



the Seedhead News

Native Foods of Desert Peoples Found to Control Diabetes

By Gary Nabhan

An exciting discovery has been made which relates the slow absorption qualities of traditional Southwestern Indian foods to the control of blood sugar increases detrimental to diabetics. The discovery is part of scientific research results soon to be reported at the annual meetings of the Nutrition Society of Australia by B. J. Snow and Jennie Brand of the University of Sydney, in collaboration with Gary Nabhan. They provide further support for the hypothesis that traditional desert foods served to protect indigenous peoples from developing diabetes, through slowing the digestion and absorption of starch in staple foods.

During this century, acculturation of indigenous peoples of deserts around the world has been associated with a dramatic increase in the incidence of noninsulin-dependent diabetes mellitus (NIDDM). The O'odham people of southern Arizona -- historically known as the River Pima and Papago -- currently have one of the highest prevalence of this nutrition-related disease of any human population known in the world. Yet, until 50 years ago, when desert farming and wild food gathering contributed a greater proportion of the staples in their diet, these people showed few of the afflictions associated with the NIDDM syndrome.

Despite a 20-year, multimillion dollar project by the National Institute of Health and the Indian Health Service to study the causes and cures of this disease among the O'odham, little effort has been given to understanding the relationship of their traditional diet to diabetes. The NIH/IHS team apparently lost interest in traditional diet composition after a 1971 study suggested that the average O'odham today consumes about the same number of

calories, and the same amounts of carbohydrates and fat, as the average U.S. citizen. But that dietary study, like others, failed to analyze the actual traditional foodstuffs that comprised the O'odham diet historically; it simply substituted known nutritional values of conventional analogs for the native foods. For example, any kind of dry bean, whether tepary, pinto or lima, was considered the same in composition and influence on the diabetic diet as the dry beans listed in standard USDA food composition tables.

A major challenge to such assumptions by dieticians advising diabetics came in a 1981 paper by David Jenkins and collaborators. It confirmed that the carbohydrate exchange lists offered by the American Diabetic Association and other groups did not reflect the true physiological effects of foods in reducing "postprandial" (after-eating) blood sugar levels. Jenkins developed a "glycaemic index," a measure of the effects of different foods on blood glucose (the lower the score on the index, the greater its benefits to diabetics and others suffering from hypoglycaemia). He found that the foods having the least negative effects in a diabetic diet were those commonly eaten by nondominant cultures, i.e., ethnic minorities in the West, and many land-based communities in the Third World. Jenkins and collaborators were tempted to conclude that diabetes is a disease of adopting the values and diets of dominant affluent cultures, which are dysfunctional for the metabolisms of many ethnic populations around the world.

Nutritionists Jennie Brand and Ann Thorburn recently tested this hypothesis with traditional Australian Aboriginal foods. These wild desert foods were demonstrated to produce significantly

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Seed Savers in Their Own Right



Maude Andrews & Alice Lopez

By Mahina Drees

Maude Andrews and Alice Lopez, who live about 10 miles from the Mexican border, are some of the last Tohono O'odham (Papago) floodwater farmers still planting. Unfortunately, they are not always able to both plant every year. They do not do all the farmwork by themselves. Their family helps, but the fields belong to these sisters, inherited from their parents.

Although Ms. Andrews said her father originally used a digging stick for planting, she only remembers him using a horse drawn plow. Furrows plowed by modern tractors allow the water to run through the field too quickly, not permitting adequate water retention, she informed us. The family did not always farm. Sometimes they sold pottery and picked crops in Mexico. But their traditional pattern of life was to spend May and June at wells in the Baboquivari Mountains and then return to the fields with the advent of the rains. Their house used to be in the middle of one field and the parents actually slept in the watermelon patch during the season to prevent coyotes from eating the fruit.

The children learned from their parents how many steps to take between planting seeds (four for watermelon) and how many seeds to plant in each place (two or three each step for corn). Beans (red and teparies) were broadcast in separate parts of the field. They also grew the O'odham pumpkin, as well as a banana

squash (probably from Mexico), black eyed peas, and sugarcane in the summer. Of course, the children learned the proper prayers to say as well. In the winter they grew peas and garbanzos. Chiltepinas and onions were collected and not grown in the old days.

The sisters, Maude and Alice, have planted almost every year since their father died. But of all the seeds they plant, only the 60-day corn is the same as that grown by their father. The rest have come from neighbors and friends in other villages. Native Seeds/SEARCH has returned the red bean and local watermelon seeds to them.

They grow two kinds of corn, 60-day and June. The 60-day is used for gai'iwesa, a toasted cracked corn dish something like coarse hominy grits but with a smoky flavor. Mrs. Lopez told us that June corn is grown because it produces such large corn husks -- ideal for wrapping tamales. June corn is also used in menudo. Tepary beans, pinto beans from commodity foods and cushaw squash are their other current field crops. Many modern vegetables grow in Ms. Andrews' irrigated gardens in the yard. There are even strawberries planted under a tree by Mrs. Lopez that are doing well.

Pests seem to be a larger problem now than in the past. Mrs. Lopez thought this might be because people no longer eat quail and squirrels. The birds seem worse now, too. Perhaps this is because there are fewer fields to concentrate on. In addition, some fields used to be protected by sling shot in the old days. Johnson grass is now the most severe problem faced by the sisters and other growers in the area.

We first met Ms. Andrews through the Meals for Millions home garden program. She was our best pupil and our teacher. Her seed saving advice to our members is simple and true: "Make sure the seeds are dry before storing." Her nephew seems to have inherited her interest and the family talent. We hope they will carry on, for the future of this form of agriculture may lie in their hands. Native Seeds/SEARCH is grateful to them for their persistence and skill.

