On The Fringe
Journal of the Native Plant Society of Northeastern Ohio

# What's in a Name?
## *A Primer of Plant Taxonomy*

**By Elizabeth Peters,** Director of Publications at the Brooklyn Botanic Garden

Plant names change. It's something I never considered before I started working in a botanical publications department. But it's a pervasive pitfall in writing about plants, and gardening writers need to watch where they step.

Take this issue of *Plant & Garden News* as an example. We spotlight the umbel family, which is sometimes called Umbelliferae and other times Apiaceae. Which is the correct name? Both, it turns out: This is one of eight plant families for which synonymous names are allowed.

### Where Do Plant Names Come From?

Many plants received their scientific names in the mid-18th century, when Swedish naturalist Carl Linnaeus set out to catalog all the plants then known. His flora, published as ***Species Plantarum*** in 1753, named close to 8,000 plant species and marked the beginning of modern botanic nomenclature.

Prior to Linnaeus, plant names were usually long and unwieldy Latin descriptions of a plant's character known as *differentiae specificae.* Linnaeus organized his flora by genus, streamlined *differentiae* to what he considered the most essential terms, and designated a *nomen triviale,* a single-word descriptor (or epithet) unique within the genus, for every single taxon of plant. Together, the genus name and epithet formed a unique, binomial species name. This simple and elegant convention of binomial nomenclature caught on rapidly and became the accepted form of naming species throughout the world.

Over the next century various natural history and scientific societies debated ways to further standardize the naming of taxa. In 1867 the Swiss botanist Alphonse de Candolle published the first international rules of botanical nomenclature, which gave rise to today's International Code of Botanical Nomenclature (ICBN), now in its 13th edition. (There are separate codes governing the naming of cultivars, animals, bacteria, and viruses, each with the goal of assigning to taxa one valid name that is accepted worldwide.)

The ICBN is not a list of plant names but rather a clarification of the rules and recommendations by which names are assigned, with an appended list of exceptions to these rules. Every six years at an International Botanical Congress (IBC) about 300 botanists and taxonomists convene to hash out proposals for amendments to the rules and argue about plant names.

You might think of scientists as mild mannered, and those who choose to study flora as likely to be calmer than, say, nuclear physicists. But things can get pretty heated when botanists gather to talk about plants—particularly when names are at stake.

### What's Your Type?

The ICBN does not name plants—that task falls to individual scientists and plant pursuers. In fact, anyone can propose a name. In order to name a newly discovered species, or rename an existing one, one simply publishes the name along with a plant description in botanical Latin, then waits for it to catch on. In scientific publication, an author's name is generally appended to each plant name as a citation.

When a particular species is referred to by more than one acceptable scientific name, the ICBN decrees that the earliest published name is the correct one. Linnaeus' name is therefore attached to many binomials because, again per the ICBN, ***Species Plantarum*** gave him authorship of all the names he set forth, even though in most cases he was not assigning new names but reporting the scholarly name that had been recognized for centuries.

Since the 1930 IBC, names have been required to be associated with a "type"— a preserved plant specimen that embodies the character of the taxon being named and thus serves as a reference to confirm the identity of the species. The preserved type specimens are archived in herbaria around the world, where pretty much anyone who's interested can examine them.

(*continued on page 3*)

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## Program Schedule Winter/Spring 2008

**Jan. 4, Fri: ORCHIDS OF OHIO** - **7:00 PM**. – **The West Woods Nature Center, Geauga County** *(9465 Kinsman Rd., Novelty 44072***).** NPS board member Tom Sampliner presents a pictorial journey through the seasons with Ohio's native orchids and their habitats. Directions: Take St. Rt. 87 east from Rt. 306 approx. 2 miles to the park entrance on south side of the road***. No registration required.***

**Feb. 10, Sun: THE BEST IN BLOOM – 3:00 PM. – The West Woods Nature Center, Geauga County** *(9465 Kinsman Rd., Novelty 44072)*. Discover the diversity of flora found around Ohio and elsewhere as members share their best photos, including field trips from 2007. Directions: Take St. Rt. 87 east from Rt. 306 approx. 2 miles to the park entrance on south side of the road***. If you are bringing slides/photos to share, please call Ami Horowitz to add your name to the program: 216-921-9242.***

**Mar. 2, Sun: NATIVE AND NEAT: WILD PLANTS IN CIVILIZED AREAS, – 1:00 PM**. - **Chagrin Falls Public Library** *(100 East Orange St., Chagrin Falls 44022, just east of Main St.)* - NPS board member Kathryn Hanratty of Enviroscapes Landscape Designs shares how you too can landscape with native plants, including reasons for using natives, basic design information, and suggestions on some natives that are easy to use and readily available. No registration required.

**Mar. 9, Sun: SKUNK CABBAGE WALK – 1:00 PM. - South Chagrin Reservation Polo Field** parking area, Rt. 87 entrance. Skunk cabbage blooms long before other spring wildflowers. Search the wetland areas near the Chagrin River for this unusual plant. Directions: Take Rt. 271 to the Chagrin Blvd. exit. Head east on Rt. 87. Continue just past Chagrin River Road to the parking area on the right. Call Ami Horowitz to register: 216-921-9242.

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## Global Invasive Species Initiative

http://tncweeds.ucdavis.edu/index.html

The Global Invasive Species Initiative is The Nature Conservancy's response to abating the damage caused to native biodiversity by the human-facilitated introduction of non-native, harmful invasive species. This web site provides many resources designed to help all conservationists deal most effectively with invasive species.

(***What's in a Name****? – continued from page 1*)

For example, the plant that Linnaeus called *Apium petroselinum,* commonly known as parsley, was reclassified in 1768 as *Petroselinum crispum* by the British botanist Phillip Miller. Because the type system did not exist in 1768, a retroactive type specimen (or "lectotype") was later assigned to the species.

This lectotype resides in the George Clifford Herbarium of the Natural History Museum, London, which you can visit by appointment. In fact, because Linnaeus cataloged George Clifford's collection in the 1730s, it's possible that he handled this very plant while he composed his species diagnoses.

Herbarium visitors can even dispute the identification of a type by pasting a little card onto the specimen sheet. If the herbarium's curators agree with you, they may opt to amend the specimen's descriptive label. Otherwise, your annotation will remain in place for future researchers to take into consideration. Some herbarium records have dozens of annotations pasted onto them. It's like an analog version of a collectively written wiki.

### Plant Family Dynamics

Naming a plant specimen involves a few interrelated actions. First, there's identifying what group of plants the specimen belongs to ("taxonomy"). Then there's determining the correct way to refer to that group of plants ("nomenclature"). "Plant systematics" generally comprises these two actions, but the three terms are somewhat fungible, and each seems to be used to describe both a system of classification and the act of classifying within that system. Linnaeus and his predecessors used physical (or morphological) characteristics to group plants, and this held sway until the 1990s, when advances in molecular systematics began to offer new opportunities to study plant relationships through genetics. In some cases genetic discoveries reinforced the suppositions made through prior examination of form and structure, but in others DNA analysis showed that plants formerly thought to be related were actually quite different. Taxa were then reclassified—and therefore renamed.

### Genera X

Plant names are changing at an accelerating pace, as new species discoveries and genetic information provoke new understandings of plant relationships. In many cases, plants formerly grouped under a single species are reclassified into distinct species. This recently happened with *Acacia,* a large genus of trees found in Australia, Africa, the Americas, and Asia that was originally described by our friend Phillip Miller in 1754. Recent genetic research identified *Acacia* as a polyphyletic grouping, meaning one without a recent common ancestor, prompting proposals to segregate *Acacia* into five different genera.

Controversy sprang up over which plants would retain the genus name *Acacia.* Because the genus type is of one of the African species, the ICBN dictated that the name *Acacia* be conserved for the African species, and therefore the 956 unrelated Australian species would adopt new names under a new genus *(Racosperma).* (It's as if the U.S. decided there could be only one city called Portland, and Maine and Oregon had to duke it out.) However, the Australians raised strong objections, not only because of the quantity of plants affected but also because of their perception of *Acacia* as an iconic Australian species with historical and cultural significance.

Australian botanists proposed changing the type specimen attached to the *Acacia* genus to a specimen from one of the Australian species. This retypification would allow the genus name to be conserved for the Australian plants while a new one would be assigned to the African group.

The ICBN Committee for Spermatophyta (seed-bearing vascular plants) and then the General Committee voted to recommend the proposal, which then was brought to the Nomenclature Section. After a heated discussion, Australia won the right to keep the name *Acacia.* Ironically, Australia will host the next IBC, where this aspect of the code might again be challenged.

### By Any Other Name

In a perfect world, there would be one true and accurate name for each plant. But this isn't the case. Scientists debate systems, classifications, identities, and exceptions. Names will change at an increasing rate as molecular analysis provides new insight into plant phylogeny.

In the end, all we really need to know is that it's okay to use Umbelliferae (Antoine Laurent de Jussieu, 1789) and Apiaceae (John Lindley, 1836) interchangeably, because the ICBN says so (Art. 18.6). And it really doesn't matter whether gardeners call umbels by one of these names, or the parsley family, the carrot family, or even the parsnip family. As long as they can distinguish parsley from fool's parsley!

Reprinted from ***Plants & Garden News***, Brooklyn Botanic Garden, Fall/Winter 2007-8

# The Sun-Gold Tree: The Eastern Larch

**Robert L. Tener**

The Eastern Larch is a most unusual tree, being deciduous and having many names. I first saw the Eastern Larch in late October when my wife and I went for a drive along the Peninsula Road in Akron, Ohio, where a stand of 20 or 30 trees had been planted. Being late in October, the larches had already turned their rich sun-gold color prior to dropping their needles. I was transfixed, not quite knowing what I was looking at. When I found out that they were larches, I began to collect them and now have on my private arboretum six Eastern Larches, two Japanese Larches, two Western Larches, and one weeping Larch.

