



the Seedhead News

TUMAMOC GLOBE-BERRY: THE SONORAN DESERT'S ENDANGERED CUCURBIT

In the cool morning air the herd first smelled the delicious scent that promised juicy tubers nearby. Tracking the faint odor that would remind humans of rotten milk, the javelinas found the plants. If not for the smell, they would be unfindable -- it was late autumn and the perennial vines of summer had died back during fall's drought, leaving only underground tubers for next year's growth. The javelina rooted and devoured the tubers, enjoying this rare treat. It would be later that humans would examine the remaining signs of their feast and reflect on how the javelinas' culinary habits might be endangering the Tumamoc globe-berry.

Suggested for federal protection in 1981, a small population of Tumamoca maddougalii was discovered on the site of the Central Arizona Project's (CAP) aquaduct between Phoenix and Tucson. The required study of Tumamoca globe-berry's current status and how the impact of the aquaduct might be avoided or mitigated provides some interesting information on why this desert cucurbit (member of the gourd family) is rare and threatened with extinction.

How rare is it? There are only 31 sites known where this globe-berry have been found, a total of 1985 known, live plants. Of these plants only 15 now receive any form of protection -- they are located in Saguaro National Monument. When the May, 1985, U.S. Fish and Wildlife Services designation of Tumamoca as threatened or endangered is finalized, then 29% of the known plants, which are found on other federal lands, will receive protection. The other plants will only gain indirect benefits of increased awareness of state land managers and developers of private lands. Development of subdivisions and agricultural projects in areas where Tumamoca are found will continue to destroy critical habitat.

Tumamoca is found only in south-central Arizona and western Sonora, but it has been located in a wide variety of microhabitats. However, many plants may eventually be found in this region, less than 20% of populations are sizeable adults capable of enduring droughts of more than 5 months. Tumamoc globe-berry plants have been found primarily in isolated groups, all clumped together, while perfectly suitable habitat remains Tumamoca-less.

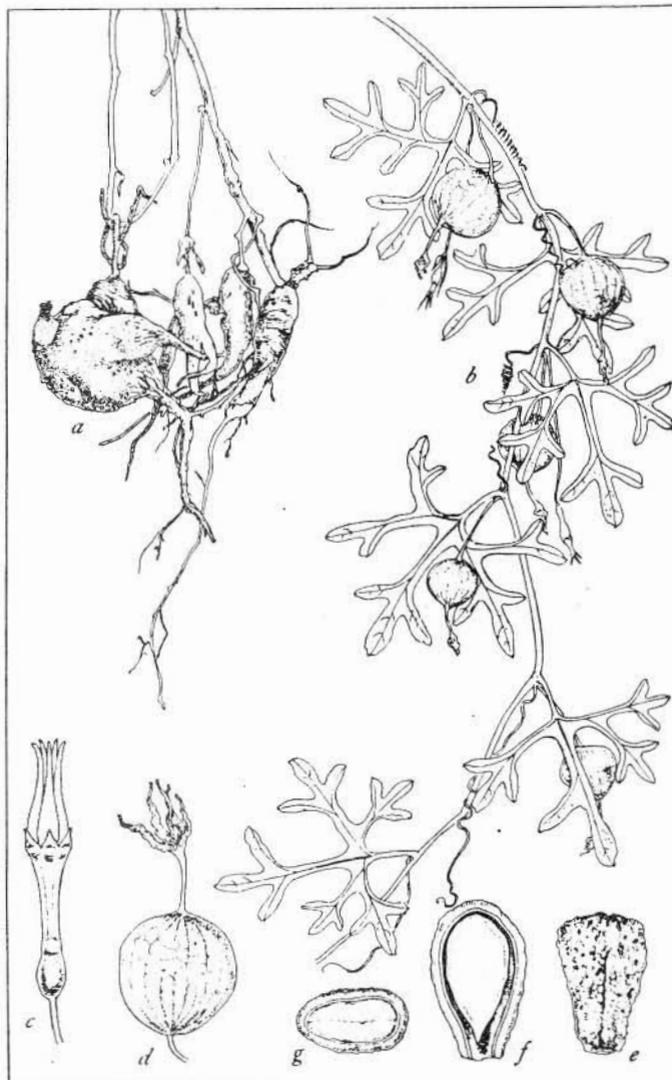
Why this happens is a question that botanist Frank Reichenbacher has explored. Frank is the scientist who performed the study that originally located Tumamoca in the aqueduct route and the subsequent survey of the status and distribution of the plant. His observations have led him to suggest a failure of the plant's seed dispersal system, as he writes in his report:

"The juicy red fruit, produced in August and September, seems to be adapted for seed dispersal by birds. It is puzzling then that the only animal dispersal observed was by a species of ant. It is suggested that the original disperser was a species of bird that is now, at least locally, extinct, and that this is responsible for the contagious (clumped) distribution of the species."