New Gardeners

The new Native Seeds/SEARCH Demonstration Garden Managers are Daniela Soleri and David Cleveland. They are long-time Tucson gardeners, and have studied and written about gardens in Tucson, Mexico, Egypt and Africa. They are currently completing a book on food gardens in drylands. They are also Co-Directors of the Center for People, Food and Environment, an organization dedicated to understanding and supporting sustainable food systems that promote individual and community health. Their goals for the Native Seeds/SEARCH garden include continuing Esther Moore's work of increasing seed production and expanding the demonstration and explanation of locally adapted production techniques. They also hope to explore the possibility of growing more perennials.

Native Foods *continued from page 1*

lower glycaemic and insulin responses than do the majority of Western starchy staples with which they were compared. Another experiment in Australia placed Aboriginal people who had suffered from diabetes back onto a diet of traditional foodstuffs, and resulted in significant improvement in their condition within one month's time.

Given these results with foods native to Australian deserts, Jennie Brand became intrigued by the potential of parallels with Sonoran Desert foods. During an International Arid Lands Conference in 1985, she met Gary Nabhan and offered to analyze foodstuffs which served as staples in O'odham diets over the centuries. Nabhan had already hypothesized in his writings that the quality and seasonality of desert foods in O'odham diets had historically cushioned them from the effects of diabetes from which so many modern O'odham currently suffer. Yet he was unaware of a mechanism which would account for this "dietary protection," and offered to send Brand Sonoran Desert foods for future investigations.

In the summer of 1986, Brand and her students requested sizable quantities of staple foodstuffs, and traditional recipes for preparing them. The foods included four cultivated staples known prehistorically from the Sonoran Desert: 60-day flour corn, mottled lima beans, white tepary beans, and yellow tepary beans. Also included were velvet mesquite pods from the desert and nonbitter Emory oak acorns from the uplands adjacent to the true desert.

Brand and her student B. J. Snow fed 25 gram carbohydrate portions, prepared according to traditional recipes, to eight healthy volunteers on mornings following overnight fasts. Fingerprick blood samples were then analyzed for glucose and insulin and scored according to Jenkin's glycaemic index. The results showed that the five foodstuffs other than corn had a significant effect on controlling blood glucose responses. Additional analyses indicated that the slower the digestion of the foodstuff (due to dietary fiber, etc.), the lower the glycaemic response.

Compared to the 68 conventionally-available foods which Jenkins and collaborators studied, the native foods of the Sonoran Desert region had significantly low (favorable) ratings on the glycaemic index. The five native foods (other than corn) fell with the lower 12 percent of the foods which the Jenkins team evaluated. The two wild foods -- mesquite and acorns -- were surpassed only by peanuts and soybeans. Significantly, the O'odham diet was historically based on legumes such as teparies and mesquite, more than on corn and other grains. They may have been the bean-eatingest people in the Americas, if legume consumption data prior to World War II is correct for them. In the past, seasonally-available legumes and acorns may have protected genetically-susceptible Pima populations from the diabetes which in recent years has afflicted them 19 times as frequently as

it has an average, European-American population.

The hope is that these native foodstuffs can be reintroduced into modern diets in a manner acceptable to diabetic Native Americans of the Southwest. Unfortunately, many of these foodstuffs have been ridiculed or dismissed by dieticians unaware of their cultural and nutritional value. As crops, they have suffered from severe genetic erosion. If their harvests could be promoted, subsidized or otherwise encouraged for reintroduction into the diets of Native Americans suffering from diabetes, both the plants and the peoples may look forward to a healthier future.



La Fiesta de los Chiles

By Muffin Burgess

It's the hottest thing going this fall! It's Native Seeds/SEARCH's Fiesta de los Chiles, Saturday, October 17, from 9 a.m. to 4 p.m. on the grounds of the Tucson Botanical Garden, 2150 N. Alvernon Way. Native Seeds/SEARCH has planted the seed for this idea whose time has come!

The Chile Fiesta will be a fun-day and a fund-raiser day in celebration of the zestiest of all our native foods, wild and domesticated. Just imagine the aroma of fresh roasting chiles . . . There will be restaurants and ethnic food clubs to tempt your palate with the finest chile and chile dishes imaginable -- and lots of booths with cool-down drinks as well. No better selection of chile products and chile spices has ever been assembled. And, there will be an amazing array of chile theme gifts -- wreaths, T-shirts, chile lights, chile ceramics, cards and crafts, even a chile artist who paints spicy "sand" paintings with chile powders! For the kids, there will be free face painting and even a fire engine in case the piquante mood gets sizzling.

A chiles-in-the-fine-arts show and sale will display works by many talented artists. The hottest acoustical musicians and song-writers in southern Arizona will keep things hopping with great sounds all day. It's all happening as a benefit for Native Seeds/SEARCH and Tucson Botanical Garden with the exuberant endorsement of The Tucson Festival Society.

Come prepared for great eating, family enjoyment, and the best Southwestern Christmas shopping ideas ever! Come early before 10:30 a.m. and meet Jean Andrews, artist and author of the beautiful chile pepper book, *The Domesticated Capsicums*. She will also be signing copies of her book.

Fall Garden Update

By Daniela Soleri

The much anticipated chubasco or monsoons characteristic of late summer in the Sonoran desert seem to have passed Tucson by this year. Nevertheless, the days are getting shorter and the evenings and mornings are refreshingly cool. As the summer season ends, harvesting becomes the major activity in the Native Seed/SEARCH demonstration gardens.

