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Gila River Pima Dietary Reconstruction

Amadeo M. Rea

The Gila River Pima, or the Gileños, as they were known in Hispanic colonial times, are the northernmost group of Tepiman-speaking people; they inhabit lands from northern Jalisco in Mexico to the Phoenix region in Arizona. Their self-designation is Akimel O'odham, or River People. Their Piman relatives in the United States are various dialectical groups comprising the Tohono O'odham (Papago) in southwestern Arizona and the now extinct Sobaipuri in southeastern Arizona.

This desert riparian people made a livelihood of gathering, farming, fishing, and hunting. Their agriculture was dependent on the biannual rise in the Gila flow: the first in the spring with the melting snow in the Gila headwaters, and the second with the advent of summer monsoonal storms from the south. Water at these times was diverted by brush weirs into an elaborate system of ditches that irrigated the nutrient-rich lower terraces of the river.

It is not known for certain when the Gileños arrived at their riverine oases, but all versions of the Pima Creation Epic, as well as their oral history, tell of a Piman conquest of a pueblid people who were already living in these desert valleys. Archaeologists call the earlier people the Hohokam. The last evidence of the distinctive Hohokam culture, with its hundreds of miles of irrigation canals, characteristic ceramics, and complex of meso-American elements, disappears from the archaeological record by A.D. 1400-1450.

The new people, coming from somewhere in the Piman heartland, were culturally preadapted to use the flora and fauna at the northern fringes of the Sonoran Desert. And in spite of what appears to the outsider to be a rigorous environment, the Gila River Pima maintained a stable culture in their desert riparian ecosystem for at least four centuries. We know that it was stable and well within the local carrying capacity from numerous documentary accounts. Both Jesuit and Franciscan travelers in the Hispanic period marveled at the industrious and provident people they encountered on the Gila. Early in the Anglo period, the Gileños were able to respond to the needs of military and civilian Anglo immigrants, producing prodigious amounts of grain and other supplies far in excess of their own needs, for commerce.

At least 95 biological species of plants entered the dietary of the Gila River Pima. Thirty of these are post-contact species (16 introduced annual crops and 14 fruit trees; this list excludes crops and products that were not named, such as olives, pepper, and okra, but that were occasional dietary items.) This leaves nearly 65 native plants known to have been eaten at some time during the River People's annual cycle.

The Gila River Pima and their kinfolk, the Salt River Pima, are now best known not for their highly successful adaptation to desert living, but rather for having the highest known incidence of adult-onset diabetes of any ethnic group in the world. This condition was virtually unknown early in the century, but by World War II significant changes had occurred in Pima environment, culture, and eating habits. The ecological conditions that support desert rivers form a fabric that is easily damaged. Through a whole series of land-use changes, primarily in the watersheds, the Gila River suffered irreversible damage. The economic backbone of the tribe was destroyed. The people switched from what was essentially a subsistence economy to a cash economy. The River People became a people without a river.

The nutritionally poor modern diet is a dim reflection of what aboriginal and early colonial Pima once ate. One might wonder whether it is possible this late in the acculturation process to reconstruct the aboriginal diet of the River People. I think the answer is a qualified yes. The historical subsistence diet is known in considerable detail. Older people living today grew up when a cash economy hardly affected the diet. Roads at the time were scarcely passable parts of the year and flooding rivers sometimes cut off travel altogether, so that families had to be relatively self-sufficient. Purchase of most

store commodities required a rough wagon trip into Phoenix or one of the other off-reservation Anglo settlements. By the 1880s and 1890s, the Gila River was beginning to show serious effects of watershed damage, and people of the upper villages in particular were feeling the pinch as a traditional lifeway slipped from under them.

Protohistoric Subsistence Diet

The lands of northwestern Sonora and what is now southern Arizona were known as Pimeria Alta in Hispanic colonial times. This area included the lands from the Gila south to the Rio San Ignacio, and from the Rio San Pedro west to the Gulf of California. Direct documentary accounts for this far north are sparse. Jesuit contacts in the colonial period were limited to southern and central Pimeria Alta; no missions were established on the Gila until the American period. However, using "ethnographic analogy" and Pima oral history, we can reconstruct the Pima diet before the introduction of Euro-Asian crops and animals, and before the ecological changes in their riverine habitat. As a baseline, the protohistoric Gileño diet is assumed to include all indigenous crops and all native plants and animals known to have been harvested during historic times.