Frank believes the seed was adapted for dispersal by birds because it meets many of the characteristics common to seeds that birds disperse: an outer protection against premature eating; some protection against seed digestion (hard seed coat); signalling colors when the fruit is mature; no closed, hard rind; in hard fruits the seed is exposed or dangling; no smell (though this is no impediment since birds have no or only a poorly developed sense of smell); and an attractive edible part. By the way, the Tumamoc Globe-berry is potentially edible (to humans) but Frank says it tastes terrible.

With this inefficient seed dispersal and a high mortality potential from javelina, Frank went on to ask why Tumamoca are still with us at all. The wildlife literature, though, shows that javelina were not always as abundant in Arizona as they are today. Carmony and Brown have written that although vegetation changes during the last century have favored javelina, we may also be experiencing a northward expansion of the range of javelina that began before American involvement in the Southwest.

In addition to seed problems and javelina, there are the impacts of "progress." The Tumamoc globe-berry population that the CAP aquaduct will bisect, and with 385 live plants it is the largest of any of the known 31 sites, can be preserved with the construction of



TUMAMOCA MACDOUGALI ROSE.

drains to prevent flooding of most of the adult plants. The other plants could be transplanted to other federal lands.

It's more difficult to protect the 71% of the plants which are found on private and state lands. Already, construction of a proposed golf course near Tumamoc Hill (the plant's namesake, where it was first discovered by Dr. D.T. Macdougal) is wiping out Tumamoc habitat. Native Seeds/SEARCH has led several conservation groups in urging the golf course developer to salvage any of these rare plants prior to more habitat destruction.

Kevin Dah

1985 ANNUAL REPORT: GROWTH AND NEW ACTIVITIES

The summer rains are upon us and the two week string of 100plus degree days and cloudless skies will soon be broken as the thunderclouds bearing rain begin to build each afternoon. It is the time of year when we get desperate ... even begin to pray for rain to cool our brows. We SEARCH folks begin to look back on the year and what we've accomplished, much as the Papago do with the summer rain ceremonies that usher in the new year. June 24, San Juan's Day, has become our celebrated Anniversary.

In our second year, we have grown by leaps and bounds. Our membership of Associates has increased to over 500. This year we mailed our 1985 seedlisting to 28,000 potential seedbuyers and associates. Since then we have experienced no slack in mail box activity.

We have made major contributions to national and international policy on the seed saving front, with reports to the National Plant Genetic Resources Board, Office of Technology Assessment, USDA Indian Programs and Office of Endangered Species. On a local level we have coordinated with conservation groups, and continue to appear in local papers and professional publications.

What follows is our annual report to our readers. It's been a busy year, and we thank all of you who have lent endless support. And now... let it rain.

SEED COLLECTION

Several major collection trips were undertaken by Native Seeds/SEARCH staff and researchers into the remote regions of Arizona, New Mexico, Sonora and Chihuahua during the 1984-85 field season. Exhaustive collections of all available varieties of wild chiles, corn and wild beans were made. Seed collections are being used for research purposes, submitted to seedbanks, and, if surplus available in sufficient quantities, packaged for sale through the seedlisting and at museum giftshops.

Researcher Cindy Baker has located populations of wild chiles at their

northernmost distribution in frost-protected canyons of southern Arizona and Sonora. Seed collections from these populations comprise important contributions for breeding cold tolerance and virus resistance into domesticated chile varieties. As a result of Cindy's finds, seven chile population locations and eight descriptions have been submitted to The Nature Conservancy, Arizona Chapter for possible wild chile reserves. Several of these locations are in danger of extirpation by local wild chile harvesters who covet the fiery fruits for home culinary use and by cattle who crop the rare young plants.

