



Minnesota Plant Press

The Minnesota Native Plant Society
Newsletter

Volume 16, Number 2

Winter 1997

Upcoming Monthly Meetings

Minnesota Valley National Wildlife Refuge
Visitor Center, 3815 East 80th Street
Bloomington, MN 55425-1600 612-335-2323

6:30-7:00 PM—Refreshments, Room A
7:00-8:30 PM—Program & Society Business
8:30 PM—Socializing
9 PM— Doors close sharply at 9 PM

1997

January—No meeting

February 6—Bonnie Harper-Lore: *Roadside
Vegetation Management Nationwide*

March 1—Board Meeting, 10-12 AM.

March 6—Dean Hansen: *Creating and
Enjoying a Sand Prairie*

April 3—Lee Ronning: *Land Stewardship*

May 1—Plant Photography Contest

June 3—Kathy Boleen, *Exotic and Problem
Plants in Minnesota Parks and Natural Areas;*
Plant Sale; Book Store Open

June 22—Board Meeting, 12-4 PM

Deadline for Spring Issue is March 15, 1997

•To pool rides to the **Minnesota Valley National Wildlife Refuge**, please call—well in advance—Grace Gray who will coordinate pooling (612) 484-0190.

•For **Winter Weather Emergency**, contact Diane Hilscher, 612-557-9153 to find out if the Center is open or not

Growing Prairie Seedlings Indoors

Char A. Bezanson

Growing prairie seedlings from seed collected in the wild or from a restoration site is a rewarding project that can help you get to know particular species on a new level, as well as to provide native plants for a pollinator garden or to diversify a prairie restoration. Many prairie plants grow easily from seed, but there are some ways that native seed differs from most seed sold by commercial garden seed suppliers.

Native plants are genetically diverse. Generally, native prairie plants have not been manipulated by plant breeders to select for particular characteristics, such as flower form or size. The genetic makeup of seeds is not uniform: the plants grown from native seed, even from seed of the same species, will vary in characteristics such as germination requirements, size, flower form, rate of growth, and other genetically determined attributes. Native plants are not usually tended by gardeners, and it is to the plants' advantage to be able to survive under a wide variety of weather and "cultural" conditions. In some ways, this makes native seed very "forgiving": it's likely that at least some seeds will germinate, grow, and survive in a particular year, whether spring is early or late, the summer wet or dry, or the seedbed sunny or shaded. As gardeners, however, we may not be satisfied with a 5% germination rate or weak seedling growth, so we can try to imitate a "good" year, providing optimal conditions for the seed and young plants. While a typical herbaceous plant is composed of 95% water, a mature seed contains about 2% water. In this dormant form, the young plant is very resistant to adverse environmental conditions such as dry air or extreme cold.

Once the seed germinates, however, the plant is at its most vulnerable stage. It is subject to damage by cold, heat, and lack of water. For these reasons, plants possess many mechanisms to ensure that the seed will germinate when it is likely to encounter enough moisture, warmth, and light to grow and mature.

Seed treatment. Some seeds require abrasion or acid treatment of the seed coats; without this treatment, seeds will not imbibe water—the first stage in germination. (*continued on page 8*)

Editorial

Shade-grown coffee, birds, and ecology

Changes in the way coffee is being grown in Latin America and the Caribbean may be contributing to the decline of America's songbirds, writes Laura Tangle in *Science* (November 22, 1996). According to the US Breeding Bird Survey, wood thrush numbers have dropped by 40% over a 25 year span, and the golden-winged warbler and orchard oriole are down 46% and 29%, respectively. At first the loss of forests was thought to account for this, but now it may be attributed to the way coffee is grown. Coffee has for some time been grown in the canopy of trees. Shade-grown coffee was the preferred crop. Such a canopy provided a diversity of habitat that attracted birds and other wildlife, including snakes, mammals and insects. Coffee plantations teem with wildlife.

Now, farmers in Latin America are switching to higher-yielding coffee varieties that are grown in full sun—a habitat that is not as conducive to migratory birds and other wildlife. This illustrates that striking shifts in the culture of one agricultural crop can alter the ecology of many life forms. This has been amply demonstrated in the American prairies where field crops replaced natural vegetation. And, the logging off of forests has changed the fauna and flora of woodlands.

We have also witnessed reversals in which we have attempted to restore prairie vegetation along roadsides and in parks. Note the several references in this issue to "take back" nature: the Greening Conference (page 3), use of mycorrhizae in roadside plantings (page 4), the Olmsted Prairie Nursery Project (page 5), as well as the lead article (page 1), and the topic of February 6, on roadside vegetation management.

