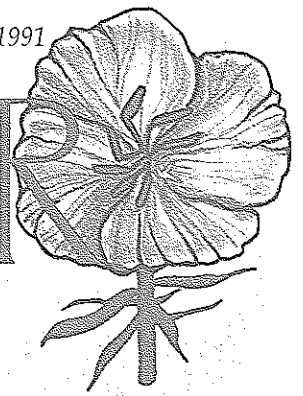


WILDFLOWER



A non-profit organization dedicated to researching and promoting wildflowers to further their economic, environmental, and aesthetic use.

WHAT MAKES MY WILDFLOWER SEEDS GROW?

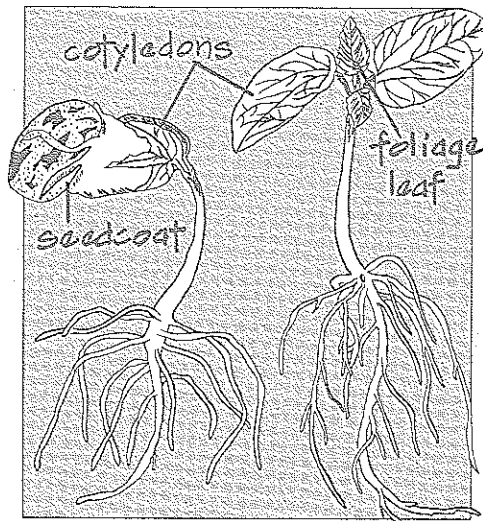
What makes some seeds sprout while others lie buried in the soil, seemingly dead? If we consider the growing conditions of a wildflower species, we can better understand the importance of planting its seeds in the proper place and at the appropriate time.

After a plant has flowered and produced fruit, the seeds within can be dispersed in a variety of ways. The wind will carry some seeds long distances, while others will fall to the ground close to the parent plant. Animals will carry some seeds that stick to their fur and later fall off, or eat the seeds and later eliminate them.

Whatever the dispersal mechanism, seeds end up in a variety of locations and conditions that either promote growth or prohibit it. When a seed lands in an inhospitable environment, it remains dormant until conditions are amiable for germination and growth of the plant to fruition. Remember—the plant's ultimate goal is to perpetuate the species, so production and protection of the seed stock is essential.

SEEDS ARE SENSITIVE TO ENVIRONMENTAL INFLUENCES. SOME WILL NOT GERMINATE UNTIL EXPOSED TO THE PROPER AMOUNT OF LIGHT.

Some built-in protection devices inhibit seed germination until specific environmental and physiological requirements are met. For example, some desert plants have a chemical that inhibits seed germination. Plants that live in arid environments with annual rainy seasons developed this chemical mechanism, which does not allow germination until there is sufficient water to support growth of the entire plant. The inhibitor, located just under the seed coat, prevents germination until the seed has received enough water to leach out the inhibitor—indicating that the rainy season, and not a



Under amiable conditions, the seed will germinate and grow.

sporadic shower, has arrived.

Another protective system is a hard seed coat that requires scarification to break it open, allowing water to enter and germination to begin. Over time, natural events including microbial decay, fire, and digestion by animals, begin to break down or scarify the hard seed coat. Alternate doses of freezing and thawing will break open some seed coats. Plants benefit from the scarification process because it prevents all seeds of a species from germinating at the same time. If all the seeds were to germinate at the same time and a drought or a severe freeze occurred, the entire stock would perish. Spreading germination out over time gives a much greater chance that some plants will survive.

Seeds are also sensitive to other environmental influences such as light and temperature. Some seeds will not germinate until they are exposed to the proper amount of light. Tiny seeds, for example, require light to indicate their depth in the soil, and sun-loving plants have light-sensitive seeds that will not germinate under a heavy shade canopy. Conversely, many seeds must experience darkness to trigger germination.

read on, page 5

Special intern appeal enjoys great success!

The National Wildflower Research Center is searching for a student to receive a semester-long research internship, thanks to the special generosity of Wildflower Center members!

