

overview:

Students report back to the class any changes they may have observed in their plant(s). Encourage your students to use a variety of means to communicate their observations to the rest of the class. This activity can be used effectively in conjunction with Language Arts Activity 1 and Mathematics Activities 1 to 3.

activity **four**



DYNAMIC GRAPHICS

Reporting to the Class

skills

Observing, recording, communicating

materials

Illustrations and colour photos of Plantwatch species from the webpage. (see website <www.devonian.ualberta.ca/pwatch>)

Student logbooks

preparation

Read Background Information (on the following page) with its definitions of first and full flowering for the Plantwatch species your class is observing.

focus

What is happening to your plant?

suggested connections

Language Arts Activity 1, Descriptions (Connections - Language Arts, page 3-47)

Mathematics Activity 1, Growing Degree Summation (Connections - Math, page 3-27)

Mathematics Activity 3, Graphing and Mapping (Connections - Math, page 3-31)

explore/investigate

1. Have your students periodically report on their plants to the class. When the flower buds begin to swell, students should visit the plants every 2-3 days, and take particular care to observe the changes in their plants. They can regularly report these findings. Have the students sketch the changes they are observing.
2. List the bloom dates for each of the observed plants/patch of plants.
3. Report the dates to Plantwatch (see next lesson). Reporting can be done as soon as the plants start to reach first bloom, and can continue as more dates are observed.
4. Have the students make graphs of their results.

background information

Before the students can start to report signs of flowering on their selected plant, they need to know how to recognize these flowering stages. Only then can accurate dates for these phases can be recorded. Please see the website for definitions of bloom stages to observe.

See the website for growth stage definitions



Common purple lilac (*Syringa vulgaris*);
cultivated shrub, common
in gardens



Western trillium (*Trillium ovatum*);
herb, northwestern North
America



Dandelion (*Taraxacum officinale*);
introduced herb, common
in lawns, disturbed areas



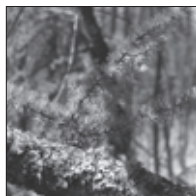
White trillium (*Trillium grandiflorum*);
herb, eastern deciduous
forest



Aspen poplar (*Populus tremuloides*);
tree, across Canada (report
flowering and leafing times)



Bunchberry, crackerberry (*Cornus canadensis*);
herb, boreal zone



Larch, tamarack (*Larix laricina*);
tree, across Canada (report
flowering and leafing times)



Labrador tea (*Rhododendron groenlandicum*, formerly *Ledum groenlandicum*);
shrub, boreal



Prairie crocus (*Anemone patens*);
herb, prairie and northern
North America



Purple saxifrage (*Saxifraga oppositifolia*);
herb, arctic-alpine



Bearberry (*Arctostaphylos uva-ursi*);
low shrub, across Canada



**White dryad, white
mountain avens (*Dryas octopetala/integrifolia*);**
mat-forming low shrub,
arctic and alpine tundra



Saskatoon, serviceberry (*Amelanchier spp.*);
tall shrub, across North
America

overview:

The teacher registers the class and reports its data to Plantwatch.

activity five



ELISABETH BEAUBIEN

Reporting your Data

skills

Calculations, completing data forms

materials

Plantwatch Data Forms (page 2-13)

preparation

1. Examine the Plantwatch Data Form
2. Read Background Information on Data Form
3. Complete Mathematics Activity 4, *Latitude and Longitude: How to Calculate Your Global Address* (Connections - Math, page 3-35)

explore/investigate

Send the data to Plantwatch as soon as one of the tagged plants reaches first flowering. Keep sending data as the plants all reach first and full bloom. Complete one form for each tree (i.e., aspen poplar, larch), bush (i.e., saskatoon, lilac) or patch (i.e., prairie crocus, trillium, etc.) observed.

Just press "send" after completing your report on a plant and a confirmation page will appear. Complete another report form if you have a date to report for another plant.

To contact Plantwatch by e-mail: e.beaubien@ualberta.ca or plant@ualberta.ca

background information on the Plantwatch Data Form

A. Observer

1. Registration Number. If reporting by Internet, you need to first register with Plantwatch on the homepage where you will instantly receive

a registration number. Use this number when sending data and locations for your observations. If you registered previously and forgot your number, just send plant@ualberta.ca an e-mail, and we'll send it to you.

2. School or Observer Name. Give the school and teacher name, or individual observer's name. This information will appear on the Internet compilation with your flowering date(s).

B. Plant Observed

This data form is used to report observations on one plant (or patch) of one species. Put a checkmark beside the plant species you observed. If you had observations of several plants of one species (e.g., three lilac bushes, or two patches of western trillium), mark under "Plant Number" which plant or patch you are reporting (e.g., #1, or #3).