In the west garden, seedheads of Tohono O'odham sugercane (*Sorghum* spp.) and fruits of Zuni tomatillos (*Physalis philadelphica*) have already been harvested. The Jean Andrews chile collection has made a great recovery from a low point in late August. Scarab beetle larvae were chewing back root hairs and roots which, combined with the hot, dry weather this August, was very stressful for the chile plants. Shading, heavy mulching, pruning and digging up some of the larvae helped reduce water losses from transpiration, as did lower daytime temperatures. Now the harvest is on with a variety of beautiful fruits ripening every day.

Pima "kuri basho" (*Cucumis melo*) melons are ripening while four beds of Acoma watermelons (*Citrullus lanatus*) are getting established and started blossoming the first week of September. Another crop which has just started to blossom in this garden are the black and white Jacob's cattle beans from the Homer Owens collection.

Though unusually short this year, the Mohave sweet corn (*Zea mays*) has been tassling and producing silks for several weeks starting around the end of August, and ears are forming nicely.

In the east garden three beds of chiltepinas (*Capsicum annuum* var. *aviculare* and *glabrisculum*) are thriving, studded with ripening fruits. The two patches of Hopi orange lima beans (*Phaseolus lunatus*) nearby have been prolific producers this year. The wild tomato (*Lycopersicon esculentum* var. *cerasiforme*) is also full of fruits although it seems to be suffering from curly top virus.

A mixed bed of Warihio red sweet corn and Paiute black and brown beans (*Phaseolus vulgaris*) is healthy and lush. The corn has yet to tassel but the beans already have well developed pods. Along the north side of this bed a row of Apache brown sunflowers (*Helianthus annuus*) are beginning to bloom. Another Warihio crop, the rare *Panicum sonorum* has done very well and by mid-September the harvest was well under way.

Two wild beans are flourishing in the east garden. *Vigna pachycharpa* are climbing all over the dense chiltepine bushes. In late August this bean's large, spectacular purple flowers started

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Notes

THANKS. Much heartfelt thanks go to our regular office and garden volunteers: Nell Bachus, Richard Pletcher, Terry Posedly, Bob Sullivan, Steve Maher, Bruce Bailey, Susan Husband, Sue Skirvin, and April Baisan. Thanks also to everyone who has lent a hand from time to time. If you have spare time to join us, please stop by at our Tucson Botanical Garden office on Tuesdays and Thursdays, 10 a.m. to 4 p.m., or call at 327-9123.

PERMACULTURE COURSE. An in-depth two week design course on permaculture -- wholistic and benign land use for sustainable living -- in arid and semi-arid lands will take place on Nov. 1 - 14 at the Crown C Ranch in Sonoita, AZ. Gary Nabhan is one of the speakers. For details, contact Tim Murphy, 1250 E. Edison, Tucson, AZ 85719.

APPRENTICESHIP. The Agroecology Program/ U.C. Extension offers a 6-month apprenticeship in Ecological Horticulture, April 4 - Sept. 30, 1988, at the Farm & Garden Center, Santa Cruz, CA. Application deadline: Dec. 5, 1987. For details, Apprenticeship, Box A, Agroecology Program, Univ. of California, Santa Cruz, CA 95064. Phone: (408) 429-2321.

Wild Rice *continued from page 5*

appeared to enjoy the pleasure of the rhythm as much as anything.

Commercial wild rice is often soaked to expand the grains out of the husks and then dried for winnowing. The Chippewa claim that this accounts for the pasty, sometimes moldy taste of commercial wild rice and the nearly black and uniform coloration. The rice sold for \$1.75 was either broken rice or immature grains. Most rice sold on roadside stands in Wisconsin that advertised those cheap prices sold the good quality wild rice for \$4 to \$6 a pound and even this was all commercially grown in the paddies.

To obtain the true wild rice harvested by the Chippewa from the sloughs and lakes where the grain is native, one must buy it from homes of the Chippewa. It is sold in very small quantities, for the majority of the harvest is saved for family consumption. Saguaro syrup in our desert is an analogous commodity -- if one obtains any at all from the Indians, it is for a high price. The "wild" wild rice sold for \$6 to \$8 a pound.

This holiday, rice may be more available than ever. It will probably not be "wild" wild, unless you know its exact origin or collected it yourself. If you're a purist about chemicals and fertilizer, you may be better off eating javelina and teparies. As for me -- I'll settle for the crunchy taste of those grains no matter where they come from.

Wild Rice

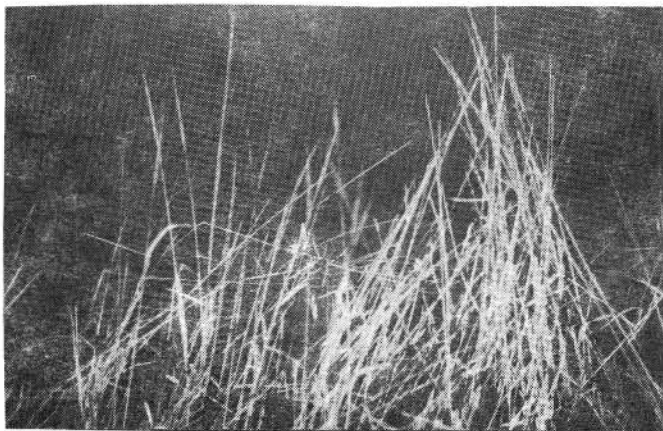
By Karen Reichhardt

In the desert southwest wild foods are seasonally available during different times of the year than the rest of the United States. Cholla buds and saguaro fruit ripen in late spring or early summer and greens are ready to be picked after the summer or winter rainy seasons. When holiday season rolls around we are perplexed that the turkey, cranberries and wild rice do not conform to our region -- but we serve them anyway.