The Eastern Larch has several names, being called Tamarack, Hacmatack, Hacmatac, Hackmatack, American Larch, Black or Red Larch, Alaska Larch, Cypress, and even Juniper. Botanists and horticulturists refer to it as *Larix laricina* (DuRoi), K. Koch. Its generic name, *Larix,* is the ancient Latin or Celtic term for the European tree, and the species name, *laricina,* means like a larch, a curious redundancy.

This is a tall pyramidal conifer that can reach 40 to 90 feet in height and 1 to 3 feet in diameter. Sparse of limb and foliage, it rarely exceeds 50 feet with a girth of 2 feet. At maturity its sparse crown and unsymmetrical appearance catches the eye immediately. Its slender, triangular, bright green needles (3/8 to 1 inch long) form a dense cluster on short lateral knobs. In early fall its needles turn an oat-yellow creating a sun-golden pyramid tree. Then, unlike most conifers, later on it sheds all of its needles to stand throughout winter looking quite dead. But don't cut it down! You will be rewarded. In early spring globular shaped male flowers appear dressed in pale yellow; then, not to be outdone, female seed-bearing cones appear in purple-rose hues. These stand erect but are only 1/2 to 3/4 inches tall.

Preferring wet lands and northern slopes, the Eastern Larch covers the northern swamps of Newfoundland, Labrador, and the Hudson Bay area west across the Rockies. Near the Arctic tundra it is small. It grows as far south as northern New Jersey and Pennsylvania and all the way west to Minnesota. It is found in swamps and other wet areas in upper northeastern Ohio from Ashtabula west to Cuyahoga and from Trumbull southwest to Wayne. A rapid grower, it will thrive on bottom soil, clay, clay loam, or sandy loam soils and likes the glacial lake borders in Summit, Portage, and Stark counties

It is excellent for poles, posts, and railroad ties as its wood is heavy, hard, resinous, and almost indestructible. Producing straight poles free of large knots, it may under proper conditions outlast oak. When used for tables and cabinets, its wood takes a high polish, though the Western Larch is superior for furniture. It has fibrous tough roots which in the past were used as threads by Indians to sew their canoes. Rich in tannins, the European species yields Venice Turpentine used in veterinary work. From the summer needles a sweet medicinal gum can be obtained, and from its wood is distilled ethyl alcohol. Its seeds, needles, and inner bark provide winter food for sharp tailed and ruffed grouse, black and red squirrels, rabbits, porcupines, and deer. At the same time its bare branches in dense stands provide shelter for over-wintering birds. It makes a beautiful tree for lawns and parks.

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Robert L. Tener is a member of the Native Plant Society of Northeast Ohio. He lives in Rootstown, Ohio.

*Botany 101, Lesson 28*

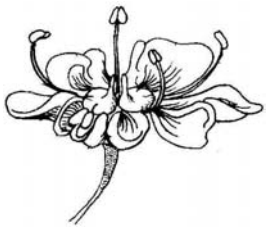
# Apiaceae = Umbelliferae = Carrot Family

**Rebecca Dolan, Ph.D., Friesner Herbarium, Butler University**

Worldwide, the carrot family boasts 275 genera and 2,850 species. Indiana has 28 genera and 37 species.

## Characteristics

Aromatic biennial or perennial herbs with hollow, furrowed stems.
Leaves are compound and alternate with sheathing bases.
Inflorescence is an umbel, with flowers opening from outer edge to center. Flowers with 5 parts, often with yellow or white petals.
Stamens alternate with the petals.
Fruit is a schizocarp, a dry fruit that splits down the center to yield two 1-seeded parts.



Carrot Flower

## Economic Importance

Parsnips, parsley, carrots, celery. Seeds with aromatic oils: caraway seeds, dill, coriander, cumin, anise, fennel, chervil.

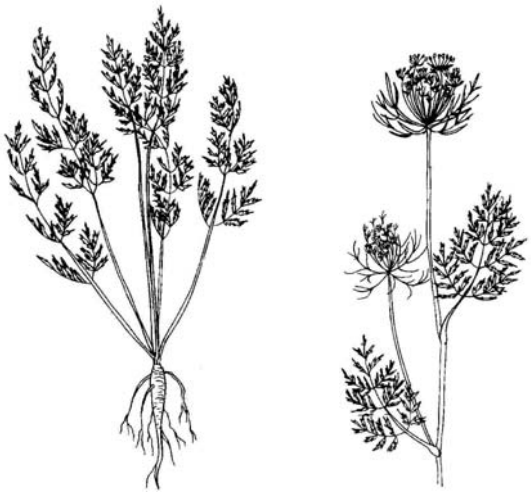
## Some Native Apiaceae

**One of our earliest flowering plants:**
Harbinger-of-spring, *Erigenia bulbosa*

**Common summer bloomers in the woods with mostly inconspicuous flowers:**
Aniseroot, *Osmorhiza longistylis*
Black-snakeroots, *Sanicula* spp.
Honewort, *Cryptotaenia canadensis*
Sweet-cicily, *Osmorhiza claytonii*

**A few prairie plants:**
Golden alexanders, *Zizia aurea*
Rattlesnake master, *Eryngium yuccifolium*

**Marshes and moist woods:**
Cow parsnip, *Heracleum sphondylium*
Water hemlock, *Cicuta maculata*
Poison hemlock, *Conium maculatum*
Purple-stemmed angelica, *Angelica atropurpurea*
Water parsnip, *Sium suave*



**Carrot**
**First Year** **Second Year**

## Non-native

Queen Anne's lace, *Daucus carota.* This is the distinctive wild carrot, a roadside and old field weed. Belongs to the same species as the carrot of commerce.
Wild parsnip, *Pastinaca sativa.* Avoid this plant! It is a biennial most easily identified by its flowers, but it also has distinctive leaves when you know what to look for. Many years ago INPAWS Vice President Ellen Jacquart and I were measuring royal catchfly *(Silene regia)* plants for a demographic study. These prairie plants persist in Indiana in some roadside ditches. Ellen and I broke out with a horrific rash on our arms. Turns out wild parsnip was also in the ditches. It can cause a contact dermatitis similar to poison ivy but without the itch. Weepy blisters appear after exposure to the plant, triggered by sunlight. I've read that beggars used to rub themselves with the plant in its native Europe to look pathetic. I now recognize the leaves.

Illustrations from J. Glimn-Lacy & P.B. Kaufman, *Botany Illustrated.* Chapman & Hall, 1984.

# Buckeye Fever!

## Greg Payton, Dawes Arboretum Plant Records Specialist

Fall is here and the tradition of crafting those buckeye necklaces in support of our favorite football team is in the works.

Both buckeyes and horse-chestnuts belong to the genus *Aesculus* in the family Hippocastanaceae (the horse-chestnut family). First things first, the horse-chestnut is not a chestnut. The true chestnut is in the genus *Castanea* which is in the Fagaceae (beech family). Horse-chestnuts and buckeye nuts have a superficial resemblance to a chestnut and that is where the similarity ends.

The differences between buckeyes and horse-chestnuts are:

- Horse-chestnuts are usually larger trees than buckeyes.
- Horse-chestnuts have seven leaflets in a palmately compound leaf whereas buckeyes usually have five (but can have nine).
- The leaflets on buckeyes are usually more tapered at the tip while horse-chestnuts are wider at the tip.
- There are native species of buckeyes in Ohio (primarily the Ohio buckeye) while horse-chestnuts are primarily from Europe.
- The buds of horse-chestnut are sticky while buckeyes' buds are not.
- Horse-chestnut flowers are typically white to pink and red while buckeyes are most often greenish-yellow.
- The nuts of buckeyes are mostly all brown and shiny, as if varnished, while horse-chestnuts have a much larger dull patch (often half the nut).

The following are some of the buckeyes you can grow to have a never ending supply of necklace material.

**Ohio buckeye** *(Aesculus glabra):* The state tree of Ohio. A small tree up to 30' tall. Common name is derived from its nuts which resemble the eye of a deer. Distinguished by smooth, white bark on older trees. Medium to dark green, lustrous foliage. Flowers open in mid-May as upright, greenish yellow clusters. Autumn foliage is usually yellow but occasionally brilliant orange-red. Easy to recognize in early spring as it is one of the first trees to leaf out.

**yellow buckeye (syn. sweet buckeye)** *[Aesculus flava,* (syn. *Aesculus octandra)]:* Considered by many as the most beautiful of the larger growing buckeyes. This deciduous tree develops an upright-oval crown reaching 60-75' in height and up to 50' wide. Upright panicles of greenish yellow flowers bloom in May. Its palmately compound leaves do not suffer summer defoliation as do many other buckeyes. Leaves turn pumpkin-orange in fall. The dark brown nuts are covered in a smooth, tan husk. Bark on mature trees is grayish brown and somewhat plate-like.

**red buckeye** *(Aesculus pavia):* A small tree reaching 10-20' in height with equal spread. Beautiful red flowers in May in panicles 3-6" long. Excellent specimen plant for the home landscape.

**painted buckeye** *(Aesculus sylvatica):* An understory plant reaching 10-15' tall. Flowers appear in April or early May in panicles 4-8" long, and vary in color from yellow-green to pink. It requires rich, moist soil, high in organic matter. Grows effectively in shade, but will tolerate full sun.

If you want to grow your own buckeyes, the nuts perish quickly and need to be planted immediately in the fall or refrigerated until spring. Most species grow quickly and can produce nuts in 5-10 years. Many species suffer from a fungus disease which causes the foliage to turn brown and drop early. While this is unattractive in the fall, it does not cause the tree undue stress and it will still flower and fruit just fine.