Wild Crops. In spite of being an agricultural people whose skills were praised by both Hispanic and Anglo itinerants encountering them, the Gileños were until the twentieth century dependent on wild harvest for about half their annual diet. The major wild crops included velvet mesquite (*Prosopis velutina*), saguaro (*Carnegiea gigantea*), agave (*Agave deserti* and perhaps other species), and cholla (*Opuntia* spp.).

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Mesquite bosques once were found throughout Pima country. Excessive woodcutting during the late 1800s and early 1900s — the drought years — cleared most of them, and the later downpumping of the water table prevented even this deep-rooted tree from finding moisture on most of the reservation. Before these ecological changes, the Pima stored great quantities of mesquite pods in large arrowweed baskets or bins. Two crops usually appeared each season: the first about June, the other about September. Mesquite pods crushed in a wooden mortar and then soaked in water produced a drink called vau. It was so frequently used at meals that native consultants compared it to coffee. The flour from crushed mesquite pods was made into an uncooked cake or loaf that found a frequent place at meals. Various other dishes were made from the mesquite or screwbean mesocarp. Judging by both ethnohistorical and documentary evidence, mesquite must have been the staff of life for the Gila River Pima.

The saguaro provided another abundant and seldom-failing crop, this one available in midsummer. So important was saguaro in the annual cycle that the Piman "New Year" began with the Saguaro Harvest Moon. The sweet pulp of the fruit is filled with seeds rich in protein and fat. This pulp was dried whole, as well as being prepared directly as jam and syrup. The ground seeds were mixed with grains to make a porridge or were made into a paste resembling peanut butter. Some of the syrup was fermented for the annual wine feast, an elaborate liturgical celebration intended to bring rain and to continue it through the monsoonal growing season.

In addition to mesquite vau, the Pima made several other beverages. Wolfberry crushed and boiled with water, and sometimes with whole wheat or white flour, was drunk cold. Ripe saguaro fruit made a similar cold drink.

A third major wild harvest was of cholla buds, which were gathered in spring. The major species (*Opuntia acanthocarpa*) was ready in March or April, and the secondary species (*O. arbuscula*) about a month later. The green calix with the entire unopened flower was picked, pit-roasted with seepweed or inkweed (*Suaeda moquinii*), then eaten fresh or dried for future use. When dried, the roasted buds occupied little storage space and lasted indefinitely.

Pit-roasted agave hearts may have been the fourth major wild resource in aboriginal times. While their procurement was labor-intensive, the yield was great. The dried product was very sweet and could be stored indefinitely. The drawback was that the agave harvest took the Gileños away from the relative security of their villages into the outlying desert ranges, where they were vulnerable to attacks by the Apache. (Athabascan raiding probably became a serious threat at about the time of the arrival of the Jesuits in northern Pimeria Alta.)

Wild greens were an important part of the Pima diet. Most of the species were eaten boiled or were boiled, strained, and refried. Many of the species gathered grew in profusion as a result of the Gileños' agricultural practices. The annual cycle of greens covered most months of the year.

If winter rains came from the Pacific, patota (*Monolepis nuttalliana*), a small chenopod, grew on bare disturbed soils of the floodplains. In late winter and early spring, eremalche or star mallow (*Eremalche exilis*), wild heliotrope (*Phacelia* spp.), and fiddlenecks (*Amsinckia* spp.) grew on the bajadas, and wild sorrel or dock (*Rumex* spp.) grew in the marshes. (All four of these dropped entirely from the Pima dietary; one suspects they were spring starvation-season foods.) In the hot spring, several goosefoots and two annual saltbushes were (and by some still are) harvested in abundance. During summer, Pima fields produced two other important greens: verdolagas or common purslane (*Portulaca* spp.), and Palmer's carelessweed or bloodroot amaranth (*Amaranthus palmeri*). The leafier species, especially the saltbushes and amaranth, were dried and stored for year-round use. Between the fresh and dried products, the Pima were never without their greens during the year.

