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Corn silage harvest timing: Not all growing degree days are created equal

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Corn silage harvest timing has important implications on both the yield and forage quality of the crop as a livestock feed.

In a study conducted as part of the New York Vermont Corn Silage Hybrid Evaluation Program, the same four hybrids (planted in replicate on the same date) were harvested one week apart. In this seven-day difference in harvest date, whole plant dry matter (DM) went from 32.4 percent to 37.2 percent nearly bookending the DM range of 32 to 38 percent typically referenced as the target for corn silage harvest.

The overall yield trended higher going from 20.4 tons/acre to 23.1 tons/acre, when adjusted to 35 percent DM. A significant amount of this yield increase is a result of the maturation of the kernels with more of the kernel milk converting into starch as reflected in the 4.2 percent increase in starch content. As anticipated, the changes to fiber digestibility were not significant with this one-week delay in harvest. Starch digestibility was not measured in this study and while it is understood starch digestibility can decline as the corn kernel nears black layer (physiological maturity), any level of decline is expected to remain minimal in the target DM range. While the rate of change in DM, yield, and starch content observed in this specific project may not be realized in every situation, it demonstrates the achievable gains by allowing the crop to reach a greater DM at harvest. See this factsheet on Corn Plant Dry Down for more details.

Growing Degree Days (GDD's) remain one the best tools available for tracking corn progress and predicting approximate harvest timing, see Using the Number of Growing Degree Days from the Tassel/Silking Date to Predict Corn Silage Harvest Date. The use of an official weather station, where temperatures are taken by a standardize method is strongly encouraged. The Climate Smart Farming GDD Calculator is one good option.

While GDD's are a good option, when determining corn silage harvest timing it is important to recognize that other environmental factors also play a role in the plants progress and confirming plant development stage by checking fields and taking whole plant dry matter samples remains critical to properly timing harvest.

The plant can experience stress both pre- and post-tasseling that can impact how well it is able to utilize available GDD's. Different hybrids may respond slightly differently to these stressors but looking at the mean plot data for field locations in the New York Vermont Corn Silage Hybrid Evaluation Program provides some insight into what can occur. In these trials the same set of hybrids is planted at three different locations in the same growing season.

In **Figure 1** the green bars represent the GDD accumulation from planting to harvest at each field location over four growing seasons from 2017 to 2020. The blue dots represent the average whole plant dry matter (DM) at harvest for the common set of hybrids planted at each location. The area within the orange and yellow lines represents the range in GDD's expected to be needed (from planting) for hybrids of this relative maturity range to reach the proper stage for silage harvest. In general, 2017 and 2019 represent growing seasons with less GDD accumulation compared to 2018 and 2020.

In some cases, weather conditions forced harvest to occur prior to desired timing and this is reflected in both the GDD and DM data for the Madrid and Aurora locations in 2019 and 2017 respectively (**Figure 1**). What is of more interest is a site year such as Aurora 2019 which just meant the minimum for expected GDD's needed but resulted in a plot mean DM of 34.7 percent. This indicates that other stressors were minimal, and the crop was able to take full advantage of the available GDD's.

In contract, the Madrid location in 2018 and 2020 as well as the Alburgh location in 2018 had GDD accumulation near the maximum of what we expect the crop to need but the resulting plot mean DM's were equivalent to or below other location-years with significantly less GDD accumulation suggesting that other factors prevented the plants from developing at the expected pace in relations to GDD accumulation. Notable for these locations in both 2018 and 2020 was abnormally dry to drought conditions early in the season followed by timely and adequate rainfall post-tasseling. Observational data on corn plant progress in these scenarios suggest that the plants at these locations were unable to fully capitalize on the early season GDD's due to moisture stress; however, they did benefit from the moisture received later in the season which allowed them to improve overall performance for the season but resulted in the need for a prolong maturation period to reach its potential.

While rainfall was more regionally variable in 2021, many areas saw similar patterns of abnormally dry conditions early in the season followed by adequate (to excessive) rainfall post-tasseling. This would suggest that harvest of a high performing crop at the proper stage of maturity could be realized but patience will be needed to allow for the extra GDD's necessary for the crop to reach this potential. If this is the case, making harvest decisions based on GDD accumulation alone (without regard for actual plant progress) is likely to result in harvest occurring too early causing depressed yield and forage quality typical of corn silage harvested too wet.

