

Phenophase by Lisa Smith

Introduction

Phenology is important to our natural annual plant or animal life cycles with a start and end period, This period has been known to last a few days to a few weeks. Phenological events are useful for evaluating crop conditions, drought severity, wildfire risk; it's also used to track invasive species, infectious diseases, and insect pests. Phenological data is used to support science and inform natural resources and management decisions. (USA National Phenology Network)

My hypothesis is that I predict that the growth rate, and phenological changes of the trees will be close to the same, due to the fact that the trees are all in the same general area.

Methods

During this experiment my partner and I went out once a week, every week for a month to gather our phenological data. We decided to pick three trees behind FRC's science building, we picked one pine tree (seen on figures 1-3), one mystery tree with little pollen cones (seen in figures 4-5), and a holly tree.

Figure 1



In figure one, you can see the small start of a bud forming on this pine tree. This was my partner and I's first measurement.

Figure 2



In figure 2, you can see that the bud on the pine tree has gotten a bit longer, but what is really starting to become visible is the small pine cone scales starting to emerge.

Figure 3



In figure 3, you can see that the shape and size of the pine cone is really starting to emerge. Looking closely at the tip of the cone, one can really see the modified scales of the pine cone starting to take form.

Figure 4



In figure 4, you can see the pollen buds are full of pollen at this stage of development.

Figure 5



In figure 5, you can see that the buds on the tree are just starting to form, and you can also take note of the tiny cones in the top right background which are only as big as the smallest pollen bud in Figure 4.

date	Pine	Little Cone tree	Holly tree
April 8, 2021	L: 2cm W: ½cm	L: 1 ½cm W: ½cm	L: 1 ½cm W: ½cm
April 15, 2021	L: 2 ½cm W: ½cm	L: 1 ¾cm W: 2cm	L: 1 ½cm W: 2cm
April 22, 2021	L: 2 ½cm W: ¾cm	L: 4cm W: 3 ¾cm	L: 3 ½cm W: 2cm
April 29, 2021	L: 3cm W: 1cm	L: 5 ½cm W: 3 ¾cm	L: 4 ½cm W: 2cm
May 6, 2021	L: 4cm W: 1 ½cm	L: 6 ½cm W: 4cm	L: 6 ½cm W: 3 ¾cm
Growth over the study period:	The average growth rate of the Length(L) of the Pine showed that the pine will grow at a rate of 2.8 cm in the five weeks of observation. The average growth rate of the width(W) of the Pine showed that the overall growth through the weeks of observing was 0.85 cm.	The average growth rate of the Length(L) of the Little Cone Tree showed that the cone tree grew 3.85 cm during the weeks of observation. The average growth of the width(W) in weeks of observing showed that the Little Cone Tree grew 2.85 cm.	The average growth rate of the Length(L) of the Holly tree throughout my weeks of observing showed it grew an average of 3.5 cm. The average growth rate of the Width(W) of the Holly tree during the five week observation, showed that it grew an average of 1.95 cm.

Cited References

- Henson K. (2020) NASA. 03/28/21 [Alaska's Vegetation is Changing Dramatically \(nasa.gov\)](https://www.nasa.gov/press/20200328/alaska-vegetation-is-changing-dramatically)
- Potter, C. (2020). Satellite Observations Aid Bison. Nasa. 03/28/21. nasasearch.nasa.gov/search?query=phenological+event&affiliate=nasa&utf8=%E2%9C%93.
- Phenophase. USA National Phenology Network. 3/28/21, [phenophase | USA National Phenology Network \(usanpn.org\)](https://www.usanpn.org/)

Results

In Table 1, we can see that the length and width of the three trees are very similar, particularly in respect to the natural placement of the trees.

- In the Pine there is a steady growth in length, and in width throughout the weeks of observing.
- In the Little Cone tree, its growth was very slow the first two weeks, but the growth of the buds was exponential in the last two weeks, comparatively.
- In the Holly Tree, one can see that it did not grow the first week of recording, but by the last week of following up the Holly tree grew six times its original size.

Discussion

My original hypothesis was that, I predicted that the growth rate, and phenological changes of the trees will be the same due to the trees being in the same general area.

My hypothesis was shown to be inconclusive, because the measured growth and phenological stages of the trees can be easily recognised, but the average growth in length(L) and width(w) over the five weeks of observation is seen as so insignificant that the test becomes inconclusive.

Future Research

My partner and I never measured the buds or leaves of any trees closer to the waterfront, nor farther up the mountain. In future experiments, I would measure the growth and phenological changes of a larger amount of trees in two different places, and compare them. This experiment would give me a better understanding of the differences of similar trees with ample water and resources, vs. not as sufficient water and resources.

My partner and I would also use a larger time scale. A larger time frame would allow for us to gather more results and better understanding of the