Several seed plants were used to make mucilaginous drinks that we know were highly esteemed, even though they have completely fallen from the Pima dietary during the past half-century. These include chia (*Salvia columbariae*) and the so-called Indian wheat (*Plantago* spp.). Certain conditions, particularly winter and spring rains, produced great crops of wild plants. The Pima fire drives also probably stimulated wild plant growth in specific areas, making harvesting easier. Another beverage was made from a tansy-mustard (*Descurainia pinnata*), a native plant, and later from a similar, introduced mustard, London rockets (*Sisymbrium irio*), which now is abundant in Pima country. The seeds of both were mixed with water to make a drink or were parched before mixing with water to make a kind of pinole (parched and ground seeds). With all four of these species, the seeds absorb great quantities of water when immersed, yielding a mucilaginous mass. With changing tastes, these fell out of favor. One old Pima described the chia drink to me as "something nasty, like when you have a cold."

Certain foods were snack foods eaten primarily by children. These included the tubers of several bulrushes and nut-grasses (*Scirpus* spp., *Cyperus* spp.), the bulbs of bluedicks or covenas (*Dichelostemma pulchellum*), the pulp of a fishhook cactus (*Mammillaria microcarpa*), the fruit of the hedgehog cactus (*Echinocereus engelmannii*), Wright's groundcherry (*Physalis acutifolia*), and adult cicadas. The fruit of fan palms (*Washingtonia filifera*) later was added.

Other foods were snacks indulged in by all age groups. Both the white and amber sap from the velvet mesquite and screwbean (*Prosopis pubescens*) were relished. Catkins (male flowers) of cottonwood (*Populus fremontii*) in about February and mesquite later in spring were eaten as is, while squash blossoms were cooked with crushed wheat as a conventional soup. The oily seeds of both the wild and domestic devil's claws (*Proboscidea* spp.) were a welcome addition to the diet, as were the seeds of cotton (*Gossypium hirsutum*) and various cucurbits.

In addition to these major wild crops (mesquite, saguaro, cholla, agave, and seasonal greens) the Gila River Pima made use of many other wild plants. Most of these were available only seasonally.

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The Gila River Pima made use of several arboreal legumes in addition to mesquite. The peas from the little-leaved paloverde (*Cercidium microphyllum*) were harvested and eaten raw while still tender or were cooked when halfway mature. Dry ironwood seeds (*Olneya tesota*) provided another crop in midsummer; leached and roasted, they tasted like peanuts. Flour processed from the screwbean was used somewhat like the more abundant velvet mesquite.

Pima women dug the small tubers of the *camote-de-raton* or hog-potato (*Hoffmanseggia glauca*), even though these grew at considerable depths. Occasionally, even the flesh of the barrel cactus (*Ferocactus* spp.) was prepared as a special dish with mesquite pods.

Both graythorn (*Zizyphus obtusifolia*) and elderberry (*Sambucus mexicana*) grew abundantly in Pima fence rows. Both produced fruits the Pima gathered. Graythorn was used until recently. With the drying of Pima country, the water-loving elderberry was almost forgotten, but earlier Hispanic missionaries had complained that the Upper Pimas in northern Sonora brewed a wine from this tree that kept the Indians drunk for days.

Two parasitic plants and one fungus contributed to the aboriginal Pima diet. In late winter, desert broomrape (*Orobancha cooperi*) appeared in washes and other sandy places. Broomrape was gathered when it had just began to emerge and most of its succulent stalk was below ground; it was eaten cooked or raw. Desert mistletoe (*Phoradendron californicum*) often infested arboreal legumes. The pinkish berries were eaten cooked or raw. One mushroom that grew on the trunks and fallen logs of willows along the river was made into a gravy.

Trade with the Tohono O'odham, or central desert Pimans, brought to the Gileños saya roots (*Amoreuxia palmatifida*), cakes of banana yucca (*Yucca baccata*), acorns (*Quercus* spp.), chiltepinies (*Capsicum annum*), and several other plants that did not grow in Pima country.

