

By P. Mirocha & G.P. Nabhan, with Mayor R. Romero, J. Mabry & T. Hanley. 2022, Tucson, Arizona

### **FOREWORD**

THE AGAVE HERITAGE FESTIVAL is both a celebration of the agave and an acknowledgement of Tucson's rich cultural history and the traditions that unite the peoples of the Southwest.

Next to the iconic Saguaro, the agave is perhaps one of the most recognized plants across Tucson's landscape. With its unmistakable grey-green, sword-like leaves, this majestic plant is equal parts medicine, nutrition, horticulture and spirit.

Agave cultivation in the Tucson basin dates to the year 950 C.E. In fact, Mezcaleros—artisanal Mezcal distillers—have identified 10 pre-Columbian domesticated agaves grown in Tucson suitable for the fermentation and distillation of mezcals. There are currently 20 species of wild agave cultivated in Southern Arizona which have been used for generations for mezcal distillation.

Ubiquitous in our Tucson yards, the agave is so much more than a xeriscaping plant. It is an ideal candidate crop for "slow agriculture" for a hotter, drier climate. When planted in significant densities, various agave species can draw down and store the dry weight equivalent 12 to 24 tons of carbon per acre per year. And planting more agaves can support the recovery of threatened species of pollinators like migratory long-nosed bats, hummingbirds, and butterflies.

This year Tucson will celebrate the 14th anniversary of the Agave Heritage Festival and the agave's role in the culture and history of the Arizona-Mexico borderlands. I am excited to hear that the Governor of the state of Sonora, Alfonso Durazo, has announced Survivors Inc. Nursery. plans to make the traditional agave distillate, Bacanora, a core part of the state's economy. I look forward to building a partnership between the City of Tucson and the State of Sonora to continue to explore our economic, cultural, and geographic ties.

On behalf of the City of Tucson, I wish to welcome you as we toast to the resilience of the agave.

Mayor Regina Romero CITY OF TUCSON

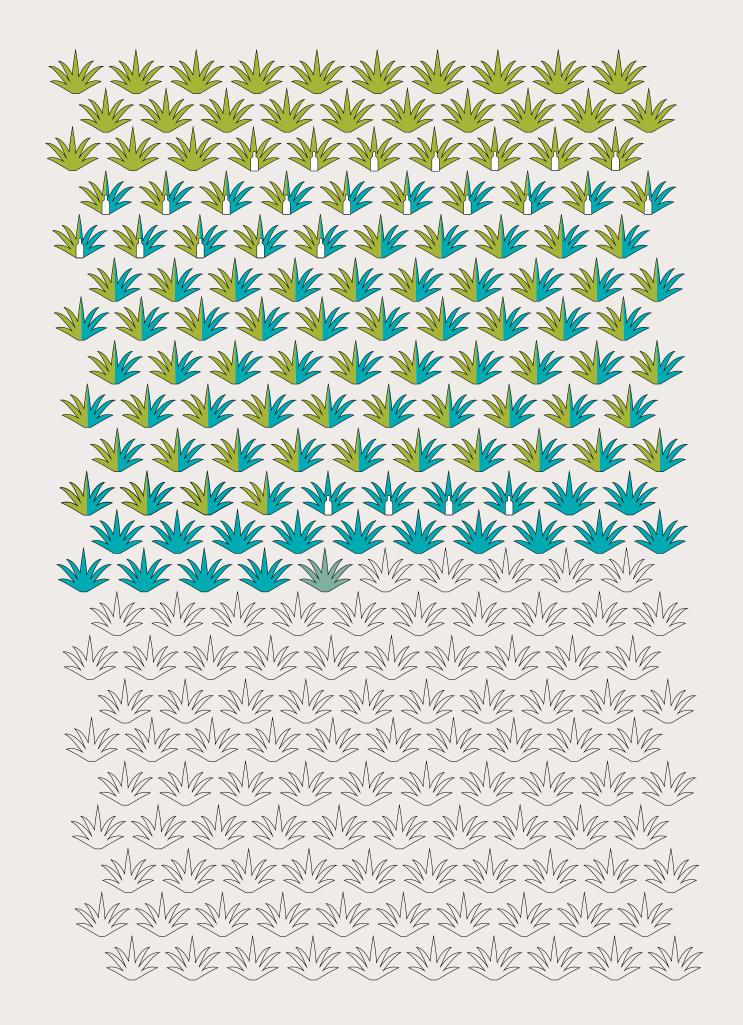
Facing page:

Agave hybrid by Steven Derks

www.stevenderks.com



Mayor Regina Romero with an Agave ocabui plant, a gift from Desert



### CITY OF CENTURY PLANTS

Tucson dwellers are inordinately fond of Century plants. Six agave species grow wild in the desert surroundings, yet citizens of Tucson have collected and cultivated at least 125 agave species within urban limits.