Friends of the Wildflower Center have donated more than \$21,000 for the project. A portion of the funds will be used to hire a horticulture or botany student for a research internship.

The student will receive hands-on experience, assisting with various Wildflower Center research projects.

Dr. David K. Northington, executive director of the Wildflower Center, said he is gratified by the members' strong support of the internship program.

"The Wildflower Center's research will greatly benefit from having a qualified student working with our botanists, and we feel the intern will gain valuable technical training and work experience for their future," Dr. Northington said. "Ultimately, the Center's membership will benefit from having more valuable research information added to the educational materials and articles we provide."

The student chosen for the internship will work at the Wildflower Center through the spring semester. Watch *Wildflower* for more information on our new intern!



If you buy property and plan to develop it, try to preserve any native species already on the land, and save the topsoil!

GIFTS INSIDE

Director's Report

The Wildflower Center's mission: heal the U.S. with native plants

Establishing goals and setting specific objectives for accomplishing them is important for any organization. It's equally important to have an overriding purpose, to have an organizational mission. Missions are more general than a "to-do" list. An organization's mission statement must briefly consider what need exists within its circle of influence, and how the organization addresses that need.

This is the National Wildflower Research Center's mission statement:

A critical problem facing the Earth and its inhabitants is the ecological imbalance caused by the loss of native flora.

The National Wildflower Research Center was created in 1982 by Lady Bird Johnson to encourage a legacy of natural beauty and ecological stability, and to foster a desirable environment for future generations.

The Wildflower Center is a research and educational organization committed to the preservation and reestablishment of native wildflowers, grasses, shrubs, and trees.

As a non-profit organization, the Wildflower Center must develop specific goals and objectives that respond to the public, because your interest in our mission supports our programs and enables such a far-reaching purpose to be successful.

We are an organization that works with this nation's native plant heritage. Relatively little is known about pro-

pagating, reestablishing, and managing these plants in gardens, home or building landscapes, parks, roadsides, or cultivated areas or pastureland, so we must develop techniques and test many factors to successfully carry out this mission. The credibility of our information rests on our research and the accurate evaluation of others' research.

The effectiveness of our education program depends on how well we translate our findings to others who are interested in native plant reestablishment. Our conferences, seminars, workshops, publications, meetings presentations, and on-site demonstration plantings must be well-designed, clearly written or presented, and, most of all, useful—a tall order for a young organization. After almost nine years, we now understand why so many advocacy organizations promote good causes and encourage change, public education, and new solutions to problems—but don't have a research or demonstration function. We do advocate and encourage understanding of the problems created by replacing the native flora with exotics. We want to foster a new way of looking at our planned landscapes—an acceptance of another option.

Our uniqueness lies, however, in our efforts to provide scientifically based information and to apply our recommendations in areas where the public can see them. We work hard to accomplish these goals nationally, but more infor-

mation is available for some parts of the country than for others. We do, however, have useful guidelines, species lists, and "how-to" fact sheets for all 50 states and for various regions of the country. We can also guide you to other regional and local sources and displays.

The fact sheets are free to you, our members, and you also receive a discount on the books and other products we offer for sale. All you have to do is write to our Clearinghouse and ask for our fact sheet order form. Non-members are asked for a \$2 donation (we also accept donations from our members), and all inquiries should include a self-addressed mailing label, which can be a business card-sized piece of paper or an index card.

Of course, our newsletter articles also continue to provide such information. For more in-depth coverage of specific topics or plants, our *Journal* articles serve many of your needs. We appreciate the many compliments and the numerous suggestions we received from the more than 860 of you who

read on, page 6



David K. Northington, Ph.D., is executive director of the National Wildflower Research Center.

Wildflower

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The Research Committee of the Wildflower Center's Board of Trustees met with Wyoming native plant enthusiasts and experts September 13-15 during the full board's fall meeting in Jackson, Wyoming.

Resource Botanist Beth Anderson presented a paper titled "Educational Aspects of Grassland Restoration" at the annual meeting of the Native Plant Society of Texas in Kerrville in October.

