose smut resistance.

TR232 is a two-rowed malting variety with good performance and maturity similar to **Harrington**. It is similar to **TR229** in disease resistance.

AC Buffalo is a white aleurone six-rowed variety with performance similar to **B1602**.

B2912 is a short, strong early six-row with white aleurone.

Feed and Food Barley

Main Characteristics of Varieties

			Yield as % of Harrington					Resistance to*							
							Relative***			Leaf spots					
Type & Variety	2 or 6 row	Rough or Smooth Awns	Area 1	Area 2	Area 3	Area 4	Maturity Ratings	Lodging	Shattering	Net Blotch	Scald	Loose Smut	Other Smuts	Root Rot	Stem Rust
Feed															
Bridge	2	R	106	105	107	103	L	G	VG	P	P	P	F	F	F
Brier	6	S	114	113	116	115	M	F	F	G	F	P	VG	VP	G
Bronco	6	R	96	109	114	116	L	G	F	F	P	P	G	F	G
CDC Dolly**	2	R	112	117	109	113	M	G	G	P	F	P	G	F	F
CDC Guardian	2	R	99	106	107	113	L	F	G	F	VG	P	VG	P	G
AC Lacombe	6	S	102	108	112	111	M	G	F	F	F	P	VG	F	G
Prospect	2	R	103	108	110	112	L	F	G	P	P	P	F	F	P
Seebe	2	R	98	105	108	114	VL	G	G	P	G	P	VG	P	P
Virden	6	S	107	105	107	109	VL	VG	G	F	P	P	G	VG	G
Hulless															
CDC Buck	6	R	82	89	86	85	E	G	F	F	P	P	F	G	G
CDC Candle**	2	R	93	104	119	119	M	P	F	F	P	P	VP	F	F
Condor	2	R	85	83	82	79	M	G	G	P	P	P	F	F	F
Falcon	6	S	67	98	87	87	M	VG	P	F	VG	P	F	F	F
Phoenix	2	R	82	94	94	94	M	G	G	P	P	P	F	G	P
CDC Richard	2	R	84	94	93	90	E	F	F	P	VG	P	F	G	G
CDC Silky**	6	S	78	95	104	100	M	G	F	F	VG	P	F	G	F
Intensive Management															
Duke	6	R	92	97	97	95	L	VG	F	F	VG	P	VG	G	G
CDC Earl**	6	R	98	120	119	115	L	VG	F	G	VG	P	G	G	G
Tukwa**	6	S	92	117	122	119	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: The relative maturity of the check, Harrington, is **M** (on average 91 days from seeding to swathing ripeness)
VE - very early; **E** - early; **M** - medium; **L** - late; **VL** - very late.

Progress through Research

AT TIME OF PRINTING:
Applied for Protection: AC Oxbow, TR229, TR232, AC Buffalo, AC Lacombe, Falcon, Phoenix.
Refer to Section "What is Plant Breeders' Rights".

Comments:

Bridge is a two-rowed feed variety with good yielding ability; it is slightly later than **Harrington** with poor disease resistance.

CDC Guardian is a high-yielding 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 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 two-rowed feed variety with good yield potential. It has poor resistance to diseases.

CDC Dolly is a new two-rowed feed variety with excellent yield potential and very good seed size.

AC Lacombe is a new six-rowed feed variety with excellent yield, good straw strength and disease 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. CDC Candle** is a new waxy hulless barley that should only be grown under contract.

CDC Silky is a new hulless six-rowed variety with excellent performance and disease resistance. It will require post harvest processing to remove hulls. **Falcon** is a six-rowed semi-dwarf hulless variety with good yield potential and disease resistance.

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

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.

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, CDC Earl, Tukwa, Falcon and CDC Silky** 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**.

General Comments:

A race of stem rust which attacks all of our previously resistant varieties of barley has appeared in the eastern prairies and the northern great plains. It is not 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.

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.

Rye

Main Characteristics of Varieties

	Yield as % Musketeer					Resistance to*			
Variety	Area 1	Area 2	Area 3	Area 4	Relative** Maturity Rating	Winter Killing	Shattering	Lodging	Stem Smut
Musketeer	100	100	100	100	M	VG	F	G	G
Prima	109	109	105	108	M	VG	F	F	G
AC Rifle	138	104	96	—	M	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:

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. **AC Rifle** is a semi-dwarf. Seed supplies of **AC Rifle** will not be available in 1995.

Triticale

Main Characteristics of Varieties

	Yield as % of Frank					Resistance to*				
Variety	Area 1	Area 2	Area 3	Area 4	Relative** Maturity Ratings	Lodging	Stem Rust	Leaf Rust	Bunt	Root Rot
Frank	100	100	100	100	M	G	VG	VG	VG	F
Banjo	92	96	98	97	L	G	VG	VG	VG	G
AC Copia	99	97	92	99	M	G	VG	VG	VG	G
Wapiti	96	103	97	90	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. Test weight of **AC Copia** is superior to other varieties. The seeding rate for triticale must be increased at least 30 percent to have the same number of plants per square foot as with CWRS wheat.