If Columbus had landed first at the mouth of the Colorado River we would celebrate Thanksgiving with teparies, javelina and wild chiles the size of cranberries.

To learn the mysteries of wild rice, which is now commonly available even in supermarkets, Gary Nabhan and I traveled to a northern Wisconsin Indian Reservation of the Chippewa or Ojibway during the height of their wild rice season.

I've seen wild rice mixed with brown rice in Uncle Ben packages in the store. In the Minneapolis airport one can buy 8 oz. of Minnesota wild rice for \$12. In Minnesota we saw signs advertising wild



Wild rice, *Zizania palustris*.

rice for \$1.75 per pound at roadside stands. Why is there such a discrepancy in prices?

All of the foods labeled "wild" rice are actually a wild grass called *Zizania palustris*, with a large seed the size of a rice grain that turns black if soaked in water before it is dried. It grows in water, germinating from submerged seed each year and remaining underwater until the flowering stalk rises above the surface. When the seeds are ripe in late August it is harvested, traditionally from canoes. It grows in freshwater lakes, river channels and sloughs.

Its native range is more and more restricted to remote areas and Indian Reservations around Lake Superior, although it was once more widespread throughout the northern midwest. It is considered a scarce resource. In the past few decades it has been grown commercially in Minnesota and Canada in paddies. In



Wild rice lining slough on Chippewa Reservation. Photos by Karen Reichhardt.

California, fertilizer and pesticides are applied to the rice, and boat-driven threshers mechanically harvest the grain.

Since 1983, California "wild" rice has flooded the market; it is all cultivated. This rice is a genetic variant of the Minnesota native wild rice. It differs because the grains stay attached to the rice stalk so a high percentage of the grains are harvested with the mechanical threshers. The true wild rice "shatters" -- the grains fall off easily when ripe. Traditional harvesters work the same stands frequently when they are ripening, and a large percentage falls back into the water to reseed the stand. The commercial Minnesota market is nearly bankrupt because of the underpricing of the California rice. Minnesota commercial paddies cannot compete with the shatterproof wild rice from California because of the difficulty of completely replacing volunteering seedstock with the newer strain. Diseases have not been a problem in California because the crop is way out of its natural range.

Aside from the different cultivation practices, the harvesting process accounts greatly for the variations in price and availability. The true wild rice is harvested by hand from canoes by the Chippewa. It is kept as dry as possible until taken home or to a local processor. It is then dried and "scorched" or heated either in a large metal pot or drum. Before the French brought large iron pots to the area the rice was probably heated on hot rocks.

The rice is then threshed in a mechanical thresher. The traditional mode of threshing, which is still in use by some families, is with a native birchbark basket. The lighter weight Chippewa and their children dance in the baskets of unthreshed grain while wearing moccasins to separate the grains from the chaff. It is either winnowed by tossing the baskets in the air or with homemade mechanical winnowers which use fans. The entire process from canoe harvesting with long sticks to winnowing is like a sacred dance. The people I observed harvesting

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Native Seeds Experimental Results

By Dan Parker

Editor's note: Last year, six varieties of crops obtained from Native Seeds/SEARCH were the subject of a greenhouse experiment at the UA's Environmental Research Lab. The lab's multi-faceted mission includes experimenting with potential crops for arid regions. We are pleased to reprint portions of Dan Parker's report as an example of what sort of information home experimenters could also record. Because of space limitations, we've omitted a complete description of soil beds, soil mix, planting scheme, greenhouse layout and environmental data including air and soil temperatures, humidity, and amount of daily sunlight (but you should know that humidity ranged from 50 to 90 percent). Read on and learn how well these varieties did in the face of extreme temperature and pests.

On May 20, 1986, six native seed varieties were planted in four soil beds to determine growth, production, water use, and overall efficacy of the use of continued to have a very high infestation. The Pima Limas started flowering on July 10, 51 days after planting, and several pods were set by July 24. The first brown, field dried pods were harvested August 13, 85 days after planting, and any brown, dry pods were harvested daily thereafter in an effort to get new flowers to set pods and therefore maximize production.

PAPAGO COW PEA. Planted 3/4" deep in a 6" grid. Plants started to emerge in 3 days with 98 percent germination in 1 week. The newly emerged plants were almost completely covered with black aphids and the plants were stressed to the degree that termination of the crop was considered. The initial growth was extremely retarded for the first few weeks, after which growth resumed and the plants appeared relatively healthy despite the high population of aphids on the leaves and stems. The aphids remained in high numbers through the initial flowering, and started to decrease only after several pods were set. Initial flowering occurred July 20, 61 days after planting, and pods were starting to set by July 24. The first brown, field dried seed pods were harvested August 6, 78 days after planting, and harvesting continued until the end of the experiment. It was noted that when mature pods were removed from the terminal ends, new flowers would appear soon after and eventually more pods would set. It is believed that this continual harvest of mature seed pods increases the total yield over what would be obtained from a single harvest at a later date.

