
Missouri Native Plant Society



Petal Pusher

JAN.-FEB Volume 3 Number 1, 1988

UPCOMING EVENTS

February 16, Tuesday, 7:30 PM Kansas City Chapter Meeting. Call Linda Ellis for details, 472-0227.

February 20, Saturday, 8:30 AM: Field trip - Winter tree Identification. Meet at Dept. of Conservation parking lot. Jefferson City Chapter.

February 25, Thursday 7:30 St. Louis Chapter meeting, Rm 101, MacMillan Hall. Speaker Tim Nigh. Program: Ozark Natural Features, Inventory, Procedures and Progress.

February 27, Saturday, Kirksville Chapter, 1:00 PM. Work on the prairie restoration project. Meet at the south side of Science Hall. Remember to bring work gloves and hostility for multiflora rose.

March 1, Tuesday, 7:30 PM, Jefferson City Chapter monthly meeting. Dept. of Con. Headquarters. Program: Jim Huckins, Ozark Wildflowers.

March 19, Saturday, 8:30 AM. Jefferson City Chapter. Field trip to Ha Ha Tonka St. Park. Meet at Shulte's parking lot to car pool.

March 22, 7:00 PM, Kirksville Chapter Rm 124 at NMSU Science Hall. Speaker: Virginia Wallace from Mo. Dept. of Conservation.

March 24, Thursday, 7:30 St. Louis Chapter Meeting, Rm 101, MacMillan Hall. Speaker Midge Tooker on "Plants of Side Pocket".

March 26, Saturday, St. Louis Chapter, Follow up field trip to Side Pocket.

April 5, Tuesday, Jefferson City monthly meeting. 7:30 Dept. of Con. Program on Mushrooms by Phil Ross, Mo. Mycological Society.

April 23 - 24, Saturday and Sunday, MONPS Statewide Meeting, Roaring River State Park. See page 2 for details.

April 9 - 10, Saturday and Sunday, Kansas City Chapter Membership Drive. Wildflower walks at Burr Oak St. Park. Walk from 1:00 - 3:00, meeting at 4:00.

April 16, Saturday, Kirksville Chapter. Another Prairie work day, Depart NMSU Science hall at 1:00 PM

April 16, Saturday, Jefferson City Chapter Field trip to Stanford's farm to hunt mushrooms. Meet at Schulte's parking lot at 8:30 AM for carpool.

April 30, Saturday, Kirksville Chapter. Depart NMSU's Science Hall at 1:00PM for a wildflower walk. Objective is to find *Viratrum viride* in bloom. (Maybe you better bring a snack).

MARK YOUR CALENDARS

The MONPS Annual Meeting will be June 4th and 5th in the Trenton Mo. area. The emphasis will be on prairies.

On the weekend of September 17-18 we will visit the Eleven Point River area in Oregon Co. The emphasis will be on woodland habitat.

Details will be provided in upcoming issues.

April 23-24 Field Trips

Southwest Missouri's unique landscape is the focus of April's excursion. The glades, dry forest, and unique plants for which it is known will be experienced first hand in field trips to Piney Wilderness and Buzzard's Bluff. Meeting activities, lodging, and dining will center at Roaring River State Park, on Highway 112 six miles south of Cassville, Missouri. The program includes a board meeting, presentation on Southwest Missouri's natural and geologic history, and an informal slide presentation session.

Schedule

Friday evening: Informal slide presentation session, outdoor amphitheater, Roaring River State Park. Bring your slides!

Saturday

8:00 a.m. Piney Wilderness Field Trip. Leave from the parking lot by the Roaring River State Park office for an all day hike into the Piney Wilderness. The glades should be quite colorful, with many species in full flower by this time. Bring a sack lunch, water, and wear comfortable hiking shoes. Trip leader - Linda Ellis.

6:00 p.m. Dinner at the dining lodge, Roaring River State Park.

7:00 p.m. Natural History and Geology of Southwest Missouri, by Merle Rogers, Naturalist, Roaring River State Park.

7:45 p.m. Board meeting.

Sunday

8:00 a.m. Buzzard's Bluff Field Trip. Leave from the parking lot by the park office. Buzzard's Bluff is a sandstone bluff located about 60 miles north of Springfield. It contains excellent fern habitat, has several rare mosses, and sports a dwarf oak-hickory forest. Trip leader - Paul Redfearn.