- ₩ METRO TUCSON harbors a minimum of 125 agave species in its streets, parks, gardens, and nurseries, more than half of all the agaves described in the world.
- SIX ARE NATIVE WILD SPECIES in the Tucson Basin and adjacent mountain ranges, while several others may have been cultivated prehistorically.
- ₩ THE 10 BEST NATIVE PLANT NURSERIES in Tucson offer 106 species of agaves plus 6 hybrid cultivars to Tucson's yards and gardens.
- THE 10 MOST-VISITED PUBLIC SPACES focusing on native plant landscaping—such as botanical gardens and outdoor museums—feature 88 agave species, 16 of which are not currently found in nurseries.
- W No METRO AREA IN THE WORLD other than Tucson (and perhaps Mexico City's El Pedrigal at the National Agave Collection of UNAM) displays as much agave diversity in public spaces.
- ★ AGAVE CULTIVATION IN THE TUCSON Basin was well underway 1,000 years ago. Taking place on 5,000 acres of the Santa Cruz Valley within 50 miles of Downtown Tucson, this was one quarter of the 34 square miles of prehistoric agave cultivation in Arizona documented so far.
- \*Tucson is the U.S. Hub for agave archaeology; ancient agave cultivation has not yet been confirmed in any other Southwestern state.
- \* AT LEAST 10 PRE-COLUMBIAN

  DOMESTICATED agaves are grown in Tucson

today, all suitable for the fermentation and distillation of mezcals.

- \*\*TWENTY-FIVE AGAVE SPECIES—or one fifth of all now cultivated in metro Tucson—have been culturally utilized for making probiotic beverages or distilled mezcals by the diverse cultures of the U.S. Southwest and Mexico.
- AGAVE DISTILLATION CONTINUED as a "bootleg" tradition within 50 miles of Tucson through Prohibition, with mezcal bottling occurring in downtown Tucson well into the 20th century.
- ➤ IN CULTIVATION, agaves use one-fifth to one-half the water of other food and beverage crops to produce the same weight of edible biomass, making them an ideal candidate crop for "slow agriculture" for a hotter, drier world.
- \*\* AGAVE CARBOHYDRATES—called inulin and agavulin—are now being used for "slow release" hypoglycemic foods and probiotic beverages around the world to deal with the epidemics of adult-onset diabetes and childhood obesity among Indigenous and other peoples of the world.
- \*\*AGAVES ARE NOT ONLY BEAUTIFUL, but when planted in significant densities, various species can draw down and store the dry weight equivalent of 12 to 24 tons of carbon per acre per year.
- \*THE NECTAR THAT WELLS UP in agave blossoms provides essential nutrients and energy to pollinators, like migratory longnosed bats, hummingbirds and butterflies.

The agaves of Tucson





In Tucson nurseries



In Tucson public spaces





Wild in the region



All 220 known agave species



These living sculptures dotting the terrain are more than just familiar plants of our desert home. Some species are cultural relics, the tenacious survivors of a nearly forgotten desert agricultural practice.

THE INDIGENOUS TOHONO O'ODHAM remember their tradition of harvesting wild a'ud, sometimes a hundred at a time, and roasting them in large pits as a community activity. But archaeologists have pieced together clues revealing that Hohokam farmers in the northern Sonoran Desert relocated several wild Agave species out of their natural ranges and began growing them extensively on bajadas between A.D. 900 and 1350, leading to domestication of at least three species. It was an agricultural intensification involving decades of investment that yielded more delayed, but larger caloric returns per hour of labor than maize farming.

The more essential return on investment was that these aridadapted, nutrient-dense succulents provided a food buffer when maize harvests were lean. This was the apex of "slow agriculture" in Arid America, and the principles could point the way for future food production in hotter, drier climates. As the first UNESCO Creative City of Gastronomy in the U.S., Tucson can be a global leader in relearning old ways and blending them with new technologies to create a more sustainable desert agriculture.

> JONATHAN MABRY Tucson City of Gastronomy





In 1983, archaeologists Suzanne Fish and Paul Fish experimentally planted one tiny agave in this Hohokam agricultural device called a "rockpile."

The rockpile in an ancient field near Marana slows and absorbs surface runoff on dry basin slopes following rains. It then acts as an enhanced mulch that retards evaporation beneath the stones.