MOJAVE FLOUR CORN & HOPI BANTAM SWEET CORN. All seeds were planted 2" deep in a 12" grid, and each variety was planted in a separate soil bed. Plants started to emerge in 4-5 days with 100 percent germination for Mojave Flour Corn and 83 percent germination for Hopi Bantam Sweet

TABLE 1

Crop	Harvested Seed g/m ²	Crop Cycle (days)	Water Use l/day/m ²
Pima Lima <i>Phaseolus lunatus</i>	336.3	133	8.30
Papago Cow Pea <i>Vigna unquiculata</i>	531.0	133	8.30
Mojave Flour Corn <i>Zea mays</i>	577.4	72	9.27
Hopi Bantam Sweet Corn <i>Zea mays</i>	383.8	72	8.45
Hopi String Beans <i>Phaseolus vulgaris</i>	28.1	108	8.17
Warihio Cow Peas <i>Vigna unquiculata</i>	466.7	133	8.45

Corn after 1 week. The young corn sprouts were also infested with large numbers of black, winged aphids and a few green peach aphids, but showed absolutely no signs of stress. The aphid population decreased approximately 2 weeks after emergence and almost none were found during the remainder of the growing period until a native plant varieties with natural tolerance to heat, drought, insect pests, and pathogens under extremes of environmental conditions.

Growth and Production. A summary of the data obtained on harvest yield, crop cycle length, and water use is presented in table 1. The figures for harvested seed represent the weight of dry, storable seed, dried in a drier at approximately 38 degrees C (98.5 F -- not recommended for seed saving) for 1-2 days. The crop cycle length of 133 days for Pima Lima, Papago Cow Pea, and Warihio Cow Pea was the result of the termination of the experiment on October 1, and seeds were still being harvested and new flowers were appearing which were probably a response to cooler temperatures and/or a change of photoperiod. These plants would continue to produce for multiple seasons if temperatures remain above freezing. The figures in the table for water use can be misleading if applied to crops grown in more moderate environmental conditions. Air temperatures were extremely hot during the growing period and certainly much less water would be required to produce the same yield if the crops were grown in a more controlled (cooler) environment. The Pima Lima, Papago Cow Pea, Hopi String Bean, and Warihio Cow Pea plants were somewhat vinelike and growth overflowed the perimeter of the soil beds onto the ground. The plants could have been staked for vertical growth, but were allowed to trail onto the ground in an effort to keep the plants at a cooler level of the greenhouse. Approximately the same or better yields/square-meter could be expected with staked plants and a cooler, less stratified temperature gradient.



PIMA LIMA. Planted 1" deep in a 6" grid. Plants started to emerge at 5 days with 60 percent germination at 1 week. All the young sprouts were virtually covered with black aphids for a period of about two weeks after emergence. The young plants appeared very stressed by the aphid population and had curled leaves and apparently stunted growth. In the third week after emergence, very few aphids remained on the Limas although the Papago Cow Peas in the same 4' x 8' soil bed

dramatic resurgence of the green peach aphid occurred at the very end of the crop cycle. On June 25, 36 days after seeding, the first tassels appeared in both beds. Two days later the first silks appeared and were hand pollinated because of the low amount of air movement within the greenhouse. Notably, viable pollen was produced during the last part of June when daily high temperatures averaged approximately 50 degrees C (122 degrees F) at that level in the greenhouse. On July



31, a very rapidly increasing population of green peach aphids present on the Hopi Bantam Sweet Corn plants started to produce wings and some had already swarmed to the soil bed containing Mojave Flour Corn. Both corn crops had to be harvested immediately and removed from the greenhouse. Grain production was complete, but plant biomass was not completely field dried. An average of 1.87 ears of corn were harvested from each Mojave Flour Corn plant and 2.07 from each Hopi Bantam Sweet Corn plant.

HOPi STRING BEAN. Planted 1" deep in a 6" grid. Plants started to emerge at 5 days with 98 percent germination at 1 week. Very high population of black aphids were also noted on all young emerging plants. The aphids stunted the initial growth and caused curling of the leaves in the seedlings. Growth resumed at about 2 weeks and the plants appeared healthy despite the continued aphid infestation. On June 19, 30 days after planting, a few flowers had appeared and had produced pods by July 3. Many more flowers were produced during a few cooler, cloudy days in the first part of July, but apparently were aborted in the following hot weather because no pods developed. On August 6, 78 days after planting, a few mature seed pods were harvested. During the remaining part of August the plants had a slightly wilted appearance and lower leaf senescence, and by September 5, all plants were dead and dry. The extremely low yield and poor performance of this variety is probably the result of two factors. First, the origin of this variety is in the high desert, and the plant is unable to withstand the extreme high temperatures in the greenhouse as well as the other legume varieties tested, whose origins are from the low, hot desert. Secondly, high dissolved salt content and excess nutrients were known to be present in this soil mix. This variety was apparently less salt tolerant than the other varieties tested in this experiment. The potential for good production with this variety in a more controlled environment

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Experiment *continued*

is evident by the large numbers of flowers produced.

WARIHIO COW PEA. Planted 3/4" deep in a 6" grid. Plants started to emerge in 4 days with 100 percent germination at 1 week. All plants were almost completely covered with black aphids for a period of 3 weeks after emergence and initial growth was stunted, but the plants recovered and appeared healthy during the remaining growing period despite the continuing aphid infestation. The first flowers appeared on August 6, 78 days after planting and some pods were set by August 11. Harvesting of the mature seed pods began August 30, 112 days after planting, and continued until the termination of the experiment.

