plantwatch

TEACHER'S GUIDE

by Elisabeth Beaubien

National Plantwatch Coordinator
Devonian Botanic Garden, University of Alberta
Edmonton, Alberta, Canada T6G 2E1

Plantwatch Teacher's Guide 2001

by Elisabeth Beaubien
National Plantwatch Coordinator
Devonian Botanic Garden
University of Alberta
Edmonton, Alberta
Canada T6G 2E1

Editing: R. Edrea Daniel (edited earlier versions)

Design and Layout: Judy Cook, Broken Arrow Solutions

This Teacher Guide is only available electronically (on the Internet).
Web addresses are current as of November 2001.

Acknowledgements

Many thanks to the volunteers who have enthusiastically observed, recorded and reported flowering dates (some, since 1987!).

Thanks to the following who helped research and/or write this guide:

Plantwatch assistants: Laura Frost (who helped complete this guide and post it on the webpage), Trevor Lantz, Anna Radziszewski, and Karla Williamson; also Beth Cornish, Judy Cornish, Sandra Guilbert, Trudy Harrold, Jessica Smith, Laureen Snook and Kay Willson.

The following teachers/consultants kindly provided suggestions/ improvements:

Paul Anderson, Judy Bennett, Peggy Bergmann, Joanne Cameron, Gloria Cathcart, Bernie Galbraith, Ed Hecker, Sherry Maitson, Peta Mudie, Pat Redhead, Dave Turner and Heather Wheeliker.

Thanks to the University of Alberta Devonian Botanic Garden which kindly provided space, equipment, and administrative assistance beginning in 1991.

Thanks to the following who provided financial assistance for the production of this guide:

Alberta Sport, Recreation, Parks and Wildlife Foundation

Canadian Circumpolar Institute

Canada Trust Friends of the Environment Foundation

Environment Canada
- Action 21 (EcoAction)
- Biodiversity Convention Office
- Ecological Monitoring and Assessment Network
- Northern Ecosystems Initiative

Federation of Alberta Naturalists

Natural Resources Canada: Canadian Forest Service

Shell Environmental Fund

In-kind assistance was provided by:

Campbell Scientific
Friends of the Devonian Botanic Garden
Friends of the Environmental Education Society of Alberta (FEESA)
Hole's Greenhouses and Gardens
International Tundra Experiment (ITEX)
Royal Botanic Garden, Burlington, Ontario
University of Alberta: Earth and Atmospheric Sciences Department

Table of Contents

Appendices

Forms

Figures

Introduction to plantwatch

www.devonian.ualberta.ca/pwatch

HOW TO USE THIS TEACHER GUIDE:

1. Read the introduction.
2. Select a likely plant species for observation (see list of indicator plants following). This will ideally be a plant species that can be found within a 5-10 minute walk of the school, so that it can be checked every 2 days by students.
3. Read the plant description.
4. Check the activities and select which ones may suit the students' level/ interests.
5. See the key activities and data form to get ready for blooming season.

YEAR AT A GLANCE

(all the following can be done in springtime, but it is better to spread the stages out)

In the fall:

1. select a plant to observe
2. select activities to work on with the class
3. print the species' description and review with students
4. locate plants near school and tag up to 5 numbered individuals (e.g. 5 saskatoon shrubs, or 5 patches of dandelions)

In late winter:

1. for poplar, test branches in water to ensure trees are males, not females
2. determine latitude/ longitude for the tagged plants, and record other environmental details concerning their position
3. register for Plantwatch, and record the registration number you receive on registering

