

Fall Phenology Observations

The season is changing before your very eyes! The trees and animals are preparing for winter using strategies they've evolved over tens of thousands of years. One of the most obvious changes in the fall is colorful foliage displayed by common trees. Tree leaves change color and drop every fall but when does this process begin and how long does it last, and does this transition period vary from year to year?

We're going to begin to address some of these questions in this lesson. Phenology is the study of seasonal changes in the life of an organism due to changes in its environment.

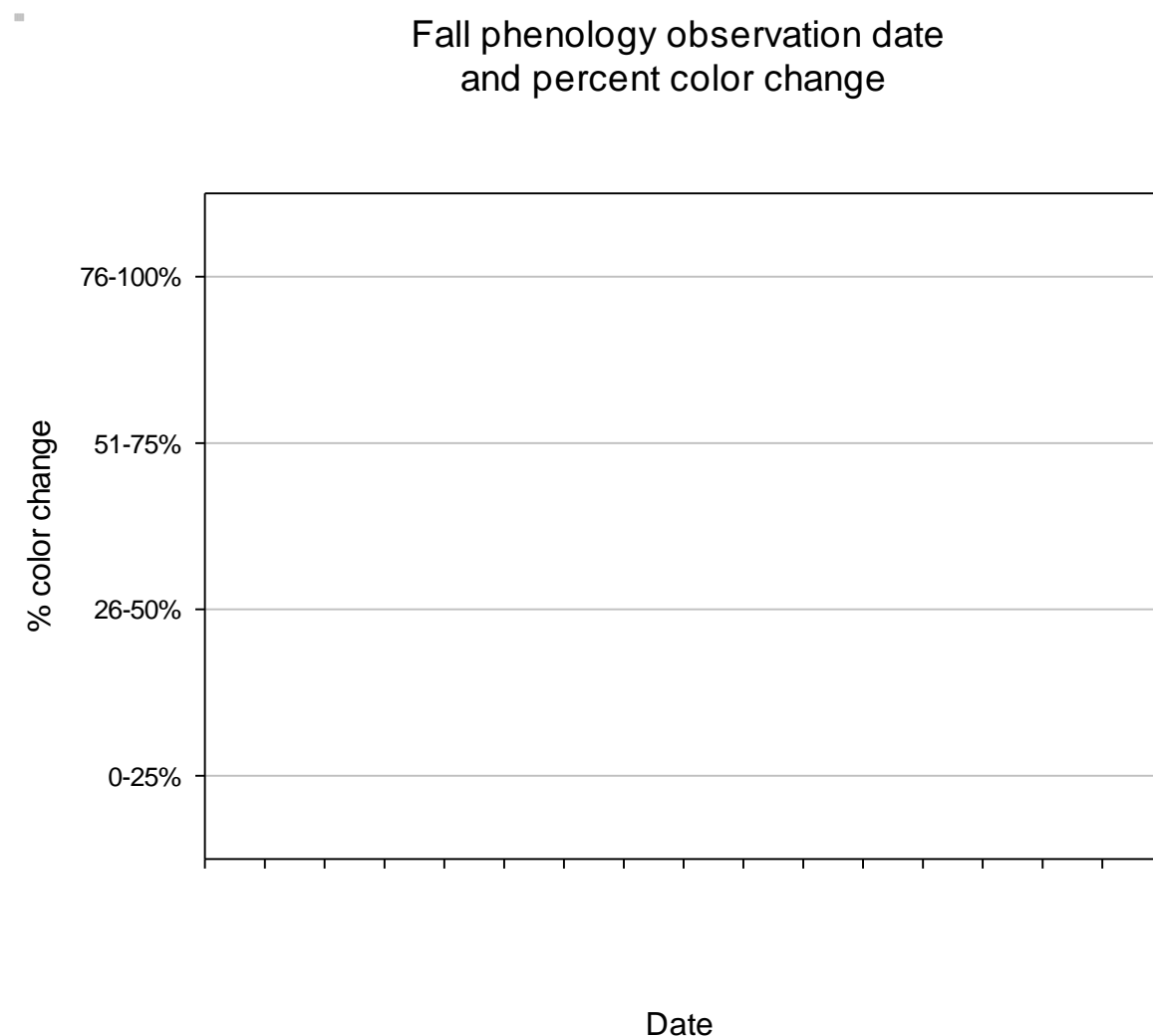
Let's get outside, find some deciduous trees and use the attached field sheet to make weekly observations!

Fall phenology observation steps:

- 1) Find a forest edge where you can stand back and get a good view of the trees. Identify 2 nearby trees of the same species with healthy looking leaves that are easy to see. Use the attached slide show to help identify your tree. Mark your trees. If you have time, find 2 more trees of a different species and mark those trees for regular observation.
- 2) Draw a leaf from your two different species on a sheet of paper and make note of the condition of the leaf including any signs of insect activity or color onset. If possible, measure the length and width of the leaf you are drawing and note that on the sheet. Also note the location of the tree your leaf is from. Is the tree on an edge near a parking lot or lawn or is it in a more forested setting? Also note if your tree is small (a sapling) or a big tree. If you have a second species, draw and measure a leaf from that tree too.
- 3) Using the field sheet provided, fill in the date and tree species. You will have 2 individuals of the same species so mark them as tree 1 and 2 on your sheet (example: sugar maple 1 and sugar maple 2). Observe your trees and use your best judgement to classify them according to the choices provided on the field sheet. Are the leaves mostly still green? Then you'd choose 0-25% changed, but if they're mostly colored, you'd choose 75-100% changed. Be a careful judge and observe as much of the tree as possible. Sometimes one side of a tree is more colorful than the other side. Don't worry too much though. Give your best educated guess. Also assess whether the leaves have dropped using the same percent ratings.
- 4) Repeat these observations for all your trees. Do you notice any difference between individuals of the same species or between the different species?

