Growing Degree Day Modelling for Spring Canola

(Interim Report)

Purpose:

The primary purpose of this project was to evaluate a growing degree model as a predictor of spring canola development. Additionally the effect of row width on spring canola development, flowering, maturity and yield was evaluated and finally to collect air temperature data for use in modeling canola insect development.

Methods:

- Weather data would be collected from existing soil & crop volunteer weather monitors. New stations were established near row width & variety trials if there were no existing stations within reasonable proximity. Weather data was collected and analyzed centrally. Variety trials provided valuable information for determining if a GDD model is suitable for most/all varieties. Temperature data included high & low temperature from April (MAY at new locations in 2005) through to a killing frost in the fall.

- Five 5 – 10 row width trials were established throughout the main spring canola production area. Row widths included 19 and, 36 cm (7.5 and 14.5") (at a lower seeding rate/acre)

Results:

Canola planted in April to Early May produced excellent stands, but growth was retarded by cold weather that followed. An extremely long hot and dry period during June and July seriously impacted growth, yield and quality of spring canola. Yield and growth data was not collected at some sites because of the serious impact caused by the weather.

Row width trials: 4 locations were harvested, and results of these should be viewed with reservation due to the dry, hot weather. Canola in the 36cm (14") row width, took significantly longer to canopy over than the 18 cm (7") rows. All plots showed considerable moisture stress at flowering, and flower blasting was very evident. Variety and seeding rate varied by location. Except for one site, the seeding rate for 36 cm row width averaged 4.37 kg/ha (3.9 lbs/ac) vs. 6.0 kg/ha (5.3 lb/ac) for 16 cm (6") row widths. Final plant population in the 36 cm rows ranged from 45% to 90% of that in the 16 cm row width. Given the reduced canopy in 2005, this may have impacted final yield.

Figure 1: Arthur site: June 28. 16 cm row widths (left) vs. 36 cm row widths (right)

Figure 2. 36 cm row widths (left) vs. 16 cm row widths (right). Note greater branching in 36 cm row width.

Growing Degree Days (GDD): Weather and canola development data is included for 6 out of the 10 sites. Data from the other 4 sites was discarded due too, a malfunction in temperature recorder at two site, and poor emergence and growth at the other 3 sites. GDD data for 2005 supports GDD Model prediction research conducted in Western Canada. No data was collected for winter canola, due very dry soil conditions following planting which resulted in uneven and delayed emergence. The date of spring canola planting varied from April 19 – May 23rd. The flowering period was 1 to 2 weeks shorter than the normal 3 – 4 week period. Maturity occurred on average at 79 days in this year's trials compared to a typical 95 – 100 days.

Table 1. Average GDD Data from 2005 Sites

Canola Stage	GDD Literature	2005 Trials* GDD	Calendar Days
1 – 2 leaf stage	282 - 324	285	21
4-6 leaf stage	411 - 463	484	32
Bud – Early Flower	582 - 666	659	38
Late Flower	759 - 852	810	52
Maturity	1326 - 1445	1461	79

* Average of 6 locations

Summary:

The 2005 GDD data supports the literature. Additional years of data are required to verify accuracy of the model. No conclusions can be drawn from the row width trial, due to the extreme weather this past season, and until additional years of data are collected. Collecting plant population data allowed evaluation of using the 'hulla – hoop' method for stand counts.

Next Steps:

- Validate the GDD model for another season for spring and winter canola
- Conduct additional row width X seeding rate trials

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