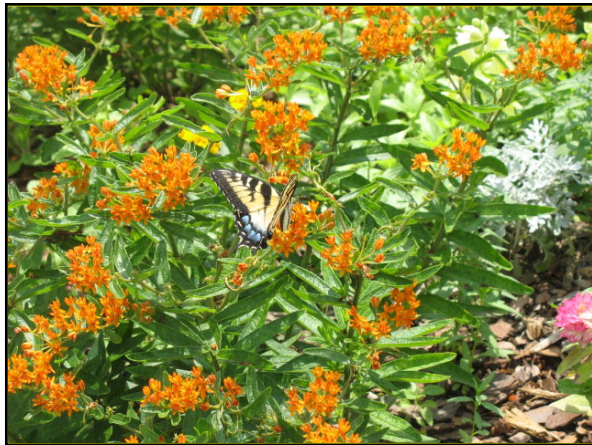
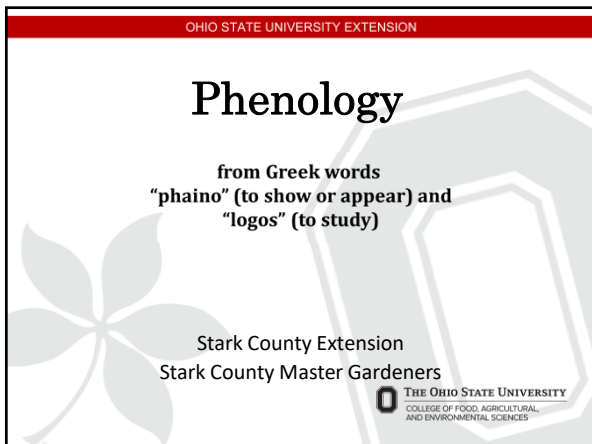




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OHIO STATE UNIVERSITY EXTENSION

**Information taken from OSU Fact
Sheets Bulletin – Special Circular
195 & 173-00 (ohioline.osu.edu)
osu.edu/phenology**

**Nature’s Notebook,
Denise Ellsworth
Powerpoint**

Stark County Extension
Stark County Master Gardeners



THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL
AND ENVIRONMENTAL SCIENCES

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**Phenology:
Not the Bumps on Your Head**

Phenology is...

**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....**

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Origins of Phenology

- Observations used by hunter-gatherers
- Important in early agriculture

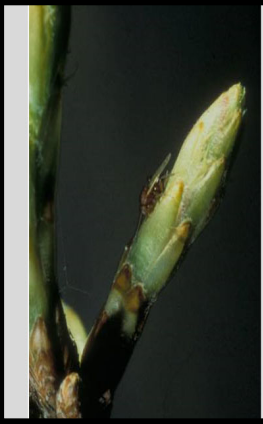
A photograph of red maple leaves, likely during autumn, showing vibrant red and orange hues.

9

Science of Phenology

- China, written records from 11th century BC
- Cherry blossom observations in Japan from 9th century AD to today
- Carl Linnaeus, 19 locations in Sweden (late 1700's)
- Robert Marsham and family in England 1736 through 1958
- In the US:
 John Bartram (late 1700's)
 Henry David Thoreau (1840's)
 Aldo Leopold (early 20th Century)


10




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

11

For a customized
 Biological Calendar
 Google: GDD OSU
www.oardc.ohio-state.edu/gdd



12



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

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




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Key Phenological Events



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

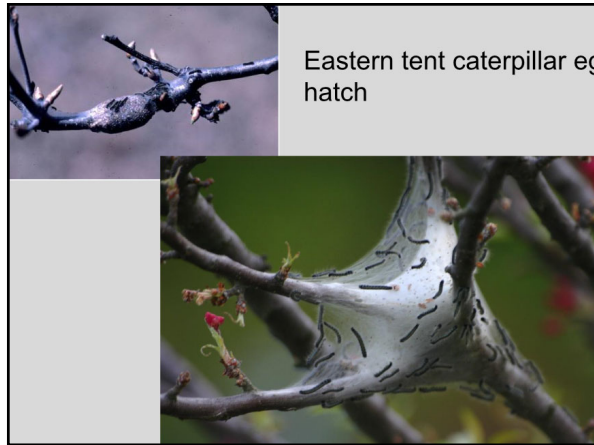


Full bloom: date 95% of flowers have opened (1 out of 20 buds remains closed). **(Last bloom)**