General conclusions are that, with the exception of the Hopi String Bean, the varieties tested had relatively good production, considering the extremely high temperatures in the Draft Greenhouse during the summer months. Also, as previously repeated for each variety, major infestations of aphids attacked the plants in the early stages of growth, when they are most vulnerable. The plants not only survived, but grew to produce a reasonable yield under the circumstances. The cause of the decline in the aphid population on some varieties after emergence is not known, but possible factors are that the maturing plants developed a thicker cuticle or some repelling anti-nutritive substance, which caused the aphids to have a preference to the other varieties. Washing the aphids off the plants was somewhat effective, but proved too injurious to the young plants. Also, an extract of garlic, onion, and red pepper was sprayed on the aphids with apparently no effect. Hand crushing of the aphids was a daily chore, only to find the underside of the leaves covered with aphids the next day.

Still another factor which could have limited production by these plants is excess nutrients and dissolved salts present in the soil mix. The soil mix used in this experiment was the same mix as used in the six adjacent soil beds for the Soil Depletion Experiment. Soil analysis was not performed for this experiment, but the complete analysis obtained at the beginning and end of the Soil Depletion Experiment last spring revealed a dramatic increase in soil nutrients, dissolved salts, and conductivity during the crop cycle. This increase was presumably caused by the rapid release of the "slow-release" fertilizer due to the relatively high soil temperature. Summer temperature in the Draft Greenhouse was considerably higher than in the spring during the Soil Depletion Experiment, and undoubtedly the nutrient level and dissolved salt content of the soil was beyond the range for most conventional crop plants.

The ability of these plants to withstand extremely high temperatures, high dissolved salts in the soil, and severe insect pest infestation, yet still grow and produce relatively good yields, demonstrates an overall hardiness.

Fall Garden Update *continued*

blossoming and a problem with blossom drop appears to have been reduced by shading the plants. The other wild bean is the wild mitten leaf desert bean (*Phaseolus filiformis*). The several plants in the garden have kept us busy since late August collecting seeds from their tiny pods. It is essential to harvest these as soon as the pod has dried because the seeds look just like brown, angular sand and are impossible to find once the pods have dehisced.

Seeds are also being harvested from two wild sunflowers (*Helianthus exilis*) plants from Baja, California, which are



growing along the ridge of our simulated arroyo. These plants form small bushes covered with many small attractive blossoms. Also along the arroyo are some "nescafe" okra plants, so named because their seeds are roasted to produce a coffee substitute. The pods on these big sturdy plants are growing rapidly.

In the Hopi terrace beds, seedheads of the black molasses sugercane (*Sorghum* spp.) are being bagged to protect them from birds as the seeds ripen, turning deep purple. Nearby several *Amaranthus hypochondriacus* plants are blossoming.

While most of the crops in our gardens are annuals, we have several perennials which will die back or lose their leaves with the freezing winter weather, and then leaf out again in the spring. These include the chiltepinos, wild desert cotton (*Gossypium thurberi*), and the Tohono O'odham pomegranate bushes which are blossoming and setting fruit right now. A perennial in the east garden which shows no seasonal changes is *Agave angustifolia*, used to make the bootleg liquor *bacanora*.

Planting of winter crops will begin in late September and planning is well underway. Crops to be grown include cultivars of several Old World introductions which have been selected and adapted by Native Americans over the centuries, such as lentils, garbanzos, fava beans, peas, *Brassica campestris* mustard greens, cilantro and wheat. O'odham i'ittoi multiplier onions, southern huazontle greens (*Chenopodium berlandieri*) and the salt tolerant green orach (*Atriplex* sp.) are some native plants which we will be growing this winter.

Please come by and visit the Native Seeds/SEARCH demonstration gardens. Any volunteers interested in garden work are welcome, just leave a message on the Native Seeds/SEARCH telephone (327-9123) for Daniela or David.

A Visit to Seed Savers Exchange's New Farm

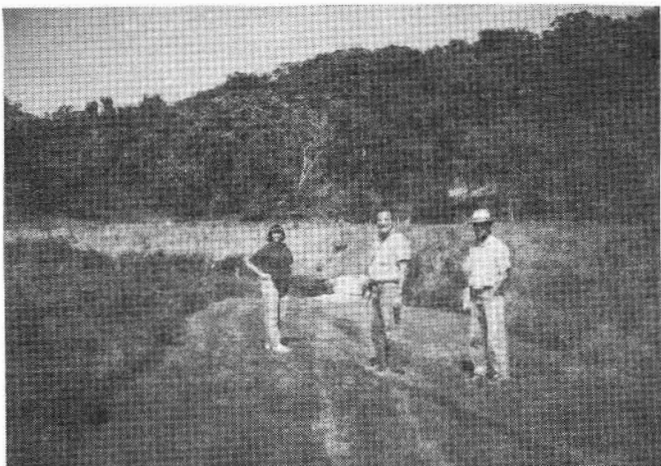
By Karen Reichhardt

In late August Gary Nabhan and I traveled to Decorah, Iowa, to see for ourselves what seemed to be a dream come true. Less than a year ago Diane and Kent Whealy of the Seed Savers Exchange (SSE) purchased a northern Iowa farm of 56 acres for the organization. The task of growing out and increasing the country's rare and heirloom vegetable seeds now is grounded with a true home. A portion of the funds to make the downpayment on the land came from foundation loans, but many of the individual donations helping to purchase the land came after Kent made an appeal to the SSE membership. In the next few years they hope to pay off the loan completely -- a challenging goal!

