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Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants, and Extension Personnel

Department of Entomology
239 West Waters Hall
K-State Research and Extension
Manhattan, KS 66506-4027

Tel: 785-532-5891
Fax: 785-532-6258



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A TOOL FOR HELPING TO DETERMINE THE ONSET OF INSECT AND MITE PEST ACTIVITIES

Phenology is the branch of science dealing with synchronized relationships between different recurring biological entities as regulated by climatological factors such as temperature, moisture and day length. Easily observed plant phenological events (commonly, bud stages, bloom stages, leafing out) are correlated with Growing Degree-Days (GDD's). More difficult-to-observe events (such as the hatching of insect eggs) can be correlated with the aforementioned "easily observed" stages of plant development.

Growing Degree-Days for a 24 hour period are determined by averaging the daily high and low temperatures, and then subtracting a "threshold temperature". Because the development of most insects and mites is limited below 50°F, 50°F is commonly used as the base temperature for GDD calculations. Example: the official 2/21/2007 high and low temperatures for Manhattan, KS, were 63.5°F and 27.3°F, respectively. Thus the daily average temperature was only 45.4°F ---- below the 50°F base temperature. Despite the high daytime temperature which would have seemingly favored egg development, there were no accumulated GDD's.

Bear in mind two important facts: (1) Because phenological indicators merely are guidelines, close inspections of individual sites are required to determine if, in fact, specific pest species are present, as well as their current life stage; (2) Specific insect developmental stages do not occur at a specific GDD number, but rather within a range of GDD's

A widely recognized reference devoted to phenological events is Donald A. Orton's, Coincide: The Orton System of Pest Management. The following table lists GDD ranges (of some insect pests) per the Orton's reference:

<u>PEST</u>	<u>Generation 1</u>	<u>Additional Generation</u>
European pine sawfly	100-200	
Eastern tent caterpillar	100-200	
European elm scale	100-200	900-1200
Juniper webworm	100-200	2700-2900
Spruce spider mite	100-200	2900-3100
Scurfy scale	200-300	1300-1500
Honeysuckle aphid	200-300	
Pine needle scale	200-350	1600-1700
Ash/lilac borer	275-500	
Oystershell scale	275-500	1600-1700
Elm leaf beetle	400-600	
Bronze birch borer	400-600	
Peach tree borer	500-600	
Flatheaded apple tree borer	500-600	
Euonymus scale	500-700	
Bagworm	700-800	
Mimosa webworm	900-1200	1800-2100
San Jose scale	800-900	
Two-spotted spider mite	900-1100	2100-2200
Lecanium scale	900-1200	

Some people may opt to use indicator plants as a basis for determining the onset of pest activities, while others may choose to utilize GDD's as the tool to determine the onset of pest activities. If selecting the latter, be aware that daily calculations are required to accurately determine accumulated GDD's. Maximum-Minimum thermometers can be used for gathering daily temperature extremes. Or, use the internet to access Kansas State University Research and Extension's weather data web site:

<http://oznet.ksu.edu/wdl/>

Click on the **Kansas Weather & ET Data** toolbar. Click on a **weather station site**. Select the data sets you desire (**Max/Min** for temperatures). Click on **Submit query**. If you are missing Max/Min temperature data for previous dates, information can be retrieved by entering those dates for which data is missing.

Because it is unlikely that GDD's are generated during the typically cool/cold months of January and February, March 1 typically is used as a starting point for recording GDD for a new calendar year.

Sincerely,

Robert J. Bauernfeind
Extension Specialist
Horticultural Entomology