Reprinted from ***Happenings***, newsletter of the Dawes Arboretum, October 2007

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## Ohio Prairie Association Web Site

The Ohio Prairie Association is a non-profit volunteer organization that promotes knowledge, appreciation, conservation, restoration, management, and expansion of Ohio prairie communities and their native plant and animal species to individuals, conservation organizations, public agencies, educational institutions, and others with an interest in native ecosystems.

**www.ohioprairie.com**

# The Bladdernut

## Tom Sampliner

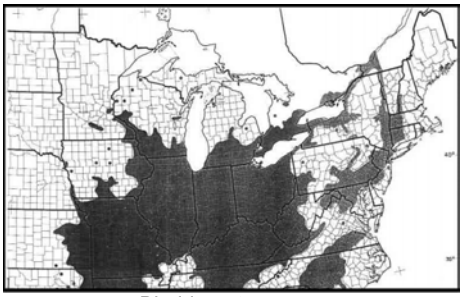
Ohio has a shrub commonly called the bladdernut, *Staphylea trifolia* L., that can be seen in our area to good advantage along waterways. It is so called because of the unusual fruit, which deceptively appears as if it were a good sized brown nut, but in truth is a softer casing that covers the three capsular seed vessel. We can see this tree along our pathway at the Geauga County park, The Rookery.

Surprisingly, this species is one of only two found in North America. The genus mate is located in California. The genus is important enough to warrant giving the entire small worldwide family the root for the name: the Staphyleaceae or Bladdernut Family. The family has 6 genera with 25 species that are trees or shrubs. They are distributed in temperate as well as subtropical areas in Europe, Asia and North America. All feature the inflated bladder-like fruit. Commercially, these woody plants are not of much value, though there seems to be enough visual appeal that they are in cultivation as ornamentals. Apparently, the combination of bright green compound leaves with clusters of small white flowers that ripen into the aforementioned fruits are enough for aesthetic appeal. Notice that in recent years, cultivars have been developed making them hardy enough to withstand abuse as plantings in shopping center parking lots.

Our only native species, called American bladdernut, is partial to woodland thickets especially alongside waterways. It is found from Quebec south to Georgia then west to Kansas and Nebraska. The leaves are trifoliate compound, meaning two lateral leaflets then the odd end leaflet between them. In spring to early summer, expect clusters of small white five part flowers. These seem to attract their fair share of insect visitors. Leaves turn pretty fall colors, mostly yellows. This contrasts nicely with the brown fruit capsules which are somewhat oversized for such a tree size. They make a handsome addition to any pathway adjacent to a waterway.

Tom Sampliner is a member of the Native Plant Society of Northeast Ohio, a botanical photographer and tour guide.

Bladdernut flower



Bladdernut range

Bladdernut fruit

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# On the Road: Focus on Eastern Ontario

## by Lorraine Johnson

### Purdon Conservation Area

The existence of this large orchid colony is due to the vision of Joe Purdon, who originally owned the land as part of his farm and who, in the late 1930s, discovered a few dozen showy lady's slipper orchids growing there. By controlling the water levels, thinning the brush and hand-pollinating the plants, he encouraged the colony to increase and thrive so that today there are more than 16,000 showy lady's slipper orchids on the site. In 1984, Mississippi Valley Conservation acquired the land and pledged to preserve it as a publicly accessible natural area.

Although the pink and white orchids, which bloom in mid-June to early July, are the showpiece of the Purdon Conservation Area, there are many other interesting plants to see: northern green orchid (*Platanthera hyperborea*), leafy white bog orchid (*Platanthera dilatata),* tufted loosestrife (*Lysimachia thrysiflora*), slender cotton-grass (*Eriophorum viridi-*

*carinatum*), pitcher plant (*Sarracenia purpurea*). As well, at least 50 species of birds inhabit Purdon, including the swamp sparrow, veery, and red-shouldered hawk. A 4-metre wooden boardwalk through the heart of the orchid colony allows easy access and protects the soil and plants from trampling.

*Directions to Purdon from Lanark, Ontario: Take Highway 511 for 5 km north of Lanark; turn left onto County Road 8 and drive for 12 km; turn right onto Concession Road 8; Purdon Conservation Area is 2 km ahead on the right. Open* to *the public year-round. To confirm orchid blooming conditions, call the Mississippi Valley Conservation Foundation, (673) 259-2421; e-mail* info@mvc.on.ca *; http://www.mvc.on.ca/areas/purdon.html.*

**Fletcher Wildlife Garden**

A long-term project of the Ottawa Field Naturalists' Club, the 7-hectare Fletcher Wildlife Garden is designed as a series of connected habitats to show homeowners how to attract wildlife to backyards. Demonstration gardens include an amphibian pond, butterfly meadow, backyard garden, hedgerow, old field, and new woodlot. Self-guided trail brochures allow visitors to tour the entire garden on the Bill Holland Nature Trail. There are also regular educational events, guided tours, and a well-stocked Interpretive Centre. For more information, see the website http://www.ofnc.ca/fletcher.php, e-mail fletcher@ofnc.ca, or call (613) 722-3050

*The Fletcher Wildlife Garden is located off Prince of Wales Drive, south of the Dominion Arboretum, at Central Experimental Farm, Ottawa, Ontario.*
Reprinted from *The Blazing Star*, Newsletter of the North American Native Plant Society, Summer 2002

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The talk Doug Tallamy gave for our recent annual dinner lecture was one of the best we've had. His new book is scheduled to be published this month, and it should be high on any native plant lover's Christmas list.


## Bringing Nature Home
### How Native Plants Sustain Wildlife In Our Gardens

### Douglas W. Tallamy

The pressures on wildlife populations today are greater than they have ever been and many gardeners assume they can remedy this situation by simply planting a variety of flowering perennials, trees, and shrubs. As Douglas Tallamy points out in this revelatory book, that assumption is largely mistaken. Wild creatures exist in a complex web of interrelationships, and often require different kinds of food at different stages of their development.

As Tallamy has confirmed through extensive research, there is an unbreakable link between native plant species and native wildlife. When native plant species disappear, the insects disappear, thus impoverishing the food source for birds and other animals.

Fortunately, there is still time to reverse this alarming trend, and gardeners have the power to make a significant contribution toward sustaining biodiversity. By favoring native plants, gardeners can provide a welcoming environment for wildlife of all kinds.

Healthy local ecosystems are not only beautiful and fascinating; they are also essential to human well-being. By heeding Douglas Tallamy's eloquent arguments and acting upon his recommendations, gardeners everywhere can make a difference.

Douglas W. Tallamy is Professor and Chair of the Department of Entomology and Wildlife Ecology at the University of Delaware in Newark, Delaware. Chief among his research goals is to better understand the many ways insects interact with plants and how such interactions determine the diversity of animal communities.

**Book details**
**ISBN-13**: 9780881928549
**Price**: US$27.95, C$36.95, £17.99
**Format:** Hardcover
**Pages:** 288 pp.
**Dimensions:** 6 x 9 in (150 x 230 cm)
**Illustrations:** 308 color photos, 4 diagrams

**Publication Date**: October 31, 2007

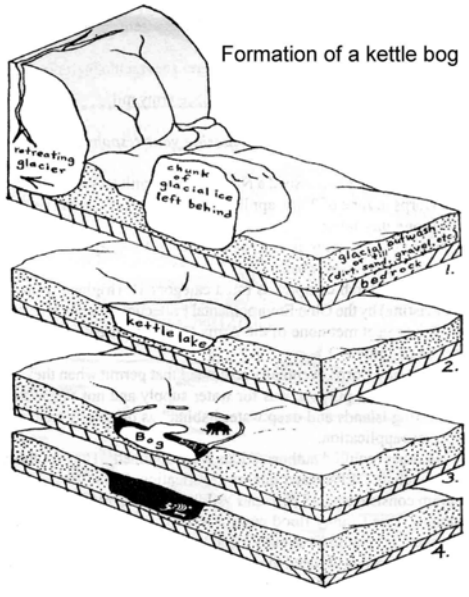
## Wetlands that Boggle the Mind

One of the most intriguing and exotic types of wetlands in our area is the kettle bog. Although these peculiar and fascinating habitats are now rare in Ohio, they were once fairly common. This is amazing, considering the special circumstances that have to exist in order for a bog to form.

First of all you need the vast continental glaciers that once covered northern Ohio. Second, you need to have a huge chunk of ice to break off the glacier as it retreats. Third, this marooned ice chunk must have its base surrounded by the soil, sand, gravel, and other material that flows out of the glacier as it melts and retreats northward. Fourth, when this ice chunk melts, leaving a steep-banked 20- to 50-feet deep depression or "kettle hole" in the glacial debris or "till," the lake that forms in this depression (called a kettle lake) must not have an inflow or outlet; it must derive all its water from rainfall (some of its water may also seep in through its sides from groundwater). This usually means that the kettle hole often more or less sits on fairly impermeable clay soils. Given these conditions, a kettle bog will usually develop.

What makes a bog different from a run-of-the-mill pond or lake? Since bogs lack water inlets and outlets, when the plant material that grows in them dies and decays, the products of this decay–including the acidic compounds–have no way to leave the system, and they build up and increase the acid levels. Also, since the system has little or no water movement, there is little opportunity for the oxygen that is depleted by decay to be replenished. Furthermore, because water flow is the major means of importing and exporting nutrients into and out of the system, bogs tend to be extremely nutrient-poor habitats; the major avenue of nutrient introduction for bogs is actually rainwater (the technical term for such a nutrient regime is *ombrotrophic,* which literally means "storm growth"). Nitrogen, especially, is in very low supply, and is a limiting factor for plant growth.