Lodging Information:

- 1) A block of rooms is being held at Roaring River State Park for MONPS members. Make your reservations as soon as possible at (417) 847-2330. We're competing for space with the trout fishermen, so don't delay. Cabins are also available.
- 2) Roaring River Resort (417) 847-3235
- 3) Townhouse Motel (417) 847-4196
- 4) Holiday Motel (417) 847-3163

NEW SCHEDULE FOR PETAL PUSHER

The PETAL PUSHER will now be published every second month beginning with February. This change was requested by the editors who had a time conflict with work. Because of this change, no Petal Pusher has been published since the December issue.

There is also a new deadline; material must be in the editor's hands by the first of the month before the publication month, i.e., the deadline for the April issue is March 10.

There is no penalty for sending material before the deadline. Articles which do not have a time requirement will be published in the next issue after we get them or, rarely, the next issue in which we have space.

The Editors

RULES FOR SUBMISSION

If you type: 4½ inches wide - no more single space any length

If you don't type: Write legibly

Include your phone number just in case.

Tell us if you want it printed as you wrote it; otherwise we may correct grammar, etc., or shorten it for space requirements.



Forest violence

Reprinted from The Center For
Plant Conservation, Summer 1987

The U.S. Fish and Wildlife Service (FWS) listed the white bladderpod (Lesquerella pallida) as endangered under the Endangered Species Act on March 11, 1987. This annual plant in the mustard family is known from three populations in San Augustine County, Texas.

The running buffalo clover (Trifolium stoloniferum) was listed as endangered by the FWS in July. Only one population of four individuals is known to exist. This population, diminished from 18 individuals in 1985, is located along an off-road vehicle trail adjacent to the New River on private land in Fayette County, West Virginia. Threats include destruction by off-road vehicles, trash dumping, pollution, and trampling by humans and animals.

Running buffalo clover may also have been dependent upon buffalo for soil enrichment, periodic disturbance, and seed dispersal. As buffalo disappeared from the east, so did populations of the clover.

Effective July 13, 1987, the rough-leaved loostripe (Lysimachia asperulaefolia) was also listed as endangered. This perennial herb grows from a rhizome and showy yellow flowers top the slender stems.

The rough-leaved loostripe is endemic to the coastal plain and sand hills of North and South Carolina, but is now known from only nine populations in North Carolina.

ECOSYSTEM MANAGEMENT: RARE SPECIES AND SIGNIFICANT HABITATS

A conference on this subject will be held June 6 - 9, 1988, at State University of New York, College of Environmental Science and Forestry, Syracuse 1, New York, in conjunction with the 15th Annual Natural Areas Conference and the 10th Annual Meeting of the Natural Areas Association (NAA).

Various aspects of ecosystem management will be discussed including inventory and monitoring techniques, data analyses, public involvement and legalities.

For information about costs and housing, write to ESF Continuing Education, SUNY College of Environmental Science and Forestry Syracuse, NY 13210-2784.

New books available:

Aquatic and Wetland Plants of Kentucky, by E. O. Beal and J. W. Thieret. Kentucky Nature Preserves Commission Scientific and Technical Series Number 5. 1987. 312 pp. \$20.00. Kentucky Nature Preserves Commission, 407 Broadway, Frankfort, Kentucky 40601.

The Plant Book: a Portable Dictionary of the Higher Plants, by D. J. Mabberley, University Lecturer, Department of Plant Sciences, University of Oxford. 700 pp. \$34.50. Missouri Botanical Garden, Department 11, PO Box 299, St. Louis, Missouri 63166.

The Genera of the Eupatorieae (Asteraceae), by R.M. King and H. Robinson. 580 pp. Hardbound. \$70.00, plus \$1.50 postage. Missouri Botanical Garden, Department 11, Box 299, St. Louis, Missouri 63166.

Books to look for in the near future:

Atlas and Annotated List of the Vascular Plants of Arkansas, by Edwin B. Smith. Revision of 1978 first edition.

Ferns and Fern Allies of Kansas, by Ralph E. Brooks. Illustrated by Carol Kuhn.

