

Introduction

Phenophases are the annual life cycle stages which occur during a plant's and animal's life for a year (1). The phenophase for a plant first starts as soon as it emerges from the ground, then too the flowering of the bud, and then onto pollination (2). A good example of this the phenophase lifecycle of an oak tree (Figure. 1). Changes in phenological events are among the most sensitive biological responses to climate change. How plants and animals respond to phenological events help us predict whether their populations will grow or shrink (3).

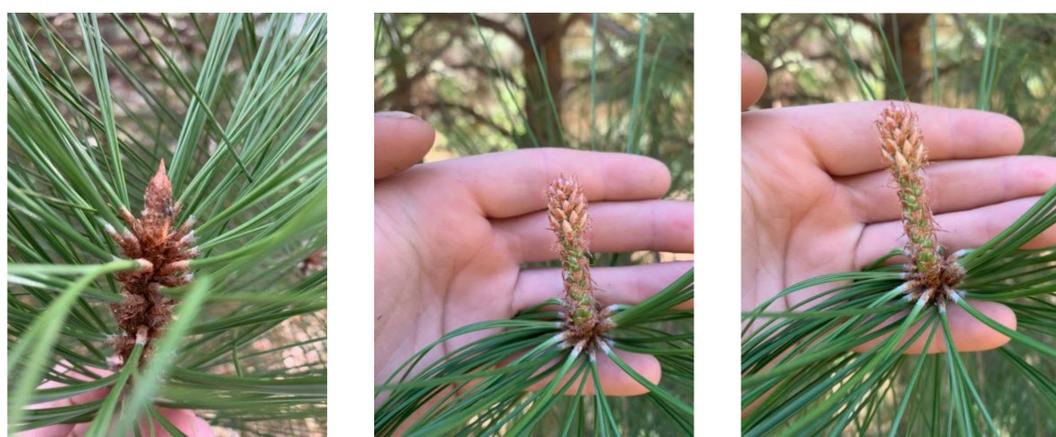
Hypothesis

I predict that my phenophase samples will first emerge new needles and leaves during the first phase. As the needles and leaves begin to grow they will reach the second phase in which pine, holly, and the little cone tree will release pollen. During the third phase my samples will begin to flower and expand the leaves further. As my samples enter the fourth phase the leaves and needles will be completely unfolded (Figure 1, 2).

Methods

My partner and I began measuring our phenophase samples on April 8th 2021 and continued our measurements for 1 month. We measured our samples weekly in centimeters. (Table 1).

Figure 2. Phenophase Cycle



Week to week phenophase progression of the pine.

Table 1. Growth of samples

Date	Pine	Little Cone Tree	Holly Tree
April 8, 2021	Length: 2cm Width: ½cm	Length: 1 ½cm Width: ½cm	Length: 1 ½cm Width: ½cm
April 15, 2021	Length: 2 ½cm Width: ½ cm	Length: 1 ¾cm Width: 2 cm	Length: 1 ½cm Width: 2 cm
April 22, 2021	Length: 2 ½cm Width: ¾ cm	Length: 4 cm Width: 3 ½ cm	Length: 3 ½cm Width: 1 cm
April 29, 2021	Length: 3 cm Width: 1 cm	Length: 5 ½ cm Width: 3 cm	Length: 4 ½ cm Width: 2 cm
May 6, 2021	Length: 4 cm Width: 1 ½ cm	Length: 6 ½ cm Width: 4 ½ cm	Length: 6 ½ cm Width: 3 ¼ cm

This table shows growth over a one month period

Results

Even though the buds of the little cone tree started out smaller than the pine and the holly, it eventually caught up to the other two and outgrew them (Table 1).

Cited References

- (1) USA national phenology network. Retrieved 04/28/2021. <https://www.usanpn.org/about/why-phenology>
- (2) Phenophase Examples (2021). Retrieved 04/22/2021. Class handout. Wikipedia. <https://en.wikipedia.org/wiki/Phenology>
- (3) Northeast Indigenous climate resilience network. Retrieved 04/28/2021. <http://www.nicrn.org/phenology-definition.html>

Figure 1. Phenophase Lifecycle



This figure shows the phenological cycle of plants

Discussion

In a months time of observation the pine were slow to grow compared with the holly and the little cone tree. As my partner and I went and measured every week we observed the first stages of the phenophase cycle (Figure. 2) taking place as new needles from the pine and leaves from the holly and little cone tree began to emerge. Even though a month wasn't enough time to completely see the cycle through, it still showed that the cycle was beginning to take place with stage one, needle growth and leaf growth. This first phase of growth supports my hypothesis.

I also noticed that the little cone tree outstripped the growth of the other two plants in my study,, though it started with a smaller bud and slower growth. I believe this might be because the little cone tree was in a more open environment with more light.

Future Research

If I had time for further research I would continue the measurements and take pictures as the phenophases of the project continued to show maturity with each phase until the end.