

# INDIGENOUS GARDENS

## Cultivating Agave in the Grand Canyon

By Vincent Diaz,  
Carrie Cannon,  
and Wendy Hodgson





We found an Indian camp today with gardens made with considerable care...We took several squashes...Wish we had taken more of them.

—George Bradley, one of John Wesley Powell’s men, describing stealing squash from a Shivwits Paiute garden at Whitmore Wash, August 26, 1869.

Writers often cite John Wesley Powell and his crew as the first men to explore the Grand Canyon. But Indigenous communities have been living, farming, trading, and traveling through the canyon since time immemorial, long before Powell’s boats floated downriver. In fact, Indigenous peoples had observed and studied the canyon’s plants, animals, waters, weather, and geology for generations. Powell Expedition member George Bradley’s account of looting a garden at Whitmore Wash, along the Colorado River in the heart of the Grand Canyon, speaks not only to the long history of Indigenous cultivation in the canyon, but to the taking of Indigenous resources.

Thankfully, as a nation, we continue to move beyond the notion that Columbus “discovered” America, since millions of people already called this place home in 1492. Similarly, Western science is slowly acknowledging that early cultures already knew very well the plant species later “discovered” in the canyon. Indigenous peoples had their own names, uses, and highly sophisticated classification systems for them. One such plant is the Grand

Canyon agave, *Agave phillipsiana*, a species whose remarkable story reveals Indigenous peoples’ extraordinary understanding of cultivation and domestication. Indigenous peoples in the Grand Canyon may well have cultivated agave for centuries, selecting and maintaining favorable traits in a plant vital to Indigenous economies and lifeways across the region.

*Agave phillipsiana* is one of 250 kinds of agave that occur from the Southwest and Florida all the way into northern South America. Agaves produce short, thick stems and succulent leaves that form a rosette ranging from four inches to eight feet tall. The sword-shaped leaves often bear small teeth or fibers on their margins. Once agaves flower—which can take anywhere from eight to 40 years depending on the species—most produce fruits and seeds, and then die. The common name “century plant” comes from the erroneous assumption that agaves can take 100 years to bloom. Many agaves also reproduce by creating little rosettes from underground stems (called “pups”), or from the flower stalks (called “bulbils”).

Agaves have been of great economic and social importance to Indigenous peoples in the Southwest and Mexico for at least 9,000 years. Parts of the agave plant provide food, fiber for sandals, rope, and other necessities, are fermented into beverages, and used in ceremonies to this day.

As a food, agave was one of the main carbohydrate sources before Indigenous peoples began cultivating corn. From about 8,000 B.C.E. to A.D. 500, the earliest hunting and foraging peoples in the Grand Canyon no doubt harvested the two varieties of Utah agave (*Agave utahensis*) that grow in the canyon for food. Indigenous peoples of the Grand Canyon region harvested wild and cultivated agave in the spring when the plants began to develop a flower stalk, accumulating carbohydrates. The plants need the carbohydrates to produce their large stalks, which can grow up to 15 feet tall. After selecting agaves to harvest (ones with emerging flowering stalks), Indigenous people pried them from the ground with a digging stick and cut off the leaves, leaving the inner white core—the



TOP: Hualapai elder Frank Mapatis, an instructor with the Hualapai Ethnobotany Youth Project, harvesting agave with Phyna Cook, part of the next generation of Hualapai youth agave harvesters. CARRIE CANNON MIDDLE: An unbaked agave head trimmed of its leaves. CARRIE CANNON BOTTOM: Agave phillipsiana with several pups near Deer Creek in the Grand Canyon. WENDY HODGSON

Similar to artichokes in how they are eaten and what parts are edible, roasted agave heads are golden brown, with a sweet, molasses-like flavor, the center having a texture like baked squash.



“head” or “cabeza” of the plant—then roasted them in an underground pit for one to three days. Once the agave heads were cooked, they were ready to extract from the pit and eat.

Similar to artichokes in how they are eaten and what parts are edible, roasted agave heads are golden brown, with a sweet, molasses-like flavor, the center having a texture like baked squash. The baked leaf-bases and center are rich in calcium, iron, and fructans—complex carbohydrates. In agave, fructans not only provide energy for the rapid growth of the flower stalk but also protect the plants against freezing temperatures, heat, and drought. Fructans can also help treat diabetes and obesity as they lower glycemic levels and slow food absorption. Today, tribal communities

in Arizona continue to harvest and roast agave at social occasions where stories are shared that help build and strengthen cultural ties.