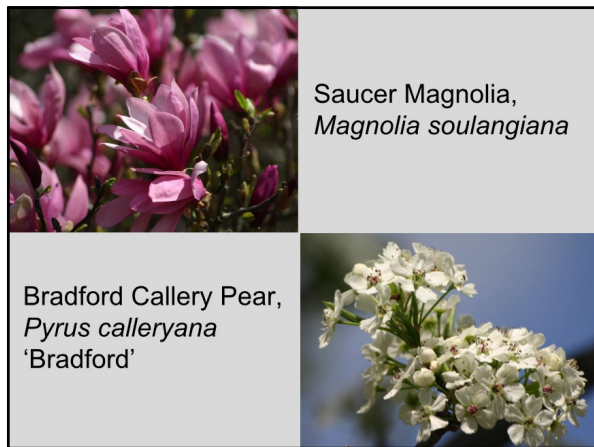
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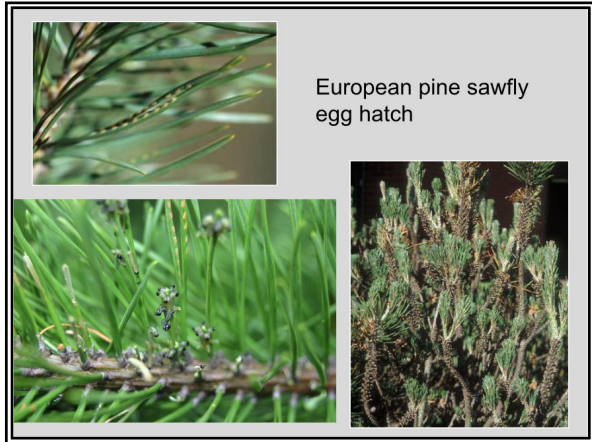
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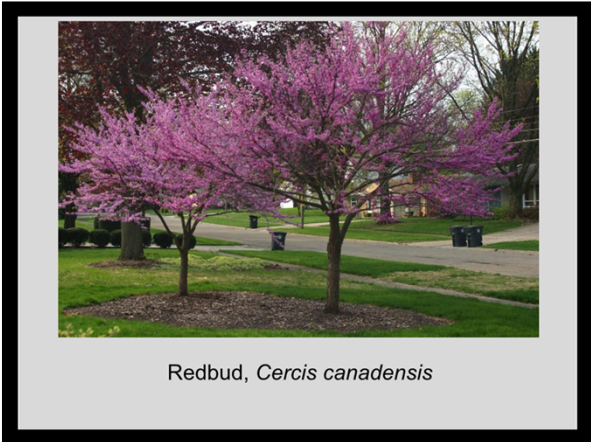
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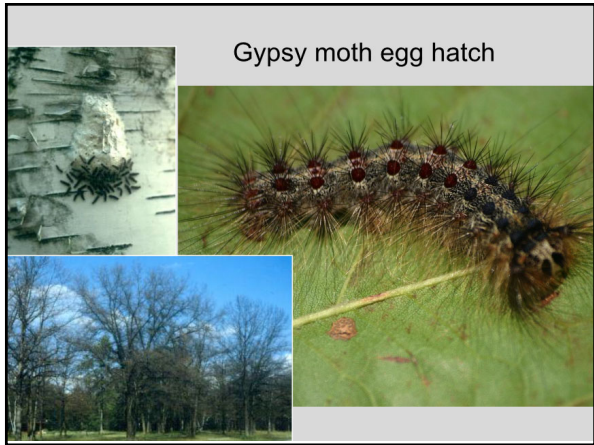
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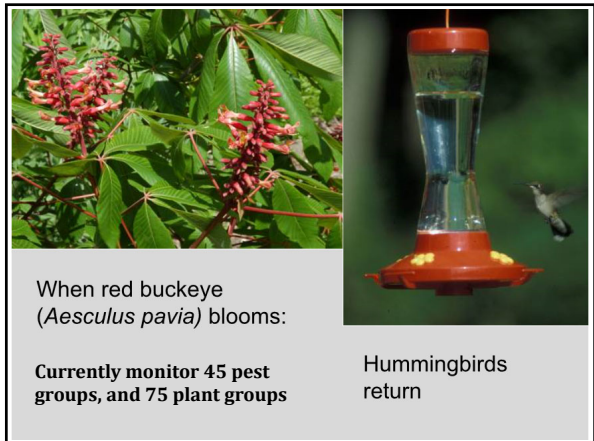
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Practical Phenology