The Center is now using recycled paper for all its publications, brochures, stationery, and photocopying. Other printing jobs utilize recycled paper whenever possible.

Zales Corporation donated \$12,000 in September to the Center during a special showing of Connoisseur porcelain and an autograph party where Mrs. Johnson signed copies of *Wildflowers Across America* at its Corrigan's store in Dallas.

Thanks to the Whitehead Foundation, the Center has constructed an open-air propagation house. The facility allows for separate storage of different soils and potting supplies, and provides space for potting plants used in research projects.

In the September/October newsletter, the illustration on page 3 incorrectly labeled the item within the circle as the "Node." The item should not have been labeled. Wildflower regrets the error.

Evolving coastal environments provide harsh homelands for dune plant communities

Pounding surf. Beckoning beaches. Vast ocean vistas. The lure of coastal shorelines is irresistible—evoking latent desires to wrestle with waves and frolic in the sand. In response to this urge, millions of vacationers flock to the world's beaches each year. In his book, *Coastal Environments*, R. W. Carter notes that almost half of the U. S. population lives near a coast, while 80 percent of Australia's inhabitants cluster next to the ocean.

Yet coastal environments, so inviting to humans, create some of the harshest conditions for plant communities. To survive, dune vegetation must withstand salt spray, blasting from windblown sand, alternate flooding and drought, poor nutrient supplies, varying temperatures, instability or burial from constantly shifting sands, and human-caused pressures. Plant colonization along shorelines is a slow process during which any disturbance, natural or otherwise, can instantly reverse the progress of plant succession.

Sand dunes form as strong, offshore winds blow beach sand farther inland and deposit it. Dunes protect inland areas from storms, and provide surplus sand for the ever-changing shoreline topography. Distinct zones, which vary from region to region, occur from the beach inland. Dune plants within those zones can be characterized, by their functions, into three categories: initiators, builders, and stabilizers.

Dune initiators, which occur primarily in the pioneer zone or foredune, include small grasses or forbs, such as *Sesuvium portulacastrum* (sea purslane) and *Ipomoea* spp. (morning glories), that grow rapidly and aggressively in poor conditions. Initiators usually have a prostrate, spreading growth form that creates depressions where other seeds accumulate. To reduce moisture loss, their leaves are succulent, or coated with wax.

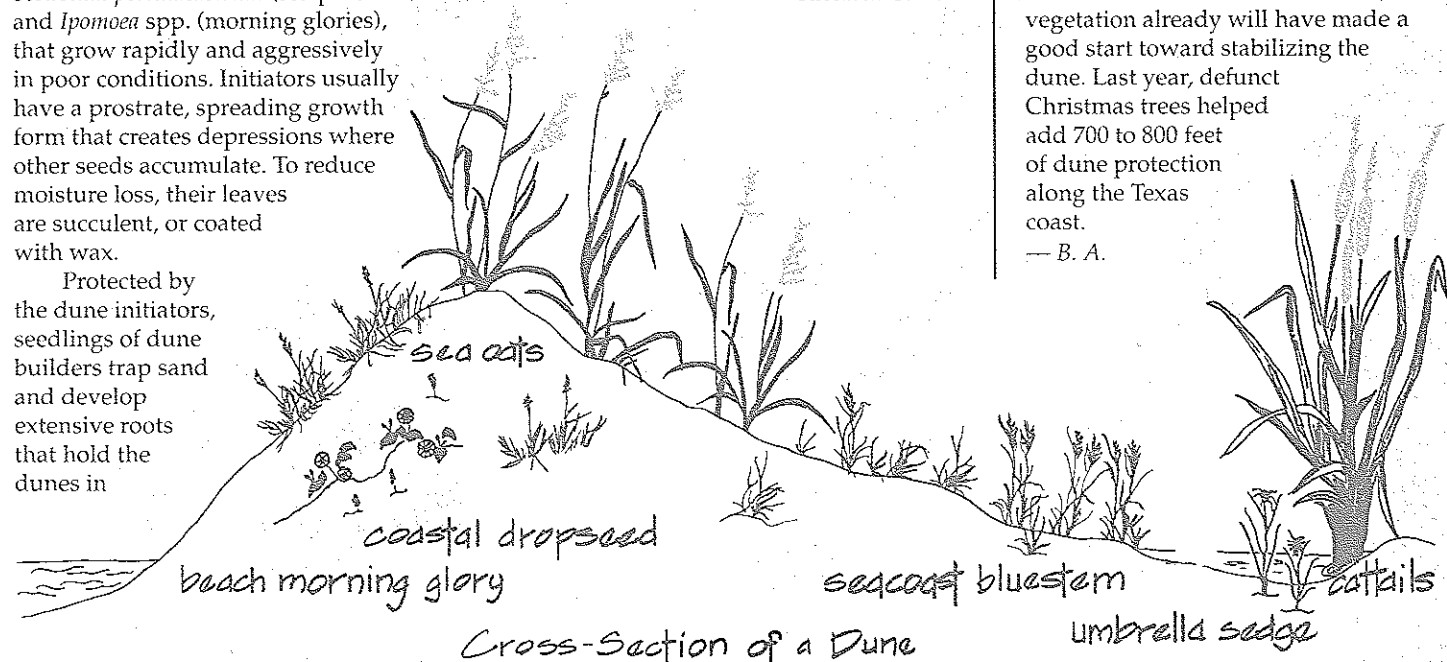
Protected by the dune initiators, seedlings of dune builders trap sand and develop extensive roots that hold the dunes in