Wetland Plants of Kansas, by Ralph E. Brooks. Illustrated by Carol Kuhn.

HELP WANTED:

I would appreciate it if you could point me to any source(s) of *Sapindus drummondii*.
Jay Press
503 W High
Urbana, IL 61801

WELCOME TO NEW MEMBERS

Mr. & Mrs. James Bowen, Kirkwood
Irene Brunner, Shell Knob
Marlene & Charles Buescher, Chesterfield
Ann Case, St. Louis
Dr. Iran Cohen, Brighton
Robert Elworth, Willard
Margaret Glynn, Ballwin
Dorothy Hitt, Florissant
Helen Edith Hollowell, Kansas City
Karl & Christine Hussey, Florissant
Michael Laird, Kansas City, KS
John Lower, Bollivar
Jane Markley, Willow Springs
Willis Marshall, New Bloomfield
John Maxwell, St. Louis
Erwin Rodenburg, Springfield
Ann Ruger, St. Louis

A SECOND RATE HILL FARM

On December 17, 1816, a government surveyor headed due east between sections 13 and 24, T51N,R16W, in what is now Prairie Township, Howard County, Missouri. He recorded the land as "2d rate hilly; tim(ber) W Oak, B Oak, Hickory, Elem; ungt (undergrowth) hazel, vins, and briers." Twenty years later the first settler bought the land astride this section line and for well over a century farm families worked to survive among these ridges and ravines that border Leach Creek. Today, their descendants live elsewhere, while the house cornerstones, tiny cemetery, and other relics lie well hidden in the "ungt".

Be this land judged ever so second-rate by some, it is choice grade for this ridge-roaming retiree. I often poke around the old homesite, birding, botanizing, or just enjoying the aged shade trees. among its more fascinating features are the surviving Old World plants that folks evidently set out long ago. In May the Star-of-Bethlehem (Ornithogalum umbellatum L.) blooms, in June the Orange Day Lily (Hemerocallis fulva L.). Common Burdock (Arctium minus (Hill) Bernh.) blooms by the crumbled barn in late July; does it trace its "roots" to plants grown for 19th-century vegetables and medicinal herbs? One August I found a sprawling patch of Matrimony Vine (Lycium halimifolium Mill.) in flower. Among all the 5-petal flowers, one bore six petals.

The most enjoyable discovery happened just this past November. As I checked around for deer signs in a rough field corner left unmowed for 3 or 4 years, it dawned on me that a clump of four rose bushes that had grown up, unnoticed, were different from any I knew. Most obviously, they bore a bumper crop of remarkably large hips. Thorns and resinous glands suggest the Small-flowered Sweetbrier (Rosa micrantha Sm.) but verification will come with next summer's blooms. Did these plants come from stock brought there long years ago for a garden? Or could this exotic rose have been introduced more recently by wildlife? For an amateur botanist, each year brings a profusion of entangling and thorny questions, like a fresh crop of "vins and briers". Happy New Year afield!

Cal Royall



MINING IN NATIONAL FOREST, OZARKS

A Draft Environmental Impact Statement ("Hardrock Mineral Leasing; Mark Twain National Forest, Missouri") issued October 1987 by the Forest Service and Bureau of Land Management, gives tentative approval to mining in one of the most-protected areas of the Ozark Plateau, an area with numerous rare and uncommon plant and animal species and rare wilderness beauty.

In the three counties (Shannon, Oregon, Carter) that cover this land area are 18 Missouri Natural Areas (MDC), 62 springs of known waterflows, more than 30 wild plants and 34 concern status that might be affected, and numerous wetlands and floodplains.

Bordering the 157,000 acre study area:
Ozark National Scenic Riverways
Eleven Point National Scenic River
The Irish Wilderness

Within the study area:
Cupola Pond
Tupelo Gum Pond
Falling Spring
Greer Spring
Turner Mill Spring and Cave
Horseshoe Bend and Bluff
Bliss Spring

Among the reasons to oppose the proposal: the ground water may well be affected by toxic mineral residue and the Outstanding National Resource Water be contaminated; the visual standards of the MTNF would be changed; habitat would be affected and unique habitats might be further threatened; wild plant and animal species will be affected (including the bald eagle and Habenaria ciliaris, a rare orchid, for example); nationally famous recreation areas might be changed in detrimental fashion.