Agave plants have many other uses. Indigenous peoples used the fibrous leaves for hairbrushes, paintbrushes, sandals, bowstrings, and hats, and wove them into cords or ropes. The Hualapai used agave flower stalks to make quivers for arrows and wove the stalks into drying racks to dry roasted agave into cakes similar to fruit leathers. The Hualapai often shared agave plants and parts among the tribe’s different bands throughout their ancestral lands as well as with other tribes. According to anthropologist H.F. Dobyns, “The Chloride Walapai once traded [agave] to the Utes . . . at Milkweed Springs. They received

hatchets and knives in exchange.” The Pine Springs Band of Hualapai traded with the Hopi, as did the Havasupai.

Many Indigenous peoples, including the Hualapai, still follow this time-honored tradition of processing wild Utah agave as a valuable food source. The late Malinda Powskey of the Hualapai Tribe grew up learning how to harvest and process agave and was vital in keeping this tradition alive. Thanks to her, young people participating in the Hualapai Ethnobotany Youth Project have conducted an annual agave harvest and roast for the last 17 years. Tribal elders describe the program as a way to connect tribal youth to the land and to plants, keeping traditional knowledge alive and vital.

Because agave was so important to many tribes of the Southwest, archaeologists speculated that Indigenous people might have cultivated it, since relying solely on the wild species in the Grand Canyon or elsewhere might have been hit or miss. Agave cultivation may have begun as early as 6,000 to 5,000 B.C.E. in Mesoamerica. However, in the American Southwest and northwestern Mexico, early colonial explorers only noted wild agaves that Indigenous peoples collected or traded. The gardens where agave grew were overlooked not only by early explorers—though evidence supports that agave cultivation had waned by the time early explorers made it here—but by later archaeologists and most botanists. Evidence that Indigenous peoples cultivated agaves in the Southwest on a grand scale wasn't understood until the 1980s, when archaeologists revealed remnants of large-scale agave farming by the Hohokam in southern Arizona. Until then, hardly any researchers even fathomed that people would cultivate agaves north of the border. Still, who grew what agaves and where?



Hualapai elder and teacher Malinda Powskey harvesting mescal agave in Peach Springs Canyon in 2006. CARRIE CANNON

In the 1930s, Grand Canyon National Park's first hired botanist, Rose Collom, a self-taught botanist from Georgia, set out to document plants for the canyon's fledgling herbarium. She found a small group of agaves in Clear Creek Canyon (a few miles upstream of Phantom Ranch), just downcreek from a major archaeological site. Collom knew it was different from the other agave species in the canyon. However, lacking evidence, such as flowering parts for documentation, she never described it as a new species.