Many wetland plants common to our area (e.g. cattails) cannot grow in such an impoverished, acidic situation, and so many plant species which ordinarily cannot compete with such species have an opportunity to thrive in bog areas. These species include a number of grasses and sedges; cinnamon, royal, marsh, and Virginia chain ferns; poison sumac, gray birch, larch, buttonbush, mountain holly and winterberry (and the awful exotic European buckthorn, *Rhamnus frangula);* and many flowering herbaceous plants, including orchids and swamp loosestrife (a native species not to be confused with the alien, problematic purple loosestrife, which is in a different genus of the loosestrife family). Curiously, there are several members of the heath family (Ericaceae), including leatherleaf, cranberry, and highbush blueberry, commonly found in bogs. These plants are usually associated with such dry habitats as thin-soiled ridge tops among oaks and hickories. Their presence on bog mats, with their roots immersed in water constantly, is explained by the fact that they are adapted to nutrient-poor conditions that often accompany arid habitats, and also by the fact that the high acid content of bog water makes it difficult for plants to suck up water from this ionic osmotic gradient (think of Coleridge's *Ancient Mariner*, surrounded by "Water, water, everywhere/Nor any drop to drink;" these dry-adapted plants of the heath family are very adept at extracting water from "dry" environments, and a bog, because of its acid levels, is, biologically, actually a very dry environment for plants). And, if we add to this system, which has a tendency towards acidity in the first place, the presence of various species of sphagnum moss, which actually add more acid to the system through their metabolic pathways, we end up with water that can be as acidic as vinegar - a clear but coffee-colored brew that will not support fish or insects or most mollusks; even the bacteria that help decay are largely absent from a well-developed bog. This inability of decay to take place accounts for one of the most intriguing – and dangerous – features of a bog: the bog mat.



Bogs are often referred to as "quaking" places; the seemingly solid surface of a bog is not at all the *terra firma* that it seems. The plants are often actually growing on a mat of mucky, partially decomposed plant material that is floating upon open water. It is sometimes difficult to gain the mat by foot because the bog is often bordered by a 5- to 15-feet wide moat, whose origin and ecology are not well understood (there is a theory that a successional dynamic of chemical and biotic factors actually cause the mat to migrate concentrically inward from the bog shore to the interior and then reform at the border and repeat the succession). The mat usually starts its existence as clumps of swamp loosestrife (whose arching stems, once they touch back down to the water surface, grow roots and sprout new buoyant plant bodies) which soon sport a matrix of sphagnum, and then communities of St. Johnsworts, bugleweeds, sedges, ferns, and so on. It is a singular and entrancing experience to stand waist-deep in a apparently solid foundation of vegetation in bog and have the bushes and small trees quake up and down along with you when you bounce on the mat; it's like walking on top of a vast water bed. Many a mastodon, woolly mammoth, and giant ground sloth doubtless found the experience not entrancing but fatal when, as they foraged sanguinely over these lush areas, the ground parted beneath them and then closed above as they were swallowed by the secret deeps of the bog.

Eventually, over thousands of years, the mat thickens until the entire bog is filled with its peat (bogs in Ireland have peat deposits so deep that they have been pressed into bituminous coal at their bottoms; these deposits are mined and used as fuel in Irish stoves). A number of skeletons of Pleistocene animals have been discovered in Ohio when these dried-up, defunct bogs have been mined for their peat. In Celeryville, near Willard, Ohio, water-hungry crops such as celery and lettuce are grown on senescent boggy areas which still supply plenty of water to the crops from below – even in times of drought, for this peaty old bog mat material (a completely organic soil known technically as Carlisle muck) acts like a sponge and holds water like nobody's business. Old bogs, if they had not been destroyed, would probably have a significant mitigating effect on local ground-water supplies in times of drought.

Some of the most glamorous inhabitants of our bogs are the carnivorous sundews and pitcher plants. These organisms have evolved means of supplementing the meager supplies of nutrients, especially nitrogen, available to them by the adaptations that allow them to digest nitrogen-rich insects. The pitcher plant *(Sarracenia purpurea),* often tucked down amid taller plants on a sphagnum hummock, has 2- to 6-inch high leaves that wrap around and join to form a pitcher-like structure which contains a clear liquid that is attractive to many insects such as flies and mosquitoes. But the inside of the pitcher is lined with downward-pointing hairs which prevent the insect's escape. It keeps landing back down in the brew it the bottom of the pitcher which contains a digestive enzyme; thus does *Sarracenia* render to itself snacks succulent with nitrogen. Incredibly, there is a species of mosquito which is not only impervious to the digestive liquid; it actually *lays eggs* in the stuff! The plant is most conspicuous when on a 2-foot high stalk, it grows its single, 2-inch, other-worldly flower with a broad, button-like pistil and wide purple-brown sepals and petals.

The 2-inch high sundews *(Drosera rotundifolia* and the state-endangered *D. intermedia* with its more oblong leaves) also grow on sphagnum hummocks in bogs. The round reddish-green pad-like leaves have many small hairs that each exude a sticky drop of digestive juice at the tip. Again, these tiny lollipops are attractive to ants and other small insects which get entrapped when the hairs bend around them, and they are stuck tight to the leaf and digested.

To walk out onto a bog mat is very like stepping through the doors of Dorothy's Kansas home into another world. It is truly an exotic and enchanting experience that even the most ecologically naive person cannot fail to appreciate. An important element of our state's history and culture, the bog experience should be available to every Ohioan. Unfortunately, past human activity, so incredibly disrespectful and insensitive to even the most amazing habitats and ecologies, has led to the destruction of so many Ohio bogs (most have been drained and/or mined for their peat) that the few that remain (only three classic larch bogs remain in the state, although there are a number of other bogs in glaciated Ohio) are protected by private conservation organizations such as The Nature Conservancy or by ODNR's Division of Natural Areas and Preserves as State Scientific Preserves, and as such are off limits to the general public. And this is as it should be. But if you ever get a chance to go on a supervised trip to Lake Kelso, or Triangle Lake Bog, or Lorain County's only bog, Camden Bog, the opportunity is *highly* recommended.

Reprinted from the ***FOWL Newsletter***, February 1994, reprinted May 2001.

# Desonier State Nature Preserve

**Heidi Hetzel-Evans, ODNR**

Change is inevitable, even in nature. A wonderful place to see nature in transition is Desonier State Nature Preserve in Athens county. The site was a gift from Henry I. Stein to the Division of Natural Areas and Preserves in 1974 as a living memorial to his sister, Marie J. Desonier.

The 491-acre preserve is bisected by Jordan Run, a tributary of the Hocking River and features steep topography, varying from 680 feet to 900 feet in elevation. This mixed mesophytic forested site is a landscape in transition; habitats range from old farm fields to mature forested areas. Large beech and oak trees are found in the cool, moist ravines while the drier uplands are dominated by hickory trees, typical of the region.

Spring delivers a nice array of woodland wildflowers, but in summer, the rugged two-mile trail is filled with vibrant blooms, including the deep red blossoms of cardinal flower. Other late summer flowers greeting visitors along the hard-packed trail include Virginia knotweed, ironweed, goldenrods and tall bell flower, as well as the deep green fronds of sensitive ferns.

Two interesting parasitic plants occur at Desonier. Like an orange garland draped over green leaves, common dodder (*Cuscuta gronovii*) is easily spotted clinging to woodland plants along the trail. After dodders come in contact with a host plant, they lose their roots and survive solely on the host plant. If you take a closer look, it's hard to tell where the dodders begin and end.

The other parasitic species here is a beloved symbol of holiday cheer, mistletoe (*Phoradendron leucarpum*). Desonier is the only state nature preserve to host this plant. Unfortunately for visitors, it does not grow along the trail.

Recently, thanks to donations to the Ohio Income Tax Checkoff Program, a section of the preserve's main trail was rerouted and enhanced by a boardwalk near the bridge crossing Jordan Run. Trails are occasionally moved or improved because of visitation impacts, however at Desonier, the trail change was necessary due to the impact of local inhabitants—beaver.

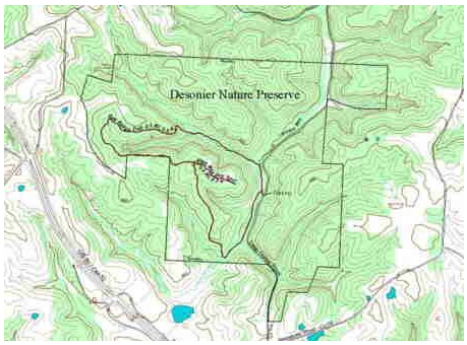
In recent years, a group of beaver have made Desonier their home. After seeing the handiwork of these mammals, it is easy to understand why biologists refer to them as a keystone species. Other than humans, there are few animals that can dramatically alter their environment in order to create their particular habitat. The wetland areas they create provide needed habitat for other species.

Using sticks, bark from hardwood trees, and Jordan Run, the beavers created a pond that stretches for several acres. It is ringed by the remains of trees felled by these industrious animals.

You may think you're familiar with the building skills of beaver, but until you see it a few feet in front of you, it's hard to imagine that most of the meticulous construction work was done at night. Beaver are nocturnal animals, which is why you can spot their den from the trail, but you may never see them.

At Desonier, the struggle between man (division staff) and beaver has ended. The newly routed trail will keep visitors out of flooded areas, while still providing an incredibly up close view of the beaver's den and handiwork.

What other changes lie in store for Desonier State Nature Preserve as the size of the beaver pond grows and the plant and animal life respond to the changing landscape is hard to say. Preserve Manager Randy Beinlich already has noticed a change in visitation—from those who are seeking a rugged hike in the woods to birders armed with binoculars as the pond attracts more migratory waterfowl each year.