Gypsy moth eggs hatch when redbuds bloom

Hummingbirds return when red buckeyes bloom

THE OHIO COLLEGE AND ENVIRONMENT

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Black cherry, *Prunus serotina*

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Optimal timing for aerial Bt applications for gypsy moth

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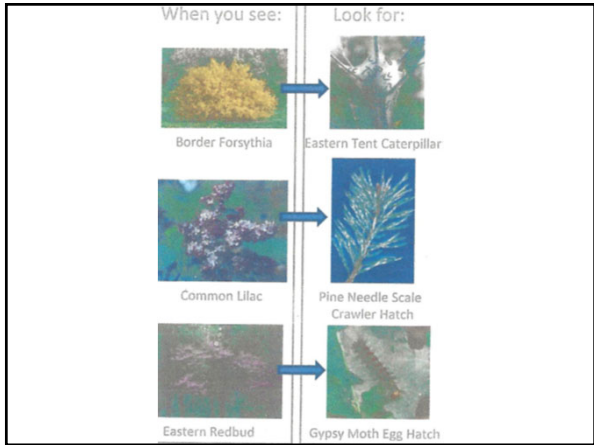
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Phenology Garden Network
 A state-wide network of identical gardens across Ohio, now studying native plants and pollinators.

<i>Apogonche scrophularifolia</i>	Blue Giant Hyssop
<i>Dalea candida</i>	White Prairie Clover
<i>Eryngium yuccifolium</i>	Rattlesnake Master
<i>Eupatorium perfoliatum</i>	Common Boneset
<i>Eutrochium purpureum</i>	Sweetscented Joe Pye Weed
<i>Monarda fistulosa</i>	Wild Bergamot
<i>Pycnanthemum muticum</i>	Clustered Mountainmint
<i>Ratibida pinnata</i>	Pinnate Prairie Coneflower
<i>Verbena hastata</i>	Swamp Verbena
<i>Veronicastrum virginicum</i>	Culver's Root
<i>Zizia aurea</i>	Golden Zizia

Coordinators: Dr. Dan Herms, Denise Ellsworth

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Woody Plant Selections:

Species	Avg. Ohio First Bloom(DD50)
Goldtide™ Forsythia	74
'Royal Star' Star Magnolia	101
PJM Rhododendron	151
Koreanspice Viburnum	189
'Coralburst' Crabapple	233
'President Grevy' Common Lilac	263
Vanhoutte Spirea	352
'Miss Kim' Lilac	401
Redosier Dogwood	405
'Abbotswood Bush Cinquefoil	434
'Red Prince' Weigela	498
Autumn Jazz™ Arrowwood Viburnum	532
Goldflame Bumald Spirea	645
Oakleaf Hydrangea	780
Cutleaf Elderberry	812
Rose-of-Sharon 'Blushing Bride'	1529

DD50 = measure of accumulated heat beginning in January

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Perennial Plant Selections:

- *Anemone x hybrida* 'Honorine Jobert,' Japanese Anemone
- *Asclepias tuberosa*, butterfly weed
- *Baptisia australis*, false indigo
- *Dianthus gratianopolitanus* 'Tiny Rubies'
- *Doronicum orientale* 'Magnificum,' Leopardbane
- *Echinacea purpurea* 'Magnus,' Purple coneflower
- *Geranium* 'Nimbus,' Perennial geranium
- *Helleborus x hybridus*, Lenten rose
- *Hemerocallis* 'Raspberry Pixie,' Daylily
- *Iris sibirica* 'Anniversary,' Siberian iris
- *Monarda didyma* 'Raspberry Wine,' Bee balm
- *Penstemon digitalis* 'Husker Red,' Beardtongue
- *Phlox paniculata* 'David,' Garden phlox
- *Salvia x sylvestris* 'May Night,' Hybrid sage
- *Sedum* 'Autumn Joy'

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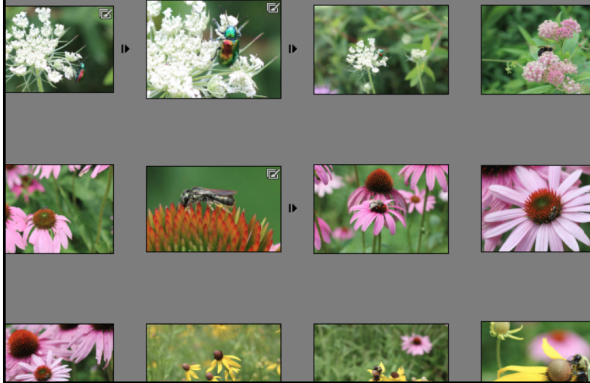
Reconstructing a record from photos



