



Minnesota Plant Press

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The Minnesota Native Plant Society holds monthly meetings from October through May, on the first Wednesday of each month, unless noted through special mailing. Meetings are held in room 335 Borlaug Hall, St. Paul campus U of M. Meeting are 7:30 - 9:00 PM.

Long-Range Planning for Minnesota Wildflower Gardens

May Wright

You have probably seen or heard about computer programs that can show you a landscape plan and then show you what it will look like ten years hence. It can be done quite accurately because of the general knowledge of cultivated species. It entails information on how fast the tree species grow and how fast the undergrowth plants spread and reproduce.

With native wildflowers however, this information is not as readily available. The following are a few observations about Minnesota wildflowers that may be helpful.

For a home garden to continue to be attractive over several years and yet not demand excessive care the species should be chosen carefully. What is needed are ones that are adapted, attractive, long-lived, and that increase, but not so rapidly that others can not co-exist. Yearly fluctuations occur but over several years these comparatively-rapid spreaders can be recognized. They may be used to good advantage in difficult or confined spaces as individual ground covers. In nature, or in restorations where areas are large, rapidity of growth is not as much of a problem.

In the deciduous woodland garden, be careful about introducing the following:

- Wild Ginger, *Asarum canadense*. This covers an area very quickly. Better as a ground cover.
- Virginia Waterleaf, *Hydrophyllum canadense*. Increases rapidly and forms such a compact mat that it is hard to eliminate.
- Baneberries, *Actaea rubra* and *A. pachypoda*. Multiply readily and overshadow others. Better by themselves.

Wildflowers continued on pp. 2.

Inside

Announcements.....	2
Saving Vermont's Wild Orchids....	4
MNPS Membership.....	
Board of Directors....	

Announcements

- **Tales of the Tall Grass II** - The International Prairie Tour of the Lower Red River Valley of the North (North Dakota, Minnesota & Manitoba). August 13, 14 & 15. Each state or province will host one day of tour activities that will include prairie visits, programs and presentations on a variety of prairie-related subjects, bar-b-ques, and evening entertainment. For registration materials contact Garry Barvels, Lake Bronson State Park, Box 9 - Lake Bronson, MN 56734, 218-754-2200.

- **City of Maplewood Natural History Seminar Series** - Welby Smith, DNR Botanist, will show slides of orchids from his upcoming book at Maplewood Nature Center Monday June 28 at 7:00 PM. He will teach you how to identify orchids and share their unique natural history.

His lecture is part of a series of Natural History Seminars offered by Maplewood Nature Center beginning on June 14. Call 738-9383 for more information.

Wildflowers from pp. 1

- Violets, *Viola* sp. Everyone loves them but they can become a nuisance unless confined in some manner.
- Mayapple, *Podophyllum peltatum*. Requires quite a bit of space as these large-leaved plants spread in yearly-widening circles.

Which ones then will do well over several years? There are many. Here are a few to start with, listed in order of bloom:

- Hepaticas, *Hepatica acutiloba* and *H. Americana*
- Bloodroot, *Sanguinaria canadense*
- Dutchman's breeches, *Dicentra cucullaria*
- Early Meadow-rue, *Thalictrum dioicum*
- Rue-Anemone, *Anemonella thalictroides*
- Large-flowered Trillium, *Trillium grandiflorum*
- Bellwort, *Uvularia grandiflora*
- Rosy Twisted-stalk, *Streptopus roseus*

In the north-woods garden, the acid condition does not support very rapid growth, so competition is not much of a consideration.

- Wild Lily-of-the-valley, *Maianthemum canadense*. This does better as a ground cover than among other plants.

Some species that live together well in a north-woods garden:

- Bluebead Lily, *Clintonia borealis*
- Starflower, *Trientalis borealis*
- Wood sorrel, *Oxalis montana*
- Partridge-berry, *Mitchella repens*

- Pink Pyrola, *Pyrola asarifolia*
- Wintergreen, *Gaultheria procumbens*

While planning for a moist or mesic prairie or meadow garden, be aware that conditions there are conducive to the rapid spread of some forbs. These can limit diversity.