**Location** (Coordinates 39.2385° -81.8675°):
**From Athens** - East on US Rt. 50, turn left on TR 117C, go .8 miles, turn left on CR 65, go .2 miles to where CR 65 turns left, proceed .7 miles to the parking area on the left.
**From Coolville** - West on US Rt. 50, turn right on CR 56 (Brimstone Rd.), go 1/2 mile to where CR 56 turns left. Parking lot is .7 miles on left. Parking is available in front of the gate.

Reprinted from Natural Ohio, Division of Natural Areas and Preserves, Fall 2006.

# Making a Prairie Garden

## Ohio Department of Natural Resources

Easy-to-grow prairie plants are among nature's most spectacular flowers, producing waist-high blooms of brilliant yellow, flaming crimson and soft lavender. Because of their extensive root systems, prairie plants can be the answer to problem garden spots. Once established, they require little maintenance.

Small patches of prairie grow throughout much of Ohio. They are relicts of a time 4,000- 6,000 years ago when a sustained warm, dry period caused the expansion of drought-resistant western plants eastward through Ohio to western Pennsylvania.

When the rain and cooler summers eventually returned, the eastern edge of the prairie again gave way to forest except for pockets of land where erosion, shallow dry soils or prolonged seasonal flooding prevented tree seedlings from developing. Today, because of agricultural expansion, only a few scattered prairie remnants survive.

### Choosing the Site

The first step in creating a prairie landscape is to choose the site. Except for needing full sunlight, prairie plants adapt to most conditions. Prairie plants grow in a diversity of soil, from clay to sand, and tolerate a wide range of soil fertility and acidity. Prairie plants also grow in dry shallow soils or marshy soils that most plants cannot tolerate.

Prairies are divided into three types: dry, mesic (moderately moist), and wet. Mesic and dry prairie plants prefer loose soil with good drainage. Wet species grow in poorly drained areas, where water stands after a heavy rain. Using a wide range of prairie species can help disguise problem areas, such as a boggy hollow or gravel hill.

### Planning

Once the site is selected, you may want to draw a planting plan. The following tips can help you design an attractive and healthy garden.

- Prairies are grasslands, but check local weed control ordinances before planting prairie grasses. Instead, you may prefer to concentrate on prairie wildflowers.
- Use native Ohio species whenever possible.
- Match plants to your soil–dry, mesic, or wet.
- Fit the size of the plants to the size of your area.
- Keep tall plants to the edges.
- Planting in curves, instead of rows, will give you a more natural look.
- Allow one species to dominate, then blend into another.
- Try for continuous color throughout the growing season.
- In a large prairie garden, you may want to make paths to walk along.
- You can turn your prairie garden into a wildlife oasis by selecting plants that are attractive to butterflies, birds and other wildlife.
- Nurseries that sell prairie seeds or books about prairie flowers can help you select the best species to suit your needs.

### Collecting Seeds

Many prairie plants are rare or endangered and are protected by law when growing on public land.

Seeds can not be collected from state nature preserves or wildlife areas.

Always obtain permission from landowners before collecting on private land.

Scout prairie areas during the peak blooming season, late July through August, to find which seeds you want to collect. Then draw a map or mark the flowers with a stake or tie.

Seeds should be collected when they become ripe in the fall. Leave enough seeds at the collection site for it to propagate itself. Digging a mature plant is not a good idea–its deep roots make it almost impossible to transplant.

### Preparing & Planting

Once collected, seeds should be spread on a screen to dry, which prevents mold. Remove any surrounding plant material from the seeds.

Because the seeds have to go through a cold spell to trigger germination, they have a better chance of germinating if they are planted in the fall, as soon as they become ripe. However, fall planting increases the toll taken by rodents, birds and insects during the winter, so plant more seeds than needed.

If you cannot plant when collected, store the seeds in a cool place until spring. During winter, you can use the trunk of your car or the crawl space of your house for storage. However, as soon as it starts to get warm, place them in the refrigerator. All it takes is one 80° day to break the germination cycle and the seeds will have to go through another cold spell before growing.

Hard dense seeds may need their seed coat scratched before germinating. Shaking them in a small coffee can lined with rough sandpaper is a good way to do this.

Prairie seeds need light to sprout. Once the garden is plowed and cultivated, just scratch the surface, then pack the seeds down by stepping on them.

### Maintaining Your Prairie Garden

The biggest challenge of prairie gardening is controlling weeds during the first two or three years. Prairie plants spend the first years of their life rooting while Eurasian weeds put all their energy above the ground, crowding out prairie seedlings.

You can control weeds in a variety of ways using herbicides, mulching or hand weeding. Planting a groundcover crop the first summer, like oats or annual rye, will take up space so weeds cannot crowd out prairie plants. Since they only live one year, they will allow prairie plants room to expand the second year.

Mowing and raking every spring also helps control weeds and promote growth. You should mow in late June with the blade set above 5-8 inches high. This will cut back early growing annual weeds, but not affect slower-growing prairie plants.

By the third year, there is little for the prairie gardener to do but enjoy their colorful landscape!

Prairie gardens require no covering, no pruning, no spraying, no irrigating and little, if any, fertilizing–saving prairie gardeners hundreds of dollars in maintenance costs and hours of labor.

### Selected References

*The Prairie Garden: 70 Native Plants You Can Grow in Town or Country*. J. Robert Smith and Beatrice S. Smith, The University of Wisconsin Press, 1980.

*Nursery Sources: Native Plants and Seeds*. Available from New England Wildflower Society. Garden in the Woods, Hemenway Rd, Dept FG, Framingham MA 01701.

### Sources of Prairie, Woodland and Wetland Plants and Seeds:

Quailcrest Farm
2810 Armstrong Rd
Wooster OH 44691
(330) 345-6722

Baker's Acres, Inc.
3388 Castle Rd NW
Alexandria OH 43001
(740) 924-6525

Prairie Moon Nursery
Route 3, Box 1633
Winona MN 55987
(507) 452-1362

Prairie Nursery
PO Box 306
Westfield WI 53964
(800) 476-9453

Prairie Ridge Nursery
9738 Overland Rd
Mt. Horeb WI 53572
(608) 437-5245

Applewood Seed Co.
5380 Vivian St
Arvada CO 80002
(303) 431-7333

Ion Exchange
1878 Old Mission Dr
Harpers Ferry IA 52146
(800) 291-2143

Shooting Star Nursery
444 Bates Rd
Frankfort KY 40601
(502) 223-1679

Ohio Department of Natural Resources publication, available at http://www.dnr.state.oh.us/prairiegarden/default/tabid/11838/Default.aspx

## Along the Road to Recovery:
# Habitat factors are the key to survival

Gardeners are familiar with the adage that success depends on having the right plant in the right place. They've learned the hard way that plants can't grow just anywhere. Most have particular preferred conditions, and if they aren't supplied, while they may hang on in the garden for a time, they never really thrive.

The same principle applies to working with vulnerable species in the wild. Investigating the nuances that define preferred or optimum habitat conditions (called habitat characterization) can be critical in reversing decline for imperiled species.

Restoring imperiled plants requires that both the vulnerable species (focus or target species) and its habitat (or plant community) be robust and self-sustaining. When beginning work with a species of conservation concern, it's essential to step back and try to place the species in the context of the plant communities of the area. Establishing a working concept of a plant's optimum habitat is a vital reference point for recovery. The chances for success in many areas of future conservation work are improved if the habitat is well-characterized and understood. It can help refine searches to find a few more populations to work with. It provides a foundation concept to guide decisions evaluating the most promising sites for conservation or restoration, and developing a workable range-wide strategy for long-term stability.

Tasks like identifying and managing threats, planning or implementing habitat restoration actions, restoring the plant populations themselves, fine tuning land management practices, and planning for future maintenance are actions at the community level that require a good functional understanding of the habitat type. Working in inappropriate or less than optimum habitats for an imperiled species increases the likelihood of failure, and the loss of valuable resources (i.e. plant genetic materials, labor, and goodwill) and funding would have been wasted. Plant ecologists working at the community level (synecologists) are the experts in helping decipher the "what" and "where" of optimum habitat for a species at risk. Like humans, many factors are important in determining where a plant lives. Plants respond to many different physical and biological parameters. Physical (abiotic) parameters like moisture, temperature, topography, elevation, exposure, geology and soils impose definite limits on plants, often influencing habitats over relatively large areas (a coarse scale ecological factor). Biological parameters also impose limits on plant growth, usually operating on a finer scale. Biological factors include the position, composition and structure of associated vegetation as well as interactions with other organisms like soil mycorrhiza, pollinators and seed dispersers. Vegetation reflects both environmental characteristics of an area, and the biological tolerances of different species.

On the landscape, under the influence of local physical and biological environmental conditions, plants aggregate into groups or suites of species (communities) suited to the conditions. These suites of species occur together consistently enough to form a recognizable pattern, repeated in multiple areas. These communities are called plant associations or habitat types. Over the years, plant community ecologists analyzing these species patterns have worked out local and regional vegetation classification systems for much of the country, with habitat type names and detailed descriptions of their structure and characteristics. Some vegetation classification work includes keys to habitat type identification, and many are mapped. Some habitat types are common and widespread. Others are uncommon, even rare, and occur in limited areas.

The relationship between a single target species and the habitat types across its range varies. Some plants are generalists, have a broad tolerance of environmental and biological parameters, and may be found over a large geographic range. They may be common in a number of habitat types. But some species with comparatively wide tolerances and extensive ranges, like the American chestnut *(Castanea dentata),* have become very vulnerable due to range-wide conditions or events such as disease or habitat fragmentation.

Other species, including many rare and imperiled species, are adapted to very particular, less common habitats. These plants are called specialists and occur on a narrow range of habitats, often in only one habitat type in a limited area. Species uniquely adapted to particular habitats and found nowhere else are called endemic species.

Sometimes there is one obvious or primary factor that seems predominant in determining the development of a distinct habitat type. Many rare and

imperiled plant species' habitats are adapted to one specific soil type.

