



Green Down Data Shows Leaves May be Falling Sooner

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Abstract

As a result of our interest in and the importance of green down data and its relationship to climate change, we decided to analyze data throughout Ohio to really understand if the leaves were changing color and falling sooner than they have in the past thirty years. We used the GLOBE plant color guide to observe eight different trees every week. Using a combination of our personal observations and data from the past thirty years across Ohio, we observed that the leaves have been falling sooner than they have for the past few years, likely as a result of climate change.

Research Question

Asking Questions

Are the leaves falling quicker than they have in the past thirty years?

Introduction

Content Knowledge

We are fascinated in taking green down and green up data because we want to see how different species of trees are changing and adapting to a changing climate. We are choosing to focus more on the green down cycle. We wanted to keep track of how quickly chlorophyll left the leaves each week for our own data. We also wanted to tie in data from all across Ohio. Since this is the thirtieth year of the GLOBE program, we decided to tie in the data from past years. According to Universitat zu Koln, the importance of collecting green up and green down is to calculate growing season length and monitor interannual changes in growing season duration. We want to focus on the effects that climate change may have on how quickly the leaves on trees are changing colors and falling from the trees. Green down data can help with more than just climate studies. When discussing green down protocols, according to GLOBE, green down helps scientists with collecting data that they will use in numerous fields of study. We hope that our green down data can be used to help in at least the field of climate, to make a difference in the world.



Research Methods

Planning Investigations

Describes the planning process

Frequency of observations: At least twice a week beginning two weeks prior to the anticipated start of green down, continuing until plant color change has ended or leaves have dropped off.

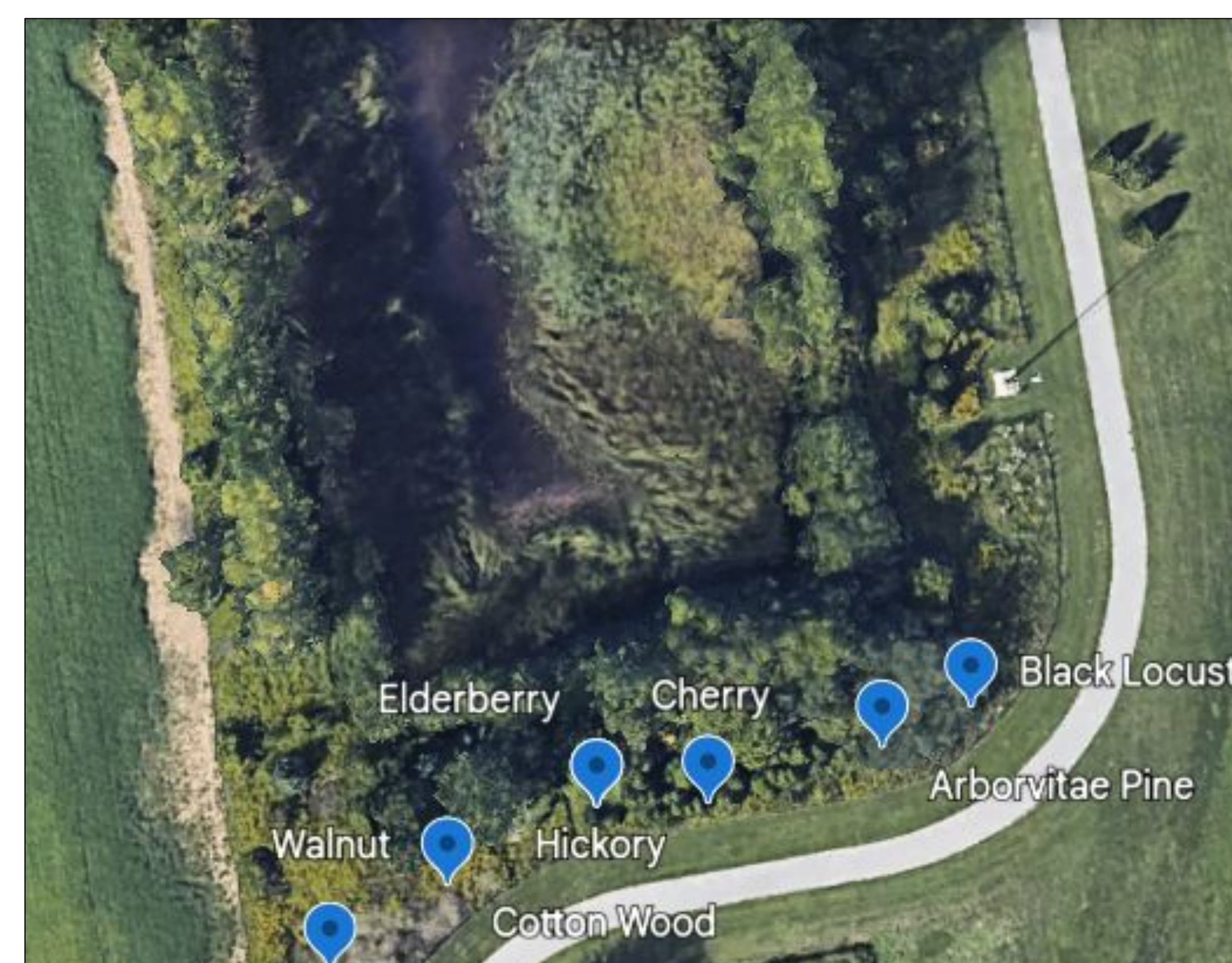
Reporting the number of growing seasons: Some locations have multiple growing seasons in a year.