Another exhaustive search, this time for wild beans from the Sierra Madre and peripheral mountain ranges of southern Arizona, New Mexico and west Texas was performed cooperatively with Mexico. With funds from FAO, Ing. Jose Muruaga Martinez of the Mexican government Genetic Resources Unit and SEARCH members Drs. Gary Nabhan and Barney Burns made collections of wild Phaseolus and Macroptilium populations, many of which are currently under pressure from land clearing and grazing. Significant collections were realized.

Corn varieties grown by native peoples of Sonora were collected by Barney Burns and Mahina Drees during collection trips in the fall of 1984. Because corn actively crosses, its races are sometimes difficult to distinguish. Through dedicated study and consultation with Charlie Miksicek, Mahina Drees has become a local expert at recognizing the races of northern Mexico. Results of these trips have provided for seed to be analysed by the USDA for genetic "fingerprinting", and for new offerings in the SEARCH seed listing.





Illustration of maize in the 1566 edition of the herbal of Dodonaeus.

SEED REINTRODUCTIONS

A long term goal of SEARCH is to replenish genetic resources to farming areas throughout our region. Great progress was made this year in returning long sought-after seed to depleted areas. We returned to the Mountain Pima of Sonora tepary beans, panicgrass seed, and Tarahumara scarlet runner beans. The Cocopah of the Lower Colorado River were given cushaw squash and panic grass to be planted in a long garden lying beside the Rio Hardy where these crops once thrived. The Zuni requested red corn and other seed to replace those varieties once grown there. The Papago continued to receive quantities of seed for gardening projects across the reservation. Hopi, Mayo, Mohave, Pima and San Juan Pueblo Indians were also provided seed during the course of the year.

Seed donations were also made to the INIA Genetic Resources Unit, Mexico City and to the Genetic Resources Conservation and Evaluation Program of the University of San Carlos, Guatemala. Tohono Chul Park and Kino School in Tucson, The Lord's

Ranch in New Mexico and the Papago Nutrition Improvement Program in Sells, Arizona, are among those who also received seed.

SEED DISTRIBUTION

During 1984 200 seed orders were sent through the mail. From January to June 15 of 1985 422 orders have already been filled. Seed packages and current seed listings continue to be sold at the Tucson Botanical Gardens giftshop. Boyce-Thompson Arboretum recently began to carry the seed packages. For promotional purposes, seeds were sold at the Fourth Avenue Street Fair in Tucson, the Desert Museum Harvest Bazaar and the San Diego Museum of Man's Indian Fair.

EDUCATIONAL PROGRAMS

Esther Moore continues to manage the SEARCH Demonstration Garden at Tucson Botanical Gardens, capitalizing on two growing seasons for growing crops from the various climates of the American Southwest. The garden is expanding in concept as well as design. Utilizing a larger plot to the east of the existing garden, SEARCH will place a greater focus on causes of extinction of plants, using more rare plants for illustrative purposes.

Tours of the garden this year have been given to Antioch College students, the Tucson Botanical Garden Docents, and the public attending the TBG plant sale. TBG docents now give guided tours of the garden on a weekly basis. A display donated in part by the Arizona Native Plants Society increases the interpretive value of the garden.

Internships lasting three to four weeks each were granted to three dedicated enthusiasts. Jill Thompson, Linda Parker and Dean Portman lent hours of labor and support to SEARCH.

A growout network was implemented as a solution to increasing rare seedstocks which we currently maintain in limited quantities. Distributing these seeds for growout to interested associates will help in keeping individual strains from crossing, while increasing takes place. This first year we mailed seed in April and plan to mail more seed before the summer rainy season begins.

RESEARCH INVOLVEMENT

SEARCH funds have been used where necessary to supplement research projects for which we have received grants. Projects receiving funds include wild chile collections, Northwestern corn collections of Mexico and wild cucurbit collections in Sonora.

Projects for which we received outside funds include: Pioneer Hi-bred grant for corn collection for the USDA; the writing of a genetic resources primer for agricultural development workers in the Third World funded by a consortium of Canadian development groups; a survey of grassroots activities maintaining biological diversity through living plant collections, on contract to the U.S. Congress Office of Technology Assessment; and, a Tides Foundation grant for developing a SEARCH marketing strategy.



This cut, in the herbal of l'Obel (1581), is the first to illustrate prop-roots.