place. Most dune builders are perennial grasses such as *Ammophila breviligulata* (American beachgrass), *Uniola paniculata* (sea oats), and *Panicum amarum* (bitter panicum). Dune builders reproduce vegetatively by rhizomes (underground stems) or stolons (above-ground stems). As organic material enriches the soil, the abundance of soil microorganisms, which aid in nutrient uptake, increases. This allows more species to become established and further stabilize the dunes.

Sandy flatlands, covered with grasses, sedges, and rushes, occur behind the foredunes. These grasslands are quite extensive along the Gulf Coast. Along the Atlantic and Pacific coasts, the grassy flats merge with an intermediate scrub zone of forbs, shrubs, and stunted trees. If left protected and undisturbed, the scrub zone gradually is replaced by a highly stable forest community.

Despite continuous alteration by natural forces and, more alarmingly, by human activities and disasters, these fragile coastal ecosystems maintain a tenuous existence. As pressures on coastal areas mount, ecologists are learning more about dune restoration and the intricate processes that direct those communities. With greater awareness of their fragility, and increased expertise in working with coastal systems, the world's coastlines will survive to beckon to future generations.

Beth Anderson
Resource Botanist
National Wildflower
Research Center



A county's Christmas gift to the beach

Long after carolers sing the last notes of "Oh, Christmas Tree," beach crews in Nueces County, Texas, will echo the refrain, "how lovely are your branches," as they gather surplus Christmas trees for dune revegetation projects. The county began collecting discarded Christmas trees more than 10 years ago—long before recycling became a hot topic.

Although private citizens are invited to drop off trees at designated sites, the majority of trees used in the project come from Christmas tree vendors. With limited staff and equipment, the county cannot afford to collect homeowners' trees individually.

"Even though we accept private trees," says Chris Lawrence, director of beach services for the county, "we can't use them if they've been flocked or still have tinsel on them."

The county collects an average of 10,000 Christmas trees each year. Following state erosion control procedures, the trees are placed in recreational areas where dunes have been washed out or trampled. Stacked together in rows to a height of three feet, the trees' branches lower the wind velocity and entrap sand. Left undisturbed, a four-foot dune will develop within 9 months. After 18 months, dune vegetation already will have made a good start toward stabilizing the dune. Last year, defunct Christmas trees helped add 700 to 800 feet of dune protection along the Texas coast.

— B. A.