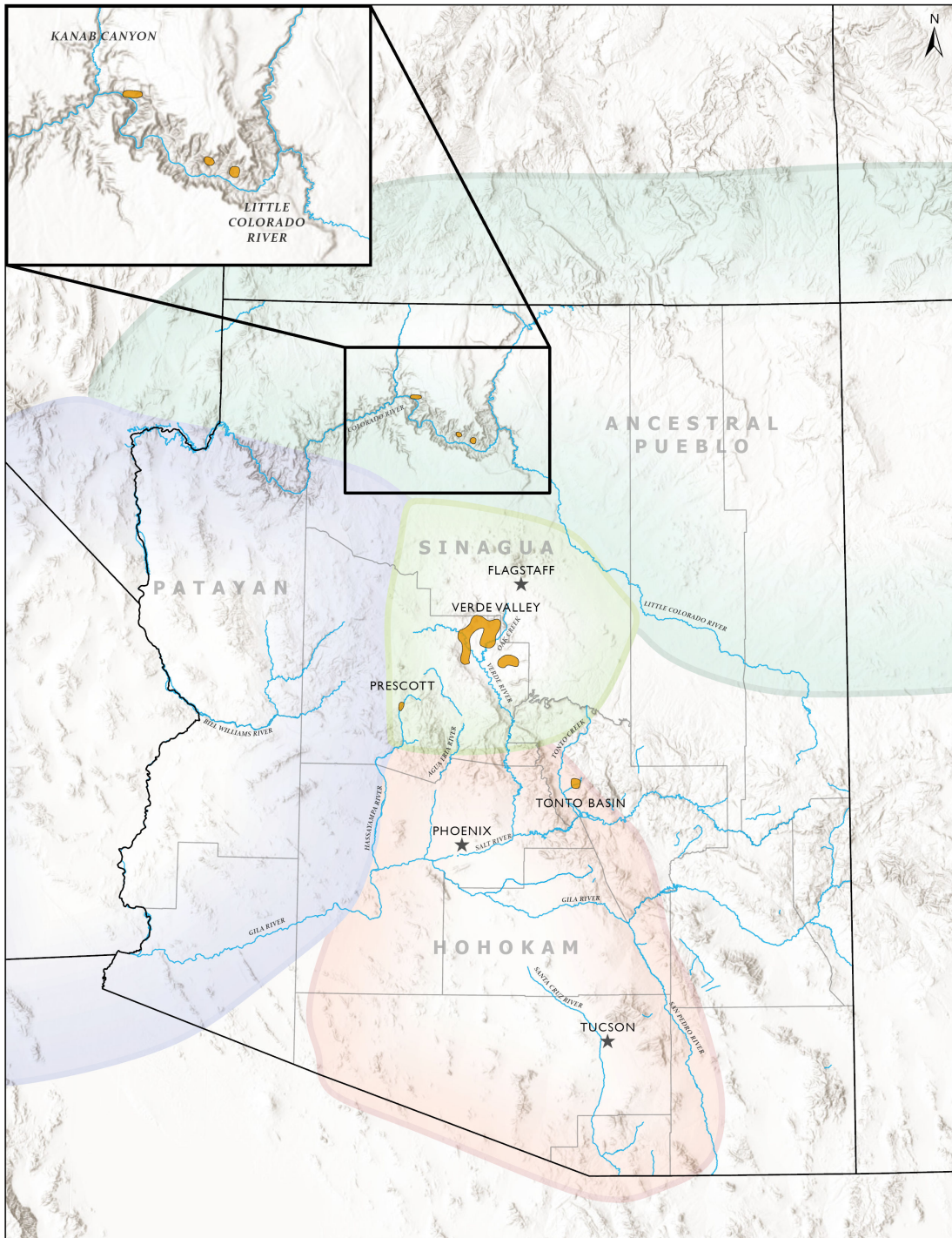
Nearly 60 years after Collom's observations at Clear Creek, botanist Wendy Hodgson, one of our coauthors, found the same population thanks to the plant's ability to make clones of itself. These plants matched agaves growing along Deer Creek, first rediscovered by Grand Canyon plant expert Arthur Phillips III and

later documented by Hodgson who formally described and named the plants *Agave phillipsiana*, in honor of Phillips.

Today, *Agave phillipsiana* occurs in four places in Arizona: the Grand Canyon, the Verde Valley, the Tonto Basin (east of Phoenix), and south of Prescott. In the Verde Valley and the Tonto Basin, it grows with other pre-contact domesticated agave species farmed by the Sinagua and Hohokam peoples, respectively. Such a broad range is the result of the widespread trade of this agave among four different cultures growing it in different ecological zones, climates, soils, and elevations. Such extensive trade attests to how important the plant was for food and cultural use.

What makes this agave so special? Like five other early agave species domesticated by Indigenous peoples that still grow in Arizona today, *Agave phillipsiana* isn't found in natural vegetation stands, but instead grows in clonal clusters within ancient fields where it was once farmed. Within the canyon, we find it growing close to habitation sites, granaries, and roasting pits. Outside of the canyon, we also find it growing near petroglyphs and rock mulch features such as rocks arranged in lines and rock piles that help direct and retain water and nutrients. Wherever you see the Grand Canyon agave today, you are looking at the descendent of plants carefully domesticated and tended by Indigenous horticulturists. How is it that we see today the same plants, in the same setting, as those grown hundreds of years ago? The answer has to do with how the plant makes more plants.

*Agave phillipsiana* flowers, but does not produce seeds, relying on the relatively fast production of several pups from its underground stems. These small pups not only



The orange spots on this map indicate places where the domesticated Grand Canyon agave, *Agave phillipsiana*, is still found today. MAP BY ARYN MUSGRAVE, DESERT BOTANICAL GARDEN, BASE MAP BY CATHERINE GILMAN, ARCHAEOLOGY SOUTHWEST

kept the plants growing over centuries, but more importantly, made it easy for early farmers to grow, transport, and trade them. In addition, the fact that the plant produces so many pups also made it easier for Ancestral Puebloan, Sinagua, Hohokam, and Patayan horticulturalists to select for and keep desirable traits, such as easy-to-cut leaves, requiring fewer

years to mature, different flowering times (and harvest times), and of course taste—*Agave phillipsiana* is the best-tasting of several Arizona agaves. Over time, as Indigenous people planted and harvested agaves, selecting for preferred traits, a new species of agave developed different from its (thus far) unknown progenitor. Agave plants grew in agricultural fields of

varying size and required human care for their long-term survival such as weeding, providing water and nutrients, removing and replanting pups, and other unknown activities that encouraged the survival of plants having favorable attributes.

