

A close-up photograph of a pink flower with a small green insect on its center. The flower has many pink petals and a dark brown center with yellow stamens. The insect is small and green, with transparent wings, and is positioned on the center of the flower. The background is dark and out of focus.

# Phenology: Nature's Calendar

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**OSU Extension**





Phenology: not the bumps on your head...

- The study of recurring biological events....
- Natural events and their relationship to weather....
- The study of cyclic events of nature in response to seasonal and climatic changes in the environment
- The sequence of natural events through the season....



**Key Premise:**  
**Development rate  
of plants and  
insects is  
temperature  
dependent.**

# Degree Day Overview



Daily temperature readings can be used to calculate growing degree-days, which is a measure of accumulated heat.

$$\text{Avg. daily temp} - 50\text{F} = \text{DD}$$

# Degree Day Example

**March 6**

**High of 60, low of 40**

- **Base temp is 50**
- **$60 + 40 = 100$**
- **$100/2 = 50$**
- **$50 - 50 = 0$  DD**

# Degree Day Example

**March 6**

**High of 60, low of 40**

- **Base temp is 50**
- **$60 + 50 = 110$**
- **$110/2 = 55$**
- **$55 - 50 = 5$  DD**

**March 7**

**High of 70, low of 50**

- **$70 + 50 = 120$**
- **$120/2 = 60$**
- **$60 - 50 = 10$ DD**

**Add yesterday's units,  
gives us a running total  
of 15 DD**

# Google: GDD OSU

Degree Day Phenological Calendar - Windows Internet Explorer

OSU OARDC http://www.oardc.ohio-state.edu/gdd/

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Go osu high tunnels Bookmarks 0 blocked Check AutoLink AutoFill Send to osu

white flies honeydew r... OSU OARDC Growing Degree Da... GoalSearch.com - Infor... AT&T Yahoo!

## Growing Degree Days and Phenology for Ohio



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### PHENOLOGICAL CALENDAR

Enter your zip code and obtain a daily calendar of all the phenological events occurring in your area.

Please enter your 5-digit Ohio zip code and a date and the cumulative GDD for that date will be calculated.













Zip Code:

Date:

Development of this website was funded by the USDA CSREES through the North Central IPM Grants Program. Phenological data was obtained from research by [Dan Herms](#) & John Cardina, and web site development was managed by David Lohnes.





MASSILLON		0	
Silver Maple	first bloom	34	F P P
Corneliancherry Dogwood	first bloom	40	  F F
Silver Maple	full bloom	42	F P P
Red Maple	first bloom	44	 F P P
Speckled Alder	first bloom	52	F F
Northern Lights Forsythia	first bloom	58	F
Japanese Pieris	first bloom	60	F F
Red Maple	full bloom	75	 F P
Star Magnolia	first bloom	83	 P P F
<b>White Pine Weevil</b>	adult emergence	84	F
Border Forsythia	first bloom	86	 F F
<b>Eastern Tent Caterpillar</b>	egg hatch	92	   F
Manchu Cherry	first bloom	93	F F
Northern Lights Forsythia	full bloom	94	F
Speckled Alder	full bloom	97	F F
Corneliancherry Dogwood	full bloom	98	  F F
Norway Maple	first bloom	116	F M
Border Forsythia	full bloom	116	 F F
Chanticleer Callery Pear	first bloom	123	F F F
Sargent Cherry	first bloom	127	F F
Larch Casebearer	egg hatch	128	F
Japanese Pieris	full bloom	129	F F

Red Horsechestnut	full bloom	440	 
<b>Boxwood Leafminer</b>	adult emergence	440	
Doublefile Viburnum	full bloom	444	 
Bush Cinquefoil	first bloom	444	 
Snowmound Nippon Spirea	first bloom	445	 
Red Prince Weigela	first bloom	446	 
Pink Princess Weigela	full bloom	446	
Redosier Dogwood	full bloom	448	
Scarlet Firethorn	first bloom	459	 
<b>Species</b>	<b>Event</b>	<b>Growing Degree Days</b>	<b>Link</b>
<b>MASSILLON</b>		<b>467</b>	
Black Locust	first bloom	467	  
Ohio Pioneer Thicket Hawthorn	full bloom	470	
Red Buckeye	full bloom	471	 
Common Ninebark	first bloom	478	 
Pagoda Dogwood	full bloom	479	
Umbrella Magnolia	full bloom	480	 
Sweet Mockorange	first bloom	482	  
<b>Oystershell Scale</b>	egg hatch	497	   
Miss Kim Manchurian Lilac	full bloom	498	   
Smokebush	first bloom	501	   
Catawba Rhododendron	full bloom	503	  

