

# Growing degree days

<b>Focus questions</b>	What role does air temperature play in crop production?
<b>Vocabulary</b>	Growing degree units (GDUs)

## Background

Corn growth and development can vary according to corn maturity. An early-maturing product may produce fewer leaves or develop through growth stages faster than a slower-paced, late-maturing product.

Corn development is directly correlated with air temperature. Therefore, development varies from year to year if calendar days are only used to track progress. However, development becomes predictable within and across growing seasons when evaluated using thermal time (Growing Degree Units). The time required for corn to progress from one developmental stage to another is based on the amount of heat accumulated. Thermal time represents the length of time the crop spends within a defined temperature range considered optimum for that crop. For example, shoot emergence occurs when approximately 125 Growing Degree Units (GDUs) accumulate after emergence. The GDU calculation assumes that corn development is consistent and linear within the defined temperature range of 50–86°F. For more information visit [Corn Growth Stages and Growing Degree Units: dekalbasgrowdeltapine.com/en-us/agronomy/corn-growth-stages-and-growing-degree-units.html](http://dekalbasgrowdeltapine.com/en-us/agronomy/corn-growth-stages-and-growing-degree-units.html)

## Instructions

1. Research the local average number of Growing Degree Units (GDUs) for crop production. How does this number compare across the state? Do all areas of the state have the same number of days?
  
2. Pick a corn variety based upon its genetic maturity in Growing Degree Units for your home county.

Corn variety maturity	GDUs
<b>Early:</b> 85–100 days	2100–2400
<b>Mid:</b> 101–130	2400–2800
<b>Late:</b> 131–145	2400–3200
<b>Choice:</b>	

3. Access the Growing Degree Unit calculator at: [nutrien-ekonomics.com/tools-to-calculate-fertilizer-needs/calculators/gdd/](https://nutrien-ekonomics.com/tools-to-calculate-fertilizer-needs/calculators/gdd/) to determine the number of accrued degree units for the test plot in question.
  4. Enter the following information on the webpage:
    - Location
    - Choose your crop
    - Start date: May 15, 2019
    - End date: July 4, 2019
  5. Hit "Calculate."
  6. Use the growth stage chart to determine the approximate growth stage for the corn plant based upon your calculated GDUs for your current time in your local zone.
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7. Observe your corn plant and compare/contrast your calculated GDUs to your analysis of the plant's current growth stage from the dissection lab in Lesson 2. How do they compare?

#### **Equation and method**

$$\text{GDD} = [(T_{\text{max}} + T_{\text{min}} / 2) - 50$$

GDUs are calculated from VE (emergence) and not the planting date. See the example below:

- Day 1: high 80°F, low 55°F
- Day 2: high 66°F, low 40°F  
(change 40°F to 50°F in the calculation)
- Day 3: high 92°F, low 72°F  
(change 92°F to 86°F in the calculation)

#### **Calculations**

$$\text{Day 1: } (80 + 55 / 2) - 50 = 17.5 \text{ GDUs}$$

$$\text{Day 2: } (66 + 50 / 2) - 50 = 8 \text{ GDUs}$$

$$\text{Day 3: } (86 + 72 / 2) - 50 = 29 \text{ GDUs}$$

$$17.5 + 8 + 29 = 55 \text{ GDUs}$$

8. What environmental factors can impact the development of corn regardless of growth degree units?
9. What is the correct variety selection for your local area? **Create an explanation** based upon the knowledge you have gained in this unit.

### Rubric for self-assessment

Skill	Yes	No	Unsure
I can identify the GDUs necessary for a corn to reach maturity in my area.			
I can explain what a GDU is.			
I can select the appropriate corn hybrid variety for my location.			