

Lentil Management in Western Canada

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Lentil production in Saskatchewan first started in 1969 when about 160 ha were grown (Table 1). By 1972, lentils were produced on over 6,000 ha. However, lentils were promoted too rapidly, before researchers and farmers had determined the best areas of adaptation and suitable management practices. No one knew which herbicides to use. Lack of farmer experience, plus the late wet springs of 1974 and 1975 with resulting low yields and fall frost damage, nearly eliminated production of lentils in Western Canada.

However, a few farmers were able to consistently produce good lentil crops in Saskatchewan. This clearly indicated that lentils were adapted to certain areas. Meanwhile, researchers at the University of Saskatchewan Crop Development Centre were busily determining which herbicides would work in lentils and trying to get the best ones registered for use in lentils. We were also studying a wide array of management practices and developed a package of agronomic practices for successful lentil production in Western Canada. This was field-tested successfully in 1977 and published in January 1978 as University of Saskatchewan Extension Division Publication 382 entitled, "Lentil Production in Western Canada".

The Crop Development Centre cannot be given full credit for the increased lentil production in Saskatchewan. Credit must also be given to those farmers who successfully produced lentils from 1969 to 1975 and proved that lentils could be grown in Saskatchewan. Credit must also be given to Pioneer Grain Co., Ltd., for their pioneering efforts in establishing lentils as an alternative crop. We must also acknowledge the contribution of the Saskatchewan Pulse Crop Growers Association. Credit must also be given to the wheat surplus with low prices and low quotas on Board Grains during 1968-1974 and since 1976.

Table 1. Lentil production and farm value in Saskatchewan, 1969-1978

Year	Area hectares	Yield kg/ha	Production in tonnes	Farm value	
				\$/tonne	Total
1969	160	790	127	172.00	\$21,844
1970	607	450	272	172.00	46,784
1971	1,200	750	900	82.65	74,385
1972	6,070	450	2,722	110.20	299,964
1973	1,012	560	567	242.44	137,463
1974	1,416	450	635	440.80	279,908
1975	202	560	113	363.66	41,094
1976	240	910	218	440.80	96,094
1977	1,335	1120	1,500	770.00	1,155,000
1978	8,900	900	8,780	309.00	2,713,020
1979*	15,000	1000	15,000	300.00	4,500,000

*predicted

We must also acknowledge the contribution of a severe drought in the lentil producing area of eastern Washington and northern Idaho in 1977 which sent the price of lentils up to 35 cents per pound for the Canadian producer. This certainly stimulated a lot of interest in lentils in 1978.

Lentil Adaptation

Lentils are best adapted to different parts of Saskatchewan than are fababeans. Fababeans have a long growing season requirement and cannot tolerate drought stress or salt affected soils. Thus, fababeans are best adapted to irrigated areas or heavy clay soils along the southern edge of the Black Soil Zone where drought stress is rarely severe, but where early seeding will permit them to mature. They grow vigorously throughout the rest of the Black Soil Zone, but frequently fail to mature seed normally and make an excellent silage crop there.

Peas are best adapted to the Black Soil Zone including the parkland area of Saskatchewan. If they are planted early, they will mature a normal seed crop which can tolerate some wet fall weather without serious reduction in quality. Peas do poorly on salt-affected soils.

Lentils have some drought tolerance and are best adapted to the Dark Brown Soil Zone south of Saskatoon. Production is centered near Elrose and Moose Jaw, but a much larger area can grow lentils successfully. They do best on heavy clay soils, but grow poorly in areas that are salt affected.

Lentils have an indeterminate growth habit in that they will continue flowering and growing unless the plant is stressed by drought, nitrogen deficiency, heat, heavy pod set, severe weed competition or root rot. Thus, some drought stress is desired in August to terminate vegetative growth and mature the seed. This indeterminate growth characteristic is the key to lentil adaptation and management. An understanding of this indeterminate growth pattern in lentils and its implications permits us to predict responses of the lentil plant when grown in different areas or under various conditions.

Lentils can also be grown successfully along the southern fringe of the Black Soil Zone, but production problems increase. Thus, much more attention must be paid to such practices as early seeding and stubble cropping. The new variety, Laird (Table 2) is about 3-5 days later maturing than Commercial Chilean lentils and this will make early seeding even more critical in many areas.

Lentil Management - Cash Inputs

The major cash input is for the seed. The suggested seeding rate is 56 kg/ha (50 lb/a) and seed cost is about 30¢/lb for a seed cost of \$15.00/a. Note that in 1978 seed was 48¢/lb for a seed cost of \$24.00/a.

Another cash input is for herbicides. Lentils are slow growing, short and very poor competitors with weeds or volunteer crops. Thus, with a few rare exceptions, chemical weed control is required, especially since lentils should be grown as a stubble crop and this usually increases weed problems. Largely through the efforts of Crop Development Centre personnel, three herbicides have been registered for use on lentils to date. They are barban (Carbyne) for post-emergent wild oat control, dinoseb amine (Premerge-3, Sinox PE) for post-emergent broadleaf weed control and diclofop methyl (Hoe-grass) for post-emergent control of annual grassy weeds. Dinoseb amine does an excellent job of controlling wild mustard, but is weak on many other broadleaf weeds. It should be sprayed before the lentils exceed 5-7 cm in height or else severe foliage burning and stunting of the lentils will occur. Rates of 10-12 oz/a are adequate to control wild mustard.

