

Degree Day Heat Units

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Degree-day heat units were developed as a tool to measure the heat units that drive plant growth and development. It is a more accurate method of determining plant growth stages versus a regular calendar because it considers the seasonal weather records.

Each crop has a unique lower and upper air temperature threshold. It is assumed that no growth occurs outside of this range. The temperature range will be lower for cool season crops and higher for those needing more heat for growth.

Degree-day heat units are calculated for each day and the daily units added together to give a degree-day accumulation from a start date. For crops other than alfalfa, the start date will be the planting date. Default planting dates and upper and lower thresholds are listed in the table below.

Crop	Default Planting Date	Lower Temperature Threshold	Upper Temperature Threshold
Alfalfa	February 15	41°F (5°C)	86°F (30°C)
Corn	March 20	50°F (10°C)	86°F (30°C)
Cotton	May 10	60°F (15.6°C)	100°F (37.8°C)
Grass Hay	March 1	50°F (10°C)	86°F (30°C)
Peanut	May 10	55°F (12.8°C)	95°F (35°C)
Sesame	May 20	50°F (10°C)	100°F (37.8°C)
Sorghum	May 1	55°F (12.8°C)	95°F (35°C)
Soybean (single crop)	April 10	50°F (10°C)	95°F (35°C)
Soybean (double crop)	June 10	50°F (10°C)	95°F (35°C)
Wheat	October 1	32°F (0°C)	86°F (30°C)

The Oklahoma Mesonet used the “Cutoff Method” to calculate degree-day values, based on the following formula:

$$\text{Degree-days} = (\text{Maximum Daily Air Temp} + \text{Minimum Daily Air Temp}) / 2 - \text{Base Temp}$$

When the maximum daily air temperature is above a crops’ upper temperature threshold, the maximum daily air temperature is set to the upper temperature threshold. When the degree-day value is negative, the degree-day value is set to zero.

The degree-day heat unit calculator for the Hinton site is shown on the back. Once you select a crop, the default planting date will adjust accordingly. Producers always have the ability to insert a start date that is more appropriate for their unique situation.

Degree-day Heat Unit Calculator

Site *
 x

Crop *

Start date *

End date *

Crop
 Alfalfa
 Corn
 Cotton
 Peanut
 Sorghum
 Soybean
 Wheat

The following table shows the degree days for cotton planted on May 15th, 2022, at Hinton. The navigation buttons allow the user to move throughout larger data sets. The save/print buttons create a PDF file for recordkeeping purposes.

Save Print

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Degree-day Heat Units for Cotton at Hinton, lower threshold 60°F and upper threshold 100°F			
Date/Time (CST)	Number of Days	Daily Degree-day Heat Units	Season-long Degree-day Heat Units
5/15/2022	1	18.3	18.3
5/16/2022	2	10.6	28.9
5/17/2022	3	21.2	50.1
5/18/2022	4	21.8	71.9
5/19/2022	5	19.6	91.5
5/20/2022	6	13.2	104.7
5/21/2022	7	0.1	104.8
5/22/2022	8	0.0	104.8
5/23/2022	9	0.0	104.8

For wheat, an additional column is shown. The Wheat Growth Day Counter (number of days GDD > 0) shows the number of days when wheat degree-day heat units were positive from a user specified planting date. This data is used to make nitrogen fertilizer recommendations utilizing GreenSeeker® technology. For more information read [OSU Nitrogen Use Efficiency](https://nue.okstate.edu/) - <https://nue.okstate.edu/>.

Degree-day Heat Units for Wheat at Hinton, lower threshold 40°F and upper threshold 86°F			
Date/Time (CST)	Growth Days Above 0	Daily Degree-day Heat Units	Season-long Degree-day Heat Units
10/1/2022	1	29.7	29.7
10/2/2022	2	26.5	56.2
10/3/2022	3	26.6	82.8
10/4/2022	4	28.6	111.4
10/5/2022	5	31.1	142.5
10/6/2022	6	32.3	174.8
10/7/2022	7	19.1	193.9

References: [Degree-days and Phenology Models](https://ipm.ucanr.edu/weather/ddconcepts.html), University of California, Statewide Integrated Pest Management Program - <https://ipm.ucanr.edu/weather/ddconcepts.html>.

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