Oat

Main Characteristics of Varieties

Variety	Yield as % of Calibre				Test wt. (kg/hl)	% Hull	% Plump	Mat. Rating*	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(96 days)	G	VP	VP	P
CDC Boyer***	101	103	98	102	47.2	22.6	81	E	G	VG	P	P
Derby	100	99	100	102	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	98	101	99	99	45.5	20.7	35	L	F	VG	G	G
AC Mustang***	97	106	108	110	49.5	29.0	70	M	G	VP	VP	F
AC Preakness	96	105	101	99	48.8	22.6	66	L	G	VG	VG	G
Waldern	95	100	105	105	45.7	25.0	74	VL	G	VP	VG	F
Hulless												
AC Belmont***	76	76	75	72	52.0	N/A	N/A	M	G	VG	G	G

* Relative maturity: The relative maturity of the check, Calibre, is M (on average 96 days from seeding to swathing ripeness). **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

*** Less than three years of data for Area 4

PBR Progress through Research

AT TIME OF PRINTING:

Applied for Protection: AC Belmont, AC Preakness.

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

Comments:

CDC Boyer is a new variety with an improved yield/maturity combination and good grain quality. It has yield potential similar to Calibre but a three day maturity advantage. It has excellent plumpness and low hull content but is lower in test weight. CDC Boyer has better rust resistance than Calibre and Derby, and while not equal to that of AC Preakness, could be considered for production in south-east Saskatchewan.

AC Mustang is a new variety with high yield potential and maturity similar to Calibre. It has good test weight and grain plumpness but very high hull content, thus is not desirable for the milling industry. It appears to have good potential as a forage oat. AC Mustang is rust susceptible and may be at risk if grown in south-east Saskatchewan.

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

Derby has high yield potential and test weight, plumper grain and lower hull content than Calibre and is slightly earlier.

Dumont has good disease resistance for south-east Saskatchewan. It has good kernel quality, however it has weaker straw, lower yield potential and is later maturing than Calibre.

AC Marie has good disease resistance for south-east Saskatchewan. It has good yield potential and very low hull content, but low test weight and plumpness. It is later maturing than Calibre.

AC Preakness is a new variety with good 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.

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 later maturing than Calibre.

Calibre, Derby and **Waldren** 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 at a moisture content less than 12%.

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 infromation:

Saskatoon 306-975-4240

Oilseed Crops

Canola

Main Characteristics of Varieties

Type and Variety	Area 2	Area 3	Area 4	% Oil	Average Maturity In Days	Resistance to* Lodging	White Rust	Blackleg**
	Yield as % of Legend (See Comments Below)							
Argentine								
Legend	100	100	100	43.0	100	F	VG	F
Alliance	104	106	106	44.6	102	VG	VG	F
B2416	104	106	108	43.0	101	G	VG	F
Bounty	109	107	101	43.1	99	P	VG	P
Bullet	107	100	105	43.9	98	F	VG	G
Celebra	98	95	100	43.8	102	G	VG	F
Crusher	108	99	107	45.1	103	VG	VG	F
Cyclone	120	112	115	43.8	101	G	VG	G
Defender	113	107	110	43.3	99	F	VG	G
Delta	109	103	112	42.5	101	G	VG	F
AC Elect	100	98	113	44.7	100	F	VG	P
AC Excel	99	94	99	44.3	99	F	VG	F
Frontier	97	101	96	44.1	99	G	VG	F
Garrison	115	111	124	43.5	102	VG	VG	G
AC-H102	123	113	128	44.3	103	VG	VG	G
Hyola 401	112	112	98	42.6	101	G	VG	P
Hyola 417	105	108	113	43.2	101	F	VG	F
Impact	106	102	115	43.7	101	F	VG	F
Jackpot	105	104	121	43.7	100	F	VG	P
Legacy	110	107	118	44.0	100	G	VG	F
Mari	93	85	84	44.4	102	F	VG	G
Norseman	106	103	104	44.1	101	G	VG	F
Pearl	105	97	103	42.6	102	G	VG	G
Polo	95	93	86	47.0	102	F	VG	F
Princeton	110	105	107	43.8	101	F	VG	F
Settler	111	107	116	43.4	101	G	VG	F
Seville	112	102	109	43.4	102	VG	VG	F
Trojan	108	102	115	43.5	101	G	VG	F
Vanguard	99	94	99	43.5	100	F	VG	F
45A58	94	105	97	43.0	99	VP	VG	F
Stallion (TT)	77	80	72	41.1	101	F	VG	F
AC Tristar (TT)	70	76	68	42.1	99	VP	VG	VP
	Yield as % of Tobin							
Polish								
Tobin	100	100	100	41.9	85	F	G	P
Cash	94	101	104	43.1	86	F	F	P
Colt	101	99	100	42.6	87	F	VP	P
Eclipse	94	94	94	43.1	87	F	F	P
Eldorado	99	102	99	42.5	87	F	P	P
Goldrush	92	97	88	41.8	89	G	G	P
Horizon	102	102	102	42.6	87	F	VP	P
Hysyn 100	103	104	114	43.1	86	F	F	P
Hysyn 110	104	100	110	42.6	86	F	F	P
Klondike	96	104	111	42.8	89	F	VP	P
Maverick	94	100	106	43.9	86	F	F	P
AC Parkland	96	100	102	43.4	87	F	VG	P
Reward	97	101	99	43.6	86	F	VG	P
AC Sunshine	94	97	99	43.5	87	F	VG	P

TT = Trizane Tolerant.