Some national organizations are encouraging home plantings of native plants to provide habitat for flora and fauna that are disappearing from the prairies and woodlands of the nation. We seem to be learning!

MNPS' Guide to Spring Wildflower Areas published in 1996 is still available

This guide prepared by Marylyn and J.B. Andersen, Jim Schuster, and John Moriarty has been updated, redesigned, and reprinted as the 1996 edition, and covers the Twin City natural areas. Vera Ming Wong prepared new illustrations. Copies can be purchased at regular meetings of the MNPS at the Minnesota Valley National Wildlife Refuge Center.

To receive a copy by mail order, send \$5 (check or money order) to MNPS, c/o Char Bezanson, The School Nature Area Project, 1520 St. Olaf Avenue, Northfield, MN 55057. Make checks payable to the Minnesota Native Plant Society.

Board Briefs

- Decision was made **not** to hold a regular MNPS meeting in January.

- A sum of \$300 was donated to the Minnesota Valley National Wildlife Refuge for use of meeting rooms.

- Don Knutson volunteered to monitor the doors at MVNWR until other volunteers come forth.

- Volunteers are needed for postcard mailing and to serve refreshments at meetings.

- The board voted for MNPS to become an official member of the University of Minnesota Landscape Arboretum with an annual registration fee of \$60.

- Charles Umbanhowar volunteered to develop a home page for MNPS, to be linked as <http://www.stolaf.edu/depts/biology/mnps>

- 90 attended the meeting in November, and 44 in December.

Remember to pay dues

The Minnesota Native Plant Society

Minnesota Plant Press

Thor Kommedahl, editor

Membership dues are \$10 per year for regular members and includes subscription to the newsletter; dues for students and seniors are \$8, for family \$12, for institutions \$20, and donors \$25. Checks can be made out to: Minnesota Native Plant Society, and sent to: Minnesota Native Plant Society, 220 Biological Sciences Center, 1445 Gortner Avenue, St. Paul, MN 55108.

Four issues are published each year.

MNPS Board of Directors

President: Char Bezanson,

Vice-President: Charles Umbanhowar,

Treasurer: Pat Ryan,

Secretary: Christine Drassal,

Deb Anderson,

Dave Crawford,

Gerry Drewry,

Thor Kommedahl
Val O'Malley,

Gary Perrault,

Roy Robison,

The Minnesota Native Plant Society is a tax-exempt 501 c3 organization as determined by the US Internal Revenue Service.

The Greening Conference is planned for February 22

The theme of this conference to be held at the Hennepin Technical College on February 22, 1997, from 8:30 AM to 5 PM, is *Using Plants to Build Communities*. This is an activity of the Minnesota Green Program.

The keynote speaker is Susan Davis Price, author of *Minnesota Gardens: An Illustration History*. In addition to a variety of topics, there will hands-on demonstrations on planting and equipment.

The Minnesota Green Program supports grassroots efforts in community greening projects and provides for membership and benefits. For details on the Minnesota Green Program or the 1997 Conference, contact Terri Goodfellow-Heyer at _____, or Greener MN at (800) 676-3638.—selected from material prepared by Terri Goodfellow-Heyer, Minnesota State Horticultural Society.

Record native plant and landscaping projects for MNPS presentation

Members of MNPS are encouraged to take slides of their own projects on native plants and landscaping and save them to alternate with Plant-of-the-Month presentations. Projects could include native plants, propagation, butterfly gardening, mini-prairies, landscape design, habitat restoration, and more. Share your experiences with others. If interested, call Gary Perault.

DNR seeks volunteers

The Minnesota DNR welcomes volunteers for any of the 6 regions in the state. Request details from DNR Volunteer Programs, 500 Lafayette Road, St. Paul, MN 55155.

MNPS Online

The Minnesota Native Plant Society has a web site. It was developed by Charles Umbanhower of St. Olaf College. On the home page are described the society, the newsletter, speakers and topics for 1996-1997, links to information and images of native plants, and a listing of suppliers of plants in the state. In addition, recent articles that have appeared in *Minnesota Plant Press* are printed and available for downloading. Access it at <http://www.stolaf.edu/depts/biology/mnps>

MNPS Display Board Use

All members are welcome to show our display board at events, museums, and schools, if an attendant is present or it is safely displayed. This 3 by 5 foot, 2-sided board holds information on the Society, native plants, and stewardship. Request it from Don Knutson

International Horticultural Conference in New York

The International Horticultural Conference will be held June 21-22, 1997 at the Buffalo Museum of Science, in New York. Topics include: Creating a Garden Journal, Water Garden Plants, Unusual Trees and Woody Plants, Perennials, Wild Flowers, Landscaping for Birds, Gourmet and Medicinal Mushrooms, Early and Late Gardens, and Irises. The registration fee before May 1, 1997 is \$160 for 2 days for museum members and \$175 for non-members. For details, contact Buffalo Museum of Science, 1020 Humbolt Parkway, Buffalo, NY 14211; tel. 716-895-8739; fax 716-839-5662.

