Corn By Degree (Days)

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nies use and provide GDDs with other data about varieties they offer, though historically the "relative days to maturity" have been the mainstay of farmers.

But days to maturity is not a very good help to predicting when a plant variety will actually reach that stage.

Using GDD estimates can narrow down maturity very closely, without having to go the field every other day to check for other plant indicators of maturity.

Starting at 50 degrees Fahrenheit — the bottom threshold temperature for corn activity — the accumulated amount of energy usable by a plant to achieve certain stages of maturity, including maturity, can be followed during the year to help predict field work requirements for optimum harvest.

GDDs can also be used as a general indicator of which varieties of corn (and other crops that have been shown to have growth changes that closely correlate to GDD) may be most suitable for a specific location, harvest window, and use.

Dr. Greg Roth, a Penn State Extension agronomy specialist, stated in a several-year-old Extension publication, "Hybrid maturities for corn are rated either by a 'days to maturity' system or by a 'growing degree day' system."

That publication, "Latest Planting Dates For Corn Hybrids In Pennsylvania," referred to the last possible dates in the year for planting a corn variety so that it would mature before frost.

It discusses GDDs and the formula for calculating them.

A farmer who knows his daily high and low temperatures can calcualte the GDDs on his farm, track and anticipate the growth of plants.

"The days to maturity system is a relative measurement of hybrid maturity and is based on the grain moisture content of hybrids at harvest compared with check hybrids," Roth wrote.

"For example, under similar conditions, a 75-day hybrid will generally have a lower grain moisture content at harvest than a 100-day hybrid.

"The days to maturity expressed in these ratings do not actually represent the number of days needed for a hybrid to mature, since a 100-day hybrid may require 95 days to mature in a warm season and 115 days in a cool season."

With GDDs, if it requires 2,450 GDDs to attain maturity, that doesn't change, regardless of cool or warm season.

In fact, by using GDDs, a grower can know fairly well what kind of season he is experiencing while it is happening, not a month or more later.

Though the information about GDD has been around for years, its use has not been that great. Voight wants to change that because he said he believes those who use them can better plan optimum times for harvest and also because they can be used to predict insect emergences.

Two weeks ago Voight said that some of the corn in test plots he was involved in planting this spring should start tasselling this week.

At the time, with unseasonably high and dry weather, with corn leaves curled tightly and brown bottom leaves, and with plants stunted and looking about ready to die instead of advancing into a reproductive stage, his prediction based on GDD seemed as though he was putting too much reliance on an estimate.

Perhaps with the long cool spring/summer seasons, and the heat only picking up relatively recently, it didn't seem as though corn was developing to have much maturation.

He made the prediction and it came through.

What it means is that for dairy producers who need to build up feed stocks for their herd, there is a lot of short corn and silage and grain production should be cut dramatically from last year.

While corn prices are currently relatively low, several people this week suggested that dairy producers may want to purchase grain needs now in advance of any price increases, in order to cover their shortness in home-grown feed.

But what Voight's come-true prediction also means is that using GDDs actually works well, much better than days to maturity in narrowing down when things will happen with the plants.

Corn growers who haven't been in their fields in the area should also be interested to know that corn rootworm beetles have infested many fields, and their emergence and activities can also be tracked and predicted using GDDs.

As more and more research is done to correlate GDDs with plant and insect activities, the ability to monitor them at home should help farmers better plan their activities.

The publication that Roth helped to author was mostly concerned with helping farmers figure out which corn hybrids would fit in their fields so as to reduce the risk of frost-kill before maturity.

Color-coded maps of Pennsylvania are included in the publication that correlate colors to weeks in the spring during which a hybrid could be planted with only a 25-percent chance of frost before maturity.

If the weeks when frost kill historically hits a farm field can be determined, and a farmer has access to historic daily temperature variations for his area, he can calculate GDDs for his farm fields and what varieties will mature before frost.

The formula for determining GDD is simple: the daily high temperature is added to the daily low temperature and divided by two; 50 is then subtracted from that number.

"50" is used in the equation because at 50 degrees, corn plants are basically dormant. Any temperature below 50 is considered effectively to be 50.

Likewise, a corn plant generally doesn't grow any faster at temperatures above 86 degrees, so for any recorded daily high temperatures above 86 should be considered as 86 degrees in the equation.

GDDs are cumulative.

For accumulation of growing degree days for corn, 50 or less would equal zero accumulation. Likewise 86 or above would equal 86.

In the seed company literature, the GDDs are generally reported along with the relative days to maturity. For most varieties of 85 days to 120 days, the GDD is usually above 2,000 and less than 2,800.

Some are very close in terms of relative days, but the decision of whether to harvest or not to harvest on a specific day can be determined if GDDs are tracked.

Voight's prediction of tasselling

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Delbert Voight, Lebanon County Extension agronomy agent, stands in between corn variety test rows to show the difference in growth and response to growing degree days. Based on his recording of growing degree days for the area, he is able to predict within a day or so when certain stages of growth should occur. By tracking GDDs, and knowing the research determined levels for physiological changes, as well as following the weather reports, he was able to predict about two weeks in advance about what day the corn would be in tassel. By continuing to collect and record GDDs, he will be able to predict maturity of corn for harvesting. The pratical application of using GDDs as a farm management tool is that it can significantly help plan work, and provide a better sense of control over activities on the farm.

From the left, Del Voight, Lebanon County Extension agronomy agent, shows a corn rootworm beetle to farm owner Tom Krall, and how to determine the difference in sexes. By using growing degree days, it is possible to predict insect activity for better anticipation and preparation for control.