Holiday gift ideas bloom at the Wildflower Center

Shorter days and colder nights signal the approach of the holiday season, and the Wildflower Center's products division has the gift solution. Ordering by mail or phone is a convenient way to shop, and all sales revenues support our research and education programs. Members receive a 10-percent discount on all purchases.

Our 60-title book selection includes regional field guides, general or regional gardening books, and other volumes promoting the appreciation of wildflowers and other native plants. (For a list of titles, please write Dept. SR at the Wildflower Center.)

Of particular note: *The Wildflower* by Bette Castro, containing 30 poems celebrating nature's own tapestry (\$9.95). Actress Helen Hayes reads the poems on the companion cassette tape (\$14.95). Both are sure to become collector's items.

Connoisseur Porcelain's exquisite collection of wildflower figurines in both open- and limited-editions can be ordered through the Wildflower Center. (For a brochure, please write Dept. CP at the Center.) Although these beautiful porcelains are available at fine stores across the country (the Center earns a royalty on each sold), your purchase through the products division allows the Center to receive both proceeds and royalties.

Our own Battersea box (\$125), pictured in our gift brochure, is beautifully hand-crafted and one of those special treats that anyone would be delighted to receive. The supply is limited.

Wild Ideas: A Holiday Shopping Spree!

Looking for unusual items for the wildflower lovers in your life? The Wildflower Center's gift shop comes to the rescue in December with extended hours during the *Wild Ideas* shopping event Thursday, Dec. 5 through Saturday, Dec. 7.

Those seeking unusual gift items, including apparel, stationery, home accessories, wildflower books, and children's educational items, are sure to find something unique.

Book signings, special sales, and giveaways are among the activities planned. Free refreshments will be provided during the evenings and all day Saturday, Dec. 7.

Special visiting hours during the event are: 9 a.m. to 8 p.m. on Thursday and Friday, Dec. 5 and 6, and 10 a.m. to 5 p.m. on Saturday, Dec. 7. Admission is free.

Come see us!

Education and the environment go hand-in-hand. For children, the "Backyard Explorer" kit (\$9.95) provides knowledge and appreciation of the natural world, plus hours of fun. The kit includes a leaf collecting album, a leaf and tree guide, and craft ideas. For all who wish to study the native scene, leaf and flower presses provide the opportunity. Small presses (\$12.50), 7" by 7", contain blotter paper, cardboard, and instructions. The larger size is 8-1/2" by 11" (\$18.50).

For useful, small remembrances or stocking stuffers, choose one dozen Wildflower Center pencils in assorted colors (\$6), two matching porcelain refrigerator magnets decorated with colorful bouquets (\$8-set), or 12 assorted wildflower bookmarks (\$4-set). Or, a colorful surprise—a wildflower watch (\$44). (Write Dept. DB for information!)

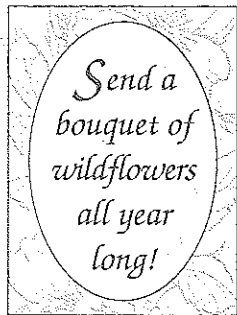
What to buy a man? A set of dominoes (\$21) decorated with blue lupine designs is one possibility, or any book from our large selection. The card players in your life will enjoy the double bridge deck (\$12.50) featured in our gift brochure.

Shop early, so you can enjoy the holidays. Use the newsletter's gift brochure order form, which lists shipping charges to place your order. For credit card orders (MasterCard or Visa), please call (512) 929-3600,

weekdays from 9 a.m. to 4 p.m. Central Time.

Orders are shipped within 10 to 15 business days. Orders received after December 12 cannot be guaranteed arrival by December 24.

Already getting the holiday shopping blues? The Wildflower Center



has the solution to those pre-holiday, what-to-give doldrums—gift memberships in the Center!

Starting at \$25, Center memberships

last all year, keeping you in that special someone's thoughts long

after the holiday season is over.

To make the occasion even more memorable, we'll send your recipients a wildflower holiday gift card, telling them about your thoughtful present. Membership benefits include our award-winning journal and newsletter, a 10-percent discount on all gift shop or catalog items, free or discounted admission to botanical gardens and museums across the country, and special educational and travel opportunities.

