Modeling Canola Phenology

C.F. Shaykewich and P.R. Bullock*

The Significance of Canola

The canola plant belongs to the *Brassica* genus (Canola Council of Canada 2016). In the history of agricultural crops, canola is relatively new. Researchers at Agriculture and Agri-Food Canada and the University of Manitoba developed *B. rapa* in the late 1970s as the first canola-quality crop cultivated in Canada, followed shortly by canola-quality *B. napus* (Gulden et al., 2008). Despite its recent origin, canola is now the world’s second largest oil crop at 10 to 15% of world oil crop production between marketing years 1999 to 2000 and 2008 to 2009 (USDA Economic Research Service, 2016). In 2010, China had a total production of 12.6 Mt, about one third of the global production (Wang et al., 2012). In 2014 to 2015, the European Union was the largest global canola producer at 33% of global production, followed by Canada at 22% and China at 20% (Gervais, 2015).

Canola seeds are 44% oil, more than double the oil content of soybeans, with high-protein meal produced from the other 56% of the canola seed (Canola Council of Canada, 2016). Although canola was originally developed from rapeseed, the two plants have very different nutritional profiles. To use the name “canola”, an oilseed plant must meet an internationally-regulated standard. “Seeds of the genus *Brassica* (*Brassica napus* L., *Brassica rapa* L., or *Brassica juncea* (L.) Czern.) from which the oil shall contain less than 2% erucic acid in its fatty acid profile and the solid component shall contain less than 30 µmol of any one or any mixture of 3-butenyl glucosinolate, 4-pentenyl glucosinolate, 2-hydroxy-3-butenyl glucosinolate, and 2-hydroxy-4-pentenyl glucosinolate per gram of air-dry, oil-free solid” (Canola Council of Canada, 2016).

Canola production occurs at higher latitudes in areas with dry weather and shorter growing seasons (USDA Economic Research Service, 2016). Winter varieties are seeded before the winter begins in Europe, Ukraine, Russia, and parts of China. In these areas temperatures do not get cold enough to kill overwintering plants, which emerge quickly in spring and produce a yield 20 to 30% larger than those in more southern, warmer locations.

Abbreviations: CD, calendar days; DB, days to bud; DEF, days from emergence to the commence of flowering; DTF, days from emergence to first flowering; DSE, days from sowing to emergence; DVS, development stages; E, emergence; ED, end of flowering; FF, first flower; FLN, final leaf number; GDD, growing degree day; LAR, leaf appearance rate; M, maturity; MF, physiological maturity; OF, onset of flowering; Pav, mean photoperiod in hours; PD, photothermal day; RMSD, root mean square deviation; SD, sowing date; Tb, base temperature; Tmax, max temperature; Topt1, lower optimum temperature; Topt2, upper optimum temperature.

Department of Soil Science, University of Manitoba, Winnipeg, MB R3T 2N2.

*Corresponding author (Paul.Bullock@umanitoba.ca)

doi:10.2134/agronmonogr60.2018.0003

© ASA, CSSA, and SSSA, 5585 Guilford Road, Madison, WI 53711, USA.