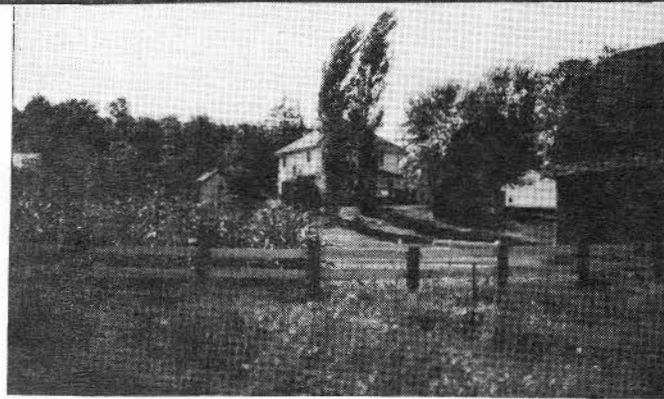
Gary and Kent first met about six years ago in Missouri (the Whealys were then living in Princeton, MO). Gary went to Missouri to discuss ways to dry, store and preserve seeds for the Meals for Millions Seedbank (which has since evolved into Native Seeds/SEARCH). At the time Kent was working a regular job and had started the Seed Savers Exchange in his spare time. (See *People Magazine*, May 11, 1987, and *Reader's Digest*, June 1987 for information on the SSE.) The SSE was just a small network of a few hundred dedicated gardeners who each were growing, increasing, and exchanging heirloom seeds with the hope of keeping alive those rare vegetable varieties that had been dropped from commercial seed catalogs or had never been listed in them.

Shortly after Gary's first visit, the Whealys received their first grant. Kent courageously left his job with the faith that the Seed Savers Exchange would be able to support his growing family.

While still living in Missouri, Kent completed an inventory of all U.S. and Canadian seed catalogs printed since the early 1900s. He also tabulated any and all information he was able to gather about noncommercial heirloom varieties that he could establish which varieties were truly rare and which were in danger



Diane & Kent Whealy with Gary Nabhan.



Heritage Farm. Photos by Karen Reichhardt.

of extinction. The results showed that the diversity of seedstocks once grown in this country were definitely in danger. The inventory sold well and became an additional source of revenue for the SSE.

About three years ago the Whealys decided to leave their beautiful owner-built homestead to live in Decorah, Iowa, where schools and services were more available to the family. Missouri was suffering from the economic stresses of the modern farming crisis, and today their Missouri home town is largely boarded up.

Even when they first moved north, the Whealy's dream was to find a farm where their carefully-stored seeds in jars and cans and humidity-free bags could be grown out and maintained as a viable collection.

The first year in Iowa, they rented a 5-acre piece of bottomland near a small river and grew out more than 2,000 varieties of vegetable crops for seed. The second year they grew out 1,000 varieties. While growing this many varieties was a herculean task, it meant that those seeds would remain viable in cool storage for another few years.

During the first two years in Iowa their six-member family moved four times. The last move was to the newly purchased Seed Savers Exchange "Heritage Farm." If their prayers are answered, it will be the last for a long while.

The farm is about five miles northeast of Decorah in a region where Amish, Finnish, Bavarian and German farmers have maintained their land for more than a century. The fertile farms here have remained small and ownership has stayed within families. Consequently, the community in general has remained viable and without the threats and foreclosures that have plagued other parts of the Midwest. A neighboring county has implemented a law which makes it a misdemeanor to have openly eroded soil on private land in order to stop yearly losses of 15 tons per acre -- a loss level common in the Midwest.

The farm itself is comprised of bottomland with rich black topsoil from two to four feet deep, several lowland pastures, a huge barn, a farmhouse, and a spring-fed large pond that remains at 42 degrees all year long. Surrounding this are acres of upland that will one day be suitable for a prairie restoration project and orchard. Adjacent to this land is a

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From Amaranth Grain To Breakfast Bars

Recipes from *The Tumbleweed Gourmet*
reprinted with permission of the author.

Popped Amaranth

When amaranth seeds are heated they pop like tiny kernels of corn. They are a bit too small to eat like popcorn, but popped grain can be added to cereals whole or ground in a blender to make a meal or flour.

To pop amaranth seed you will need a steel wok or a deep cast iron pan. Heat the ungreased wok over medium heat, add 1 tablespoon of grain and immediately and constantly stir with a natural bristle pastry brush. As soon as the popping stops, empty the pan's contents into a bowl and start over again. If the grain does not pop, it may be because the pan is too hot, not hot enough, or the grain is too dry. In the latter case, sprinkle it with water, wait a while, and try again. One-fourth cup amaranth grain will measure a full cup when popped.

Popped Amaranth Meal

To make meal, grind popped amaranth grain a half cup at a time in an ordinary kitchen blender. (If you just cannot get it to pop, grind it like it is and substitute in the following recipes.) A cup of popped amaranth will reduce to two-thirds cup when ground to meal. It can be incorporated into almost all baked goods, but remember that because amaranth grain has no gluten, it must be combined with wheat flour if you want your baked goods to rise.

It is a good idea to pop a quantity of amaranth and store it when you have time, in order to reduce the time needed for preparation of the various dishes which include popped amaranth or popped amaranth meal.

Amaranth Granola Cereal (Makes Three Quarts)

3 cups popped amaranth
3 cups rolled oats
1 cup whole wheat flour
1 cup wheat germ
1 cup coconut
1 cup sunflower seeds
1/2 cup bran
1 cup raisins
1/2 cup water
1 cup oil
1 cup honey
1 tablespoon vanilla

Preheat oven to 250 degrees F.
Combine all dry ingredients except raisins in a large bowl. Combine wet ingredients in a small saucepan and heat over low heat until honey is liquid. Pour over dry ingredients, mixing well. Spread in a large shallow baking pan and bake in preheated oven for one hour. Occasionally stir the mixture so that the toasted layer



Amaranth

on the bottom does not become too brown. When granola is an even golden brown, remove from oven and mix in the raisins. Cool. Store in airtight cans or jars.