Monitoring Corn Silage Progress for Harvest Decisions

1. Use GDD accumulation to roughly estimate harvest timing
    - Planting to harvest – rough estimate
    - Tasseling to harvest – more refined, still needs to be verified with further steps.
2. Walk fields, check kernel development, plant health (greenness or lack of) can be deceiving.
    - In some cases, green healthy plants can be much drier than they appear. See FACT SHEET 5: Corn Plant Dry Down
    - In contrast, Leaf Diseases and other damage can make the plant appear drier than it is.

- Severe leaf damage can limit photosynthesis and actually slow the drying process.

3. Take whole plant DM samples for final decision
    - Newer handheld NIR tools for determining DM of a chopped sample can be useful but proper calibration is critical and physically dry a sample is still a good way to double check.
    - See Sampling for Moisture Content in Corn Silage Fields

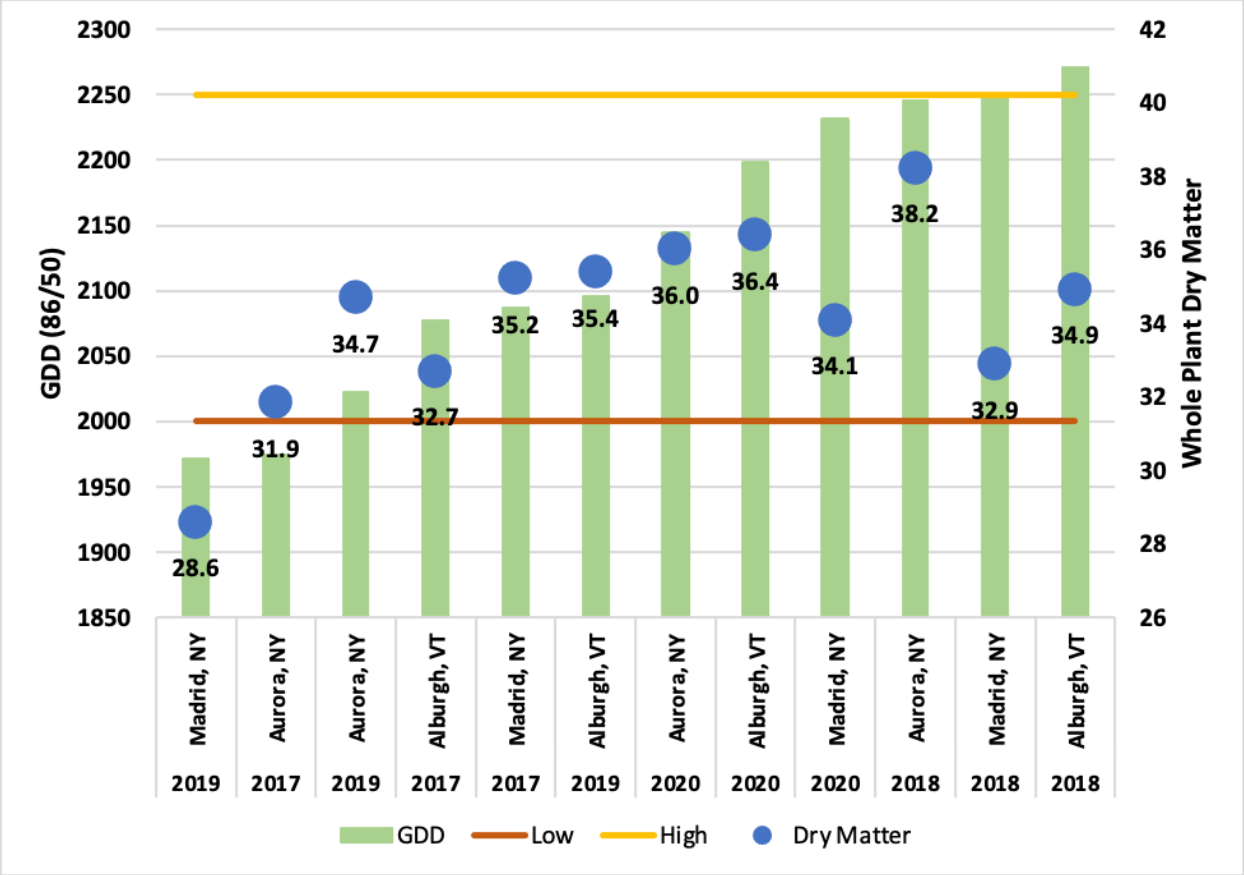

FIGURE 1: Growing Degree Day and Whole Plant Dry Matter Data from four years of the NY VT Corn Silage Hybrid Evaluation Program