All memberships are partially

tax deductible, so please help the Wildflower Center continue its work—and shorten your holiday shopping time—by giving memberships in the Wildflower Center this year!

For more information on tax deductibility, a list of reciprocal botanical garden or museum admissions, or to purchase gift memberships, please contact the Development Office at the address on page 6.

Happy Holidays!

FROM THE F.I.E.L.D

Gardens for Arizona Living, first three weekends in November, selected shopping centers in Phoenix, Scottsdale, and Surprise, Ariz.

How-to garden show emphasizing wildflowers and native plants in Arizona home landscapes.

Contact: Gardens for Arizona Living, (602) 255-4980. Press 728 at the prompt to receive information.

Society for Range Management Annual Meeting, Feb. 9-14, Spokane, Wash. **Contact:** SRM, 1839 York St., Denver, Colo. 80206, (303) 355-7070.

Urbanization and the Environment, March 5-7, Houston. **Contact:** Elizabeth Nelson, Harris County Flood Control District, 9900 Northwest Freeway, Suite 220, Houston, TX 77092, (713) 684-4037.

New England Environmental Conference, March 20-22, Lincoln Filene Center, Tufts University, Medford, Mass. **Contact:** Nancy W. Anderson, Director, (617)381-3451.

Seeds *(continued from page 1)*

Seeds are extremely varied in their temperature requirements; some may need to experience a specific low temperature over a specific length of time or they will not sprout, which protects the seed from germinating too early in the spring and getting nipped by a late freeze. In other seeds, high temperatures will prevent germination, while warm temperatures may induce it. This thermodormancy acts as a calendar for the seed, protecting it until the appropriate season arrives, so a plant can grow successfully.

These protective mechanisms are only a few of the ways seeds protect themselves from germinating at inopportune times in inhospitable environments. Recognizing the trials and tribulations that a seed must endure before it will germinate makes it easy to understand the importance of sowing the right seed, in the right place, at the right time.

Elinor Crank
Research Horticulturist
National Wildflower Research Center

WILDFLOWER OUTLOOK

According to the *Perennial Plants* newsletter, researchers at the University of Minnesota are investigating *Lythrum salicaria* (purple loosestrife), an invasive exotic weed, to discover how to control the plant's spread without also harming desirable vegetation.

Several states, including Minnesota, consider purple loosestrife to be a noxious plant. The plant, which quickly spreads by thousands of seeds, displaces native vegetation and creates food-source problems for wildlife.

Researchers are investigating the dynamics of the plant's seed reserves, and its impact on nutrient recycling, as well as trying to find herbicides that will control the plant without hurting native plants.

The Toledo Botanical Garden has a wildflower project that works to rescue wildflowers and native plants marked for destruction, according to *American Horticulturist*.

The project, which is in its third year, uses volunteers and staff members to remove native vegetation from areas that are scheduled for development, and replant the natives at the Garden. The area where the plants are placed is used in the Garden's nature education program.

Staffers from the Garden contact developers and ask permission to remove the plants, and so far, all developers who have been approached have agreed to the rescues.

Researchers at Texas Tech University and High Plains Native Grass Seed of Maple, Texas, have developed a process that increases the germination of native grass seeds, the *Seed Industry Journal* reports.

The process uses special equipment to remove the hairy covering that protects native grass seeds, which speeds germination because it breaks down the seeds' dormancy protection. Using the process before planting the grass

seeds allowed them to germinate in three to four days, instead of the usual three to four weeks.

The study was funded through grants and donations from the Texas Dept. of Agriculture's Agricultural Diversification Program and High Plains Native Grass Seed.

According to *The New York Times*, researchers are studying why the Saguaro National Monument near Tucson, Arizona, has lost more than 50 percent of its saguaros in the past 50 years.

The saguaros, which grow very slowly and can live for several centuries, are prematurely turning brown and losing their branches. The decline of the saguaros has been increasing since the early 1940s, but it is not limited to the national park. Saguaros in the Sonoran Desert in northern Mexico also are suffering.