- Canada Anemone, *Anemone canadensis*
- Fringed Loosestrife, *Lysimachia ciliata*
- Common Milkweed, *Asclepias syriaca*
- Wild Golden Glow, *Rudbeckia laciniata*
- Blue Vervain, *Verbena hastata*
- Many Sunflowers, *Helianthus* sp.
- Many Goldenrods, *Solidago* sp.
- Many Asters, *Aster* sp.

Species that are compatible in the mesic prairie garden:

- Prairie Smoke, *Geum triflorum*
- Shooting Star, *Dodecatheon meadia*
- Prairie Violet, *Viola pedatifida*
- Wood Lily, *Lilium philadelphicum*
- Great Blue Lobelia, *Lobelia siphilitica*
- Prairie Blazing Star, *Liatris pycnostachya*
- Culver's Root, *Veronicastrum virginicum*
- Bottle Gentian, *Gentiana andrewsii*

Some of those noted as aggressive in the mesic prairie garden can be troublesome in the dry prairie garden. Usually, though, the low moisture condition, due to rapid drainage, limits growth. The following will grow in a dry prairie garden:

- Pasque-flower, *Pulsatilla nuttalliana* (*Anemone patens*)
- Violet Wood-sorrel, *Oxalis violacea*
- Prairie Phlox, *Phlox pilosa*
- Birdsfoot Violet, *Viola pedata*
- Lupine *Lupinus perennis*
- Button Blazing Star, *Liatris aspera*
- Wild Bergamot, *Monarda fistulosa*
- Pale Purple Coneflower, *Echinacea angustifolia*

Even without a computer's help, you can plan before planting. Be wary of plants labeled "easy to grow." Some catalogs give a truer description by labeling them "aggressive."

Saving Vermont's Wild Orchids: Dr. William Ballard Fights For a Beautiful World

Nancy Freiberg

One simply is not prepared for the alien beauty of the showy lady's slipper. Each orchid, huddling with its neighbors, rises from large almond-shaped leaves. The brilliant white and soft pink pouch of the slipper bulges like a girl's puffed sleeve between two petals that look like hummingbird wings. One can imagine that some tiny creature has gently blown air into it or that the wings take flight when no one is looking.

More than 50 years ago, lady's-slippers graced many of Vermont's wetlands. Now the most popular of the northern terrestrial orchids is a rarity, and substantially fewer Vermonters are lucky enough to come across them. Although their special requirements are part of the problem, illegal collection and destruction of natural habitat probably account for most of the decline.

There is perhaps no one else in Vermont who has been affected more deeply by this decline than William Ballard. Now 85 and a professor emeritus of biology at Dartmouth College, Ballard's concern for the orchids goes back more than 70 years to when he first delighted in the sight of one as a boy in western Massachusetts. Remembering how prevalent they were, he has devoted the past two decades to increasing their numbers in Vermont.

"This world was made beautiful," he says. "It is being made less beautiful by people who don't understand the importance of beauty."

One of Ballard's first acts in support of the lady's-slipper was to convince Dartmouth to purchase a botanically rich swamp that biology students had visited since the 1800s. Having graduated from the college in 1928 Ballard knew lady's-slippers had once flourished there.

"I began to think about getting them back in the college bog," says Ballard, who has lived in Norwich, across the Connecticut River from Dartmouth, since 1939. "I began scattering millions of seeds there, and then I never could get out of the business. Too much fun."

Dedication and systematic research have made Bill Ballard a pioneer in the propagation of the lady's slipper.

What began as a kind of hobby for Ballard has grown into a systematic research project. In spite of the fact that many scientists had attempted to germinate lady's-slipper seeds in the lab without much success, Ballard was able to develop a growth medium that results in an 80 to 95 percent germination rate. He also found that the show lady's-slipper seeds need to be refrigerated for at least two months before germination can occur. To assure that he has plenty of seeds, Ballard spends each spring hand-pollinating every wild blossom he can find.