An example is the endangered San Mateo thornmint *(Acanthomintha duttonii)* that occurs only in serpentine grassland. Serpentine soils are low in essential nutrients such as calcium and phosphorous and high in metals such as iron and magnesium that severely limit plant growth. The habitat types that have evolved there have many unique species tolerant of these particular conditions. Other habitat types may be found only on south facing slopes, or only associated with infrequent natural features like springs or seeps.

Habitat characterization for imperiled species can be hard work. We want to know not only if the plant occurs in a recognized habitat type, but also how typical the site is, or if it has any unusual characteristics that refine our understanding.

This work requires many hours in the field, a good knowledge of the known habitat types of an area, excellent observation and plant identification skills, careful measurement, comparisons, and sometimes even computerized analytical techniques.

Generally, botanists and ecologists examine all possible sites, list the species present, record the patterns of vegetation (patchy, open or closed canopy, variation in age structure, etc), and evaluate the robustness of the habitat at each site as well as the relative condition of the imperiled plants (which may not be the same). Botanists also note land-use history for the sites, and any obvious signs of stress in the habitat (invasive species, heavy insect infestations, disease, heavy browsing damage, etc.)

When the field measurements and observations are done, botanists compare the habitat characteristics and the robustness of the species across the sites. The habitats with the most robust populations are assumed to reflect the best conditions, at least as a first approximation. Confidence is increased if there are several good sites, consistently correlated with the same habitats, or if all the known sites are correlated with the same habitats. Similarly, confidence in the interpretation of optimum habitat is improved if sites with robust populations are in habitats considered in good to very good condition, indicating that ecosystem processes are supporting both the habitat and the species well.

Using these best sites as a benchmark, botanists can carefully examine information about the optimum sites, looking for features they have in common, such as geology or soils, elevation, or landform position.

If common factors are present, then additional potential habitat areas that have a high likelihood for the species to be present can be identified, mapped and searched. If more sites are found, data from these sites will be collected and evaluated as well, and may improve the concept of optimum habitat.

Scientists are vigilant about the possibility for misinterpretation. In situations where the species is in poor condition range-wide and there are only one or a few sites, there is much lower confidence in inferring optimum habitat from site examinations of the vegetation. In some cases, historical records demonstrating that the species has been persistent on the site, especially if there are any records with information about species numbers and habitat composition, may be helpful in evaluating the likely conditions that were optimal. Aerial photographs or other photographs of the habitat areas over the years may allow an evaluation of any changes in the habitat.

Evaluating the role of disturbance in the habitat is also important. Biologists work to keep an open mind and remember that a visit to a site represents only a snapshot in time and space.

Plant habitats are predictable communities of living things, but they are not static. Habitats often exhibit a predictable cycle in revegetation after disturbance, with identifiable habitat stages called succession. Some species depend on disturbance to germinate and thrive, and these species (colonizers, or pioneer species) are the first to begin revegetating an area, forming early successional habitats. They gradually disappear as the vegetation matures, filling in and becoming more complex. Other species appear in the middle of the succession process, and still others are found in more mature habitat types that have not had a large scale disturbance in some time (mature, old growth, or climax vegetation).

Botanists working to characterize the context of an imperiled species must ask the question, "Where does this species fit in the habitat types that are part of the normal cycle of disturbance and revegetation? Is it just arriving, on its way out or in its optimum position?

When very small populations are encountered, there could be many explanations, and there is a greater likelihood the current habitat type on the site is not really optimum.

It's easier to understand the community relationships in a habitat type when you still have good sites to work with. Relying on current vegetation characteristics for populations in poor condition could easily lead to misinterpretation, and these are very challenging situations.

For example, the presence of a just a few individuals may be essentially accidental. Some seeds

may have been transported there and germinated, but the habitat may actually be marginal for the species. The plants cannot thrive, and they may not persist over time.

In other cases, the habitat has changed through succession or degradation, and we need to do more sophisticated detective work to get a good concept of preferred habitat type. Small populations may also be the result of habitat fragmentation, reducing the habitat to such small patches that pollinators cannot find the species, or the microclimate no longer supports good germination.

If there are several sites available for these more difficult situations, careful comparison of population condition (numbers of individuals, seedlings, and plants setting seed, for example) with past land-use history can give clues that may be helpful (burned vs. unburned sites, or closed vs. open canopy sites) to decipher which conditions are better for the species.

Once botanists feel that they have a good concept of what the appropriate habitat type or types for a species may be, and where that habitat is found, we can turn our attention to restoration questions for the populations that need intervention, asking the "Why?" questions: Why are these populations so small? Why aren't they reproducing well? Why is the habitat in this condition?

Then the planning can move forward for conservation and restoration activities that will reverse decline and ensure robust populations in appropriate habitats that also are functioning well.

Reprinted from ***Plant Conservation***, Spring 2006; newsletter of the Center for Plant Conservation, Missouri Botanical Garden, St. Louis.

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## Fire & Regeneration

### Helen Roback

A forest fire raged through Point Lookout, Poe Paddy State Park, in April 2000. The forest floor was blackened and bark of large trees was charred. Most of the trees survived. Eastern white pine, approximately 10' to 12', ignited like torches and did not survive.

The Department of Conservation and Natural Resources (DCNR) took advantage of this devastation and planned a study of regeneration. Within the burned area two situations were prepared for study: 1.) no change in the woodland; and 2.) shelter wood cut to open the forest canopy (also increasing debris on the ground because the downed tree tops wee not removed). In each of the two study sites a fenced and an unfenced area were established. In all cases counting took place within a circle of 18'6" radius - one eighth of an acre.

Areas were designated as follows:
Burned, fenced, 1B;
Burned, unfenced, 2B,
Burned, shelter wood cut, fenced, 3B, and
Burned, shelter wood cut, unfenced, 4B.

Counting takes place twice yearly - late May and late August. The first count was August 2002.

Inaccuracies in count were inevitable because of changing personnel on the team. In addition, the counting procedure was changed in the fall of 2003. As an example, at first all of the sprouts from a burned *Kalmia latifolia* (mountain laurel) root were counted as one. The change was to count each sprout. This change was true of all the plants present. A later change in counting permitted a count of 100 individual plants and then to extrapolate for the total circle.

The 2002 fall count followed a dry, hot summer. Spring and summer of 2003 and 2004 were cooler, with much more rain.

Diversity of genera, overall, was minimal. The greatest number was 11 genera counted in the 3B area in August 2002. The majority of these genera did not reappear. An interesting appearance was a count of 400 Japanese stilt grass in May, 2004, in 3B. September, 2004, there was no stilt grass. (We did not pull it!)

The forest floor is a carpet of *Gaylucassica* sp. and *Vaccinium* sp. (blueberries). Due to difficulty identifying in the field these genera were lumped together. B2 had a higher count than B1, the same difference was found in the shelter wood cut areas, B4 and B3. The latter, probably due to greater sunlight, was greater in both counts than the Bl and B2 counts.

*Kalmis latifolia* (laurel) was the second most dominant genus. It was most plentiful in 4B area followed by 2B. Most Kalmia were 1' to 2' in height and seemed to be sprouting from existing roots. Taller, 3' to 4', dead branches are abundant.

*Acer rubrum* (red maple) varied greatly in number in all 4 areas. 3' to 4' trees grew from stumps if they were present. 1" to 4" seedlings were also present with nothing between. Seedling numbers varied widely from count to count. For example, in Bl: 5/03 - 880; 5/04 - 68; 9/04 - 21. In B3, 5/03 - 420, 5/04 - 17- In both cases shade had increased in the lowest 6" due to growth of the blueberries.

*Quercus prinus* (chestnut oak) was most abundant in 3B. It, too had larger trees (4' to 6') growing from stumps and the opposite extreme, tiny seedlings. The most numerous, found in 3B, were 160 in 5/04, reduced to 23 in 9/04. This compares with IB, 1 in 5/04 and 0 in 9/04.

Sassafras had seedlings and small trees (3' to 4') in both

*Gaultheria procumbens* (tea berry) was locally abundant or non-existent. It favored sunny areas near fallen logs with ample fallen branches over head. From the first count it was most abundant in 4B.

Our group draws no conclusions. However, overall abundance of growth, 9/04, was evident, especially in 3B, even though counts were not higher. This was particularly true of the blueberries. Many of the blueberries, in all four areas, were stripped of leaves. Little fruit was observed in any genera - Kalmis, Gaultheria or the blueberries.

*The jury is still out. DCNR wants the study to continue to 2008. We will keep counting! (If you would like to join this study, call Helen Roback at 814-867-3522.)*

Reprinted from *Notes of the Pennsylvania Native Plant Society*, Oct. – Dec., 2004

## Fireweed: A New Beginning

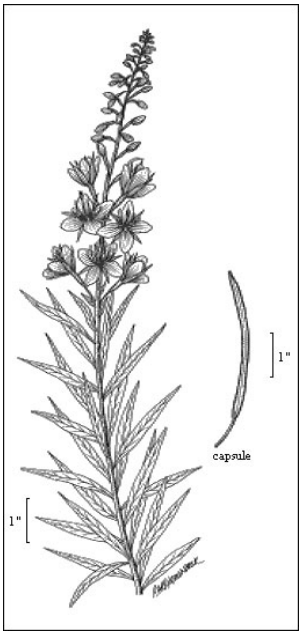
### Gordon Mitchell

Most of us are aware of the destructiveness that a forest fire can do to a forest. In less than one day, a fire can destroy what took Mother Nature decades or even centuries to create. After the fire, it will take that forest the same number years to fully recover. In the meantime, some early pioneer plants will move in and colonize the burned out forest. One such pioneer plant is the Fireweed (*Epilobium angustifolium* L.).