* Resistance ratings: **VG** - very good; **G** - good; **F** - fair; **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: Bullet, Cyclone, Crusher, Goldrush, Klondike, Impact, Legacy, Trojan.

Applied for Protection: Alliance, B2416, Bounty, Defender, Frontier, Garrison, Jackpot, Norseman, Pearl, Princeton, Settler, Seville, 45A58, Cash, Maverick.

Refer to Section "What is Plant Breeders' Rights".

Comments:

Argentine varieties yield, on average 15 to 20% more seed than Polish varieties and mature in 98 to 103 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 even greater than that of Argentine varieties. Polish varieties are more shatter resistant than Argentine varieties allowing straight combining of the crop. Polish varieties are also less likely to produce green seed than Argentine varieties.

Argentine Canola

All Argentine varieties are black seeded, they have very good white rust resistance but are susceptible to Sclerotinia stem rot. Blackleg, which is now widespread in Saskatchewan, can cause severe yield losses in Argentine varieties that have 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 wet and cool 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.

AC-H102 is a new high yielding hybrid variety that has excellent lodging and good blackleg resistance, but is late maturing. **AC-H102** has high oil content. **Garrison** and **Cyclone** are high yielding varieties with good lodging and blackleg resistance.

Defender and **Settler**, two new varieties and **Legacy** are high yielding varieties with good blackleg resistance. **Princeton**, a new variety, **Hyola 417**, a hybrid variety, and **Trojan**, **Delta**, **Impact** and **Seville** are above average yielding varieties. They are medium in maturity and have fair blackleg resistance.

Hyola 401, a hybrid variety, and **Jackpot** have poor blackleg resistance. **B2416**, **Alliance** and **Norseman** are new varieties that have good lodging and fair blackleg resistance combined with medium maturity.

Bounty is early maturing, but has poor lodging and blackleg resistance. **Crusher** has very good lodging resistance and very high oil content.

Bullet is a new variety that is early maturing and has good blackleg resistance. **AC Elect** has poor blackleg resistance and very high oil content. **Pearl** is a new variety with good blackleg resistance and good straw strength but has low oil content. **Legend** has fair lodging and blackleg resistance and medium maturity.

45A58 is a new variety that has very poor lodging resistance. **Frontier** is a lower yielding new variety with good straw strength and early maturity.

Celebra, **AC Excel** and **Vanguard** are lower yielding varieties. **AC Excel** has high oil content. **Polo** is a new, low yielding, late maturing variety with very high oil content, **Mari** is low yielding.

Irrigation

Argentine varieties respond well to irrigation. Strong strawed, blackleg resistant varieties such as **AC-H102**, **Garrison** or **Cyclone** should be used, since irrigation may increase the incidence of blackleg and cause lodging of weakly strawed varieties. Irrigation may 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 the Crop Protection Guide 1995. **Stallion** and **AC Tristar** are triazine tolerant varieties. **Stallion** has fair blackleg and lodging resistance, and is late maturing while **AC Tristar** is highly susceptible to blackleg, has very poor lodging resistance, and is early maturing.

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 impact of blackleg on reducing yields.

Hysyn 100 and **Hysyn 110** are two new, synthetic varieties that have high yield and fair white rust resistance.

Klondike is a high yielding variety that is late maturing and has very poor white rust resistance. **Colt** and **Horizon** have very poor white rust resistance. **Maverick** and **Cash** are two new synthetic varieties with fair white rust resistance and high oil content. **AC Parkland**, **Reward** and **AC Sunshine** have very good white rust resistance and high oil content. **Eldorado** has poor white rust resistance. **Tobin** is an early maturing variety, has good white rust resistance but is low in oil content. **Eclipse** is a low yielding variety. **Goldrush** is low yielding, has good white rust resistance, but low oil content.

Specialty Oil Rapeseed and Canola

A high erucic acid oil is needed for special industrial oil markets. Argentine type, high erucic acid varieties have been developed for these markets. These varieties are typically lower yielding than standard canola varieties, but have very good blackleg and lodging resistance, they are usually high oil content varieties.

Low linolenic acid Argentine type canola varieties have been developed, and the oil is used as a premium vegetable oil for human consumption. Varieties of this type are lower yielding and have low oil content, they are also susceptible to blackleg.

Information on the contract production of these specialty oil rapeseed and canola varieties should be obtained from companies which contract such production.

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 t growing season. Oilseed sunflower has traditionally been grown in the Dark Bro and Black soil zones in southeastern Saskatchewan. Extremely early maturin Sunola type cultivars **AC Aurora** and A **Sierra**, as well as the early maturing hybrid cultivars **Sunwheat 101** and **Sunwheat 103** are adapted to productic in all areas of Saskatchewan.