The Missouri Conservation Commission, the Burroughs Audubon Society of Kansas City, the Kansas City Sierra Club (Thomas Hart Benton Chapter) oppose the mining, as do many other conservation organizations.

If the Forest Service recommends against mining, this will deny permission for the current applications by the Doe Run Corporation.

The Board of the Missouri Native Plant Society opposes the mining proposal. Chapters and individual members are urged to write letters opposing the project. Letters from the public will be accepted until February 5, 1988 (extended from the previous date of December 24, 1987).

Address: B. Eric Morse, Forest Supervisor
Mark Twain National Forest
401 Fairgrounds Road
Rolla, Missouri 65401

Several alternatives are given. Alternative A of the DEIS is No Lease. The other alternatives are for leases under various conditions
Paul Williams

Editors' Note: The above is printed as written. Because of our publishing schedule, it was not possible to print it in time to meet the deadline for letters and we apologize for that. A letter sent by MONPS to the Forest Supervisor follows.



MISSOURI NATIVE PLANT SOCIETY

P.O. Box 6612

Jefferson City, MO 65102

January 28, 1988

Mr. Eric Morse
Forest Supervisor
Mark Twain Natural Forest
401 Fairgrounds Road
Rolla, Missouri 65401

Dear Mr. Morse:

On December 19, 1987, the Missouri Native Plant Society met at Jefferson City to convene a board meeting. After considerable discussion, the board unanimously moved to express on behalf of the 650 members of the society adoption of Alternative A of the Draft Environmental Impact Statement for hard-rock mineral leasing on the Winona District of the Mark Twain National Forest.

In our review of the DEIS, we saw no other recourse than to choose Alternative A for the following reasons:

- 1) The Eleven Point and Current river areas is recognized by both scientific and amateur botanists as this states most pristine, high-integrity landscapes, rich in botanical treasures and discoveries. This richness is exemplified through its distinction of national and state significant resources.
- 2) The DEIS is in error and far inadequate in assuming that the Natural Heritage Inventory, housed in the Department of Conservation, provides sufficient data on the location of rare and endangered plant species, and unusual natural communities. The Natural Heritage Inventory functions to gather information on existing data and references, and is not within itself a source for comprehensive information. The Missouri Native Plant Society recognizes that comprehensive plant studies require the work of professional botanists who systematically inventory and examine plant communities on frequent, repeated visits throughout growing seasons. Botanical surveys, conducted by graduate students working on master's thesis, are comprehensive when they examine 2,000 to 3,000 acre areas over a two-year period.

- 3) The study area is located in a section of the state known for the occurrence of groundwater-created wetlands called fens and wet seeps. The DEIS succinctly describes the complexity of groundwater movement and makes no assurance that groundwater contamination will not occur. Further, the DEIS description of wetlands and their locations falls far short of addressing the lack of location data for fens and spring seeps. These fens occur noticeably along small streams and rock-ledge shelves along the banks of the Eleven Point River. They are extremely valuable resources worthy of examination by botanists throughout the nation.

It is the floristic richness of this wild landscape that has and continues to intrigue many botanists to explore the region, knowledgeable of its primitive nature and great potential for scientific discovery. We feel that protection of renewal forest values and the precious land and water resources associated with it is the best management decision. Therefore, Alternative A can be our only choice.

Sincerely,

Paul W. Nelson
Chairman
Environmental & Education Committee
MISSOURI NATIVE PLANT SOCIETY

NEWS FROM JEFFERSON CITY

The Jefferson City Chapter elected new officers at their December meeting: President, Ginny Wallace; vice-President, Ron Hansen; Secretary, Leah Briggeman; Treasurer, Janet Schwaller.

We have our year's programs and field trips planned, and are borrowing the St. Louis Chapter's idea to tie the month's program with the field trip. We are looking forward to programs on wildflower photography, landscaping with native plants and an update on the revised Flora of Missouri project. We will also learn about mushrooms then hunt (and eat) some, look for spring wildflowers at Ha Ha Tonka State Park, learn about Missouri orchids then travel to Pickle Springs to see Isotria in bloom, and learn about lichens with a trip to see them in the wild. It promises to be an educational year for us.

