

PHENOLOGY: the timing of seasonal changes in living organisms.

PHENOPHASES: the various phases of seasonal change; in plants, for example: first leaf, first flower, leaf color change, fruit drop, etc. Phenophases are among the most easily observable responses to climate variability.

DATA: what you, as a Citizen Scientist, can contribute to a national phenology database. These data are used in the study of climate change, and are freely available to everyone.

TO REPORT YOUR OBSERVATIONS:

Go to Nature’s Notebook (part of the USA-National Phenology Network) at https://www.usanpn.org/natures_notebook and create an account.

In your account profile, be sure to add “**Denver Botanic Gardens**” from the drop-down list of Partner Organizations, under “**Botanic Gardens and Arboretums**”.

When entering data, choose Denver Botanic Gardens under “Sites” to access the specific plants on the Phenology Walk.

There is also a mobile app available on NPN’s website.

FOR MORE INFORMATION, INCLUDING MAPS OF ALL WALKS, GO TO:
<http://www.botanicgardens.org/science/plant-fungi/phenology>

For a map of this and the other Phenology Walks, scan this code:



Look for this logo on plant signs

Distance: ~ 200 feet; Time: ~ 30 minutes

Match plant # to plant sign #.

Fill **ALL** boxes in that column.
 (Phenophases described on other side.)

For each phase, circle: Y, N or ? (uncertain)

REMEMBER: Knowing when a plant is NOT in a phenophase is as important as knowing when it IS.

NOTE: Phenophases are not necessarily in order of occurrence

Date: _____
 Time: _____ AM PM
 Snow on ground?: YES NO
 % of ground covered?: _____%
 Snow in treetops?: YES NO

<i>Achillea millefolium</i> (common yarrow)			
	Phase	No. 1	No. 2
LEAF PHASES	Initial Growth	Y N ?	Y N ?
	Leaves	Y N ?	Y N ?
FLOWER PHASES	Flowers or flower buds	Y N ?	Y N ?
	Open flowers	Y N ?	Y N ?
FRUIT PHASES	Fruits	Y N ?	Y N ?
	Ripe fruits	Y N ?	Y N ?
	Recent fruit or seed drop	Y N ?	Y N ?

<i>Phacelia hastata</i> (silverleaf phacelia)			
	Phase	No. 1	No. 2
LEAF PHASES	Breaking leaf buds	Y N ?	Y N ?
	All leaf buds broken	Y N ?	Y N ?
FLOWER PHASES	Open flowers	Y N ?	Y N ?
	Full flowering	Y N ?	Y N ?
	End of flowering	Y N ?	Y N ?
FRUIT PHASES	Fruits	Y N ?	Y N ?
	Ripe fruits	Y N ?	Y N ?
	Recent fruit or seed drop	Y N ?	Y N ?

<i>Oxyria digyna</i> (alpine mountainsorrel)			
	Phase	No. 1	No. 2
LEAF PHASES	Initial Growth	Y N ?	Y N ?
	Leaves	Y N ?	Y N ?
FLOWER PHASES	Flowers or flower buds	Y N ?	Y N ?
	Open flowers	Y N ?	Y N ?
FRUIT PHASES	Fruits	Y N ?	Y N ?
	Ripe fruits	Y N ?	Y N ?
	Recent fruit or seed drop	Y N ?	Y N ?



Open flowers (*A. millefolium*)

Photo © Mary VB Goshorn



Fruits (*O. digyna*)

Photo © 2003 Steve Matson @ CalPhotos



Fruits (*P. hastata*)

Photo © Mary VB Goshorn

Code	Phenophase	Description — Note: Phenophases are <u>not</u> necessarily in order of occurrence —
LEAF PHASES	Initial growth	New growth visible after no growth (winter or drought); either buds with green tips, or new shoots breaking through the soil. Growth is considered "initial" <u>until</u> the first leaf has fully unfolded.
	Breaking leaf buds	One or more breaking leaf buds are visible. A leaf bud is considered "breaking" once a green leaf tip is visible at the end of the bud, but <u>before</u> the first leaf from the bud has unfolded to expose the leaf stalk (petiole) or leaf base.
	Leaves	One or more live, fully unfolded leaves are visible. For seedlings, consider only true leaves and do not count the one or two small, round or elongated leaves (cotyledons) that are found on the stem almost immediately after the seedling germinates. Do not include fully dried or dead leaves.
FLOWER PHASES	Flowers or flower buds	One or more fresh open or unopened flowers or flower buds are visible. Include flower buds that are still developing, but do not include wilted or dried flowers.
	Open flowers	One or more open, fresh flowers are visible. Flowers are considered "open" when the reproductive parts (male stamens or female pistils) are visible between or within unfolded or open flower parts (petals, floral tubes or sepals), or can be seen protruding from the spikelet (grasses). Do not include wilted or dried flowers.
FRUIT PHASES	Fruits	One or more fruits are visible. For <i>Achillea millefolium</i> , the fruit is very tiny and seed-like and is crowded into a tiny spent flower head; the seed-like fruit changes from whitish-yellow or yellow-green to tannish and drops from the plant. For <i>Oxyria digyna</i> , the fruit is small, winged and capsule-like and changes from green to tan or yellow with red. For <i>Phacelia hastata</i> , the fruit is a capsule that dries and splits open to expose the seeds.
	Ripe fruits	One or more ripe fruits are visible. (See "Fruits" above for specific descriptions of ripe fruit.)
	Recent fruit or seed drop	One or more mature fruits or seeds have dropped or been removed from the plant since your last visit. Do not include obviously immature fruits that have dropped before ripening, such as in a heavy rain or wind, or empty fruits that had long ago dropped all of their seeds but remained.