The Pima were not without sweets, although some sources supplied only very small amounts. In addition to the saguaro fruit products and dried yucca and agave already mentioned, there were several insect sources of sweets. A carpenter bee that bored into the agave stalk stored pollen and nectar for its larvae. Another bee put regurgitated nectar into chambers in the ground. And certain plants had a kind of honeydew on the leaves, apparently secreted by a scale insect. A Pima described this to me as "like manna in the Bible."

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the Salt River Pima, are now best
known not for their highly successful
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Cultivated Crops. At least six food crops formed the backbone of Gila River Pima aboriginal agriculture. These cultivars were maize (corn), squash and pumpkins (several species), teparies, limas, grain amaranth, and grain chenopod (huauzontle). For lack of an archaeological record, it is not known how long these were in use among the protohistoric Pima, but the first four (corn, squash, and the two species of beans) are well attested in Piman song, symbolism, ceremony, myth, and oral tradition. The two pseudocereals (amaranth and chenopod) persisted into the late nineteenth century, then vanished. It is not known whether the Pima cultivated the common (kidney) bean in this early period. There is internal evidence that they did not. Unlike the tepary and lima, it is a species not well adapted to local environmental conditions. Cultivated grasses may have been among the crops. All these crops were readily stored for use throughout the year. Even the flesh of the two cucurbits was dried for later use, as were their seeds.

Maize doubtless was the major grain food. Its symbolism pervaded myth, song, and ceremony. In legend, corn is a fickle deity. Presumably, this reflects a real-life situation: corn was a variably productive crop.

Spring crops were planted when the mesquites leafed out, a sign that the crop would be safe from freezing weather. At that time, the snows melting in the Gila headwaters raised the river flow so that fields on the lower terraces and islands were readily irrigated. A second planting came at the beginning of the summer monsoon season when the river rose once again. During this "short planting" the Pima hoped to gather a second crop before the late autumn frosts. With so-called 60-day corn varieties and other quick-growing localized land races, they usually were successful.

There are hints that some native grasses were cultivated, but the evidence thus far is tenuous. These might have been winter crops, a third planting.

A recent suggestion has been made that the Upper Pima, like their Hohokam predecessors, cultivated agaves on terraced bajadas or piedmonts. There is no ethnohistorical or ethnographic evidence among the Gileños for such a hypothesis, even though this was a widespread practice among many (if not most) meso-American groups.

Animal Foods. Of the major forms of animal protein procurement — garden hunting, communal drives, fishing, and big-game hunting — the last was the least significant for the Gila River Pima. On a day-to-day basis, fishing and garden hunting of small rodents (particularly cotton rats: *Sigmodon* spp.) and lagomorphs (both jackrabbits and cottontails) kept meat in the pot, as did continuous trapping of small granivorous birds, such as migratory sparrows and buntings in winter and quail and doves year-round. In other words, the Pima exploited the animals that exploited the lush local conditions that the Pima themselves created by their water management practices.

Fishing once was a mainstay of animal protein for the Gileños, as attested by the earliest explorers. Older Pima described to me eight named species of fish, five of them native. At least three of these were important food resources for a fish-loving tribe. (Not one of these survives on the middle Gila today.)

Environmental Stress. In spite of wild crops, cultivated crops, and both hunting and fishing, the Pima complained of a stress period in the spring. During April and May (and, aboriginally, June?), stored goods were at their lowest ebb and game animals at their least abundant. This may have been the time of the highest consumption of wild greens. But it also was the time of the seasonal availability of wolfberries (*Lycium* spp.) and cholla buds, two major wild crops that have maintained their cultural importance even today.

In addition to the annual spring stress period, there were actual starvation times. Drought could affect the local soil moisture and the production of wild crops, as well as the volume of water available in the river for cultivated crops. At such times the people were forced to rely on "starvation foods," such as the seeds of pickleweed (*Allenrolfea occidentalis*) and quail-bush (*Atriplex lentiformis*), which otherwise were not favored. Seeds of the catclaw (*Acacia greggii*) also may belong in this category. Some of the wild greens that now have fallen into disuse may have been

didn't
make
P. 7 is a listing
of plants

Table 2. Cultivated plants in the Gila River Pima dietary

1. Aboriginal

Amaranthus cf. *hypochondriacu*
Chenopodium berlandieri var. *nuttalliae*
Cucurbita spp.
Gossypium hirsutum
Phaseolus acutifolius var. *acutifolius*
Phaseolus lunatus
Zea mays