Finding himself with an abundance of lady's-slipper embryos, he says the challenge now lies in getting them to grow optimally and survive the transfer from sterile culture to the moist conditions of their natural habitat.

"About a dozen investigators are working at this frontier," says Ballard. "But much has still to be learned before they can be grown as a crop, putting out of business those who dig up and sell the wild plants."

The Nature Conservancy thinks Ballard is a treasure. "He has, no question, pioneered in an area that few people have had the patience and wherewithal to explore--how these orchids reproduce," says Marc DesMeules of the Nature Conservancy's Montpelier office. "He's a very unique person in that he's doing this because he's interested in it, not for any fame or glory."

Trained in the study of fish embryology, Ballard gave up that research about 15 years ago because carrying the required equipment and setting it up in foreign lands became too difficult for him.

Exploring the embryology of the orchids, however, was something he could do at home. Friends showed him stands of the four local species and he began to pollinate them, scattering seed in hopes of increasing their numbers. After seeing no results for several years, he turned to the laboratory to explore the orchids' requirements.

Much later Ballard found that some of his early scatterings had succeeded. Years after sowing pink lady's-slippers in the woods behind his home, for example, the first flower appeared.

He sowed hundreds of thousands of showy lady's-slipper seeds in a Norwich swamp that now contains more than two dozen clumps of the species. Through the efforts of Ballard and others, the owner of the swamp made a gift of the property to the town of Norwich. Now a trail and a boardwalk have been established to protect the plants and allow people to visit in the blossoming season.

There are four types of lady's-slippers in Vermont--the showy (often thought of as the most beautiful), the pink, the yellow and the ram's-head (the rarest of the bunch).

The yellows and showys appear in June and are in bloom for only nine precious days. This brief blooming period can be appreciated even more in light of how long it takes for them to get to this point. The orchids are teenagers before their first bloom, and their chances of surviving childhood are something like the infant mortality rate during times of plague.

A lady's-slipper seed takes five weeks to germinate and then spends two or three years underground, depending for survival on a symbiotic relationship with a primitive fungus. The fungus brings nutrients to the underground seed, which still lacks the root hairs to do the job itself. What the seed does for the fungus is a mystery; some speculate certain vitamins are transported this way.

An unfortunate aspect of this relationship is that the fungus tends to make the seeds rot. Even if the orchid survives this stage of growth, it faces more than a decade of combating such problems as too much sun or too little sun or not enough humidity. Lady's-slippers are picky.

"This world was made beautiful," says Ballard. "It is being made less beautiful by people who don't understand the importance of beauty." At home in Norwich, right, he is surrounded by plants.

In the laboratory at Dartmouth where he still works five to six days a week, Ballard has hundreds of vials with seeds floating in a sterile medium. He has found, after such trial and error, that the sterile medium is actually capable (in the case of the showys) of replacing the function of the fungus. Once the orchids produce their first green leaf, Ballard transports them to artificial bogs behind his house.

The process involves an elaborate schedule. The seeds are put in the sterile medium in September. In February, Ballard takes the embryos out (one vial may contain 200) and separates them by fives into vials. Several months later, each embryo is transferred to a larger test tube.

"He didn't take the short cut," notes DesMeules. "He took the long road. A lot of people just deal with the flowers that are easy to propagate. He did it the hard way and he succeeded."

A grant from the American Orchid Society three years ago, which Ballard says he is still "nibbling on," allows him to continue experiment with nutrients, humidity, light and temperature to find ways of satisfying the requirements of the four species.

Ballard cultivates all of them at his home in Norwich, where he has carefully created artificial bogs. These consist of sunken wooden frames lined with plastic and filled with soil. The plastic retains water, creating a swamp-like environment.