Twospotted Spider Mite	egg hatch	627	F M
Bagworm	egg hatch	630	M M
Washington Hawthorn	first bloom	635	F  
American Holly	full bloom	642	M 
Multiflora Rose	full bloom	643	F F 
Northern Catalpa	first bloom	675	F
Species	Event	Growing Degree Days	Link
<b>GLENDALE</b>		<b>702</b>	
American Elder	first bloom	707	F M
Sweet Mockorange	full bloom	717	 F F
Red Prince Weigela	full bloom	727	 F
Fuzzy Deutzia	first bloom	727	F
<b>Fletcher Scale</b>	egg hatch - 1st generation	730	F
Washington Hawthorn	full bloom	731	F  
<b>Calico Scale</b>	egg hatch	748	F   M
<b>European Fruit Lecanium Scale</b>	egg hatch	767	 M
<b>Greater Peach Tree Borer</b>	adult emergence	775	F
<b>Striped Pine Scale</b>	egg hatch	783	
Winterberry Holly	first bloom	794	F
Japanese Tree Lilac	full bloom	808	F  
<b>Rhododendron Borer</b>	adult emergence	815	   F F
Northern Catalpa	full bloom	816	F



Since plant development is temperature-dependent, phenological events of plants can also be used to track degree-days...

...and create a **biological calendar** to predict pest activity and schedule pest management appointments.