Table 2. Agronomic performance of Laird and Commercial Chilean lentil in Saskatchewan (14 tests, 1973-1978)

Cultivar	Seed yield (kg/ha)	Height (cm)	Days to first flower	1000-seed wt (g)
Laird	1585	42	53	80
Commercial Chilean	1482	34	50	58

Several unregistered herbicides that we are trying to get registered are triallate (Avadex BW) for wild oat control and fall-applied trifluralin for control of annual grassy weeds and a wide array of broadleaf weeds. Another promising herbicide is metribuzin (Sencor, Lexone) for post-emergent broadleaf control. Metribuzin controls a broader spectrum of broadleaf weeds than dinoseb amine. Metribuzin should be sprayed early, but if spraying is unavoidably delayed until the lentils are taller than 7 cm, less foliage burn occurs than when dinoseb amine is used.

A promising unregistered herbicide combination is triallate plus half-rate of trifluralin shallow incorporated immediately after seeding to control wild oats and green foxtail.

Lentil Management - General Practices

Lentil production requires a more intensive level of management than wheat production. The major practices are:

1. Obtain a contract.
2. Seed early. Lentils can be seeded as early as May 1, but must not be seeded into mud or a flooded area. Seedlings emerge rapidly and a fungicide is not normally required. We have been suggesting that farmers plant lentils before they plant wheat. However, lentils can be grown successfully most years if seeded before May 25. The risk of severe damage from fall frosts and low yields in general increases rapidly after May 25 (Table 3).
3. Seed at 56 kg/ha.
4. Use appropriate herbicides (see above).
5. Seed about 5 cm (2 inches) deep and, if a discer is used, pack the soil to prevent excess drying.
6. Inoculate the seed with Rhizobium prior to seeding, using a dilute syrup solution or powdered milk solution to stick the bacteria to the seed.
7. Seed into stubble, possibly zero-till, making sure you have decided which weed control scheme you will use pre-plant or post-emergent. (Table 4). This will also assist in lengthening the rotation. Crops on lentil stubble require less nitrogen than crops on cereal stubble.
8. Apply 22 to 28 kg/ha (20 to 25 lb/a) of P₂O₅ with the seed, if the soil test indicates the soil is low in phosphorus (Table 5). Phosphate fertilizer must be side-banded if higher rates are used.
9. Swath the lentils close to the ground when the lower-most pods turn yellow with occasional brown pods. This is necessary if shattering is to be kept to a minimum. A pick-up reel on the swather is usually necessary.
10. Lentil seeds are considered dry at 14% moisture, but if combined too dry, excess chipping and splitting of seed occurs. The combine cylinder speed should be reduced to 350-600 r.p.m. and combine augers should also be slowed down to reduce mechanical damage to the seed. If drying is necessary, air temperatures of 43°C (110°F) should not be exceeded.

Table 3. Effect of seeding date on lentil seed yields.

Location and seeding date	Seed yield kg/ha
<u>New Brigden, Alta., 1977</u>	
May 14	712
May 23	391
<u>High Bluff, Man., 1977</u>	
May 12	1519
May 30	243
<u>Saskatoon, Sask., 1978</u>	
May 8	1248
May 23	1040

Table 4. Lentil seed yields (kg/ha) from stubble- and fallow-sown lentils

Location and plot type	Fallow	Stubble	Stubble as % of stubble
Rouleau, plots, 1977	1356	1210	89
Regina, plots, 1977	2197	1948	89
Regina, field, 1977	2018	1682	83
Regina, plots, 1978	1993	1868	94
Regina, field, 1978	1877	1533	82
Elrose, plots, 1978	1388	1574	113
Bellevue, plot, 1978	255	482	189

Table 5. Effect of phosphate rate and method of application on seed yield of lentils.

Method and rate (kg/ha)	Seed yield (kg/ha)*
<u>Check - 0</u>	1994
<u>Side-banded</u>	
17	2338
33	2174
50	2268
67	2481
100	2641
<u>With seed</u>	
17	2076
33	2152
50	2145
67	2364
100	2187

*Tests were at Saskatoon and Hagen, 1977 and 1978 and soils tested low to medium low in phosphate.

The Future

Lentils can be successfully grown in much of Saskatchewan if proper management practices are used. An increase of 50% to 15,000 ha of lentils is predicted for Saskatchewan in 1979, but what about after that?

Average lentil yields in Saskatchewan are about 1000 kg/ha and Saskatchewan produces over 80% of the lentils in western Canada. I do not see much change in this respect. However, I think you will agree that the potential for expanding lentil production in western Canada is great. There are many more thousands of hectares suitable for growing lentils, but this does not mean that they will be grown. Relaxation of marketing quotas on Board Grains would reduce lentil production, even though net returns are better, simply because wheat is easier to grow than lentils.

In the short term with continuation of low wheat quotas I see a potential of 40,000 to 50,000 ha of lentils in western Canada within three years, provided the Canadian dollar remains below 90 cents U.S. I also predict a minimum price of 14 cents per lb which will provide an average gross return of \$140 per acre, subject to the same qualifications. Few wheat fields in the Brown Soil Zone will provide gross returns anywhere near this in the next few years.