

ALTERNATIVE SEEDING DATES FOR HERBICIDE TOLERANT (HT) TRANSGENIC CANOLA

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Recommended dates for seeding canola on the Prairies vary depending on location. Generally, *B.napus* varieties are recommended to be seeded in early to mid-May, while *B.rapa* varieties are recommended to be seeded in mid to late May (Canola Growers Manual). Surveys in Alberta found that top high yielding canola producers seeded *B.napus* varieties earlier than low yielding producers (Thomas, 1991).

Seeding may be delayed if farmers are applying and incorporating pre-emergent herbicides. Delayed seeding is commonly used to control weeds such as stinkweed. The introduction of canola varieties which are resistant to post-emergent herbicides such as glyphosate, glufosinate ammonium and imazethapyr reduces the need for pre-emergent herbicides and delayed seeding. Therefore, the opportunity exists to seed these varieties early and take advantage of superior weed control options.

Late October seeding of canola has shown to be successful (Austenson and Kirkland 1975). Unfortunately farmers who attempted the practice found that winter annual weeds were highly competitive. These weeds can now be easily controlled by herbicides registered in Roundup Ready, Liberty Link, or Pursuit Smart canola.

OBJECTIVE

To compare the effect of late fall (LF) early spring (ES) and mid - May (mM) seeding dates on maturity, yield and quality of Roundup Ready canola.

METHODS

Roundup Ready canola (cv, RT-73) was seeded on three seeding dates at the Scott Experimental Farm from 1994 to 1996. Actual dates of seeding are shown in Table 1. The LF seeding date is seeded as close to the first snowfall as possible. The ES seeded date is determined by picking the **earliest 'possible'** date that soil conditions permit local farmers to seed. The third date (mM) is the date at which most producers seed their canola crop.

The canola was seeded on summerfallow in 1994 and 1995. In 1996, experiments were seeded on summer-fallow, chemical fallow, and wheat stubble. Roundup Ready canola seed was treated with a fungicide and seeded at 6.7 kg/ha. Phosphorus fertilizer was applied with the seed and nutrient deficiencies corrected by applying nitrogen fertilizer.

RESULTS AND DISCUSSION

Crop Emergence and Establishment

Plant emergence counts taken in 1995 and 1996 show that FS canola had lower emergence counts than ES or mM canola. Emergence of FS canola on fallow in 1996 was poor due to soil compaction and crusting (Table 2).

FS canola emerges extremely early with emergence dates ranging from April 23 to May 1. The FS canola showed good tolerance to spring frosts after emergence. It has survived air temperatures as low as -8°C and survived 8 consecutive nights of frost in 1994. ES canola emergence ranged from 8 to 14 days after seeding while mM emergence ranged from 6 to 10 days (Table 1).

Increasing seeding rates above 6.7 kg/ha (1996 data only) have not shown an advantage.

Flowering Dates, Swathing and Combining Dates

FS canola reached the 50% flowering stage up to 13 days before ES and up to 26 days before mM seeding date. ES flowering dates range from 2 to 13 days before mM seeding date (Table 1).

Swathing dates for FS canola ranged from 4 to 8 days before ES and 12 to 17 days before mM. Combining dates for FS canola have been up to 19 days earlier than spring seeding dates (Table 1).

Table 1: Range of Dates for Seeding, Emergence, 50% Flowering, Swathing, and Combining for Fall Seeded, Early Spring, and mid-May Seeded Canola, Scott, 1994-96

| Date | Fall Seed | Early Spring | mid-May |
|---------------|--------------------|--------------------|--------------------|
| Seed | Oct 27 to Oct.31 | April 25 to May 2 | May 9 to May 23 |
| Emergence | Apr. 23 to May 1 | May 9 to May 12 | May 18 to 29 |
| 50% Flowering | June 11 to June 16 | June 21 to June 27 | June 23 to July 9 |
| Swath | July 25 to Aug. 3 | July 29 to Aug. 11 | Aug. 8 to Aug. 19 |
| Combine | Aua. 5 to Aug. 15 | Aug. 8 to Aug. 16 | Aug. 23 to Aug. 27 |

Table 2: Plant emergence (#/m²) for Fall Seeded, Early Spring, and mid-May Seeded Canola, 1995 8 1996

| | 1995 Fallow | 1996 Fallow | 1997 Stubble |
|----|----------------|----------------|-----------------|
| LF | 34 | 34 | 119 |
| ES | 58 | 242 | 194 |
| mM | 70 | 146 | 123 |

Weed Control

Glyphosate applied at 440 g ai/ha in the 3-4 leaf stage provided excellent control of annual weeds in the study. In a related study, the effectiveness of glyphosate, glufosinate ammonium, and imazethapyr was evaluated on their respective licensed HT varieties (Quest, Innovator, 45A71).