C. Flowering Phase

Fill in the date of one phase, or both phases (i.e., first bloom/full bloom), on the same sheet.

If first bloom for your plant was April 15, 2010, record 04/15/2010;

If full bloom was April 21, 2010, record 04/21/2010.

If you are reporting on lilac or aspen poplar, leafing is the day when, in at least three places on your observed plant, the first leaves have

unfolded. For larch, the tufts of needles just start loosening and spreading.

D. Plant Location

Plantwatch scientists can use and map students' flowering observations only if they have accurate location information for the plants. To determine plant locations see the Latitude/Longitude exercise (Mathematics Activity 4). Accuracy of latitude and longitude is needed to *at least* the nearest minute (plus 2 decimal points is helpful). Use the formula given in Activity 4, or the "dms" button on a calculator to convert degrees and minutes to decimal degrees (e.g., $53^{\circ}40' = 53.67^{\circ}$), which are the most useful for mapping.

Map Ordering
A 1:50,000 scale map is very helpful.

A topographic map at a scale of 1:50,000 is very useful to get accurate locations of plants.

Hunters and fishers, outdoor enthusiasts, foresters, and oil and gas workers, etc. often have Global Positioning System (GPS) technology and may be able to help by giving you the location of your sites. GPS units are small, hand-held instruments that calculate your latitude/longitude using satellite signals.

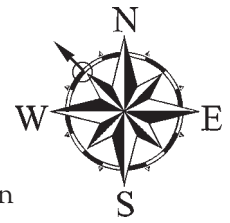
If the global position (latitude/longitude) of your plants cannot be determined then simply report at the bottom of the form under the *Comments* section of *Optional Details*, the distance and direction of the plants from the nearest highway or town.

Elevation, taken from a map, is also useful information for research on plant flowering times. Because air cools when altitude increases, flowering in higher places is often later than at low altitudes. This effect can often be seen by hikers on a mountain trail — plants of a species may be in full bloom at the start of the trail but only in bud higher up.

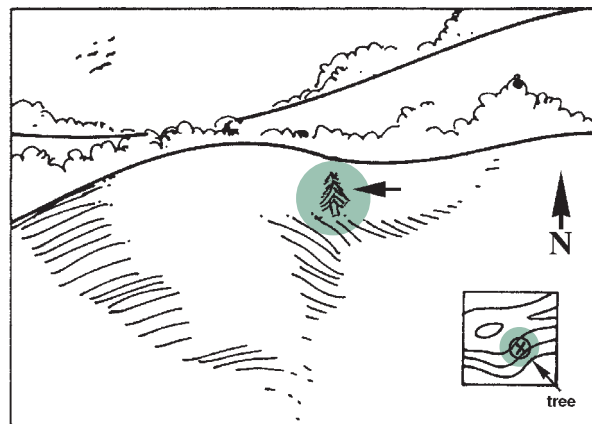
E. Optional Details

Information on a plant's exposure to sun (shading, angle of slope and aspect of slope — the direction the slope faces) and weather before flowering helps us understand how plants

may have been affected by their location or this year's weather. Use a compass to determine which direction the slope or forest edge faces. Mark an arrow (as shown above) for NW facing.



Try this exercise: This is a sketch of a hill with a single larch tree on one side. In the bottom right of the sketch is a small inset contour map of the same hill, with the tree location shown by the "x". If north is at the top of the map, which direction does the hill with the tree, face?



ANSWER: SOUTHEAST

In the *Comments* section, students could contribute

- details about the locations of plants
- notes on any interesting insects observed (e.g., butterflies, caterpillars, beetles, etc.)
- weather observations (or the calculated growing degree days to flowering: see Math Activity 1 [Connections - Math, page 3-27])
- whether some flower buds were lost to hungry deer or other animals
- the average flowering times for first or full flowering for all the plants of one species (if they are all within the same area: i.e. within a circle of 10 km diameter and within 50 m of each other in elevation)
- comments or suggestions



plantwatch

D A T A F O R M

Please fill out this data form for each plant observed. Use the Internet to get the registration form. If necessary you can fax the registration and data forms to Plantwatch at (780) 987-4141.