2. Post-contact

a. Crops

Allium cepa, *aggregatum* group
Allium cepa, *cepa* group
Allium sativum
Capsicum, cultivated forms
Cicer arietinum
Citrullus lunatus
Cucumis melo
Ipomoea batatas
Lactuca sativa
Lens esculenta
Lycopersicon esculentum
Opuntia ficus-indica
Phaseolus vulgaris
Pisum sativum
Solanum tuberosum
Sorghum bicolor [sweet sorghum]
Triticum aestivum
Vigna unguiculata

b. Fruit trees

Citrus limon
Citrus x paradisi
Citrus sinensis
Ficus carica
Malus pumila
Morus alba
Musa x paradisiaca
Phoenix dactylifera
Prunus armeniaca
Prunus domestica
Prunus persica
Punica granatum
Pyrus communis
Vitis vinifera

starvation foods. Examples are wheelscale saltbush, wild heliotrope, and fiddleneck. The few old Pima who recall these being eaten have commented that they either were tasteless or had objectionable textures.

Post-Contact Dietary Changes

The Hispanic Period (1694-1849). With the arrival of Hispanic colonists in the Pimeria Alta in the 1680s, profound changes affected the lives of the native peoples on the frontier. Direct Spanish contact with Gileño and Sobaipuri Pima came in 1694, but changes already were under way that affected the Pimas' external and internal environments. The Gila River Pima were far enough out on the fringes of the Spanish Colonial frontier that they selectively filtered and absorbed into their culture what they wished, while maintaining their culture intact.

The introduction of nonlocal crops in the Hispanic and Anglo periods considerably modified the Pima diet. Sixteen new crop species and more than a dozen kinds of fruit trees ultimately were added to the Gileño repertoire. Some of these were major crops. Wheat, in particular, filled an apparently vacant niche superimposed on the double cropping cycle, adding a third, winter planting. Wheat proved so successful that it eclipsed all other crops in importance. With the 1849 Gold Rush and a continuing flow of Anglos to the new state of California, the Gila people had a ready market for their surplus wheat, until the water supply in the Gila began to peter out. By the 1890s the Pima were destitute and the Gila River permanently damaged (Rea 1983; Dobyns 1978, 1981).

Extracted Quotes Various pulses now entered the Pima fields and diet, though their relative importance varied; the introductions included garbanzos, black-eyed peas, lentils, peas, and, perhaps at this time, common beans.

From a suite of Old World seasonings the Pima selected several (onions, garlic) but declined most (anise, cilantro, mint, mustard). Even onions and garlic may have been adopted much later in the Anglo period. Salt and chiles have remained the ubiquitous northern Piman seasonings.

The watermelon and muskmelon, both introduced novelties, proved so popular that they dispersed northward in advance of the Spaniards themselves. Sweet sorghums were esteemed additions; their crushed stalks produced a juice for making syrup.

Many of the new crops were added to the earlier repertoire, but wheat production largely eclipsed maize as the basic crop. Wheat tortillas became the staple of most meals. Even the oldest people today cannot remember anyone making corn tortillas. Wheat replaced corn or mesquite flour in many other preparations, too. Wheat pinole (grains parched with coals and finely ground) was a staple both for travelers and for those at home. It needed only to be mixed with water to make a hearty cereal drink.

A main goal of the Jesuit Fr. Kino was to establish cattle ranching as a firm economic footing for mission endeavors in Pimeria Alta. Although never missionized during the

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colonial period, the Gileños acquired some horses and cattle, as well as chickens. At this time, both horse and oxen seem to have been used principally as transport and draft animals.

Grape vines and various fruit trees were introduced at Pima missions to the south. Some of these new crops may have found their way north at this time. Pomegranates and figs may have come in early; they were preadapted to desert oasis conditions. Most, however, seem to have been adopted during the Anglo period. After all, the desert supplied an abundant harvest of saguaro and wolfberry fruit, and these did not have to be pampered and irrigated.