In the drought condition of 1995, glyphosate at 440 g ai/ha gave excellent control of wild oats, wild mustard, cow cockle and cleavers. Glufosinate ammonium applied to Innovator canola (500 g ai/ha gave excellent control of wild mustard and cow cockle, good suppression of cleavers, but unacceptable control on wild oats. Imazethapyr applied to 45A71 gave excellent control of wild mustard and cleavers, but unacceptable control on wild oat and cow cockle (Table 3).

Conversely, when the study was repeated in the good growing conditions of 1996, all treatments provided excellent control of annual weeds.

Table 3: Broad spectrum weed control in herbicide tolerant canolas with Roundup, Liberty and Pursuit, Scott, 1995 (Kirkland).

| Treatment * | Weed Species | | | | Canola ** Yield (Kg/ha) |
|----------------|-----------------|-----------------|---------------|----------|-------------------------------|
| | Wild oat | Wild Mustard | Cow Cockle | Cleavers | |
| | Control) (%) | | | | |
| Untreated | 0 | 0 | 0 | 0 | 410 |
| Poast & Muster | 66 | 88 | 15 | 0 | 1110 |
| Roundup | 100 | 100 | 100 | 100 | 1590 |
| Liberty | 65 | 100 | 98 | 84 | 1130 |
| Pursuit | 50 | 90 | 66 | 91 | 550 |
| Pursuit (+) | 56 | 94 | 63 | 91 | 730 |
| LSD (0.05) | 7 | 5 | 25 | 11 | 370 |

- All treatments applied when weeds in 3 to 4 - leaf stage.
- ** Roundup, Liberty, Pursuit and Pursuit analogue (+) applii to Quest, Innovator, and 45A71 canola, respectively.

Yields

Yields have been comparable between the three treatments with a slight advantage for the ES seeding date (Table 4).

Table 4: Yield of Fall Seeded, Early Spring, and mid-May Seeded Canola (1994-96)

| | Yield (kg/ha) | | |
|----------------------------|---------------|------|------|
| | FS | ES | mM |
| Mean of Five Site Years | 1563 | 1697 | 1435 |

Seed Quality

Oil content of the FS canola ranged from 0.9 to 1.9% above mM seeded canola (1994-95 data only). 1000 KW of FS and ES canola was higher than mM canola. The FS canola flowers during the cooler months of June which enhances seed quality.

Conclusions

Advantages of Fall or Early Seeding

- I) Early maturity
 - reduced risk of fall frost
 - reduced risk of grade loss due to high chlorophyll
 - lower yielding *B.rapa* varieties which occupy 45% of canola acreage in Saskatchewan could be converted to 30 to 40% higher yielding *B.napus* varieties
 - facilitate the development of higher yielding late maturing varieties
 - facilitate the seeding of winter crops
- II) Reduced losses
 - reduced risk of late summer insect attack - Bertha army worm, Diamondback moth.
 - reduced losses due to fungal diseases - sclerotinia & blackleg
- III) Improved seed quality, higher oil content (1 to 2%)
- IV) Early season moisture utilization
 - good seed bed conditions
 - fits into direct seeding systems
 - take advantage of June moisture, cool temperatures at seed set
 - soil conservation
- V) Highly competitive with weeds
- VI) Spread producers workload

Disadvantages of FS canola

- I) Risk of fall germination and establishment failure - #1 barrier to adoption of this practice
- II) Spring frost - not a problem to date
- III) Spring flooding
- IV) Post-emergent herbicide application may coincide with other seeding operations

REFERENCES

- Austenson & Kirkland. 1975. Seed Rapeseed In the Fall? Prepared for the Saskatchewan Rapeseed Growers Association. 2 pp.
- Canola Growers Manual. 1984. Canola Council of Canada.
- Thomas, P. 1991. Alberta Canola Production Survey. Alberta Agriculture, Food and Rural Development. 49 pp.