New Mexico Chile Association ♦ Report 32

New Mexico Chile Association

Crop Growth and Development for Irrigated Chile (*Capsicum annuum*)

College of Agricultural, Consumer and Environmental Sciences
Cooperative Extension Service • Agricultural Experiment Station

In January 2006, the New Mexico Chile Association (NMCA) accepted the role of what was formerly the New Mexico State University (NMSU) Chile Task Force. The NMCA is a non-profit organization composed of processors and farmers whose mission is "To create an environment in the New Mexico region that reinstates us as the world leader in chile production, processing and innovation." The NMCA continues to work closely with NMSU. Indeed, this partnership is key to their success.

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Crop Growth and Development for Irrigated Chile (*Capsicum annuum*)

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Crop Phenology

Plants vary tremendously in their physiological behavior over the course of their life cycles. As plants change physiologically and morphologically through their various stages of growth, water and nutritional requirements will change considerably as well. Efficient management of a crop requires an understanding of the relationship between morphological and physiological changes that are taking place and the corresponding input requirements.

Heat units (HUs) can be used as a management tool for more efficient timing of irrigation and nutrient inputs to a crop. The thermal environment affects the development of all crop systems, including chiles (*Capsicum annuum*). Plants will develop over a range of temperatures, which is defined by the lower and upper temperature thresholds for growth (Figure 1). Heat unit systems take into account the elapsed time that local temperatures fall within the set upper and lower temperature thresholds, and thereby provide an estimate of the expected rate of development for the crop. Heat unit systems have largely replaced days after planting in crop phenology models because they take into account day-to-day fluctuations in temperature. Phenology models describe how crop growth and development are affected by weather and climate and provide an effective way to standardize crop growth and development among different years and across many locations (Baskerville and Emin, 1969; Brown, 1989).

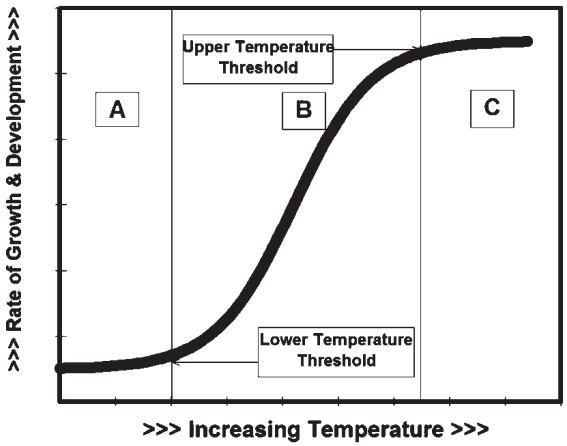

Figure 1. Typical relationship between the rate of plant growth and development and temperature. Growth and development cease when temperatures decline below the lower temperature threshold (A) or increase above the upper temperature threshold (C). Growth and development increase rapidly when temperatures fall between the lower and upper temperature thresholds (B).

The first step in developing a phenological guideline for chiles is to look for critical stages of growth in relation to HU accumulation. Figure 2 describes the basic phenological baseline for New Mexico-type chile, which was developed from field studies conducted in New Mexico and Arizona between 2003 and 2010. Use of HUs to predict chile development is considered superior to using days after planting due to the simple fact that the crop responds to

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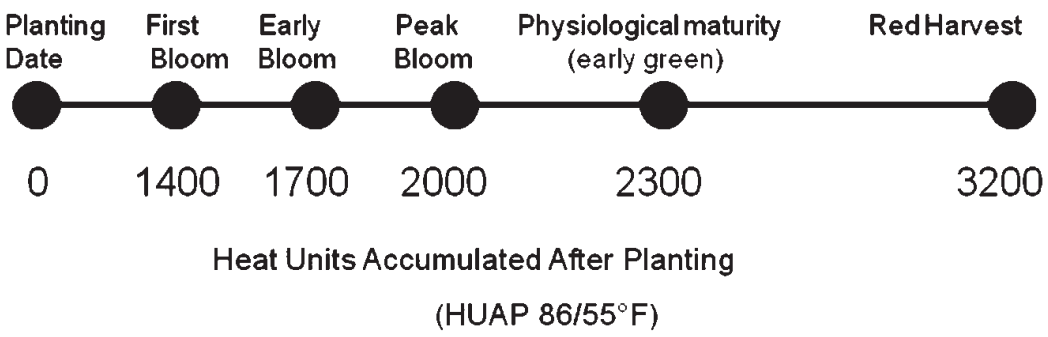

Figure 2. Basic phenological guideline for irrigated New Mexico-type chiles.

environmental conditions and not calendar days. This approach, using phenological timelines or baselines, works best for irrigated conditions where crop vigor and environmental growth conditions are more consistent than in non-irrigated or dryland situations where irregularity in year-to-year rainfall patterns can alter growth and development patterns significantly.

Phenological guidelines can be used to identify or predict important stages of crop development that affect physiological requirements. For example, a phenological guideline can help identify stages of growth in relation to crop water use (consumptive use) and nutrient uptake patterns. This information allows growers to improve the timing of water and nutrient inputs to improve production efficiency. For some crops or production situations, HU-based phenological guidelines can be used to project critical dates such as harvest or crop termination. Many other applications related to crop management (e.g., pest management) can be derived from a better understanding of crop growth and development patterns.

References

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Brown, P.W. 1989. *Heat units* [Bull. 8915]. Tucson: University of Arizona Cooperative Extension.

NM Chile Task Force/NM Chile Association Publication List

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Report 2: Chile Seed Germination as Affected by Temperature and Salinity

Report 3: Yield and Quality of Machine-Harvested Red Chile Peppers

Report 4: Chile Seed Quality

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