- On your data sheet, report which cycle you are observing.
- In a location where there is only one growing cycle, report green-down cycle 1.
- The onset of the first green-down after 1 January is considered green-down cycle 1.

Carrying Out Investigations

Describes what happened

- We used the GLOBE Plant Color Guide and compared it to the leaves of the trees, to see how long it took for the leaves to change color, when they changed color, and how long it took for them to completely fall from the trees.
- We started collecting our weekly data on September 5, 2024.
- In total, we collected the green down data for eight trees. These trees included Juglans Nigra, Populus Deltoides, Sambucus Canadensis, Prunus Serotina, Carya Ovata, Liquidambar Styraciflua, Robinia Pseudoacacia, and Thuja Occidentalis.
- We collected data for about two months and we stopped once the leaves had completely changed and fallen off of all of the trees, excluding the Arborvitae Pine tree (Thuja Occidentalis).



Results

Analyzing Data

The first graph demonstrates the color change of the cottonwood tree. We chose to use the cottonwood tree because the leaves changed color rather quickly compared to some of the other trees that we gathered data for. The cottonwood tree had lost all of its leaves at around the same time as most of the other trees.

Figure #1

Cottonwood (Populus Deltoides) Color Change In 2024

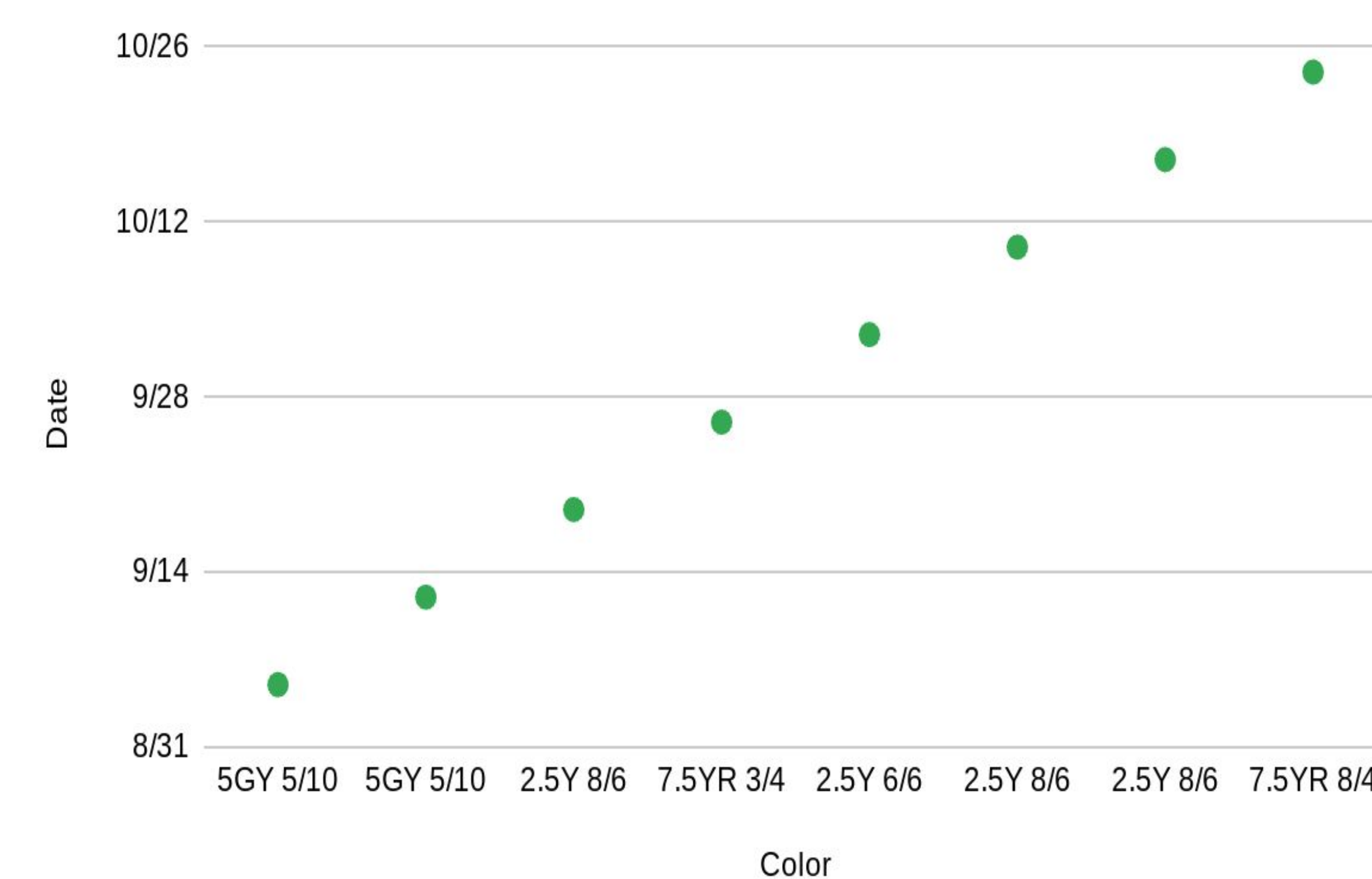
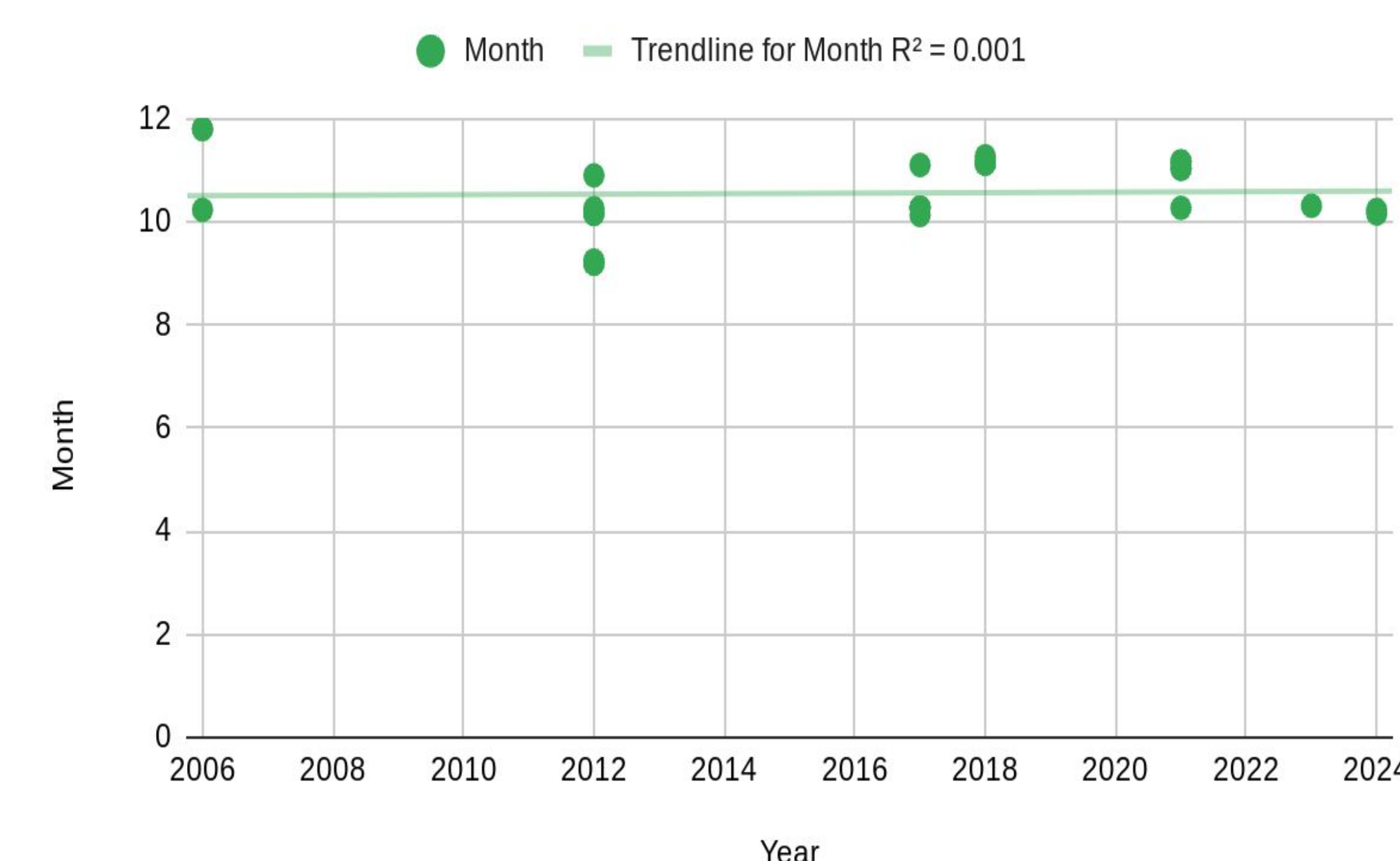


