

Growing Degree Days



Utilizing Growing Degree Days (GDD) for Herbicide Timing

Improve weed control and reduce costs utilizing GDD for timing herbicide applications.

Weeds emerge every year in sugarbeet fields. The time of weed emergence and the rate of weed growth are dependent on temperature and soil moisture.

Weeds must be controlled in sugarbeets when they are very small (less than one inch high). With the post-emergence micro-rate program, growers apply reduced rates of herbicides + methylated seed oil each time weeds reach ¼ - ½" high. According to the herbicide labels, the timing of micro-rate herbicide applications in sugarbeets should be every five to seven days following the first application. This spray schedule does not account for cool weather conditions when weeds and sugarbeets are either not growing or are growing very slowly.

During these cool periods, the time required for weeds to reach the cotyledon growth stage may be two weeks or longer. Therefore, when growers spray in these cool conditions on a seven-day schedule, herbicide application may not be necessary and can result in sugarbeet injury and wasted money. Furthermore, if the timing of micro-rates is not optimized, weeds can escape and cause future problems.

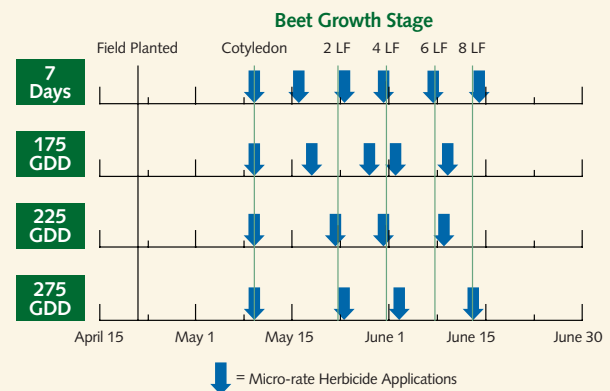
A Better Alternative

Utilizing growing degree days (GDD) may be a better alternative for timing post-emergent micro-rates. For most plants, physical development is strongly related to the accumulation of heat or temperature units above a threshold below which little growth occurs. Although temperature is the most important factor controlling the rate of plant development, other factors such as water and light availability and day-length may modify its effects.

Sugarbeet Growing Degree Day Calculation:

- Growing degree days (GDD) are calculated by subtracting the plant's minimum threshold temperature from the average daily air temperature
- Daily sugarbeet GDD (°F) = ((Daily Max Temp °F + Daily Min Temp °F) / 2) - 34°F
- A minimum threshold temperature of 34°F and an upper threshold temperature of 86°F are used for sugarbeets

Herbicide Applications Using Different Timing Regimes Perley NDAWN 2003

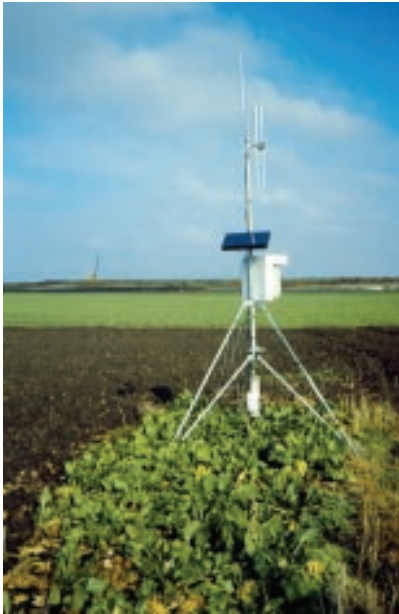


Utilizing GDD for determining post-emergent spray intervals may reduce the number of applications and associated costs. This example compares the recommended seven-day micro-rate spray interval with different GDD regimes and the total number of applications needed for season-long weed control.



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Guidelines for Utilizing GDD for Timing Post-sugarbeet Herbicides

- The first POST herbicide treatment should be applied when weeds are in the cotyledon to early two-leaf growth stage
- The number of GDD between applications can be adjusted for various situations

Examples of Recommended GDD Intervals:

175 GDD

- Utilize between applications of the micro-rate with dry soil conditions and/or high weed densities
- ALS-resistant kochia control with the micro-rate may be less than adequate even when the 175 GDD interval is used
- **Do not** use 175 GDD for POST **conventional** rates (except for a bad kochia problem) or for fields treated with a soil-applied herbicide

225 GDD

- Utilize between applications of conventional rate treatments with average soil moisture
- Use 225 GDD between micro-rate applications with good to excellent soil moisture or micro-rate applications over a soil-applied herbicide treatment for an average weed population

275 GDD

- Utilize between applications of conventional rate treatments with good to excellent soil moisture
- Use 275 GDD for the micro-rate over a soil-applied herbicide with weeds that are not difficult to control
- **Do not use 275 GDD for kochia control**

Avoid applying POST sugarbeet herbicides the day before a frost. Herbicides applied 12 to 24 hours after the frost will cause less sugarbeet injury than herbicides applied 12 to 24 hours before the frost.

Sugarbeet injury from POST conventional herbicides can be reduced by starting application at 4:00 pm or later. Severe sugarbeet injury is most likely immediately after a weather change from cool and cloudy to hot and sunny. Conventional rates cause more sugarbeet injury than micro-rates and fields treated with a soil-applied herbicide may have more injury from POST herbicides.

For additional information contact your agriculturist or extension specialists. See the Sugarbeet Research and Extension Reports book of 1996 and 2004. Also see Ag Notes #469, April 28, 2005.

Web site:
www.crystalsugar.com