Researchers believe environmental pollution may be killing the cacti, but they are still looking for other causes.

The state of Maryland is financing the restoration of the Chesapeake Bay natural areas through sales of special commemorative license plates, *E Magazine* reports. The plates feature drawings of a great blue heron and native bay grasses.

Sales of the plates, which are made from recycled aluminum, are expected to raise about \$1 million for the Chesapeake Bay Trust.

A native plant demonstration garden designed to attract hummingbirds is popular with birds and human visitors alike, reports the *Rockport (Texas) Pilot*. The garden was established at a Texas Dept. of Highways roadside rest area near Rockport, on the south Texas coast.

A special weekend festival featuring information about hummingbirds attracted thousands of visitors to the area in early September.

Unwrap the secrets of Brazil— *travel with us!*

Explore jungles, mountains, and rivers, dance the samba, and experience the unique, vibrant culture of Brazil during the National Wildflower Research Center's Brazilian FloraSafari.

The 12-day tour, which marks a new chapter in the Wildflower Center's travel program, is scheduled for Jan. 19 to 30, 1992. Included in the trip are a three-day Amazon River safari cruise, exploration of the majestic Iguassu Falls, and, of course, Rio de Janeiro.

The tour will be led by Myra "Mike" and David Polon of Safaris International; Mae Daniller, the Wildflower Center's development director; and other step-on naturalist guides in Brazil.

The Polons, who bring their archaeology and anthropology expertise to the tour, have a reputation for putting together one-of-a-kind tours that combine education, special expeditions, and luxury at bargain prices. We're very excited about our improved travel program, and hope you will be, too!

The 12-day tour costs \$2,999, an optional 4-day extension to Buenos Aires is available for an additional \$549.

For reservations or more information, please contact: "Mike" Polon at Safaris International, (512) 631-1110 or (800) 624-1386.

Hurry to sign up! The space is limited to 30 persons for this very special trip.

Director (continued from Page 2)
responded to the survey in the July/August 1991 *Wildflower* newsletter. This feedback guides us and inspires us to keep working hard.

We are proud of what we have accomplished so far, and truly appreciate the enthusiasm and interest our members display. Together, we can continue to change attitudes and increase public involvement.

The mission of the National Wildflower Research Center must become our individual goal as well, "...to encourage a legacy of natural beauty and ecological stability, and to foster a desirable environment for future generations...committed to the preservation and reestablishment of native wildflowers, grasses, shrubs, and trees."

A Thoughtful Present: Membership in the National Wildflower Research Center!

Members of the National Wildflower Research Center support wildflower and other native plant work across the nation. Benefits include *Wildflower*, the newsletter and *Wildflower*, the journal; 10% discount on unique Center products such as wildflower books, calendars, and T-shirts; advance notice on tours and discounts to Center seminars; free wildflower information from the Center's Clearinghouse; a membership card; and other benefits.

- \$25 Supporting Member. All benefits listed above.
- \$50 Sustaining Member. All the above plus a set of specially commissioned wildflower note cards.
- \$100 Key Member. All the above plus wildflower tote bag and invitations to special events.
- \$250 Center Sponsor. All the above plus wildflower poster.
- \$500 Trust Member and \$1,000 Benefactor. All the above plus special privileges.

* Thank you! Your contribution is partially tax deductible. Please contact the Development Office for detailed information on tax-deductibility.

Please enter a membership in the category checked at left:

Name: _____

Address: _____

City/St./ZIP: _____

Phone: _____

Gift Membership: If you are giving this membership as a gift, please enter your name and address below.

Donor Name: _____

Address: _____

City/St./ZIP: _____

Phone: _____

- Make your check payable to: NWRC
- Mail to: Membership, National Wildflower Research Center, 2600 FM 973 North, Austin, TX 78725-4201

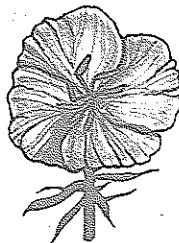
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