Observer

YOUR REGISTRATION NUMBER:	SCHOOL OR OBSERVER NAME:
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Plant Observed

(please check ONE only)

<input type="radio"/> Common purple lilac	<input type="radio"/> Prairie crocus	<input type="radio"/> White trillium	<input type="radio"/> White dryad
<input type="radio"/> Dandelion	<input type="radio"/> Bearberry	<input type="radio"/> Bunchberry, crackerberry	
<input type="radio"/> Aspen poplar	<input type="radio"/> Saskatoon, serviceberry	<input type="radio"/> Labrador tea	
<input type="radio"/> Larch, tamarack	<input type="radio"/> Western trillium	<input type="radio"/> Purple saxifrage	

Plant Number

	If you are observing more than one individual plant or patch of this species, please number them and put the number of your observed plant here. For example, lilac #1, lilac #3; or dandelion patch #5.
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Flowering Phase

FIRST BLOOM <i>(month/day/year)</i>	AND/OR	FULL BLOOM <i>(month/day/year)</i>
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for Aspen Poplar/Lilac

FIRST LEAVES UNFOLDED <i>(month/day/year)</i>
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for Larch/Tamarack only

LEAF-OUT DATE (see definition) <i>(month/day/year)</i>

Plant Location

CLOSEST TOWN OR CITY	PROVINCE/TERRITORY/STATE
Latitude <i>(in decimal form, xx.xx)</i> : _____ or _____ °(degrees) _____ '(minutes) <i>(Circle one)</i> N or S	
Longitude <i>(in decimal form, xx.xx)</i> : _____ or _____ °(degrees) _____ '(minutes) W or E	
Elevation <i>(if known)</i> : _____ meters or _____ feet	

Optional Details

Please fill out the information below to help us make better use of your flowering dates.

Select to describe the PLANT LOCATION: *(please use ✓)*

sunny and open area shaded all day (e.g., north side of building, or in a shady forest)
 in half shade at the forest edge OR near a building wall, which faces this direction: *(please circle ONE)*

Please select ONE:

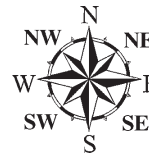
flat area gentle slope OR steep slope The slope faces: *(please circle ONE)*

Was the Plant Observed in a GARDEN? yes no

What were the WEATHER conditions for the week before flowering? *(please mark ALL that apply)*

dry rainy cold hot average temperature

Comments. *Any additional notes on location, weather, plants, etc.*



overview:

Students discuss the flowering dates of their plants and those of other Plantwatch observers. They examine data and maps provided on the Internet and interpret them in ways that fit with their other studies.

activity **six**



Looking Back

skills

Interpreting data, comparing, inferring, communicating

materials

Student observation sheets or log books
Maps of flowering dates (see website <www.devonian.ualberta.ca/pwatch>)

focus

What do these flowering times mean?

suggested connections

Science Activity 2, Weather (Connections - Science, page 3-7)

Science Activity 3, Reading About Climate Change (Connections - Science, page 3-9)

Mathematics Activity 1, Growing Degree Summation (Connections - Math, page 3-27)

Mathematics Activity 2, Calculating Averages (Connections - Math, page 3-29)

Mathematics Activity 3, Graphing and Mapping (Connections - Math, page 3-31)

Mathematics Activity 4, Latitude and Longitude: How to Calculate Your Global Address (Connections - Math, page 3-35)

preparation

Read *Science Activity 2, Weather* (Connections - Science, page 3-7)

explore/investigate

1. Depending on the class' focus while engaged in the Plantwatch program, consider the following questions:

- Do the data (maps, flowering dates) available on the Plantwatch website show the northern movement of a "flowering wave"?

Encourage your students to explain why or why not this "wave" might be happening. See Science Activities 2 and 3.

- How many days difference did the students find in the flowering dates between their observed plants? Did the variation differ between species? For example, say your class observed four saskatoon plants with first bloom dates May 10, 12, 13. The range in bloom times is May 10 to 13, or four days. But your three observed lilacs had first bloom on May 20, 24, 26 with a range of seven days. The lilacs showed more variation in bloom time than the saskatoons. In this situation the saskatoons may have all been close to each other on the top of a hill, sharing a similar microclimate. The lilacs may have been spread out over the neighbourhood, in sun or shade, hills or hollows.

Encourage your students to explain the level of variation they found. If your class reported on more than one species, did the variation differ between species? Why or why not?

Looking Back...continued

See Science Activities 2 and 3 and Mathematics Activities 1 to 4.

- How does your area differ from others nearby — is flowering earlier, about the same, or later? Use the Plantwatch maps and ask your students to predict flowering times on regions of the map where there is no data. Ask them to explain their predictions. (See Science Activity 2.)
 - If you've recorded flowering dates in previous years, how does this year compare — is flowering earlier or later? Encourage your students to explain differences or similarities. How could they test their explanations? (See Science Activities 2 and 3 and Mathematics Activities 1 to 4.)
 - What would we do differently next year? How could data collection be improved?
2. Log books — A final entry might include a student description of the Plantwatch Program: "What We Did and What We Found Out."
 3. Students could share their Plantwatch observations and data with parents, other classes or the media.