

Ag 101: Growing degree days

Your soil has a unique story

Temperatures affect the development of crops and pests and different crops require different exposure amounts of growing degree days (GDDs) to complete their life cycle. In Western Canada, GDDs are daily calculations that start in mid-April to early May and are cumulative as the season goes on.

GDD can help

- Estimate insect emergence in crops
- Know where crops are in their growth stage
- Determine the optimum time for crop scouting
- Assess the suitability of a region for production of a particular crop
- Predict maturity and cutting dates of forage crops
- Predict the best time to apply fertilizers or pesticides
- Estimate the heat stress on crops
- Plan the spacing of planting dates to produce separate harvest dates

How to calculate GDD

Formulas for calculating GDD appear complex but the concept is relatively simple:

$$\text{GDD} = [(\text{max daily temp} + \text{min daily temp}) / 2] - \text{base temperature}$$

GDD always uses a base temperature of 5 °C.

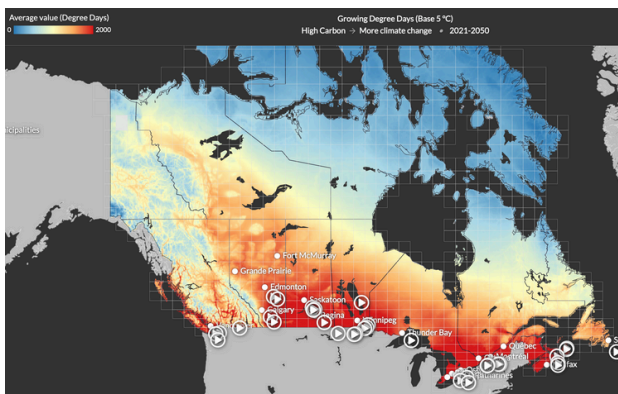



Image source: ClimateAtlas.ca

 Recommended Reading
[Effective Growing Degree Days](#)

Example: Wheat midge

- ✓ Base temperature is 5°C
- ✓ Females: 10% emergence at 660, 50% emergence by 800, and 90% emergence by 880 GDDs.
- ✓ Males: 10% emergence at 650, 50% emergence by 765, and 90% emergence by 850 GDDs

Example: Grasshopper

- ✓ Base temperature is 10°C. GDDs needed for 50% of population to reach stage:
 - Hatch: 325
 - Second instar: 414
 - Fourth instar: 614
 - Adult: 936

The following table shows the GDD requirements to reach physiological maturity of various crops using a base temperature of 5°C



Crop	GDD Requirements
HR Spring wheat	1,175
Barley	850
Oats	961
Argentine Canola	1,040
Polish Canola	850
Mustard	1,004
Flax	1,200



The GDD model considers temperature the greatest variable for crop production; however, soil moisture, soil type, precipitation, topography, evapotranspiration and local vegetation all impact crop growth and also need to be considered within the specific micro climate.