MNPS members can join Minnesota Landscape Arboretum at a discount

Members of MNPS can become members of the Minnesota Landscape Arboretum at a \$5 discount as well as receive additional benefits of Dial-U, discounts at the Gift Shop, and discounts at the Apple House. Members are admitted free to the Arboretum and receive a bi-monthly Arboretum newsletter. The regular membership fee is \$60. The MNPS is itself a member.

Garden writers seek photogenic landscapes

Sally and Andy Wasowski are working on a new book titled *Native Gardens for the Prairie States* (University of Minnesota Press) and are looking for gardens showing at least 50% indigenous plant materials. Contact the Wasowskis if you have information or photos.



Pike Island, Fort Snelling State Park
October 13, 1996

Society Activities

Treats at Monthly Meetings

After several years of much-appreciated attention by John and Jackie Buffalow, the "hospitality" function (treats and coffee at monthly meetings!) is now more widely distributed. At the October meeting, people signed up to bring treats at various meetings. Currently, we have at least one volunteer for each meeting except June—more volunteers are welcome! Coffee, which is provided by the Refuge, can be made by anyone who wants to drink some—if you get to meetings early, we encourage you to make a pot! It's easy!

We thank Chris Drassal, Diane Hagstrom, Mary Risdall, and Lee Shannon for providing treats for the November and December meetings. Volunteers for upcoming meetings are as follows:

February 6	Bettina Darveaux
March 6	Char Menzel
April 3	Kandis Tsuchiya, Peggy Brakken-Thal
May 1	Marcie O'Connor
June 3	?

—Char Bezanson

Adopted Garden Group to Meet February 6

We have scheduled a meeting to discuss the Refuge adopted-garden projects for 6:30 PM on February 6, 1997, prior to the regular monthly meeting. The top priorities will be a simple design plan and a maintenance plan for the space just outside of the classroom windows at the Visitor Center. This space is too sunny for a true woodland garden, but we will select a variety of partial-sun tolerant woodland plants, probably including wild geranium, columbine, and a few other "edge" plants. Anyone interested in becoming a regular member on the design team is welcome.

We hope to make decisions about the design and maintenance of the space this winter and start work in the spring. If you anticipate that you may have plants to donate, keep us in mind and let me (Chris Armstrong) know.

Newsletter editor will be needed in 1998

Any MNPS member with a yen for writing and editing can look forward to a challenge in becoming the editor of MPP starting the fall of 1998. This means preparing an issue 4 times a year of 4-12 pages each. Besides having writing and editing skills, the editor will need a computer with software supporting a newsletter format. If interested, contact the current editor for details. Perhaps you want to break-in first.

MN-NATPL Internet Listserv—Update

In 1995, Robin Fox set up an Internet E-mail mailing list, or "listserv" for people interested in Minnesota native plants. Currently, there are about 25 members. Activity on the list has been sporadic—mail from this list won't overflow your mailbox on a daily basis, but there have been some good discussions and networking. The list is served by a University of Minnesota mainframe computer, and has been free of charge up until now. It looks like the University may start to charge a moderate fee for this service in the near future. It is possible that MNPS could cover this fee if there were enough MNPS members interested in his program. If you are interested in making use of the MN-NATPL listserv, you are encouraged to subscribe to the list, as detailed below. If you have an opinion on the value of such a list to you, E-mail bezanson@stolaf.edu and make your views known!

As reported in MPP, Summer 1995 (Vol. 4, Nr.3):

Functions of listserv include:

- Plant rescue: notification, coordination
- Garden "chat": notes on the passing scene, materials to share, horticultural discussion
- Field trips: event calendar, trip reports, notes
- Government related: political information, action
- Visitor contact: for example, those wanting to go on field trips, wanting to contact peers
- Mechanisms for sharing net resources: for example, materials to share from other state native plant mailing groups

Anyone can subscribe but only members can read from it or review the membership: it is not anonymous. Messages (files) are not edited or moderated. Nonmembers can send files. All files should be signed (in addition to your address in the heading) and titled appropriately.