Mustard

Main Characteristics of Varieties

Type and Variety	Yield as % Of Cutlass	Average Maturity In Days
Oriental		
Cutlass	100	94
Forge	97	96
Lethbridge 22A	88	95
AC Vulcan	104	95
Brown		
Commercial	88	96
	Yield as % Of Ochre	
Yellow		
Ochre	100	95
Gisilba	97	95
AC Pennant	112	95
Tilney	100	96
Viscount	101	96

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. **AC Vulcan** is a new high yielding variety, it is higher yielding than **Cutlass** and **Forge**. **AC Vulcan** and **Cutlass** are resistant to white rust while **Forge** is highly susceptible. **Forge** has superior seed quality. **Lethbridge 22A** is an older, lower yielding variety, the seed is needed for specific markets.

The Brown mustard variety **Commercial** is brown seeded and is highly susceptible to white rust.

Yellow mustard varieties are large seeded, and the seed is light yellow in colour. Older varieties yield, on average, 30% less seed than the Oriental mustard variety **Cutlass**. **AC Pennant** is a new variety that has very high yield. **Viscount** is also a new variety, but **Viscount** as well as **Tilney**, **Ochre** and **Gisilba** are significantly lower yielding than **AC Pennant**.

All mustard varieties are highly resistant to blackleg. Differences in yield between the different type of mustard is normally compensated for by price.

Flax

Main Characteristics of Varieties

	Yield as a % of NorLin							Resistance to[1]		
Variety	Area 1	Area 2	Area 3	Area 4	Irr.	Maturity[2]	Seed Size	Rust	Wilt	Lodging
NorLin	100	100	100	100	100	M(101days)	Medium	VG	G	G
Andro	99	90	95	90	89	E	Medium	VG	F	G
AC Emerson	104**	102**	99**	-	-	M	Large	VG	VG	F-G
Flanders	102	104	99	100	106	L	Small	VG	G	VG
AC Linora	89	92	97	91	107	L	Medium	VG	G	VG
AC McDuff	102*	100*	105	102	114	VL	Medium	VG	G	VG
Somme	102	102	103	99	103	M	Medium	VG	G	F-G
Vimy	112	105	102	100	73	M	Large	VG	G	F
Solin Flax										
Linola™ 947	94*	101*	101*	93	103	VL	Small	VG	G	VG

* Less than three years of data.
** Limited data.
\- Insufficient data or no datum.
[1] Resistance ratings: **VG** - very good; **G** - good; **F** - fair; **P** - poor; **VP** - very poor.
[2] Relative Maturity: The relative maturity of the check, NorLin, is **M** (on average 101 days from seeding to swathing ripeness). **VE** - very early; **E** - early; **M** - medium; **L** - late; **VL** - very late.

PBR Progress through Research

AT TIME OF PRINTING:
Protected by Plant Breeders' Rights: Linola™ 947.
Applied for Protection: AC McDuff.
Refer to section "What is Plant Breeders' Rights".

Comments:

Andro is an early-maturing, rust-resistant variety released as a replacement for the old rust-susceptible variety **Noralta**.

AC Emerson is a large-seeded variety with better straw strength than **Vimy**.

It was selected for its resistance to chlorotic dieback, a particular problem in the Red River Valley of Manitoba.

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

Linola™ 947 is the first **SOLIN** (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 southern zones 1 and 2.

AC Linora is a new late maturing variety that is best adapted to Manitoba.

AC McDuff is another new late maturing variety from Agriculture Canada. It has a high oil content, very good straw strength but is later maturing than **Flanders**.

NorLin is a high yielding, medium-early variety best suited to zones 3 and 4.

Somme is a medium-early maturing variety released as a replacement for **NorLin**. It performs very well in all areas of the province.

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

Pulse Crops

Lentil

Main Characteristics of Varieties

Variety	Yield as % of Laird	Height (cm)	Days First Flower	Relative* Maturity Rating	Resistance to ** Ascochyta Blight	Resistance to ** Anthracnose	Seed Size	Seeding*** Rates kg/ha (lb/a)
Laird	100	41	53	VL	P	VP	Large	90-100(80-90)
CDC Richlea	117	35	50	M	VP	VP	Medium	60-70 (53-62)
Eston	117	30	48	E	VP	VP	Small	45-50 (40-45)
Rose	108	32	47	M	VP	VP	Medium	60-70 (53-62)

* Relative maturity ratings: **E** - early; **M** - medium; **VL** - very late.
** Resistance ratings: **VG** - very good; **G** - good; **F** - fair; **P** - poor; **VP** - very poor.
*** Equivalent to 12 seeds/foot^2 (= 132 seeds/m^2).

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 regrowth will occur 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 7-node stage to facilitate swathing or direct combining.

Eight 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 some 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 1995. **CDC Gold** is a zero tannin variety and the seed coat does not discolour. However, it is extremely susceptible to seed rot and ascochyta blight and is very late maturing. **CDC Matador**, a spanish brown type, and **CDC Sunrise,** a small red type, are new ascochyta resistant varieties, but no seed will be available until 1996.

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 (35-40 lbs/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 seedborne 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.

Lentil is a legume and is capable of nitrogen fixation when the seed is treated with the proper inoculum. See Seed Inoculation section under Seed Facts.