The Fireweed is a member of the Evening Primrose Family (*Onagraceae*). The generic name, *Epilobium*, is Greek for "upon a small capsule (or pod)". (*Epi* is "upon" and *lobion* is "small pod".) The specific epithet, *angustifolium*, is Latin for "narrow leaved". A previous scientific name for this plant was *Chamaenerion angustifolium* Scopoli.

This plant gets its common name from its flowered spike's resemblance to a flame and from the fact that it quickly colonizes areas that had been recently burned. Fireweed was one of the first plants to colonize after the eruption of Mount St. Helens in 1980, the Yellowstone Forest Fire in 1988, and the London Blitz in World War II. This plant readily utilizes the potash of the burnt wood's ash. It is a fast growing and a shade-intolerant plant.

Because the Fireweed is found in northern Eurasia as well as in North America, this plant goes under several different common names. Other common names for this plant are Asperge, Bay Willow, Bay Willow Herb, Blooming Sally, Blooming Willow, Bouquets rouges, Burnt Weed, Deerhorn, Fire Plant, Firetop, Flowering Willow, French Willow, French Willow Herb, Great Willow Herb, Herb Wickopy, Indian Wickup, L'herbe Fret, Moose Tongue, Persian Willow, Pigweed, Purple Rocket, Rosebay, Rose Elder, Sally Bloom, Showy Fireweed, Siberian Flax, Slinkweed, Spiked Willow Herb, Wickapee, Wickop, Wickup, Wild Asparagus, Wild Phlox, Willow Herb, and Willow Weed.



The Fireweed had many edible and medicinal uses. Both the Native Americans and the early European settlers used this perennial plant for both of those purposes.

**Range:**

**Height**: 1-10 feet.

**Stem:** Single. Erect. Stout. Smooth. Purplish or reddish. The tough fibrous stem was used for fiber, fishnet, thread, and twine. The gelatinous pith of the stem is sweet and may be eaten either raw or cooked. This pith was also made into ale, bread, and soup. The young shoots were cooked like asparagus and are high in both vitamins A and C.

**Leaves:** Simple. Alternate. Lanceolate or linear. Each leaf is about 2-8 inches long, about 1-1½ inches wide, has a broad or narrow base and a pointed tip, is sessile, and has entire, wavy, or minutely toothed margins. The leaf veins on the underside are very conspicuous. The lower leaves may be scaly. A leaf poultice was used for treating bruises and mouth ulcers. A leaf extract was used as an antibacterial agent and was used for reducing inflammations. The young leaves were cooked like spinach. However, the leaves becomes bitter to the taste when the plant ages. The more mature leaves can be dried and brewed into a tea, which can be used for treating intestinal ailments.

**Flowers:** Magenta, pink, purple, rose, or even white. The flowers are arranged in a long, spiraled, spiked, racemous cluster. Each flower is stalked, radially symmetrical, and is about 3/4-1 inch wide. The calyx consists of 4 dark, slender, spreading lobes or sepals. The corolla consists of 4 clawed, broadly rounded petals that are narrow at their base and are each about ½-¾ inch long. There are 8 protruding yellow stamens and 1 pistil with 1 downward curving style and a 4-lobed stigma. The flower buds are drooping. These flower are favored by bees and by hummingbirds, such as the Ruby-throated Hummingbird (*Archilochus colubris*). The flowers within the cluster bloom from the bottom up. A single cluster may have buds, blooms, and seedpods. An infusion of these flowers was made into a drink. Flowering season is usually June to September.

**Fruit:** Capsule or pod. These seedpods are reddish or purplish, narrow, about 1-3 inches long, 4-sided, and are angled upwards. When the seedpod splits open along its 4 valves, it releases many tiny smooth and brown seeds with white silky tufts or plumes. This is to facilitate wind dispersal of the seeds to new areas. The silky hairs from the seeds were sometimes mixed with cotton or fur and were sometimes used for making stockings. Fruiting season is usually September to October.

**Roots**: Creeping fibrous rootstock. This plant spread very rapidly through its rootstocks. The outer root rind was used as a poultice for treating boils, bruises, burns, carbuncles, sores, and swellings. Like the leaves, a tea brewed from the roots was used for treating intestinal ailments. The roots, which contain mucilage, pectin, and tannin, were also eaten.

**Habitat:** Newly burned or cleared areas, fields, and roadsides.

Gordon Mitchell works for the Columbus, Ohio, Metroparks and is a member of the Columbus Native Plant Society.

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## Trailing Arbutus: T.A. in Trouble

**Barbara E. Plampin, PhD, Shirley Heinze Land Trust**

Anthropogenic disturbance and deer teeth and hooves aren't the only problems facing Duneland trailing arbutus (*Epigaea repens*). Alarmingly, most of our plants don't bloom, and the few that do usually fail to set seed. When Indiana Dunes National Lakeshore (IDNL) botanist Dan Mason sent Lydia Miramontes and me to count plants in Eastern Porter County, we found only a scattered handful in bloom. Later, Dan found none had fruited; hence, no seeds.

What was going on? It's not that Dunes T.A. lacks pollinators; the soil is suitable for the necessary ground-dwelling bumblebees *(Bombus bifarius, B.*

*terricola, B. vagans*), says Dan. It's that T.A. is often dioecious, with male and female flowers living on separate plants. When there aren't enough flowers, bees usually don't see them, and when they do, a phenomenon called receptivity enters the picture. When female plants are over there and male plants are over here, ripe pollen and receptive stigmas are often out of synch; that is, pollen ripens too early or too late to fertilize many or even any female flowers. When flowering populations are large, enough pollen will be ripe at enough times to fertilize enough flowers to ensure reproduction. Thus, right in the Dunes, right in our own backyard, island biogeography is at work.

In 2006, Dan became a marriage broker. In my North Central Porter County yard, which borders IDNL, flourishes an irregular 20 x 20-inch patch of very well fenced T.A., perhaps the largest around. In 2005, its numerous flowers, all female, did not fruit. The nearest T.A. plant is a non-bloomer over a thousand feet away. Dan took pollen from Eastern Porter T.A. and hand-pollinated five flowers in my T.A. patch. After using a tiny brush to remove pollen and attach it to the stigma, Dan found that plucking off an anther with tweezers and rubbing it over the stigma worked better. The result: three capsules containing viable seed.

Dan also pollinated some Eastern Porter County plants and obtained two seed capsules. Dan put the seeds in cold storage (stratification) until time to germinate them in mid-February in a mix of peaty, organic sand with some soil from the Eastern Porter County habitat to provide the necessary mycorrhizal fungus, and perhaps a commercial bacterium. Dan hopes for flowering plants in two or three years. These will probably be installed near existing plants.

Trailing Arbutus (*Epigaea repens*)

What about cuttings? Dan thinks our populations are too scarce and that cuttings grow too slowly. Transplanting T.A. to get males and females closer together would almost certainly kill the transplants because of mycorrhizal fungus problems.

*My hearty thanks to Dr. Dan Mason of the Indiana Dunes National Lakeshore for his help with this article. Any errors are mine. -Barbara E. Plampin*

Reprinted from INPAWS Journal, Spring 2007

## The Possible Adaptive Value of Red Leaves

### By Larry Mellichamp

We are all aware of the fantastic array of colors that deciduous leaves turn in the fall in eastern North America. We know that green leaves contain the pigment chlorophyll as the main ingredient for photosynthesis, and various yellow-to-orange pigments that help in the process. These are all non-water soluble pigments found in the chloroplasts. As the chlorophyll deteriorates in the autumn—when the days get shorter and nights get colder—it is not replenished and its disappearance unmasks the beautiful shades of yellow and orange pigments (carotenoids and xanthophylls). This is a passive process that happens in most dying leaves—hence the yellowing of the older leaves on your parlor fig tree before they fall to the floor.

For many years it has been thought that the development of bright red color in autumn leaves was also a passive process, part of the last stages of a dying leaf. My "wild idea" is the hypothesis that this red pigment is produced for a purpose, that it is an evolved adaptation in certain species with some benefit to the trees that do it.

The red color is the water soluble pigment anthocyanin. It is formed in the watery cell sap. For deciduous trees, I believe it is produced by conversion of the sugars trapped in the leaf after the formation of the abscission layer that cuts off most, if not all, of the movement of water and food through the leaf petiole from the stem, but before the leaf actually falls off. The leaf can still carry on some degree of photosynthesis and make sugar or utilize the raw material trapped inside.

In other situations, studies have shown that anthocyanin is produced in young leaves as they

emerge as a protection from sunburn. Likewise, anthocyanin is produced in the fall in evergreen leaves as a protection against the harsh winter sun. We have all observed evergreen leaves turning purplish tones in fall, for example *Leucothoe, Mahonia, Nandina,* some rhododendrons, some conifers, etc. This change happens only in strong sunlight, and the anthocyanin disappears the following spring. This is a protective function of anthocyanin.

My hypothesis is that anthocyanin is also produced in deciduous leaves as a preservative. The species with the deepest red color are more often found in drier, less nutritive sites than species with leaves that do not turn red. Those trees benefit from the fact that somehow the leaves are more available as a source of nutrition the following spring. It would require several Ph.D. theses to work out the details of this hypothesis, but it could be done.

Here are some observations that support my hypothesis.

1. Leaves that fall are decomposed by bacteria and fungi—returning nutrients to the soil that become available for the tree to recycle. Leaves entering the litter layer that contain little or no sugar or other food compounds would decompose more slowly.

2. Tree species that evolved to live naturally along streams and rivers (before human intervention and disturbance, of course) do not have leaves that turn appreciably red or yellow. After all, any leaves they drop will be washed away by the floods and deposited elsewhere to rot. However, stream-side soil is richer than forest soil (hence agriculture along rivers) and there is no problem with the loss of these nutrients, for they are adequately replenished by floods or perhaps percolation from the above hillsides. Examples of these trees are elm, river birch, sycamore, silver maple, box elder maple, green ash.