To subscribe

- Send E-mail to: listserv@vm1.spcs.umn.edu
- Leave subject blank
- In the text: SUBSCRIBE MN-NATPL your name (not address) or UNSUBSCRIBE MN-NATPL your name

For correspondence to the group, send E-mail to MN-NATPL@vm1.spcs.umn.edu

For questions, call Robin Fox

or E-

mail him at foxqx001@gold.tc.umn.edu

Is your E-mail address recorded in the Directory of Members? If you want it listed, contact Marcie O'Connor at marcie@haven.com by E-mail.

Society Activities

A new "expert system" for tree and shrub selection is now available

A Mn/DOT interactive, multi-medium expert system for selecting trees and shrubs is now available for purchase through the DNR. The CD-ROM is titled *Trees & Shrubs For Minnesota Landscapes & Roadsides*. If you examine the CD-ROM along with the credits and information sources utilized, you will quickly realize how monumental the collaborative effort has been on this project. Michael Max of EnvironMentor Systems provided the programming assistance under contract with Mn/DOT. Key features include data and color photos for more than 320 trees and shrubs applicable to roadside and landscape plantings in Minnesota.

The interactive program is extremely user-friendly and is appropriate for professionals and novices alike. The program searches the database for plants matched to the characteristics, site conditions and functions you select and provides a listing of all plants that pass your selected criteria. You can then print out the list and fact sheets on individual plants. You can also print out range maps for native Minnesota trees and shrubs and field data worksheets to collect site information.

Use of the *Trees & Shrubs For Minnesota Landscapes & Roadsides* disk requires a computer with the following:

- 486 or better processor and Windows 3.1, 95 or NT.
- At least 8 MB of RAM and a hard disk with at least 10 MB of free space.
- CD-ROM drive, Super VGA monitor and a mouse.

The cost is \$20 per CD-ROM unless you purchase 10 or more disks to qualify for the quantity discount rate of \$15 per CD-ROM.

To obtain an order form, contact: Rose Holman, DNR Forestry, 1200 Warner Road, St. Paul, MN 55106; (612) 772-7926, fax (612) 772-7599.

—Scott D. Bradley

Scott Bradley of MN/DOT Landscape Programs described and demonstrated this equipment at the December 5, 1996 meeting of the MNPS at the Minnesota Valley National Wildlife Refuge Center.

Did you know that a gentle drop of rain falling outside of a ripe puffball can force a million spores or so into the air. A large specimen of the giant puffball (*Calvatia maxima*) is estimated to contain about 18 billion spores.—C.M. Christensen, *Common Edible Mushrooms*, U of M Press.

Conservation Issues subcommittee to meet February 6 at the refuge center

All members interested in conservation issues involving native plants are invited to a subcommittee meeting to be held before the regular MNPS meeting on February 6, 1997, at 6:30 PM. Several items will be considered, including how the MNPS can support projects such as the federal *Teaming with Wildlife* initiative, which proposes a small "user fee" on items such as outdoor equipment, bird seed, and other products used by "wildlife hobbyists", to be returned to the states for non-game wildlife conservation purposes. This program is similar to the one that has been in place for decades on hunting supplies, which goes to support conservation of game species.

Another current issue is the reauthorization of a portion of lottery funds to support conservation issues, which will be considered by the Minnesota legislature this year.

There may also be an organizational meeting of this group in January; contact board members Val O'Malley or Charles Umbanhowar for information on this.

—Char A. Bezanson

Teaming With Wildlife seeks to generate state-dedicated funds for fish and wildlife conservation, recreation, education

This program, known also as *The Wildlife Diversity Funding Initiative*, favors adding a surcharge or user fee to sales of recreational equipment. The fee will be based on a percentage of the manufacturer's cost (inventory value) of the product, ranging from 0.25% to 5%. Outdoor products being considered are recreation equipment such as backpacks, tents, canoes, mountain bikes; optical equipment such as binoculars; photographic items such as film and cameras; wildlife supplies; guide books used for field identification; and recreational and sport utility vehicles. Hunters and anglers now pay such a user fee.

The US Treasury would collect the fees and turn funds over to the US Fish and Wildlife Service. These funds will be dedicated to wildlife diversity projects focused on conservation, recreation, and education for the benefit of fish and wildlife other than game species.