Field Pea

Main Characteristics of Varieties

Type and Variety	Yield as % of Radley in Areas (Radley yields 82% of Express) 4 and North 3	1, 2 and South 3	Irr.	Maturity	Vine Length (cm)	Resistance to ‡ AB	PM	SCB	LDG	BL	Seed Weight (g/1000)
Food Type Green-Seeded											
Radley (SL)	100	100	100	M	57	F	VP	F	F	G	210
Danto (SL)	74	95	105	M	52	P	P	F	F	F	290
Emerald	112	102	102	M	75	P	P	F	F	F	250
Keoma (SL)	116 *	108 *	111 *	M	53	P	P	P	F	G	240
Majoret(SL)	103 *	107 *	100 *	M	59	P	VP	F	G	F	250
ORB (SL)	101	93	112	M	55	P	VP	P	F	P	240
Princess	81	99	95	E	58	P	P	G	P	VG	200
Ricardo	99	104	133 *	M	52	F	VP	F	P	F	280
Trump	86	91	NA	L	63	P	VP	F	P	F	250

Type and Variety	Yield as % of Express in Areas 4 and North 3	1, 2 and South 3	Irr.	Maturity	Vine Length (cm)	Resistance to ‡ AB	PM	SCB	LDG	Seed Weight (g/1000)
Food Type Yellow-Seeded										
Express	100	100	100	M	62	P	VP	P	P	240
AC Tamor	70	90	89*	L	57	VP	VG	G	VP	280
Anno (SL)	94	80	115	E	63	P	P	F	F	250
Bellevue	82	79	85 *	VL	87	P	P	G	P	180
Bohatyr	89	93	93 *	M	73	F	VP	G	F	270
Carneval(SL)	102	96	114	E	72	P	P	P	G	250
Celeste	79 *	87 *	113	E	65	P	VP	F	P	270
Century	74	83	91 *	E	106	P	P	F	P	230
Grande	114 *	109 *	103 *	M	90	P	VP	P	F	260
Highlight(SL)	102	94	112	E	66	P	VG	G	F	210
MIKO (SL)	91	94	121	M	75	P	P	F	F	260
Miranda	76	76 *	111 *	M	44	P	VP	P	VP	350
Patriot (SL)	86	91	108	E	67	F	VP	F	F	200
Richmond	101	99	98 *	M	67	F	VP	F	P	210
Scorpio	83 *	91	103 *	E	56	P	VP	P	P	280
Titan	78	83	88	L	109	P	P	G	P	250
Topper	82	89	NA	M	102	VP	P	F	P	290
Trapper	89	86	NA	L	95	P	P	F	P	140
Victoria	94	94	NA	M	84	P	VP	F	P	190
Feed Pea										
Baroness(SL)	100	96	111	E	71	P	P	F	F	290
Choque (SL)	87 *	79 *	119 *	M	60	P	P	F	F	260
FLUO (SL)	97	90	99 *	VE	85	P	P	F	F	320
Impala (SL)	89 *	92 *	104 *	M	65	P	P	F	F	270
Montana(SL)	104	99	108	VE	55	P	VP	F	F	300
Sirius	83	83	NA	M	96	P	P	G	P	240
Spring D	94	94	99 *	E	62	P	P	F	F	240
Stehgolt	83	66*	NA	E	45	P	P	P	P	290
Tara	91	89	87	L	96	F	VG	F	F	210

NA - no available data.
(SL) - indicates semi-leafless variety.
* - Limited data.
‡ - Resistance ratings: **AB** - ascochyta blight; **PM** - powdery mildew; **BL** - bleaching in green-seeded pea varieties; **SCB** - seed coat breakage; **LDG** - lodging; **VG** -very good; **G** - good; **F** - fair; **P** - poor; **VP** - very poor. (Maturity ratings relative to Express.)

PBR
Progress through Research

AT TIME OF PRINTING:
Protected by Breeders' Rights: ORB, Carneval, Highlight, Patriot, Richmond, Baroness, Grande.
Applied for Protection: Danto, Emerald, Majoret, Trump, AC Tamor, Celeste, Scorpio, Topper, FLUO, Impala, Montana, Spring D. **Refer to Section "What is Plant Breeders' Rights".**

Comments:

Field pea is best adapted to the Black and Gray soil zones. Production in the Dark Brown soil zone is possible if moisture is not limiting and the crop is seeded early. Early seeding will usually result in late August maturity and increase the likelihood of harvesting high 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. Choose varieties based on expectations for food markets or feed markets.

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 lay as flat on the ground if a good stand is achieved. Lodging in field pea can be caused by thin stands, early development of foliar and stem diseases such as ascochyta blight in the lower canopy, and strong winds and pounding rain prior to harvest. Long vine varieties are prone to early lodging. In the field pea table lodging resistance is rated relative to Radley for semi-leafless varieties and relative to Express for all other varieties.

Green-seeded varieties are generally lower-yielding than yellow-seeded varieties. Seed of most green varieties will bleach if rainy days are interspersed with hot sunny days just prior to harvest.