3. Trees that live on drier slopes, ridges and poor old fields turn reddest. Much of their nutrient input is probably returned from recycled leaves. Some examples are: oaks (some turn redder than others), sourwood, cherry, red maple, sugar maple (red mixes with yellows to form oranges), white ash, serviceberry, flowering dogwood, black gum, persimmon, sumac, sassafras, viburnum. These species would benefit most from returning the nutrients from decomposition of their high-nutrient litter in the spring.

4. There are exceptions. Many dry land species do not turn red – hickory, silverbell, tulip-poplar, fringe-tree, magnolia, redbud. These species probably do not have [functionally operating] genes to make red color. They are evidence that making red color is not a passive process of a dying leaf.

5. More exceptions: There are mutant forms of red-pigment producing trees that do not make red color—I have a yellow-leaved red maple near my house. On the other hand, Sweetgum lives in flood plains but turns red and/or yellow. The point is that some species can, and some cannot, make red pigment. It is not a passive process. Its presence confers advantages that can be selected for by natural selection in those species that can make it.

6. The production of red pigment requires direct sunlight. Leaves shaded by another leaf—or those in the understory —will not turn red as quickly. In a dull, rainy autumn, the overall red color will not be brilliant, but the yellow color can be. Only trees that evolved in an environment with prolonged cool nights and bright sunny days before dormancy could have the advantage of making red pigment—conditions found in eastern North American and eastern China-Japan.

**Summary**

Therefore, I conclude that the production of red color in leaves has a genetic basis, can be affected by mutation, can have a selective advantage, and has a value in the life of a tree. It is not a passive process. My concept of this advantage has something to do with leaves as a source of recycled nutrients for the tree. My specific hypothesis is that the red pigment functions as a preservative —acting as a micro-organism poison or converting the easily-decomposed sugar into a more stable pigment molecule — and so renders the leaf less available for rapid decomposition and therefore more available for nutrient release the following spring.

These are the main tenets of a somewhat complex set of ideas. I would be glad to hear counter arguments from anyone, or find out about research that may address these issues. At any rate, someone needs to explain the genetic basis of red color formation in deciduous leaves, and that has not been done satisfactorily.

Larry Mellichamp is with the Biology Department and Botanical Gardens, UNC Charlotte, 28223.
Reprinted from *Chinquapin*, the newsletter of the Southern Appalachian Botanical Society, Winter 2004.

# Growing Your Own Spotted Geraniums
## *Geranium maculatum*

**Gene E. Bush, Munchkin Nursery**

Steady horses plod along, one foot in front of the other, day after day, doing the job they were assigned—reliable, dependable, steadfast, and often taken for granted. Old Ned, being a common breed, is sure to be ignored in favor of the more exotic Arabians, trotters, and show horses. In like fashion, many a durable native woodland plant is passed over with a ho-hum in favor of the more exotic names and more spectacular performances.

*Geranium maculatum,* our spotted wood geranium, is one such stalwart. The plough horse of geraniums, it is found in every state east of the Rockies, from Canada through Florida. In Indiana, the geranium is found growing in all but seven counties. The holes in Indiana's map are probably due more to reporting and recording than to the reality of the wild.

*Geranium maculatum*

Large, handsome palmate leaves can be eight to nine inches across, divided into five to seven segments. Veins running through the leaves create quilting-like patterns on the leaf surface. Bright, rich green color further enhances the foliage. Well-grown stems will reach 18 to 24 inches in height.

Flowers are some shade of rose-purple with a bit of variation in color from one location to another. Each flower has five rounded petals a bit over an inch across with ten stamens. White forms are occasionally found both in the wild and in nursery catalogs. However, the white form is often confused with *Geranium sylvaticum,* the European wood geranium. If you compare the foliage of your native with the European, it is easy to recognize the difference. Look for the flowers to begin opening in April, lasting into the first part of May, depending upon how far north or south you garden.

After fertilization, seed pods form shapes resembling a long, narrow, pointed bird's beak with a rounded head. Crane's bill is a second name given to the geranium because of the seed dispenser's similarity to the long-legged bird. The beak is made up of several little catapults, all hinged at the tip of the beak. Seed rests in little half- cups at the base forming the head. With maturity, straps from base to point become dry, creating tension. Eventually the pods break loose, and the sudden release flings the seed up to 20 feet away from parent plants.

Spotted geranium can and will grow in varying environments as evidenced by their distribution. As with other perennials, if you want the geranium to perform and appear as in glossy gardening magazines, give it good garden soil. Decent soil and moisture levels, with all the light you can provide without being in full sun, will give you an exhibition-quality plant. I use a mulch of chopped leaves late each fall, and that is both nutrition and mulch for my geraniums. My drift of geraniums covers the ground beneath a native dogwood in open shade. It has now wandered over to mingle with the branches of a rhododendron.

*Geranium maculatum* can be used beneath trees in root competition where it will perform well. Perhaps not as tall or quick-spreading as in more favorable circumstances, it remains a good choice for difficult places in the garden. If the environment becomes too dry, the geranium goes dormant earlier than normal. Usually dormancy is around August in my garden.

A companion plant I especially enjoy is Solomon's seal *(Polygonatum biflorum),* which emerges to arch over the ground-covering drift of geranium. Even more showy are the blooms and berries of the *Smilacina racemosa,* or Solomon's plume. Tall ferns are a treat, and several of the more common natives work very well. My two favorites are cinnamon fern *(Osmunda cinnamomea)* and royal fern (*O. regalis).* Contrasting textures and colors of foliage are primary, with fertile fronds of the blooming ferns adding to the show through the summer. The large leaves, length of bloom, and fascinating seed pods of spotted geranium create a native garden unsurpassed by any of its more exotic cousins.

 *Gene can be reached at Munchkin Nursery & Gardens LLC, 323 Woodside Dr. NW, Depauw, IN 47115, 812-633-4858, or* www.munchkinnursery.com.

Illustration by Mary Vaux Walcott.
Reprinted from *INPAWS Journal*, Indiana Native Plant and Wildflower Society, Spring 2007.

*Book Review*

**Hazel R. Delcourt. *Forests in Peril.*** 2002, 6x9, ca. 200 pages, 34 b/w illustrations, bibliography, index. Paper (0-939923-89-0) $24.95.

The great deciduous forest that covers much of eastern North America is one of the continent's most important and magnificent natural resources. Twenty thousand years ago, however, during the last ice age, this forest did not exist. Instead, deciduous tree species formed only minor parts of forests dominated by pines, spruces, and firs that were better adapted to the glacial climate. As the climate warmed, the deciduous forest emerged as the dominant vegetation throughout the southeastern quarter of the continent. Native Americans occupied this forest, depended upon its resources, and influenced its dynamics in distinct ways. The human influence on the forest intensified greatly with the onset of European colonization, and the forest has been significantly modified during the past 200 years as a result of human activities. As demands for living space and resources increase, the size of the remaining forest diminishes and its prospects for survival in the present and future greenhouse world grow increasingly dim.

In ***Forests in Peril,*** Hazel Delcourt takes the reader on her personal journey to document the history of the forest from its elusive and nebulous presence at the peak of the last ice age through its development as a magnificent natural resource to its uncertainty in today's, and tomorrow's, greenhouse world. Along this journey, the reader is introduced to methods of studying vegetation, collecting and interpreting data, and applying the insights of forest ecology and history to project future needs of the forest in a world that is increasingly dominated by human activities. The philosophical, intellectual, and methodological perspectives contained in ***Forests in Peril*** will appeal to readers interested in understanding how the natural history of North America has been studied and how that study can contribute to the protection and preservation of America's important biological resources.

Reprinted from the publisher's promotional material.

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## Native Plant Ground Covers

*Go Native!* author Carolyn Harstad suggests six ground covers for the native plant gardener:

1. **Green and Gold** *(Chrysogonum virginianum}* she describes as "a cheerful little plant that is tolerant of a wide range of environmental conditions." It has yellow flowers. Peterson says "Note the 5 rounded rays and the long-stalked, heart- or spade-shaped leaves." *Chrysogonum* grows less than 1 ft. and likes moist shady woodlands.
2. **Wild Ginger** *(Asarum canadense}* begins spring with tiny wrinkled leaves that grow into heart-shaped leaves. It grows 4-9 inches tall and can take dry conditions as well as some sun. Harstad points out that its shallow roots can exist well with fibrous rooted trees such as maple or beech. It is a larval food source for the Pipevine Swallowtail Butterfly. Careful, though. It can be invasive.
3. **Canada Anemone** *(Anemone canadensis)* has glistening white flowers with bright yellow centers that bloom from late spring to midsummer. Also know as Windflower. It grows 12-20 inches high. Is an aggressive plant.
4. **Allegheny Spurge** *(Pachysandra procumbrens}* is our native pachysandra. Harstad notes that it is much more interesting. It grows 6-12 inches tall and has gray-green scalloped leaves that mottle with age. It has fragrant pinkish-white flowers that look like bottlebrushes. Is a slow grower.
5. **Foam Flower** *(Tiarella cordifolia}* is in the same family as Miterwort. It blooms from April to May with little white flowers on plants that grow 6-12 inches high. The leaves resemble maple leaves. It forms dense mats and looks attractive at the base of trees.
6. **Partridge Berry** *(Mitchella repens}* is a acidic loving cover, good under Pin Oaks, by rocks or fallen logs. It is a slow-growing, evergreen vine with tiny fragrant white flowers that grow in pairs. Bright scarlet berries persist into early winter.

Reprinted from *The Bark*, newsletter of the Native Plant Society of the Miami Valley, Spring 2001.

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# On The Fringe

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