We welcome all MoNPS members to visit with us if you are in the neighborhood. We meet the first Tuesday of each month at 7:30 pm at the Department of Conservation Headquarters.



NEW AND IMPROVED

MONPS has just printed our new brochure. Copies can be obtained by sending your requests by mail to the membership chairperson (Ginny Wallace). Write to: MONPS Brochures, PO Box 6612, Jefferson City, Mo. 65102.



REMINDER TO CHAPTERS

If you have not sent in your dues and an updated membership list, please do so at your earliest convenience. Also, remember that each chapter must file a year-end financial statement with the state treasurer. Please do this as soon as possible. If you haven't yet sent your 1987 minutes/newsletters to the archives, now is the time to do so. Please mail them to Sue Taylor, Botany Department, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166. Thanks.

Armed with shovels, bags and boxes, twelve MoNPS members met on the morning of Sunday, October 11, at a gas station near the Hwy. 67 bridge at the Mississippi River. Our mission: dig as many false decurrent asters as we could fit into our vehicles, take them to another location and put them (carefully) back in the ground.

Boltonia decurrens had not been seen in Missouri for a number of years until MoNPS member Alan Brant from the Missouri Botanical Garden found this population in 1986. Spurred by his find, Department of Conservation botanists searched additional suitable habitat in St. Charles County that fall and located one more population a few miles from the first. Boltonia decurrens is known now from those two locations and seven populations in Illinois. Unfortunately, the location of the first population was to be destroyed by Highway construction and construction of the new Alton Lock and Dam. Since the species is not (yet) a federally listed species, little could be done to stop the construction. So a salvage effort was organized.

We decided to move the Boltonia from the first site to the second population, since it was on Corps of Engineers property which could be managed to protect the plants. Also, since some Boltonia already grew there we knew the habitat was suitable. However, one problem remained - an adjacent landowner had decided the Corps property would make a good soybean field. The weather was also a problem. Last fall's torrential floods prevented a transplant then. Highway construction was scheduled to begin sometime this summer, and the Corps boundary line needed to be surveyed before we could move the plants. We were beginning to think our plans to move the Boltonia would fail before we started.

But the Corps did complete the boundary survey, the construction did not begin on schedule, the farmer got his soybeans out of the Corps' field, and on that Sunday morning we went to work. By early afternoon we had moved hundreds of plants to their new home. St. Louis Chapter MoNPS members agreed to continue the work as they had time, and to scatter seeds in the new location. The new population will be carefully managed to preserve and enhance the plants.

Special thanks to the many who helped this project reach a successful conclusion: the U.S. Army Corps of Engineers, Norm Stucky of MDC Planning Section and the transplanting crew - Bill Summers, Pat Grace, Don Kurz, Tim Smith, Larry Morrison, Jim Bogler, Leonard Blake, Roman Kuchner, John and Dorothy Brenner, Ann Grace and Ginny Wallace.

Kansas City News

The Kansas City Chapter will be holding it's first all member meeting of 1988 at Burr Oak State Park on February 16th, 7:30 PM. We will be seeking a permanent meeting place and preparing for April elections. A membership drive will be held at Burr Oak April 9th-10th with area wildflower walks. Some of our members will be working in various booths at the Kansas City Parks and Recreation Lawn and Garden Show February 20th - 28th. We hope to be impressive with the new brochure. Linda Ellis has been working with the KC Metro area 4-H giving a program to elementary school class rooms entitled "Missouri Wildflowers of Woodland and Prairie". Seven area schools have signed up to utilize the program.

HELIANTHUS ROTA-PLASTICUS, A NEW SPECIES

As presented with illustrations at the Eighth North American Prairie Conference, Western Michigan University, Kalamazoo, MI, 3 August, 1982

Joyce Powers and
Michele Powers
Prairie Ridge Nursery
Mt. Horeb, WI 53572

Charles C. King
Ohio Biological
Survey
Columbus, OH 43210

Helianthus rota-plasticus, n. sp. has been observed, collected, and photographically recorded since 1977 from many locations throughout North America. The type specimen was collected 14 June 1981 at Mt. Horeb, Wisconsin. The typical form of this erect perennial has a sansfoliar, ferruginous stem with a terminal plasticized inflorescence consisting of a many-flowered head, 30 cm in diameter, having brown fused corollas and phyllaries on a 11.5 cm disc with an argental inverted receptable 2.0 cm in diameter. The eight yellow ovate rays, each 9 cm in length and 5.5 cm in width are attached at an angle of 45 degrees equilaterally upon the circumference of the disc. An occasional tetraploid form has 16 rays.