Varieties differ in resistance to seed coat damage during threshing and cleaning. Damaged and uncleaned seed of all varieties indicates low quality and this seed is only suitable for the feed market. If the target market is feed, select varieties with small seed size and high yield potential.

Certified seed of **Keoma, Princess, AC Tamor, Carneval, Celeste, Topper, Trump, Scorpio, Majoret** and some other recently registered varieties will not be available in large quantities for 1995 planting. **Yellowhead** is distributed exclusively by Woodstone Foods Ltd. of Portage La Prairie and can only be grown under contract with this company. Regional yield data are still limited for **Promar,** a green-seeded marrowfat variety sold in specialty food pea markets.

Whero is a late maturing, long vine, yellow-seeded, leafy type, maple type (brown marbled seedcoat) sold in birdfeed markets. It yields about 70% of **Express.**

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.

Replicated **BLEACHING DATA** were recorded for **Radley, Keoma, Majoret, Princess, Ricardo, and Danto** from 14 dryland sites in 1994. Tolerance to bleaching from best to worst was **Princess > Radley = Keoma > Majoret = Danto = Ricardo.**

Replicated **LODGING DATA** were recorded for all entries at 12 locations in 1994. Resistance to lodging for semi-leafless varieties was rated relative to **Radley**. For normal leaf type varieties lodging was rated relative to **Express**.

Faba Bean

Main Characteristics of Varieties

Variety	Yield as % of Outlook (Northeast) Dryland	(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

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. **CDC Fatima** and **CDC Blitz** are newly registered varieties. Seed supplies are still limited.

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.

Dry Bean

Dry 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 pinto bean varieties. For dryland production on summerfallow in the Dark Brown soil zone, **Othello** is recommended. **CDC Expresso** and **CDC Nighthawk** are early maturing, black bean varieties suitable for narrow-row, direct-harvest systems in the Dark Brown soil zone. No seed of **CDC Expresso** or **CDC Nighthawk** will be available in 1995.

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 6 cm deep 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. Row crop production (20 plus inches (48 cm)) requires an undercutter and a windrower for harvest. 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. 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, proving 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 or head. The aphids often hide in the dense head of canary seed. Damage may occur at populations below these levels; data do not exist to support the suggested action threshold.

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 "Crop Protection Guide 1995" 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".

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 a herb crop called cilantro. Seedlings are slow to develop and noncompetitive. 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 yield and 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 birdseed quality and higher oil content compared to **Saffire**. Certified seed is in limited supply for 1995.

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.

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.

This 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.

Breeding Institutions and Seed Distributors of Varieties Listed in this Publication

Crop Kind, Class & Variety	Breeding Institution	Distributor
Wheat		
Bread Wheat		
AC Barrie®	Ag Canada (Swift Current)	SeCan Members
Columbus	Ag Canada (Winnipeg)	SeCan Members
AC Cora	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
Lancer	Ag Canada (Swift Current)	SeCan Members
Laura	Ag Canada (Swift Current)	SeCan Members
CDC Makwa	University of Sask. — Crop Development Centre	SeCan Members
CDC Merlin	University of Sask. — Crop Development Centre	SeCan Members
AC Michael	Ag Canada (Lacombe)	SeCan Members
AC Minto	Ag Canada (Winnipeg)	SeCan Members
Pasqua	Ag Canada (Winnipeg)	SeCan Members
Roblin	Ag Canada (Winnipeg)	SeCan Members
CDC Teal	University of Sask. — Crop Development Centre	Value Added Seeds
Canada Prairie Spring Wheat		
Biggar	Ag Canada (Swift Current)	SeCan Members
Cutler	University of Alberta	Proven Seed
Genesis	Ag Canada (Swift Current)	SeCan Members
AC Karma®	Ag Canada (Swift Current)	SeCan Members
AC Taber	Ag Canada (Swift Current)	SeCan Members
Canada Western Extra Strong		
Bluesky	Ag Canada (Beaverlodge)	SeCan Members
Glenlea	University of Manitoba	Public
Wildcat	Ag Canada (Beaverlodge)	SeCan Members
Durum		
Kyle	Ag Canada (Swift Current)	SeCan Members
Medora	Ag Canada (Winnipeg)	SeCan Members
AC Melita	Ag Canada (Winnipeg)	SeCan Members
Plenty	University of Sask. — Crop Development Centre	SeCan Members
Sceptre	University of Sask. — Crop Development Centre	SeCan Members
Soft White Spring Wheat		
Fielder	University of Idaho & USDA; Ag Canada (Lethbridge)	public
AC Phil	Ag Canada (Lethbridge)	Proven Seed
AC Reed	Ag Canada (Lethbrige)	SeCan Members
Winter Wheat		
CDC Kestrel	University 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		AB Wheat Pool
Musketeer	Ag Canada (Swift Current)	SeCan Members
Prima	Ag Canada (Swift Current)	SeCan Members
AC Rifle	Ag Canada (Swift Current)	Proven Seed
Spring Rye		
Gazelle	University of Sask.	public
Triticale		
Banjo	University 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	University of Manitoba	SeCan Members
B1215	Busch Ag. Res. Inc.	Sask Wheat Pool
B1602	Busch Ag. Res. Inc.	Sask Wheat Pool
B2912	Busch Ag Res. Inc.	Sask Wheat Pool
AC Buffalo®	Ag Canada (Brandon)	Sask Wheat Pool
Duel	Busch Ag. Res. Inc.	Sask Wheat Pool
Harrington	University of Sask. – Crop Development Centre	SeCan Members
Manley	University of Sask. – Crop Development Centre	SeCan Members
AC Oxbow®	Ag Canada (Winnipeg, Brandon)	SeCan Members
Stein	University of Sask. – Crop Development Centre	Proven Seed
Tankard	University of Sask. – Crop Development Centre	SeCan Members
TR 118	University of Sask. – Crop Development Centre	SeCan Members
TR229®	Ag Canada (Brandon)	SeCan Members
TR232®	Ag Canada (Brandon)	SeCan Members
TR 128	University of Sask. – Crop Development Centre	Performance Seeds
Feed		
Bridge	Ag Canada (Lethbridge)	SeCan Members
Brier	University of Sask. – Crop Development Centre	SeCan Members
Bronco	W.G. Thompson & Sons Ltd.	Value Added Seeds
CDC Dolly	University of Sask. – Crop Development Centre	SeCan Members
CDC Guardian	University of Sask. – Crop Development Centre	SeCan Members
AC Lacombe®	Ag Canada (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	University of Sask. – Crop Development Centre	Proven Seed
CDC Candle	University of Sask. – Crop Development Centre	Alberta Wheat Pool
Condor	FCDC (Lacombe)	SeCan Members
Falcon®	FCDC (LaCombe)	Progressive Seeds
Phoenix®	FCDC (Lacombe)	SeCan Members
CDC Richard	University of Sask. – Crop Development Centre	Proven Seed
CDC Silky	University of Sask. - Crop Development Centre	Value Added Seeds
Intensive Management		
Duke	University of Sask. – Crop Development Centre	SeCan Members