The Anglo Period (1849 to present). The most pervasive contact with Europeans came when enormous throngs of Anglo-Americans began passing through Pima lands. Beaver trapping along the desert streams drew some early. The goldfields drew others. The southern route to California brought thousands. Over about two decades, whites started putting down roots in the desert surrounding Pima country. Florence (1868), Phoenix (1869), Maricopa Station (1879), Tempe (1879), Casa Grande (1880), and other communities sprang up. Soon the rivers began drying up. The compound abuses of overgrazing, timber cutting in the headwaters, and destruction of native beaver dealt mortal wounds to the Gila, although it was to writhe in its death throes for three-quarters of a century.

Between 1875 and World War II (1945), the Pima way of life underwent many changes that affected the diet. Use of the staples mesquite, screwbean, Indian-wheat (wooly plantain), chia, wild mustard seed, saguaro, and agave virtually disappeared. Many wild greens disappeared from the diet, perhaps partly as a result of drying and abandoned fields.

Steam flour mills at Sacaton and Casa Blanca ensured a ready supply of wheat flour and abandonment of corn flour, which was produced with difficult manual labor. Trading posts appeared on the reservation and stores opened in the new Anglo settlements. Sugar and lard became regular commodities. Flour, sugar, and lard became the new trinity in a diet increasingly impoverished, both varietally and nutritionally.

The progressive drying of the Gila meant that the Pima were less dependent on their own resources and more dependent on government rations and a wage economy. By the turn of the century, many Pima eked out a living by cutting and selling mesquite wood, almost denuding the reservation in the process. Water pumping far in excess of recharge helped kill many of the surviving mesquite bosques. Many of the wild food items from the floodplains became rare or unavailable. Government farm advisors taught the Indians, who had been farming the desert for centuries, the "clean farming" models of modern agribusiness. There was little, if any, appreciation among these advisors for the ancient desert-adapted crop varieties. For instance, quick-growing native maize varieties dropped from at least seven to just one maintained by a few traditionalists.

The introduction of Eurasian herbivores meant a more dependable source of animal protein for many Gileños. The

Pima ate burros, mules, and horses as well as cows. But with the good came the bad. Wild game is decidedly lean throughout much of the year, but beef, especially, is high in fat. Beef and pork lard became available from the Gileños' own animals as well as from trading posts and Anglo towns. And the Pima relished it. A new kind of cooking appeared: grease-frying, which was unknown in aboriginal cuisine. Deep-fried dough became the famous "Indian" fry bread. Boiled desert greens were drained then fried in lard. Even cholla buds were mashed and cooked in lard.

Abundant calories from the new simple carbohydrate and fat diet soon changed the tall, lean Pima into an obese people. The "thrifty gene" that helped an aboriginal people living in a precarious and unpredictable environment to store metabolically in seasons of plenty to see them through stress times had not evolved a mechanism for shutting itself off.

The twentieth century has seen a continuing decline in the use of native foods, a decline in both soluble and insoluble fiber, and an increase in fat and simple carbohydrates in the Pima diet. Likewise, a physically active, hardworking people have become a sedentary people, as farming, gathering, and hunting have become activities of the past. Wage-earning comes more often from an office job now. The daily regimen includes many hours of television. (All of these changes can be seen in the dominant American culture as well.) A young Pima today is likely to be raised on deep-fried chicken, hamburger, greasy popovers, white bread, and canned sodas or syrupy punch. Few now know the wild greens, cholla buds, roasted corn, whole-wheat dishes, fish, or wild game. Even old people, for the most part, have forgotten the mucilaginous seed drinks, the many mesquite dishes, and caterpillar stew.

All this has exacted a toll from the Pima. Obesity has been followed by epidemic adult-onset diabetes at a rate and severity that continues to climb.



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Amadeo M. Rea is a research associate with the San Diego Natural History Museum. This article is excerpted from his unpublished manuscript *At the Desert's Green Edge*, an ethnobotany of the Gila River Pima. While the study is based primarily on interviews with Pimas born in the early twentieth century, it also draws on the studies of early ethnologists and ethnobiologists, especially Russell (1908), Curtin (1948), Castetter and Bell (1942), and Hrdlicka (1906; 1908).