More than 100 groups have given approval for this project, including the MNPS, and this approval is needed when this initiative goes before Congress. Watch for the appearance of this bill before Congress when a number will be assigned to it.

Native plants in England and Northern Ireland benefit from grazing animals

A flock of mostly Hebridean sheep were transported from a farm to graze on the tall grass on the landward side of the dunes along the Northumberland coast of England. Because of the selectivity of their grazing they take the grass and leave the wildflowers alone, thereby creating a colorful and interesting flora in the meadow. Similarly, Exmoor ponies were taken to the dunes in Northern Ireland where the ponies grazed on bracken and gorse but avoided the valued heather and other flowering species—reported in the *The Royal Oak Newsletter*, summer 1996 (page 11).

In a related story, Ken Crocker and his four sons arranged for 20 hardy cattle and ponies to graze the wild cliff tops above the Atlantic Ocean in Cornwall, England, in the fall of 1944. Orchids appeared last summer for the first time after more than a half century. Other species returning were bird's-foot trefoil, violets, wild thyme and heather. Many birds, insects, and animals also reappeared after the grazing of lands. This new management regime has encouraged farmers to alter their management practices to hasten the return of wild plants and wildlife. This was reported in *The National Trust Magazine*, number 78, page 11, 1996.

Leafy spurge on America's least wanted species list

Leafy spurge (*Euphorbia esula*) is a noxious weed that has spread across 3 million acres of rangeland in north-central United States, crowding out native grasses and cutting grazing land productivity in half. Leafy spurge is a threat in 11 states. The leafy spurge flea beetle is one possible control. (*Nature Conservancy* 46[6]:21, 1996)

National Collection of Endangered Plants kept by the Missouri Botanical Garden

The Center for Plant Conservation at the Missouri Botanical Garden maintains 496 of America's rarest plant species at 25 gardens and arboreta throughout the United States. The species maintained at these gardens and arboreta are listed on the Web and can be accessed from the home page of the Center for Plant Conservation: <http://www.mobot.org/CPC>

Mycorrhizal analysis of roadside prairie plantings

Numbers of spores in mycorrhizal fungi serve as potential indicators of restoration sites involving native grasses and forbs reports Bob Jacobson of the Minnesota Department of Transportation, in a 3-year project. The plan is to introduce inoculum of these fungi into restoration sites along highways. (*Roadsides* 4[1]:3, 1996)

Keystone species redefined

Defined by Paine in 1969 as a species to preferentially consume and hold in check another species that would otherwise dominate the system, the term has been redefined as a species whose effect on its ecosystem or community is not only large but disproportionately so relative to its abundance. Identification of keystone species is not easy.

The keystone concept shows, for example, how the loss of some species in low abundance may have surprising effects. Thus, land managers should consider carefully the consequences of species loss for which no obvious role in the ecosystem has been found. Such challenges in the quest for keystones is discussed by Mary E. Power and nine associates from various institutions. (*BioScience* 46: 609-620, 1996)

Minnesota is a national leader in production of wreaths and greenery

Many wreath producers prefer balsam fir, but some use white pine and white cedar. Harvesting is by arrangement with the DNR, Chippewa National Forest, tribal councils, and county agencies. Some work with paper companies for selective pruning of trees. Bough cutters must get a permit for harvesting boughs on public lands. Bough cutters can average 1,000 pounds of boughs in a day. —from article by John Krantz, DNR Division of Forestry (*The Minnesota Volunteer* 59[349]: 53-54, 1996)

Quaking aspen widely distributed in North America as response to catastrophe

"No other tree species occupies a larger part of North America [than the quaking aspen]", reports Chris Madson, editor of *Wyoming Wildlife*. It survived because of ice age glaciers and modern wildfires. "Aspen can withstand temperatures from 70 degrees below zero to 100 degrees above." Trees can live in muskegs and tamarack bogs as well as in arid regions of western desert basins. Genetically identical aspen groves occur because of asexual reproduction, so that all trees in the grove are clones. The quaking aspen is important to an estimated 500 species of animal and plant according to New York Botanical Garden director Thomas Elias. Aspens are now being regarded as important in modern timber management. (*National Wildlife* 34[6]: 28-34, 1996)

Midwest corn fields were once dominated by big bluestem. They were first used for grazing by Native Americans who burned tracts to attract bison to graze on the fresh new shoots, reports Rachel Bynum of *River Bend Nature Center* (17:3, 1996)

Plant Lore

What is lingenberry?