Tenderly handling a leaf, Ballard will kneel down to show you a swelling ovary on a ram's-head, or explain his system of distinguishing hybrids from self-pollinating plants in his original clump of yellow lady's-slippers, placed there more than 40 years ago.

"I have all six possible hybrid combinations of three of the four local species," he explains. "They are still in sterile medium. The question is whether I will live long enough to see them blossom." Ballard could be in his late 90s before the orchids flower.

Using a toothpick and magnifying glasses, he regularly pollinates lady's-slippers in damp Vermont woods. Later, in the fall, he takes just enough seed for his research, scattering the rest in hopes of spreading the orchids to new territory. The microscopic seeds, he explains, are very widely distributed by the wind, but most settle on unfavorable ground. Some travel as much as 1,000 miles. Each blossom may produce as many as 50,000 seeds.

Yet only about eight percent of the orchids are pollinated if left to their own devices. Performing the job by hand brings pollination up to 90 percent, Ballard says. The process is difficult because the orchid is so highly evolved that it needs a specific type of insect to pollinate it. The insect, attracted by the color of the orchid and looking for nectar (non-existent in the lady's-slipper), gets pollen on its back while making its fruitless investigation. When the insect enters another flower, pollen comes in contact with the stigma and fertilization takes place. The orchids' lack of nectar may account for its low natural rate of pollination, since even insects eventually learn that the flower has nothing to offer them.

The insect also may not happen to frequent an area where the orchids grow or the orchid stands may be so far apart that pollination never takes place.

The orchids on which Ballard has spent so much time and energy are among the oldest of the flowering plants, and thus have learned all the evolutionary "tricks" in the book, he says. But that does not keep them from being endangered. "There are advantages and disadvantages to any scheme," he notes of the orchid's life cycle.

Ballard's desire to protect and conserve nature is not limited to orchids. He is breeding tadpoles in a former septic tank, raising rare salamanders in his kitchen and will causally tell you that the rare Hart's-tongue fern on the windowsill was "brought wrapped in dirty laundry from France." Scientists and other orchid-lovers send him seeds from all over the world. An acquaintance in the state of Washington is providing him with seeds of the Calypso orchid, a flower Robert Frost immortalized in a poem called "The Encounter." Although the orchid is nearly extinct in Vermont, Ballard has been able to raise a few embryos from the seeds and is cooperating with the Nature Conservancy to maintain the species here.

With all this activity, the retired professor still finds time for a large vegetable garden, takes care of his crippled wife, Elizabeth, and goes on frequent hikes. He celebrated his 80th birthday by climbing Mount Washington.

Ballard often wears out his younger companions when leading people to the lady's-slippers in the Norwich bog.

A distinguished-looking man, in spite of the red high-top sneakers and red handkerchief he wears on such hikes, Ballard bounds ahead on these jaunts like a man 50 years his junior.

"We purposefully make this trail full of curves so if people try to find it they would get lost," he explains, picking up stray branches to clear the trail as he goes. In the half-mile to the lady's-slippers, he has gently informed his small group about the effects of the 1938 hurricane and the possibility of a scarlet tanager nearby. "Sounds like a robin with a horrid cold," he

notes. Finally he leads the last part of the trail on skinny wooden planks, dodging mosquitos, to the clumps of showy, bright visions in the murky bog. "Oh, Bill!" exclaims one of the group when she first sees the flowers. "They're beautiful!" Because underground rhizomes travel and send up new shoots, the clumps get larger every year.

Ballard's mother, a schoolteacher, interested him in wildflowers and ferns decades ago to fill the void left because there was no one his age in their French-Canadian village who spoke English. now it is Ballard who gently passes on his knowledge.

He hopes to see his work carried on and says he knows "half a dozen" people who want to get involved. He hopes that someone--or better yet a number of people--will take over his projects.

"We've got to do something to take the hardship of these disappearing species and keep them going," he says. "The more species we lose, the poorer the planet."

Freelance writer Nancy Freiberg lives in Elmore, Vermont

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