Anthesis occurs primarily during summer and autumn but occasionally throughout the year, even through snow, at many northern stations. The inflorescence frequently orients directly into the wind and rotates counterclockwise at variable speeds correlated directly with local wind conditions. This unique botanical energy transfer process is referred to as "floral-alaeoliansynthesis" and provides selective advantage over competitive photosynthetic species unable to utilize wind energy as efficiently.

The species is undergoing rapid evolution in several portions of its range. Numerous color forms have developed: rubra, alba, caerulea, purpurea, nigra, and viridens. Color variations are common in hybrid swarms. Various growth forms, each of which may have ecotypic significance, include altissima, ultra-altissima, and triplicata. A liana form and an epiphytic form with possible parasitic characteristics have also been recorded.

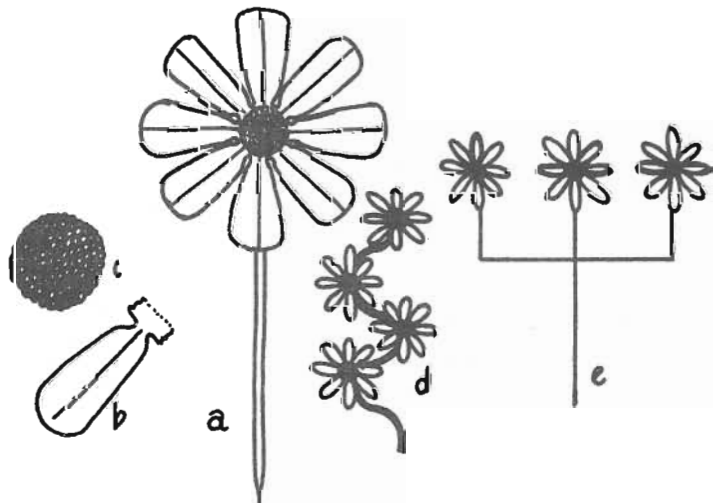
This rapidly invading, aggressive, and early successional species has attained transcontinental distribution with substantial populations at many locations especially within the Prairie Peninsula. Identified sites of endemism include such widely separated prairie locations as Minneapolis, MN; Chicago, IL; and Mountain Grove, MO. Local centers of recent distribution include garden centers. This apparently indicates that commercial propagation has been achieved, and if this be so, then Helianthus rota-plasticus could be the forerunner of the horticultural use of native species in landscape design.

Strong prairie affinities are indicated by those populations associated with Sorghastrum nutans (Indian grass) and Andropogon gerardii (big bluestem). The species is found in highly disturbed residential and commercial urban, suburban, and rural sites. Prime habitat is sunny and shaded lawns and gardens. It occurs in the open or along edges and borders proximal to human habitations, frequently in door yards. The triplicata form frequents commercial sites.

Additional associated floristic and faunistic assemblages involve such species as Agaricus maculatum (the spotted mushroom) and Rana lawniensis (the lawn frog). Strong affinities exist with Globus speculescens (the gazing globe) and with several species of birds, e.g. Anas lawniensis-alba (the white lawn duck), Anas rotaptera (the rotating winged duck), and especially Phoenicopterus subrubra (the pink flamingo). Negative correlations between the occurrence of Helianthus rota-plasticus and members of the Talpidae (moles), Sylvilagus (rabbits), Procyon (raccoons), and Corvus (crows), as suggested by folk lore, have not been substantiated. However, allelopathy is suspected in regards to some ornamental species. Some distributional records suggest a possible relationship between Helianthus rota-plasticus and certain religious and patriotic environments. Interestingly, Helianthus rota-plasticus has low fidelity as an indicator of economic status of proximal human populations since little or no correlation exists between distribution of Helianthus rota-plasticus and human-assessed property evaluation.

Additional observers are solicited to assist in documenting the spread and development of this species. Prairie People with prurient pursuits and obscene obsessions are best qualified for this task. You are encouraged to become involved.