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Crop Kind, Class & Variety	Breeding Institution	Distributor
CDC Earl	University of Sask. – Crop Development Centre	SeCan Members
Tukwa	FCDC (Lacombe)	SeCan Members
Oat		
AC Belmont	Ag Canada (Winnipeg)	Proven Seed
CDC Boyer	University of Sask. – Crop Development Centre	SeCan Members
Calibre	University of Sask. – Crop Development Centre	SeCan Members
Derby	University of Sask. – Crop Development Centre	Proven Seed
Dumont	Ag Canada (Winnipeg)	SeCan Members
AC Marié	Ag Canada (Winnipeg)	SeCan Members
AC Mustang	Ag Canada (Lacombe)	Sask Wheat Pool
AC Preakness	Ag Canada (Winnipeg)	Proven Seed
Waldern	Ag Canada (Lacombe)	SeCan Members
Canola		
Argentine		
Alliance	Albert Wheat Pool	Sask. Wheat Pool
B2416	Svalöf Weibull AB	Brett-Young Seeds
Bounty	Svalöf Weibull AB	Proven Seed
Bullet	Svalöf Weibull AB	Proven Seed
Celebra	Svalöf Weibull AB	Newfield Seeds Cdn. Seed Coaters
Crusher	Svalöf Weibull AB	Brett-Young Seeds
Cyclone	Prodana, Oseco-King Agro	Pride/Limagrain Dealers
Defender	Svalöf Weibull AB	Proven Seed
Delta	Svalöf Weibull AB	Proven Seed
AC Elect	Ag Canada (Saskatoon)	SeCan Members
AC Excel	Ag Canada (Saskatoon)	SeCan Members
Frontier	Alberta Wheat Pool	Sask Wheat Pool
Garrison	Svalöf Weibull AB	Proven Seed
AC-H102	Ag Canada (Saskatoon)	Sask Wheat Pool, Western Grower Seed Corp.
Hyola 401	Zeneca Seeds	Zeneca Seeds
Hyola 417	Zeneca Seeds	Zeneca Seeds
Impact	Svalöf Weibull AB	SeCan Members
Jackpot	Svalöf Weibull AB	Proven Seed
Lagacy	Svalöf Weibull AB	Sask Wheat Pool
Legend	Svalöf Weibull AB	Sask Wheat Pool
Mari	Maribo, Mycogen	Mycogen Canada Inc.
Norseman	Svalöf Weibull AB	Cargill
Pearl	Limagrain Canada Seed Inc	Pride/Limagrain Dealers
Polo.	Maribo Seeds	Mycogen Can. Ltd./ Performance Seeds Canada Ltd.
Princeton	Svalöf Weibull AB	Sask. Wheat Pool
Settler	Svalöf Weibull AB	Proven Seed
Seville	Svalöf Weibull AB	Prairie Seed
Trojan	Svalöf Weibull AB	Newfield Seeds Cdn. Seed Coaters
45A58	Pioneer Hi-Bred	Proven Seed
Stallion (TT)	Svalöf Weibull AB	Sask Wheat Pool
AC Tristar (TT)	Ag Canada (Saskatoon)	SeCan Member
Vanguard	Svalöf Weibull AB	Newfield Seeds, Cdn. Seed Coaters
Polish		
Cash	Svalöf Weibull AB	Newfield Seeds, Cdn. Seed Coaters
Colt	Svalöf Weibull AB	Newfield Seeds, Cdn. Seed Coaters
Eclipse	University of Alberta	Alta. Wheat Pool
Eldorado	University of Alberta	Proven Seed
Goldrush	Svalöf Weibull AB	Proven Seed
Horizon	Svalöf Weibull AB	Sask Wheat Pool
Hysyn100	Zeneca Seeds	Zeneca Seeds
Hysyn110	Zeneca Seeds	Zeneca Seeds
Klondike	Svalöf Weibull AB	Proven Seed
Maverick	Svalöf Weibull AB	Sask Wheat Pool
AC Parkland	Ag Canada (Saskatoon)	SeCan Members
Reward	University of Manaitoba	SeCan Members
AC Sunshine	Ag Canada (Beaverlodge)	Western Grower Seed Corp.
Tobin	Ag Canada (Saskatoon)	SeCan Members