5) Return to your trees at least once a week to repeat the observations. Even better if you can make more frequent observations. Do you think the leaves will change color quickly or over a longer period of time? Will the leaves stay on the tree for a long time or drop quickly? Your observations over the season will help answer these questions.

6) When all the leaves are colored and fallen use the blank graph provided below to graph your results. Use different colors and line design to graph different individuals and species. Make a legend. Did both trees of the same species transition at the same time? Did you observe timing differences between the 2 different species? Can you think of why or why not?



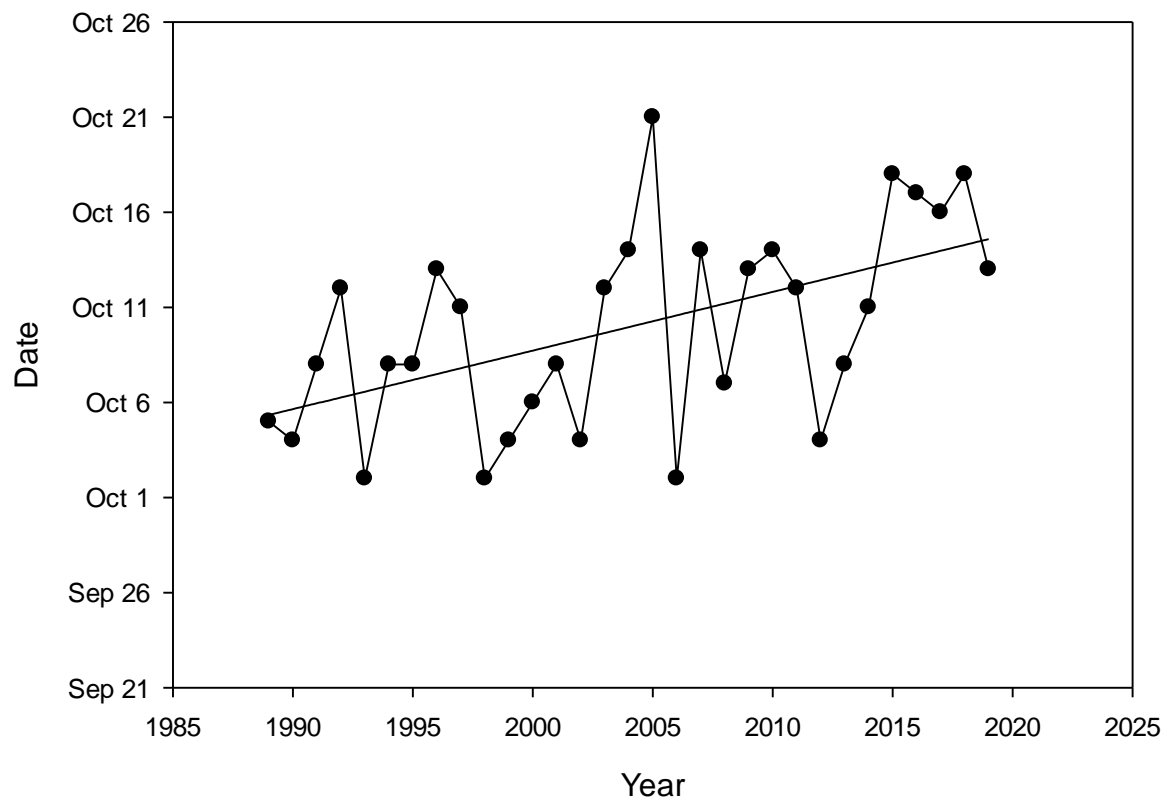
7) What date did your trees no longer have any green in their leaves or completely drop their leaves, enter these dates into the table below. At this point they are in winter condition.

When your trees reach 75-100% leaf color and leaf drop they are in winter condition		
This date varies from year to year		
	date	date
Insert species your species	76-100% leaf color	76-100% leaf drop
1st species tree 1:		
1st species tree 2:		
2nd species tree 1:		
2nd species tree 2:		
Hubbard Brook Sugar Maple low elevation		
(average of dates from 1989-2019)	10-Oct	20-Oct

Compare your dates to the date determined at the Hubbard Brook Experimental Forest in Woodstock, NH shown at the bottom of the table. Fall phenology has been monitored at Hubbard Brook since 1989, so the sugar maple dates provided in the table above are averages for 1989-2019.

8) The date the Hubbard Brook forest stops photosynthesizing or arrives at winter condition for each year from 1989 to 2019 is provided in the attached graph. The trendline or “regression line” best fits the trend in this pattern over time. Do you see any trends? Where do your data points fit in? Why do you think that your date might be different from the Hubbard Brook data?

Peak foliage for sugar maples at the bottom of watershed 1 at Hubbard Brook, Woodstock, NH



The long-term trend from fall phenology observations made at Hubbard Brook suggest that natural fall processes are changing and ongoing monitoring provides clues to these changes.

Thank you for thinking about these processes and making your own observations.