RESEARCH COLLABORATION

Projects of other institutions with which SEARCH members collaborated include:

Chiltepine electrophoresis, Steve Tanksley, New Mexico State University; Chile reserve proposals, Dan Campbell, The Nature Conservancy, Arizona Chapter; Cucurbit electrophoresis, Laura Merrick, Cornell University; Tepary bean bruchid resistance, Richard Pratt, Purdue University; *Cucurbita digitata* biogeography and germplasm collection, Allan Gathman, University of Arizona; wild *Phaseolus* biogeography, Russ Buhrow, University of Arizona; Arizona archaeological Indian cotton analysis, USDA and Arizona State Museum; Pima Indian cultivated plant ethnobotany, Amadeo Rea, San Diego Museum of Natural History; Cucurbit, bean and chile collections, Jose Muruaga, J A La Borde, Genetic Resources Programme, INIA, Mexico.

PUBLIC AND PROFESSIONAL PAPERS

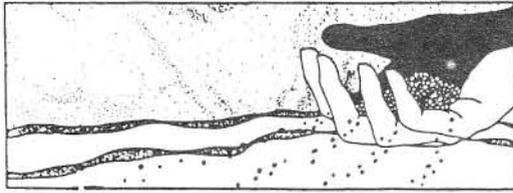
A wild cucurbit bibliography was published by SEARCH for distribution through the seedlisting. Other papers appeared in American Minor Breeds Conservancy Newsletter, Economic Botany Monographs, Ecology of Food and Nutrition and Whole Earth Review. An essay by Nabhan on desert agriculture appeared in Meeting the Expectations of the Land, a new book by Wes Jackson published by North Point Press in 1985.

FINANCIAL STATEMENT

THE TOTAL SEARCH INCOME FROM JANUARY TO DECEMBER 1984 was \$29,500. Major funds were donated by the CS Fund (\$15,000), Tides Foundation (\$15,000 - \$7,500 received to date), and Pioneer Hi-bred (\$2,500). Revenue from seed sales and membership from January 1984 to May 1984 was \$4,500. During this same time period in 1985 our income was \$10,411.

The primary expenditure of funds was for salaries, rented work space, seed collection and maintenance, a KayPro computer, seed, seed sales operations, the Demonstration Garden display materials and the Seedhead News.

Karen Reichhardt



SEED CONFERENCE

The National Gardening Association's 1985 SEED CONFERENCE will take place in St. Louis, Missouri, on October 4-6 this year, providing a weekend of lectures, demonstrations, workshops and discussions in celebration of seeds. The conference is being patterned on the successful "Seed Banks Serving People Conference" that was cosponsored by Native Seed/SEARCH's forerunner and held in Tucson in 1981.

The conference will focus on small seed companies that are preserving heirloom seeds, organizations working with genetic preservation, and seed-saving techniques. Speakers will include Kent Whealy, Director, Seed Savers Exchange; Cary Fowler, Director, International Genetic Resources Programme; Garrison Wilkes, Biology Professor, University of Massachusetts; and our own Gary Nabhan, Director, Native Seeds/SEARCH.

The United States' grandest botanical garden, Missouri Botanical Garden (MBG), will host this conference. Its "Climatron," the world's first geodesic dome greenhouse, has a tropical rainforest environment where plants like banana, rice, coffee and cacao grow along with 2000 other tropical and subtropical species, including a large orchid collection. There's also a desert house, a Mediterranean climate house, a fine rose garden and the Japanese Seiwa-En ("garden of pure, clear harmony and peace"). In addition, MBG has a demonstration vegetable garden.

For more details and registration information, write Seed Conference, National Gardening Association, 180 Flynn Ave., Burlington, VT 05401.

BOOK REVIEWS

SEED SAVING TECHNIQUES OF THE NATIONAL COLONIAL FARM

By Mary Ann Klein. 1984. Published by The National Colonial Farm, Accokeek, MD 20607. 56 pp.

This manual is useful to the beginning, temperate climate seed saver who wants more than the basics but really is not ready for a whole book. There is a glossary of seed saving terms, a grouping of common vegetables by family and crossing potential, and lots of home storage tips. The material is well organized by crop type and hence useful for reference. There is a good, short bibliography of key references on seedsaving.

Mahina Drees

FRUMENTVM INDICVM.



Woodcut of maize from the work of the Italian herbalist, Matthioli (1570).