Crop Kind, Class & Variety	Breeding Institution	Distributor
Flax		
Andro	U of S – Crop Dev. Centre	SeCan Members
AC Emerson	Ag Canada (Morden)	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		
Brown		
Commercial		Trade
Oriental		
Cutlass	Ag Canada (Saskatoon)	Trade
Forge	Colman's of Norwich	Humboldt Flour Mills
Lethbridge 22A	Ag Canada (Saskatoon)	Trade
AC Vulcan	Ag Canada (Saskatoon)	Trade
Yellow		
Gisilba	Kurt Behm GMBH	Northern Sales
Ochre	Ag Canada (Saskatoon)	Trade
AC Pennant	Ag Canada (Saskatoon)	Trade
Tilney	Colman's of Norwich	Proven Seed
Viscount	Colman's of Norwich	Proven Seed
Sunflower		
DO-707	Dahlgren and Company	Pioneer Hi-Bred
IS 7000	Interstate Seeds	Sask. Wheat Pool
IS 7111	Interstate Seeds	Sask. Wheat Pool
IS 6111	Interstate Seeds	Sask. Wheat Pool
6322	Pioneer Hi-Bred	Pioneer Hi-Bred
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		
Anno	D.L.F. Trifolium-Columbia Seeds	Columbia Seeds (AB)
Baroness	Sharpes Int.- Columbia Seeds	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
Choque	Andre Blondeau-Columbia Seeds	Columbia Seeds (AB)
Danto	L. Dsenfeldt	Brett-Young Seeds
Emerald	Selgen-OSWA	Sask. Wheat Pool
Express	Svalöf Weibull AB	Newfield Seeds
FLUO	Andre Blondeau-Columbia Seeds	Columbia Seeds (AB)
Grande	Svalöf Weibull AB	Sask. Wheat Pool
Highlight	Svalöf Weibull AB	Newfield Seeds
Impala	Cebeco	St. Denis Seed Farm (AB)
Keoma	Anttila P.B. Farm	Alberta Wheat Pool
Majoret	Svalöf Weibull AB	Newfield Seeds
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.; Stu Robson Ron McKinnon	CanMar Grain
Radley	Sharps- Columbia Seeds	Columbia Seeds (AB)
Ricardo	Cebeco	Brett-Young Seeds
Richmond	Svalöf Weibull AB	Wheat City Seeds
Scorpio	Cebeco	Brett-Young Seeds
Sirius	Inst. P.P.P., Czech Republic	Terramax
Spring D	Maribo	Brett-Young Seeds
Stehgolt	M.V.L. The Netherlands	Terramax
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

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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
CDC Gold	U of S - Crop Dev. Centre	Sask. Wheat Pool
Indianhead	U of S - Crop Dev. Centre	SeCan Members
Laird	U of S - Crop Dev. Centre	SeCan Members
CDC Matador	U of S - Crop Dev. Centre	Simpson Seeds
Rose	U of S - Crop Dev. Centre	Proven Seed
CDC Richlea	U of S - Crop Dev. Centre	SeCan Members
CDC Sunrise	U of S - Crop Dev. Centre	Sask. Wheat Pool
Faba Bean		
Aladin	University of Manitoba	Public
CDC Blitz	U of S - Crop Dev. Centre	Proven Seed
CDC Fatima	U of S - Crop Dev. Centre	Euro-Can. Seeds Ltd.. Walker Seeds (Sk)
Orion	Ag Canada (Lacombe)	Roger Lee (AB)
Outlook	U of S - Crop Dev. Centre	Lyster Farms Ltd. (AB) SeCan Members
Pegasus	University of Manitoba	Roy Legumex (MB)
Pinto Bean		
Othello	USDA/ARS (Prosser. WA)	WA & ID seed dealers
Black Bean		
CDC Expresso	U of S - Crop Dev. Centre	Specialty Seeds
CDC Nighthawk	U of S - Crop Dev. Centre	Value Added Seeds
Canary Seed		
Ellias	University 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

The Advisory Council on Grain Crops, a committee of the Saskatchewan Agricultural Services Coordinating Committee (SASCC), 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 form Saskatchewan Seed Distributing Companies

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