Figure #2

This graph illustrates data for the months that the leaves have fallen throughout the years in Ohio. This is used to give us insight on if the trees have really fallen sooner than they have in years past.

Month Fallen vs. Year



Discussion

Interpreting Data

- The results of our data analysis mostly shows that the leaves have been falling sooner than they have in the past couple of years, but not necessarily sooner than they have for the past thirty years.
- The data is not the most consistent. There were a couple of years where the leaves either fell drastically later or significantly sooner than the years around them. These outliers are likely a result of the smaller selection of data that we used for our graph. There were many years where data was not collected. So, the data in our graph skips a few years as a result of this. We also limited our data to just the state of Ohio.
- The cottonwood tree took around two months to completely change and fall from the tree. This time frame of the leaves changing color and falling from the trees was also seen with most of the other trees in our personal data collection.
- You can view the data for the cottonwood tree in the composition notebook. The graph for the cottonwood tree is attached to this project. We focused on the cottonwood, but we have the data for all of the other trees in the composition notebook below.

Conclusions

Drawing Conclusions & Next Steps

- For the most part, leaves on trees have been changing colors and falling sooner than they have in the past few years, likely as a direct result of climate change.
- We reached this conclusion by not only taking our own green down data, but also by analyzing green down data from the past thirty years from all across the state of Ohio.
- We will continue with our studies by taking data for the next few months, focusing on green up data since the greening down season is over and the greening up season is beginning.

Bibliography

References

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- <https://www.globe.gov/documents/355050/355099/Green-Down+protocol/849d4a1a-96dd-4965-ab36-0ae77a447cd9>