Lingenberry is *Vaccinium vitis-idaea*, in the heath family. It has many other names such as mountain cranberry, lingberry, lingonberry (Scandinavia), cowberry, and foxberry. The specific epithet refers to grape near Mt. Ida, Greece.

Where does it grow?

It likes rocky, dry, acid soil in upland forests, especially pine, and in peat bogs and tundra. One can find lingenberry in northeastern Minnesota, New England and northward into arctic and subarctic Canada.

What does it look like?

It is an evergreen shrub usually less than 6 inches tall. Tiny leathery, alternate leaves only a fourth to a half inch long are borne on slender stems. The bell-shaped flowers are small white to pinkish-red that eventually produce dark-red berries that are tart but edible when cooked, making flavorful jams and jellies.

How does it differ from cranberry?

Lingenberry, or northern mountain cranberry as it is known in Minnesota, differs from American cranberry by having black-dotted undersurfaces of leaves, seen with a hand lens, whereas American cranberry leaves are whitened underneath. No other creeping shrub has this black-dotted foliage.

Does it have medicinal properties?

Although reputed to be effective as a diuretic and antiseptic, only its efficacy as an antiseptic (leaves contain hydroquinone) has been documented.

In that this plant grows also in New England, has it any historical significance?

Probably; M.L. Fernald of Harvard thought that lingenberry, not wild grape, is the plant *vinber* from which the name Vinland was derived by the Vikings. Squashberry, cloudberry, and wild currant are other possibilities (*Rhodora* 12:17-38, 1910).

Wildflowers with Wings

Donald Del Greco

Perhaps the title *Wildflowers with Wings* reveals more about the intimate relationship of butterflies to plants than first meets the eye. As one observes butterfly behavior, whether viewing the beautifully adorned adult stage nectaring on a multitude of flowers or to a close inspection of the voracious yet selective appetites of the splendid larval stage, we begin to witness this close and complex link between butterflies and plants.

In refreshed pursuit of butterfly observation and study, we begin to see the natural world through a unique window, for one cannot become a butterfly enthusiast without at the same time growing more sensitive to the surrounding plants, animals, soils, weather, landforms—the landscape as a whole. Appreciation for the landscape as a whole, and the understanding of the imperative for thoughtful and caring stewardship of our remaining Minnesota landscapes will be essential to the protection and preservation of our precious natural heritage.

Continued observations and study of the marvelously complex world of butterflies with further data collection on various species will certainly complement and enhance our ecologic understandings, for as ephemeral as butterflies appear, they can serve as an integral component of environmental quality and function as indicator species.

These vivid expressions of life, from the miracle of metamorphosis to the seemingly endless color and design of butterfly wings, have filled us with wonder and have much to teach us about the diversity of life, perhaps more than first meets the eye.

A summary of a talk given on October 3, 1996, at the MNPS meeting at the Minnesota Valley National Wildlife Refuge Center by Don Del Greco, Banning State Park.

Olmsted Prairie Nursery Project plans nursery for plants destined for roadsides and parks

Kimm Crawford and Joel Dunnette have received a state grant of \$4,500 to collect seeds of native prairie plants to establish a nursery for plants that can be used for roadsides and parks. This project, however, has to match the funds with volunteer hours, money, or materials, writes John Weiss of *The Post-Bulletin* in Rochester, Minnesota.

Volunteers are needed to collect seeds, plant them in flats, survey collection areas, teach about native plants, keep track of sites where seeds are collected, and transplant seedlings.

The goal initially is to collect 50 pounds of seeds of big and little bluestem, Indiangrass, black-eyed-Susan, coneflower and other native plants.

The project is sponsored by the Zumbro Valley Audubon Society, University of Minnesota Extension Service, Master Gardeners, Olmsted County, South Zumbro Watershed, Pheasants Forever, and Friends of Oxbow. Joel and Sandra Dunnette are members of MNPS.

Plant resources on-line

•The New York Botanical Garden web site is <http://www.nybg.org>

•*Index Nominum Genericorum* (ING) can be accessed at the National Museum of Natural History web site at <http://www.nmnh.si.edu/ing/>

•*Endangered Species Update* <http://www.iucn.org/themes/ssc/index.html>

•*Poisonous Plants with photos* <http://www.ansci.cornell.edu/plants.html>

Growing Prairies Seedlings Indoors

(continued from page 1)

These seeds are often encased in a colorful, fleshy fruit that invites birds or other animals to lunch. The seed passes through the bird's crop or the mammal's acidic stomach, where the seed coat is abraded or eroded, and where the seeds are distributed far from the parent plant.