6/16/2013, Wooster OH. *Stewartia pseudocamelia*

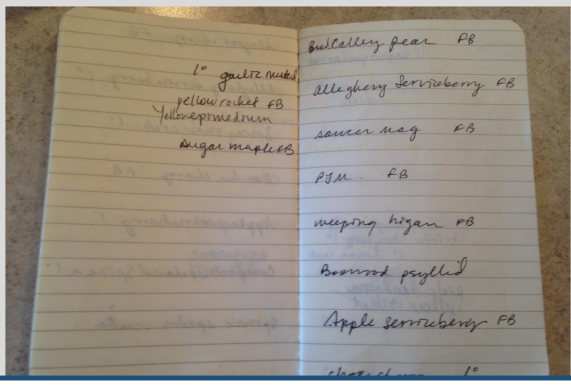
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Creating Your Own Calendar



38

Pen and paper record of observations



39

Journal events in your own garden by pictures, making entries in a journal, or on your computer or tablet.



40

Monitor phenology events and pollinators



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Pollinator Plants

(Ohio Natives)



On July 18, 2019, Ohio Governor Mike DeWine signed House Bill 59 into law designating the month of April as **Ohio Native Plant Month**. This legislation makes Ohio one of the first states in the country to have an entire **month** dedicated to our **native plants!**

A Great List of Ohio Native Plants for Gardeners can be found on the website <https://www.ohionativeplantmonth.org>
This list was recently compiled by Hope Taft and Debra Knapke (Jan 20, 2020) and is based on Robert Henn's book, *Wildflowers of Ohio*.

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Culver's Root

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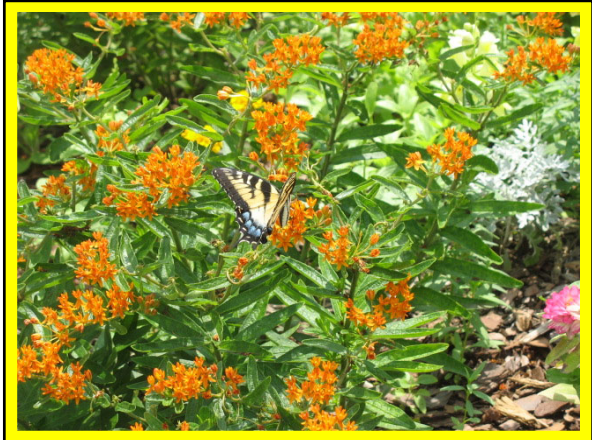


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**RATTLESNAKE
MASTER**

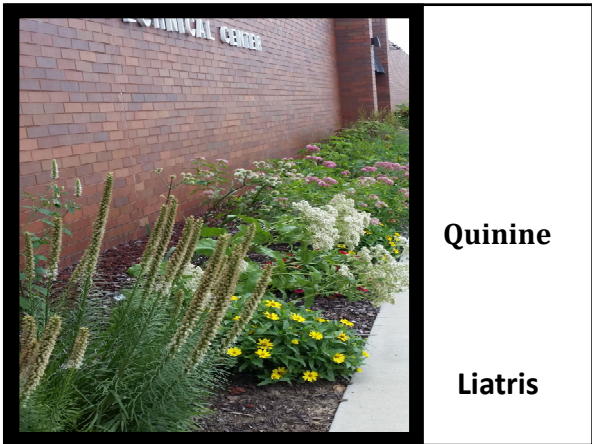
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CUP PLANT

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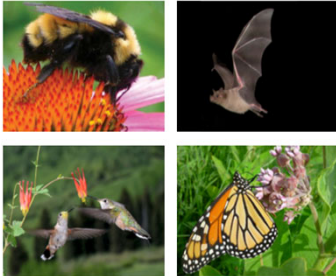


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Who are the pollinators?



Birds, bats, butterflies, moths, flies, beetles, wasps, small mammals, and most importantly, bees are pollinators. They visit flowers to drink nectar or feed off of pollen and transport pollen grains as they move from spot to spot.

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Somewhere between 75% and 95% of all flowering plants on the earth need help with pollination - they need pollinators. Pollinators provide pollination services to over 180,000 different plant species and more than 1200 crops. That means that **1 out of every three bites of food** you eat is there because of pollinators.

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