(Editors' Note: Since the reproductive system of Helianthus rota-plasticus is not yet fully understood and promises to be rather exotic, collection of the plant is discouraged. Take pictures instead.)



a. Helianthus rota-plasticus, b. petal detail, c. disc detail, d. liana form, e. triplicata form.

EXPLORING SEED STORAGE OF ENDANGERED PLANTS

Cultivated collections are the most widely used and visible approach to germplasm conservation. However, other methods are used to maintain living material. Several Participating Institutions of the Center for Plant Conservation have been developing experience with the particularly promising tool of low temperature seed storage.

Storing seed is a natural way to create genetically diverse offsite collections of rare plants. A complete seedlot, representing a thorough sample of an entire wild population, can be stored in a container small enough to hold in the palm of your hand. Seeds are a safe and convenient form in which to ship plant material. Additionally, the expense of seed storage over time may be relatively low, compared to the expense of continually growing and propagating plants.

Space and cost considerations, however, are only part of the picture. Perhaps the most important advantage of seed storage is the length of time that original plant material can be kept alive. Seeds are living plant tissue and must be either germinated or kept in a dormant state if they are to remain viable. For many native plants, especially those of temperate regions, the seeds have a dormancy mechanism triggered by a low then a high temperature; this enables seeds set in the fall to remain dormant throughout the winter, germinating the following spring or summer. Seed storage mimics this natural process, keeping the seeds at low temperatures maintains dormancy for long periods. Metabolic processes are so slow under these conditions that seeds may remain viable for decades, even centuries.

Conventional seed storage frequently takes place in a large walk-in cooler, much like the kind used in a supermarket. Some storage is just above freezing temperature (5°C) at moderate humidity (40% relative humidity). Many plants can be stored for much longer periods under colder, drier conditions (-18°C , 10% r.h.). The key to storing seed below freezing is reducing the moisture content inside the seed; if too much water remains in the seed, ice crystals will form, killing the fragile embryonic tissue.

The NSSL and other laboratories have recently begun working with cryopreservation, or storage at extremely low temperatures, below what would be encountered in nature. The most commonly used technology involves storage in vats of liquid nitrogen, which is stable at -196°C . While storage at such low temperatures is a new technique, evidence suggests that many seeds remain viable almost indefinitely in these conditions. In addition, once the initial equipment is installed, cryopreservation can be relatively inexpensive (less than \$500 per tank, per year) and reliable.

Like any technology, seed storage is not without its problems. The most significant problem from a conservation point of view is that seed storage techniques have only recently been applied to native plants. Thus there is very little data to guide botanic gardens or seed technologists in selecting optimal conditions. Many groups of plants -- especially tropical plants, and trees with large, oily seeds -- may lack the necessary dormancy mechanism or the ability to survive the low temperature and humidity. And there is always the possibility that there is differential survival among stored seed, so that we are in effect selecting for genotypes that will respond to storage conditions.

Despite these problems, seed storage appears to be a potentially valuable technique for germplasm conservation. Collections of over twenty kinds of rare plants in the Center's National Collection are already being maintained wholly or in part as seed. Several of the Center's Participating Institutions, including The Berry Botanic Garden, Rancho Santa Ana Botanic Garden, and Desert Botanical Garden, operate or utilize local seed banks for their collections.

The Center is also developing a cooperative program with the USDA National Plant Germplasm System (NPGS) for seed storage. Under this cooperation, Participating Institutions of the Center can deposit seed for long-term maintenance in USDA facilities. The cooperation represents NPGS's first major commitment to rare native plants and the first time the conservation community has sought cooperation with NPGS. The recently released report by the Office of Technology Assessment, Technologies to Maintain Biological Diversity, encourages development of such cooperative programs, using NPGS and the Center as a model. Dr. Henry Shands, National Program Leader for USDA germplasm programs, describes the cooperation as "an important adjunct to the traditional role of preserving economic plant relatives. Endangered plants are part of our rich cultural heritage," he continues. "Additionally, some may have future economic uses we don't yet know of." Seed storage may help the Center to accomplish many of its central goals, while contributing to national germplasm programs.

-Donald Falk
Center for Plant Conservation
(Reprinted from The Center For Plant
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