Gaylord Desurmont



Gaylord Desurmont



# Key Phenological Events



**First bloom:** date first flower on the plant opens to reveal pistils and / or stamens.



**Full bloom:** date 95% of flowers have opened (1 out of 20 buds remains closed).

## Growing Degree Days and Phenology for Ohio



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Red maple, *Acer rubrum*





# Corneliancherry dogwood, *Cornus mas*



Star Magnolia, *Magnolia stellata*



Border Forsythia,  
*Forsythia x intermedia*



# Eastern tent caterpillar egg hatch



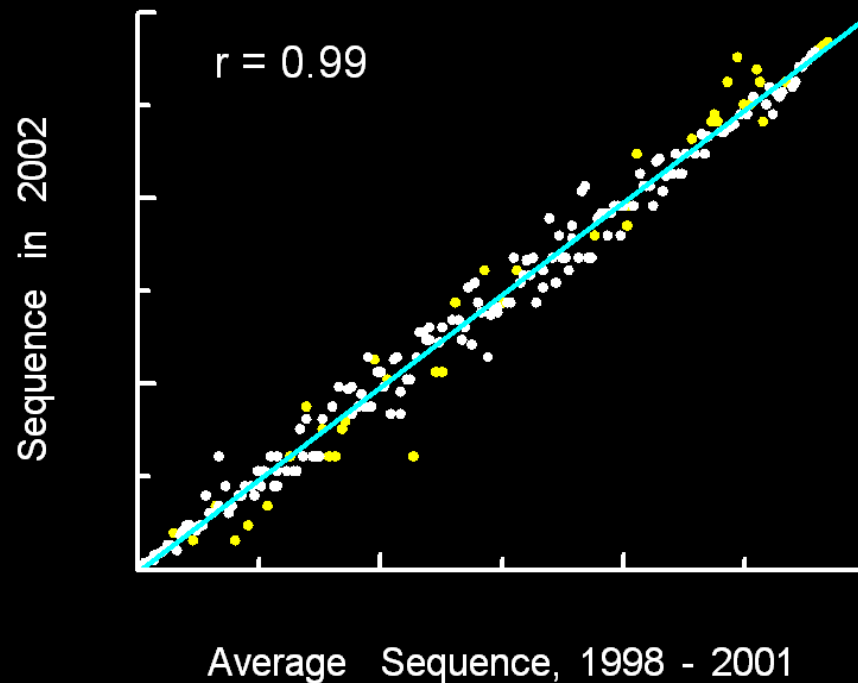


Littleleaf Linden, *Tilia cordata*

# Japanese beetle adult emergence

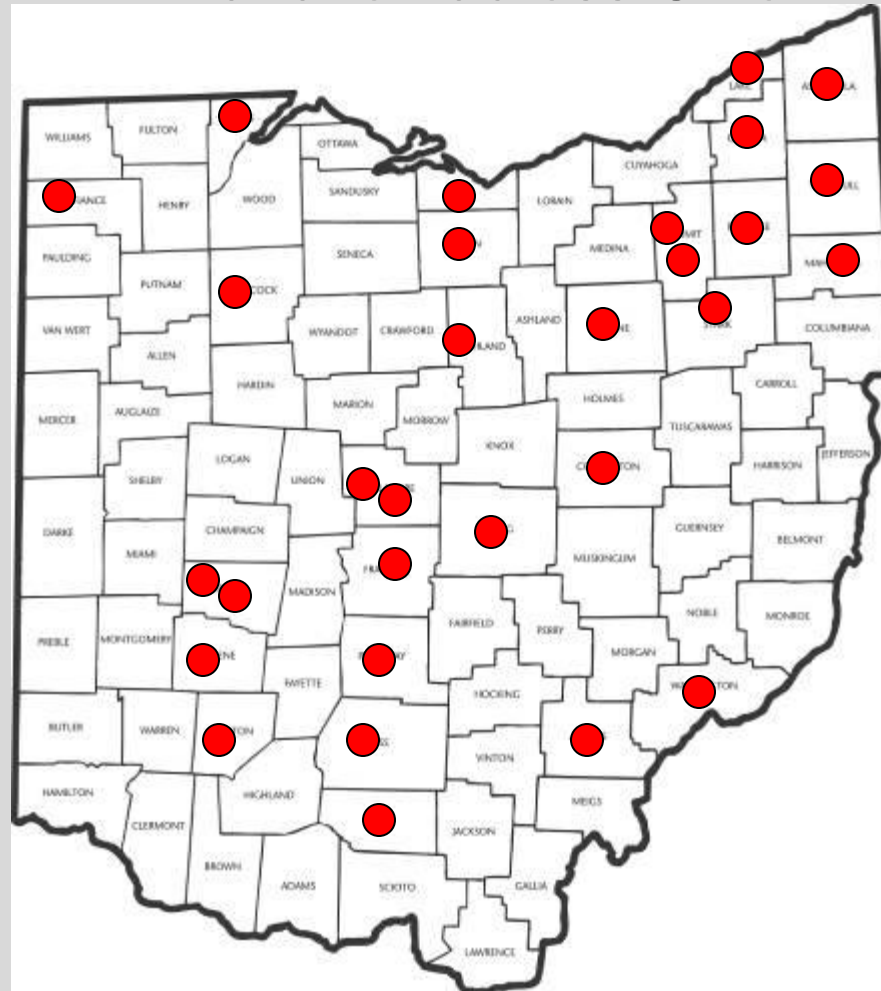


**Key finding: phenological sequence remains constant from year-to-year.**



# OSU Phenology Garden Network

A state-wide network of identical gardens to quantify geographic patterns of phenological and climatic variation across Ohio.



Coordinators: Dr. Dan Herms, Denise Ellsworth



**Objective: create a standardized biological calendar**

**Research:** document short-term phenological and weather variation; long-term climate change.

**Outreach:** predict pest emergence / fine-tune timing recommendations.

**Science Literacy:** increase public awareness / involvement with “the world’s oldest science”.

**Education:** provide infrastructure for experimentation and demonstration projects.



# Woody Plant Selections:



Species	First Bloom (DD50)
Star Magnolia 'Royal Star'	83
Forsythia Goldtide™	86
PJM Rhododendron	147
Koreanspice Viburnum	185
Crabapple Coralburst™	217
Common Lilac 'President Grevy'	234
Vanhoutte Spirea	309
Redosier Dogwood	326
Manchurian lilac 'Miss Kim'	423
Bush Cinquefoil 'Abottswood'	445
Weigela 'Red Prince'	446
Arrowwood Viburnum Autumn Jazz™	534
Bumald Spirea 'Goldflame'	624
Cutleaf American Elderberry	707
Oakleaf Hydrangea (species)	835
Rose-of-Sharon 'Blushing Bride'	1347



## End of Talk

95% of attention spans have withered or dried and PowerPoint display has ended.