Germination requirements. Some seeds require a period of "afterripening" of weeks or months after the seeds are shed, during which time the embryo continues to develop. Some seeds require light for germination: this explains why you usually get a nice crop of annual weeds after spading the garden. But the most common requirement for prairie seeds seems to be for typical spring weather: a few weeks of cold, wet conditions at temperatures just above freezing. These conditions increase the oxygen available to the seed, causing chemical changes within the seed to initiate germination.

Stratification. If a seed requires a cold, moist treatment to break dormancy, a gardener can provide these conditions by sowing the seed outdoors in the fall, and dormancy will be broken naturally in early spring. We can also sow seeds in flats, water the flats, and store the flats in a cool place for 3-12 weeks before providing warmer growing conditions. Foresters developed a method of pre-chilling conifer seeds in moist peat moss in trays stacked in refrigerators: the stacks of trays apparently looked like layers (strata) of rock, and the term "stratification" has become applied to this process. We can do the same by mixing seed with moist sand or vermiculite and refrigerating the container and its contents. For small amounts of seed, I usually use plastic film cans half filled with moist sand. I add a spoonful or two of seed to the container, shake it up, and store the labelled containers in the refrigerator. The seed should be stratified for up to several months. For seeds to store well for long periods of time, they must be kept dry; so, stratified seeds must be sown during the next growing season or seeds will deteriorate.

Stratification requirements for many species of prairie plants are known, and requirements are given in references (see end of article) or may be listed in the catalogs of prairie-seed suppliers. If requirements are not known, the first step is to see if the seed will imbibe water. If not, it probably requires scarification for water to penetrate the seed coat. If the seed does imbibe water, it may germinate with no further treatment. Often, some seeds from a lot will germinate with no treatment, but the germination rate will increase markedly if the seed is stratified for a few weeks. If your interest is more practical than scientific, and your objective is to get the most seedlings from your seed with the least trouble, I'd suggest stratifying your seed for 60 days be-

fore planting them. Many seeds require this, seeds that don't require it will not be damaged, and you can keep records of any that fail to germinate, researching them further.

Growth procedure. Growing prairie seedlings after the seed is treated is similar to growing any other seedlings. The main difference is that germination rates may not be high or uniform, and that many prairie plants will grow slowly, putting most of their energy into growing roots rather than into growing shoots. For this reason, I use a two-step process. I start the seeds in a germination flat in a light soil mix, transplanting seedlings promptly to individual containers or cell-packs as soon as seedlings can be handled. This saves potting mix, and allows for differences in germination rate and conditions among species. I've grown seedlings in school milk-cartons, paper cups, peat pots, peat pellets, and undivided flats: all have advantages and disadvantages, but all can work.

Here is how I currently do it:

After 60 days or more of cold stratification treatment, I spread the contents of a film can, including seed and sand, over the top of a layer of moist vermiculite in a recycled plastic blueberry basket with a top, or in another small flat with a cover. If the seeds are large, like the milkweeds, I cover them with a quarter inch or so of vermiculite. I then water flats from the bottom, by placing them in a shallow tray of water for an hour or so. If a cover is not available, I put the flat in a plastic bag; once the seeds start to imbibe water, they can't be allowed to dry until the plant has developed a good root system. I then put the flats in a warm place (70-80 °F), if possible: most seeds will germinate faster at higher temperatures, but even at lower temperatures they will germinate eventually. Some seeds prefer a low germination temperature—if you don't know, you'd probably be safer keeping all flats at about 60 °F.

(continued next page)

Easy-to-grow Minnesota wildflowers

All of these plants grow locally, and will attract butterflies and/or hummingbirds. All are native to prairies and need full or nearly full sun; all are perennials, although brown-eyed-Susan is short-lived: butterfly-weed (*Asclepias tuberosa*), swamp milkweed (*Asclepias incarnata*), brown-eyed-Susan (*Rudbeckia hirta*), yellow coneflower (*Ratibida pinnata*), prairie coreopsis (*Coreopsis palmata*), stiff goldenrod* (*Solidago rigida*), blazing star* (*Liatris* sp.), New England aster* (*Aster novae-angliae*), and wild bergamot (*Monarda fistulosa*).