Hi-Pro Breakfast Bars (Makes Sixteen Two-Inch Squares)

If there is not time for a nourishing breakfast at your house, bake these bars over the weekend, then grab a few to eat on the way to school or work as you sail out the door each morning.

2 tablespoons butter or margarine
1/4 cup sugar
1/2 teaspoon vanilla
1 tablespoon cornstarch
3/4 cup cream-style cottage cheese
3 eggs
1/4 cup frozen concentrated orange juice
1-1/3 cups amaranth granola
2/3 cup chopped walnuts
2/3 cup raisins
1/4 cup flour
1 teaspoon baking powder
1/4 teaspoon salt
1 teaspoon vanilla

Preheat oven to 350 degrees F.
Lightly grease a 9-inch square pan. In a small bowl cream butter, sugar, and vanilla. Add cornstarch, cottage cheese, and 1 egg; beat until smooth. Set aside. In a medium bowl, beat remaining 2 eggs until frothy. Stir in orange juice concentrate, granola, walnuts, raisins, flour, baking powder, salt, and vanilla. Mix well.

Spread half of batter into prepared pan. Cover with cottage cheese mixture. Spoon remaining batter over cheese. Zigzag through batter and filling with a knife. Bake in preheated oven for forty to forty-five minutes. Cool completely before cutting into squares.

Book Reviews

THE TUMBLEWEED GOURMET: COOKING WITH WILD SOUTHWESTERN PLANTS by Carolyn J. Niethammer. Illustrations by Jenean Thomson. Published by UA Press, Tucson. 229 pages. \$20.00 cloth ISBN 0-8165-1021-0

From the author of *American Indian Food and Lore* comes 170 mouthwatering original recipes using wild and domesticated plants of the Southwest. Years of experimenting with these foods has produced such delights as squash blossom soup, wild wheat muffins, mesquite mousse, barrel cactus chutney, and fresh corn pudding. Native crops gardeners will be particularly interested in her advice in preparing amaranth, tepary beans, chiles, squash, corn, and sunflowers. Niethammer has long been a supporter and friend to Native Seeds/SEARCH, and her writing reflects her mission of helping modern cooks find a place for ancient foods in their kitchens. If you came to the membership meeting this spring you might recognize the Desert Jewel Pie on the cover -- right after the photography session it was whisked away to our pot-luck and quickly devoured by the lucky! This book belongs on your shelf of cookbooks.

--Kevin Dahl

ALTARS OF UNHEWN STONE: SCIENCE AND THE EARTH by Wes Jackson. 1987. Published by North Point Press, Berkeley. 176 pages. \$19.95 cloth; \$9.95 paper. ISBN 0-86547-272-6.

These collected recent essays of sustainable agriculture activist Wes Jackson are a watershed of creative thought and insight into the problems of modern farming practices. Wes is co-director with his wife, Dana, of The Land Institute (Rt. 3, Salina, Kansas 67401), 188 acres of domestic prairie "devoted to a search for sustainable alternatives in agriculture, energy, shelter, and waste management." For more than a decade, he and other institute scientists, interns, and volunteers have worked on replacing modern crops with perennials and drastically reducing soil erosion and farmer's dependence on chemicals and mechanization.

The roots of Jackson's proposed agricultural revolution, while maintaining a scientific perspective, have branches in Christian philosophy, lessons from Amish and native farmers, and, perhaps most predominantly, from an understanding and appreciation of how the natural prairie has developed as a sustainable ecosystem over the centuries. With poetry, convincing examples, and a voice based on years of experience, this book has much to offer anyone interested in the problems, solutions and future of agriculture.

--Kevin Dahl

A Visit to Seed Savers

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limestone bluff with a stand of red pines that were planted there about 100 years ago. Burr oak, red oak, white oak, maples, cedars, red pine, and box elder surround acres of meadow and grass. Feral apples and wild plums are scattered around.

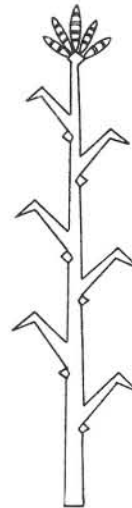
This year at the new farm the Whealys planted many different varieties of "potato-leaf" heirloom tomatoes. Most of these yield fruits about six to eight inches wide and were grown commonly by the German farmers in the Midwest. They were also growing potatoes, chiles, lettuces and the first heirloom the Whealys ever planted -- a morning glory from Diane's, since deceased, Bavarian grandfather.

While visiting the Whealys I sensed that after long searching they were finally home. The challenges of raising enough funds to keep viable the Seed Savers Exchange and the seeds they harbor still remain. The projects that were once only dreams now have the land base upon which to come true.



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Small is Beautiful

"As scale increases . . . a linear increase in size is seldom if ever attended by a linear increase in relationship. An ostrich egg as a large cell necessarily has different properties from a hummingbird egg. For purposes of illustration, a better example is found among potatoes grown by the Peruvian Indians high in the Andes. These potatoes are generally smaller than 'improved' or commercial varieties, and estimates of the number of natural varieties range from 'well over four hundred' to more than two thousand. In spite of what experts think, to increase the size of the native potatoes could be a serious mistake. Larger potatoes would be harder to cook at the high elevations where the people farm and live and they would be more watery; additionally, since the skin contains so many nutrients, an increase in size would greatly change the surface to volume ratio, so that the potatoes would yield proportionally more starch than nutrients."

—Wes Jackson from *Altars of Unhewn Stone*

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