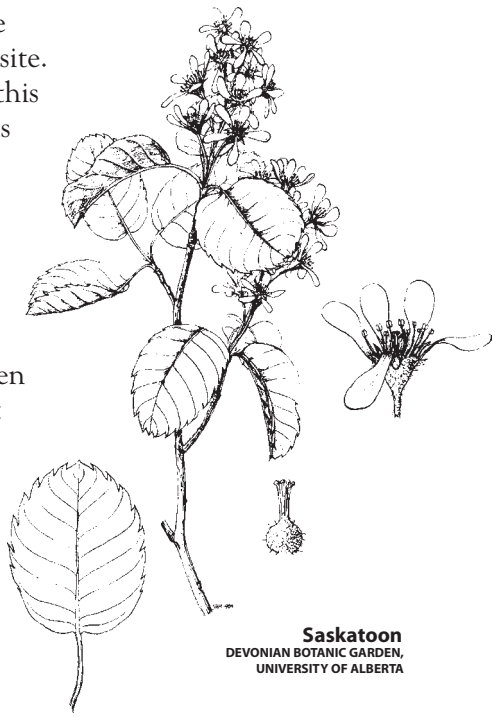
In spring:

1. check plants every 2 days once flower buds start swelling
2. become familiar with the definitions of first and full bloom (and for some, leaf size) for your plant
3. optional: do sketches, or take photos of the same plant or branch before, during and after bloom
4. check your chosen plants: when first bloom happens, note date, weather for week before flowering, etc. (see data form in Key Activities, page 2-13) and report on web data form using your registration number
5. do the same when full bloom occurs

6. check the web to see your school's data posted in tables and maps, as well as other schools' or observers' data
7. know that your contributions to this environmental monitoring network are greatly appreciated!

WHAT IS PLANTWATCH?

Plantwatch is a phenology program. Phenology is the study of the seasonal timing of events in the lives of plants and animals. This program links students and the public as "eyes of science," tracking the green wave of spring. Observers select one or more of the key indicator plants and report their bloom times using the Internet. These flowering dates are posted in tables and maps on the Plantwatch website. The purpose of this Teacher Guide is to help teachers involve their students in the Plantwatch program. Most of the contents have been written for teachers, but can be used directly in class. This guide provides information on how to observe and report flowering dates. It presents some exercises on how to use Plantwatch in class work (science, mathematics, social studies and language arts), for grades 4-12.



Saskatoon
DEVONIAN BOTANIC GARDEN, UNIVERSITY OF ALBERTA

PLANTWATCH IS GROWING!

The program is expanding rapidly. Nova Scotia started their provincial Plantwatch in 1996, and Newfoundland in 1998. Over the coming year, Environment Canada's Ecological Monitoring and Assessment Network will be hosting the Plantwatch WebPages and the Canadian Nature Federation will be promoting the program. Most provinces and territories now have coordinators and together we have agreed on 15 plant species that are useful across much of Canada. The regional coordinators will tailor the program to their areas by adding plant species specific to their ecoregions.

This teacher guide was written over the years 1996-2001 and some of the Connections and Appendices are best adapted to use by teachers and students in the Prairie Provinces. In future we plan to add more material to the program which is specifically adapted for use in the different provinces and territories.

WHY WATCH PLANTS?

The Plantwatch program engages students and the public as active participants in the collection of scientific data. By working in partnership with research scientists, Plantwatch students and teachers are able to contribute their observations to the development of new scientific knowledge. The process of scientific inquiry here is linked to an important real-life issue–the effect of climate change on local plant life. By encouraging careful observation of plants within the local environment, the Plantwatch program helps students develop a lifelong appreciation of the natural world. It also helps students use computers in a meaningful way.

The Plantwatch program began in 1995, based at the Devonian Botanic Garden, a research and educational facility of the University of Alberta. This is also the home base for a longer-running phenology program, the Alberta Wildflower Survey, which began in 1987. The Alberta survey continues to research flowering times for 15 common wildflowers, with about 200 volunteers annually sending in data sheets by mail, fax or e-mail.

To be useful as key indicator species for spring phenology, selected plants must have certain qualities. These include: perennial growth, widespread distribution, ease of recognition by the public, lack of look-alike species and a short spring bloom period.

In the coming year there will be more species added to the Plantwatch program, for a total of 15 indicator plants which are useful for observations across much of Canada. For this teacher guide we have included information on 13 plant species. Two species below (lilac and dandelion) are plants introduced to North America when settlers from Europe arrived. The others are native[1] (or wild) plant species, which means they were here long before the settlers arrived.

We suggest that a teacher and class begin Plantwatch by selecting one of the following plants for observation. Check the map or text on distribution with each plant description to see which plants occur in your area.