But who was the first to domesticate and grow this agave and when? Preliminary studies suggest Agave

phillipsiana may have originated in lands inhabited by the Hohokam in southern Arizona, rather than in central Mexico and South America where many early domesticated species such as maize, beans, and squash first appeared. Agave phillipsiana and five other known Arizona pre-contact agave domesticates represent the remnants of crops once grown in agricultural fields. For hundreds of years, human hands have tended and harvested these plants in what we see today as bio-cultural—not natural—landscapes. Their continued survival in their bio-cultural context now depends on the collaboration between Indigenous peoples, land management agencies, and researchers including botanists, ethnobotanists, and archaeologists.

The Grand Canyon has always been an important economic crossroads for Indigenous peoples. The Colorado River corridor and its tributaries are a venue for Indigenous commerce, connecting communities along the river. In addition to the many routes along the river corridor, in some places, pre-dam conditions meant seasonal river flows would be so low that people could cross the Colorado River on foot. Sadly, many trade routes are now cut off or forgotten. Still others are preserved by Indigenous knowledge keepers and kept private.

The Rio Grande-Pacific Trail, a major Indigenous trade route connecting New Mexico to California, parallels the present-day railroad built by the Santa Fe Railroad Company. This route connected many villages in the inner canyon, including communities in Peach Springs Canyon, Spencer Canyon, Cataract Canyon, Mohawk Canyon, and the present-day Flagstaff area. This trail is significant for Pai commerce with Mohave, Chemehuevi, Hopi, and other Indigenous groups.

The Colorado River network has geographically connected the Hualapai, Havasupai, and Yavapai to other Pai communities, including the Pai Pai and Kumeyaay (Ipai and Tipai) in Mexico and southern California.

To examine the role of Native people in the landscape is to understand how the Grand Canyon ties into much larger networks of traditional commerce in the region. People often overlook Indigenous trade in favor of the towering rock walls, roaring rapids, soaring California condors, colorful sunsets, rock art, cliff dwellings, and granaries the Grand Canyon offers. Yes, park rangers, river and backpacking guides, and books may mention Indigenous trade networks in passing, but how Indigenous commerce influences the environment and continues to shape our understanding of traditional ecological knowledge is a much bigger story of human ingenuity and cooperation. Agave phillipsiana sheds light on one example of Indigenous cultivation and commerce, and shows how Indigenous science, economics, minds, and hands shaped culture and nature, spreading this nutritious, useful, and important plant in the Grand Canyon and throughout much of Arizona.

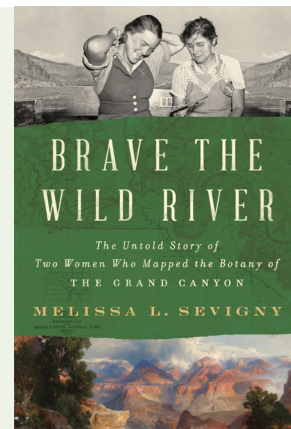
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## ON THE TRUST BOOKSHELF



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In the summer of 1938, botanists Elzada Clover and Lois Jotter set off to run the Colorado River to survey the plant life of the Grand Canyon. With its churning waters and treacherous boulders, the Colorado was famed as the most dangerous river in the world. Journalists and veteran river runners boldly proclaimed that the motley crew would never make it out alive.

“Melissa L. Sevigny unfurls one of the finest river stories of the Grand Canyon while presenting a long overdue, richly deserved, and beautifully written tribute to a pair of legendary botanists.”

—Kevin Fedarko, author of “The Emerald Mile”

### AUTHOR TALK



ALEXIS KNAPP

Science writer Melissa Sevigny will join Grand Canyon Trust members on Zoom to talk about her new book on **May 23, 2023 at 5 p.m.**

Contact Kimber at [kimber@grandcanyontrust.org](mailto:kimber@grandcanyontrust.org) or **928-286-3375** to reserve your spot.