*All listed species will benefit from stratification for 30-60 days at 35-40 °F; species marked require this treatment for germination

Post-germination care. Once the seeds have germinated, I make sure the seedlings have plenty of light, and keep them cool to encourage stockier plants. I grow them under cool-white fluorescent lamps, with the lamps about 6 inches above the flats, and provide about 18 hours of light per day, using a timer. Window light is not usually bright enough or for a long enough duration in late winter, so supplementary light makes a real difference. Because plants are covered, they will not need frequent watering, but must be kept moist. Seedlings may grow in the germination flats for up to several weeks after germination. Keep in mind, however, that vermiculite has no nutrients, and will not support seedlings for long. If they are crowded, they will also grow slowly, so it's to your advantage to transplant them as soon as seedlings are large enough to handle. The first leaves to emerge from the seed will be the cotyledons; usually, I transplant seedlings as soon as the first true leaves begin to emerge.

Indoor transplanting. When seedlings are ready, I transplant them into new or clean, reused plastic 6-pack containers. The advantage of these containers is that the seedling develops a good root system separate from any other plant, which is beneficial at planting time. I use a soil mix composed of a third sterile potting soil, a third peat moss, and a third perlite or vermiculite. I moisten the potting mix, fill the containers, and make a hole in each cell of soil with a chopstick or pencil. I then loosen the seedlings from the germination flat with a fork or stick, while pulling it out by holding onto a leaf or cotyledon. I then put the seedling into the hole. When the flat is filled, I may firm the seedlings in with a tool, or just water them in from the top with a sprinkling can or spray bottle. I place the 6-pack containers in a flat or tray with no drainage holes, and water from the bottom by filling the tray with a half inch or so of water; the potting mix will absorb the water. After an hour or so, I pour off the excess, or remove it with a turkey baster. Watering from the bottom encourages good root growth and doesn't dislodge the seedlings. It's also easier. If you want to water from the top, I suggest using a spray bottle rather than a watering can until the plants are firmly rooted. It is not really necessary to fertilize native plants, but if you feel compelled to do so, use a very dilute solution of fish emulsion or a balanced fertilizer. The main ingredient for success from this point on is plenty of light.

Field transplanting. In spring, plants must be "hardened off" before they are ready to be transplanted into the garden or prairie restoration area. The idea is to accustom them to increased amounts of ultraviolet light, as well as physical stress such as wind and rain before you disturb the root system by transplantation. I do this by putting the flat of 6-packs in a sheltered area adjacent to my garage;

here plants will be exposed to wind and rain but can be protected from direct sun by using a white polyester "floating row cover". Prairie plants are not as tender as many garden plants and will tolerate light frost, so I sometimes move the plants outside when I run out of room under my lamps; then I cover them with the floating row cover material or put them in a cold frame.

When the plant roots have filled the 6-pack cell and the weather has warmed, the plants are ready to be planted out. Some plants, like stiff goldenrod, yellow coneflower, and brown-eyed-Susan, will make a nice "plug" of roots in just a few months. Grasses and many other plants, however, take a while longer; so you may want to grow them outside in the flats for few weeks. If you do plant them out before the roots have filled the cell, take extra care in removing the plant from the 6-pack because roots will not "pop" out like a more well-developed root system will. When planting seedlings, try to envision the size of the mature plant, and allow at least one square foot of space per plant. If the ground is not moist, watering may be necessary during the first season; after that, it should be unnecessary.

The plants will spend most of the first season producing roots, and may not bloom or produce much top growth. If you want, you can mow or weed-whack a new prairie garden at about 6 inches to control weeds, but be careful about weeding as it is easy to pull up your new plants during the first season. At the end of summer, you will probably have at least some seed to collect from your new plants, and you can start all over!

Useful references:

Collecting, Processing and Germinating Seeds of Wildland Plants. James A. Young and Cheryl G. Young. Timber Press, 1986. General work; includes information on germinating tree, shrub, and herb seeds. ISBN 0-88192-057-6.

Restoring the Tallgrass Prairie: An Illustrated Manual for Iowa and the Upper Midwest. Shirley Shirley. Univ of Iowa Press, 1994. Basic advice on growing prairie plants from seed, both indoors and outdoors. 110 species are described and illustrated, including information on germination and culture. Paperback, about \$15, or hard cover. ISBN 0-87745-469-8.

The New Seed-Starters Handbook. Nancy Bubel. Rodale Press, 1988. Excellent manual on growing plants, including wildflowers, from seed. Information on soil mixes, containers, light, seed treatments, cold frames, transplanting, pests and troubleshooting, seed collection, etc. Available in paperback, about \$15. ISBN 0-87857-752-1.

This is a summary of a talk given by Char Bezanson, St. Olaf College, Northfield, Minnesota, at the meeting of the MNPS on November 7, 1996.

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