The Indicator Plants

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

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

Aspen poplar (*Populus tremuloides*); tree, across Canada

Larch, tamarack (*Larix laricina*): tree, across Canada

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

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

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

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

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

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

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

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

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

HOW IS THE DATA USED?

The timing of flowering and leafing in spring is largely in response to how warm the weather has been before these events. Studies have been started to see how much warmth (measured in heat units) is needed to get different plant species to flower. Spring phenology data for plants is essential to help answer the question, "With the predicted global warming, is spring arriving earlier?" Some exciting trends have already been discovered. In Edmonton, Alberta the flowering of aspen poplar trees is happening about a month earlier now than it did a century ago!

By collecting long-term phenology data, we can track plant responses to changes in climate.

Phenology can also help farmers more accurately time their activities. As plants and insects are both developing in response to spring temperatures, it will be very useful to use bloom times to predict the best timing for control of pests. By treating weeds or insect pests at their most vulnerable stage, farmers can use less pesticide and, thereby, boost their profits while minimizing environmental impacts. Research scientists have begun to look at the link between flowering times and the appearance of agricultural pests such as woolly elm aphids (which infest the roots of saskatoon plants) and grasshoppers (which consume cereal crops and rangeland).

Plantwatch's flowering information can also help ranchers protect rangeland

[1] MANY TERMS OR WORDS IN THIS GUIDE (SUCH AS NATIVE PLANT) ARE DEFINED IN THE GLOSSARY (SEE APPENDIX 1).

and maintain maximum plant growth. For example, the best time in southern Saskatchewan to put cattle on the range is when wild rose starts to flower, usually 50 days after prairie crocus appears.

In addition, foresters can use the data to correctly time seed-collection field trips, or to treat insects with a biological control. Spring flowering dates can help wildlife managers by answering such questions as, "Will the deer population increase this year?" We know that in the aspen parkland, more deer fawns survive in years with early springs. In the field of human health, pollen warnings can help those with allergies prepare in advance. For tourism and parks departments, these flowering dates can be used to predict the best times to photograph flowers, or to predict the behaviour of bears and other animals whose movements depend on the growth stage of their plant food. Because plant and insect development are linked, bloom times can even provide information on when to go fly-fishing!

Do your students have access to one of the species we are studying? Lilac is found in gardens or near homes. Dandelion is everywhere! For the following native plants, check the map or text distributions to see if they occur in your area. Aspen poplar is widespread and flowers very early. Larch (tamarack) trees are found in wet muskegs and forests across Canada; they also flower very early. Prairie crocus occurs in sandy soils in the west and northwestern parts of the continent, often in open pasture that has never been ploughed. It is a harbinger of spring, often starting bloom the same time as the aspen. Bearberry prefers sunny sites on infertile dry soils, across Canada. Saskatoon is often found along the edges of forests, or valleys. Western trillium occurs in northwestern forests. White trilliums bloom in beech-maple forests in eastern North America. Labrador tea grows in damp areas in the boreal forest. Bunchberry is found in boreal or broad-leafed forests. Purple saxifrage is often found high in the mountains or arctic tundra; it is one of the earliest blooms to appear after the snow. White dryad prefers open areas in mountains or tundra.

PARTICIPATION IS FREE

There is no charge to participate in Plantwatch. The webpage has all the basic information on how to participate, register, recognize plants and flowering stages, and how to report when the plants bloom. New flowering dates are posted regularly in tables and maps.

Interested teachers please contact

Elisabeth Beaubien
National Coordinator: Canada Plantwatch
Devonian Botanic Garden
University of Alberta
Edmonton, AB
Canada T6G 2E1.

E-mail: e.beaubien@ualberta.ca

Phone: (780) 987-5455

Fax: (780) 987-4141

or

Laura Frost
Coordinator: Alberta Plantwatch

E-mail: plant@ualberta.ca

Phone: (780) 987-3054

Fax: (780) 987-4141

Website: **www.devonian.ualberta.ca/pwatch**

Join us for Plantwatch!

Plantwatch seeks observers internationally for lilac and across North America for all the key indicator plant species.