

Phenophase

WHAT IS PHENOPHASE???

WHY IS PHENOPHASE IMPORTANT???

Phenophase is a visible phase in the yearly life cycle of plant. Phenophases generally last for a few days or weeks.

(2) Some examples would include flowers blooming, leaves dropping, or buds first becoming visible.

Hypothesis: For my phenophase project, I predict that my blackberry bush would grow leaves before my deciduous tree because it is more exposed to sunlight.

- “Depending on the species, phenological events are triggered by the onset of rainfall, reaching a threshold temperature, the accumulation of heat above a certain threshold following winter, or the number of hours of sunshine, or even a combination of these.” (6) For example as it gets warmer earlier, that would trigger the flowers to bloom earlier. Using equipment, data, and research to track these events in the environment has helped us find that climate change is really happening. Phenology programs are tracking animals to see which organisms adapt to it and how and which ones don't that could potentially be in trouble. A phenology program in South Africa tracked it's sardine runs for over 66 years. (5) The sardines migrate closer to the coast when winter comes. They found that the sardines were arriving to the coast at a rate of 1.3 days later per decade. The income of sardines is very important to the local fishermen making money. Having the sardines coming at a later date or not coming at all will hurt the industry. So tracking phenological data can help scientists predict changes that potentially could come due to climate change. This can aid us in preparing for the different changes. (1)
- We (mainly farmers) use 'nature's calendar' to tell us the ideal time when to plant seeds and lay down fertilizer to avoid frosts and pests. (3) Planters watch when flowers bloom to prune or lay down seeds. For example one gardener plants peppers and eggplants when Bearded Iris are in bloom. (4)

METHODS

Once a week, on Thursdays between the hours of 1 pm to 3 pm, I would analyze my blackberry bush, my deciduous tree, and my incense cedar for a couple minutes each. For the blackberry, I would take note of my observations on the axillary buds and any leaves or flowers. For my deciduous tree, I would take note of my observations on the buds, catkin and any leaves or flowers. I also would measure one catkin. On my Incense Cedar, I would take note of my observations and measurements on the tiny, yellow male cones. Measurements were taken in centimeters.



Figures were both taken on April 15, 2021 from the same deciduous tree. Figure #1 shows the catkin all shriveled up and measuring almost 5½ cm. Figure #2 shows the display of new leaf emergences. They were just tightly closed up buds on March 18.

Figure #3 and #4 show a comparison of the blackberry bush. Figure #4 was taken March 18, 2021 and then Figure #3 was taken April 15, 2021. Note the leaves emerging from the bud on the right and the new almost full grown leaves.

TYPE OF PLANT	3/10/2021	3/18/2021	4/15/2021	4/22/2021	4/29/2021	5/6/2021
Blackberry Bush	Hardly any leaves. Leaves had traces of purplish/brown color. Axillary buds were tightly closed, many of them ½ cm long.	Same leaf observation. Bud still closed.	Leaves definitely sprouted! Leaves can still expand. Most buds had leaves beginning to poke out.	Has grown more leaves and older leaves are bigger. Buds are appearing on top of mature leaves. No flowers are apparent.	The old petiole has extended at least 3-5 cm on varying leaves. No flowers yet	The same looking. No flowers.
Deciduous Tree	This tree had no leaves. Had a few catkins. Buds were also tightly closed. Catkin measured 4½ cm.	No leaves yet. Buds seem to have loosen a little. Catkin same.	Some leaves are beginning to poke out from bud. Catkin was all shriveled and measured 5 cm.	Leaves have definitely sprouted and have grown big. No more catkins hang down from the tree.	Noticed tiny green cones! (the female organ) They measured 1 cm-1½ cm.	Cones still looked the same. Overall tree seems to have grown more leaves. There were white fuzzy bugs on the stems and leaf bases.
Incense Cedar	Yellow male cones were present on the tips of the tree. Measured 1 cm long.	The male cones are the same.	The incense cedar was the same.	Most of the male cones have fallen from the tree. The female seed cones are starting to bud open.	Female seed cones still look the same.	Female seed cones swelled bigger but not by a lot. ½ cm wider.

RESULTS: On April 15 the leaves of the blackberry sprouted and some were already full grown while on the deciduous tree the leaves just had poked out from their bud. I started to think the opposite when I saw on March 18 how the buds were still tightly closed on the blackberry bush but on the deciduous tree they started to loosen. But after spring break I saw that the Blackberry bush had sprouted and grown some of its leaves and elongated it's petioles while the deciduous tree leaves had just begun sprouting.

DISCUSSION: I originally predicted that the blackberry bush would produce leaves before my deciduous tree because of its exposure to more sunlight. There were more leaves on the blackberry bush and they looked more developed than the deciduous tree on the same day. Therefore, I conclude that my hypothesis of my blackberry bush, is supported.

One observation I did not expect was after my deciduous tree developed its leaves more, on May 6 I noticed white fuzzy bugs covering the leaf petiole and base. I later found out that they are called Woolly Alder Aphid. (7) This bug is dependent on the tree's leaf sap for food to complete their life cycle and bark for shelter. This correlates with climate change because if the temperature was rising because of more days of sunshine then that will affect plants by promoting earlier leaf or flower growth. This in turn will also affect the appearance of aphids on the tree because they are dependent on when the leaves come out.

SOURCES:

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- (3) USA NPN National Phenology Network. "Why Phenology? | USA National Phenology Network, 4/23/2021 usanpn.org/about/why-phenology.
- (4) Fifthseason, and Dennis Zlatkin says. "Stores." *Fifth Season Gardening*, 2 Apr. 2015, fifthseasongardening.com/phenology-gardening-by-natures-indicators.
- (5) Jennifer Fitchett Senior Lecturer in Physical Geography, and Stefan Grab Professor of Historical climate and weather. "We Tracked South Africa's Sardine Run over 66 Years: Here's What We Found." *The Conversation*, 28 Apr. 2021, theconversation.com/we-tracked-south-africas-sardine-run-over-66-years-heres-what-we-found-120369.
- (6) Jennifer Fitchett Senior Lecturer in Physical Geography. "Explainer: Why Phenology Is Key in Tracking Climate Change." *The Conversation*, 28 Apr. 2021, theconversation.com/explainer-why-phenology-is-key-in-tracking-climate-change-123783.
- (7) Frank, Steven, and James Baker. "Woolly Alder Aphid: NC State Extension Publications." *Woolly Alder Aphid | NC State Extension Publications*, content.ces.ncsu.edu/woolly-alder-aphid-1f--text=They%20are%20called%20WOOLLY%20alder.covered%20with%20white%20fluffy%20secretion.