BOOK REVIEWS

THE FRAGMENTED FOREST: ISLAND BIOGEOGRAPHIC THEORY AND THE PRESERVATION OF BIOTIC DIVERSITY

By Larry D. Harris. Published by University of Chicago Press. 211 pp.

Dr. Larry Harris has written a book for those who must reckon with the impending ecological collapse of the old-growth ecosystems of the Western Cascades of Oregon. It is a book for both foresters and conservationists (and those rare individuals who are both), written from the perspective of a wildlife ecologist. Harris believes that a future forest by design will be far superior to any we might inherit by default. Given who's in control of "default," he is undoubtedly right. Harris applies the theory of island biogeography to the remaining archipelago of old growth "islands," then expands well beyond this theory in fitting the archipelago to the landscape. His chief concern is to design a system of old growth islands, assuming that the Freddie's [federal forest managers] will permit only some finite acreage to be committed to old growth, that will perpetuate native wildlife assemblages and ecosystem processes in the long term.

Harris begins with the recognition that the remaining old growth habitat islands are far too small and too isolated to retain native ecosystem integrity. Wide-ranging carnivores like cougars and bears, which have home-range sizes of thousands on thousands of acres, cannot maintain viable populations in the present, fragmented system. This recognition is in line with increasing evidence from around the world that not even the largest existing parks, when surrounded by inhospitable lands and unconnected to other natural areas, are able to hold wide-ranging species for very long. They either dwindle away within the park because of inbreeding or other problems of small population size, or wander outside to be destroyed by humans. Therefore, a critical consideration is that the landscape context surrounding any "protected" area is at least as important as the habitat content within that area. Animals (and plant propagules) must be

able to move among protected areas (parks, preserves, designated wilderness areas, etc.) that are interconnected into a functional network by appropriate buffer lands and dispersal corridors.

This realization should provide environmentalists with a new incentive; not only must we fight like hell to maintain the last few remnants of old growth, but we must fight for the integration of existing old growth tracts into a functional network. Each individual site is surely sacred, but isolated from its kind, each will surely die -- the ecosystem is unraveled and incomplete. We must tie it back together.

Reed Noss

This review is excerpted from a longer one that appeared in Earth First! The Radical Environmental Journal, available for \$15 per year from Earth First!, P.O. Box 5871, Tucson, AZ 85703. Reprinted with permission.

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3950 W. New York Drive
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Guest Editor: Kevin Dahl

Editor: Karen Reichardt. Contributing Editors: Barney T. Burns, Mahina Drees, Gary Nabhan. Write the editor if you wish to order back issues or contribute an article.

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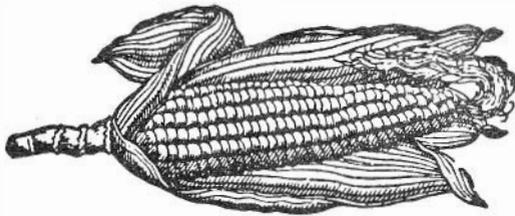
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DEAN PORTMAN- SPRING INTERN

Dean Portman was Native Seed/SEARCH's intern this spring. He really worked hard helping develop our new endangered species garden site at the Tucson Botanical Garden. Generously using his own truck, Dean hauled enough sand and manure to put in two feet of new soil over the entire floodwater field. Originally from central-coastal California, Dean has worked on farms and majored in Anthropology and Agriculture in college. In addition to working at the display garden and two other grow-out gardens, he helped catalog seed collections, mailed out seeds and NS/S information, and worked in our booth at Tucson's Fourth Avenue Street Fair. Thanks, Dean!



TEPARY WORKSHOP

The first international meeting ever to focus on the desert tepary bean will take place August 30, 1985, in Mexicali, Baja California Norte, Mexico. Entitled, "Potential of Tepary Beans in the Desert Zones of Northwest Mexico," this one-day workshop will be a series of round-table discussions by farmers and researchers on how to grow teparies under minimal irrigation, and how to get them to a wider range of consumers.

The workshop is an outgrowth of efforts of Anita Alvarez de Williams, of the Native Seeds/SEARCH board of advisors, and Mario Martinez, a Mexicali agronomist, to translate the Desert Plants special issue on teparies into Spanish to make it available to Latin Americans. The workshop is free of charge, and discussions will be bilingual. For details, write Gary Nabhan, coordinator, c/o Office of Arid Lands Studies, 845 N. Park, Tucson, AZ 85719.

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