The single original agave in the rockpile has given rise to this cluster of related clones. Today, after 39 years, the persisting cluster has matured four harvestable agaves, produced the four visible larger plants, and added numerous smaller transplantable clones at the base.



## **MODERN AGAVE GARDENS**

A series of agave terraces known as trincheras welcome visitors to Mission Garden. They are designed to emulate those of the ancient Hohokam farmers of this region who planted agaves in rock alignments or mounds set in drainages on rocky slopes to capture rainwater runoff, and take advantage of otherwise nonarable land for food production.



Mission Garden, located at the base of Sentinel Peak in Tucson, grows desert-adapted heritage fruit trees, traditional local heirloom crops, and edible native plants. Most agaves in the trincheras at the Garden are Agave murpheyi, known as Hohokam Agave, because it is associated with Hohokam archaeological sites. The Tohono O'odham call it a'ud nonbakam for its bulbils, which they liken to "eggs" or "seeds."

Growing species cultivated by ancient farmers connects us to our local farming heritage and enables contemporary desert

dwellers to benefit from domestication achieved over millennia.

The trincheras, planted atop the landfill cap at the edge of a former City dump, exemplify environmental restoration of degraded land, in this case—quite literally—turning garbage into gardens.

Since 2016, Garden staff and volunteers have been planting agaves here, learning hands-on ancient agricultural practices, erosion control, and water-harvesting methods, all keys to growing food in our desert, especially with climate change upon us.

Garden staff are planting more agaves, hoping they will send up stalks that can be harvested before flowering, and then roasted in the pit, preserving local food traditions. Some are allowed to bloom and provide sustenance for the many pollinators, including bats, who rely on them.

Above: Tom Egelhoff, Jesús García, Emily Rockey, and Dena Cowan plant some small agave murpheyi plants.





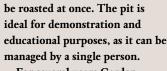
Above: Hands-on ethnobotanist Jesús García prepares agave for roasting in the traditional manner of *jimadors* (experienced farmers who harvest agave plants for tequila and mezcal production). He removes the leaves with a coa de jima and a machete. The leaves have many uses; fibers can be extracted for weaving or making rope, brushes, sandals, and other items.

The roasting pit at Mission Garden is fashioned after the agave-baking ovens typically employed for the clandestine production of bootleg mezscal distillate-often called Bacanorain northern Sonora, Mexico.

The rock-lined pit is brought to a very high temperature and then sealed to bake agave for several days. The pits of indigenous farmers who roasted agave for food and fiber were much larger; many hands were needed to seal and uncover it, and many agave hearts could







For several years Garden staff have been roasting agave for the Agave Heritage Festival, with varying degrees of success, depending on how hot the oven gets, how many rocks are heated, and the quality of the agave we have been able to harvest.

Staff are experimenting with different species, stages of development, types of rocks, and firing times. In any case, the results are delicious. Mission Garden is pleased to offer many locals and visitors their very first taste of roasted agave, an authentic taste of history.

Right: Maegan Lopez and Jesús García compare the taste of different species of roasted agave hearts fresh out of the pit.











### **MEZCAL MIXERS**







Above: Decorative border in the Hotel Congress Century Room by Tucson Designer Ryan Trayte.

Todd Hanley, General Manager of Hotel Congress, at the bar in the Hotel's Century Room.

LaMata is the for-export label of Nación de Las Verdes Matas, a small, unregistered brand project started in remote communities in Northern Mexico by Luis Loya. LaMata agave spirits were brought into Arizona through the support of the Agave Heritage Festival, with Todd Hanley, Doug Smith, Felipe Garcia and Paco Cantu.

Nación le las Verdes
Matas engages small
producers dedicated to
promoting the gusto
bistorico, the terroir, the
liquid culture, and the
history that is mezcal to
people beyond the borders
of the areas where it is
made.

The producer typically releases expressions ranging from 40 to 200 liters, with a fair and equitable compensation structure for all involved parties.

LaMata represents the best of this culture and tradition. The Agave Heritage Festival is proud to support this amazing project.



left: Mezcal bottle label. Around 1896-1903 Old Pueblo pioneer Julius Goldbaum was buying barrel loads of agave spirits from Mexico, and bottling them for Tucson consumers.

Below: Doug Smith pours a straight mezcal shot at the Thursday night mezcal tasting bar at Exo Roast Company, 403 N 6th Ave. Right: New labels on Mezcal Vago are intentional about sticking to plain facts. Made of agave fiber paper, they are designed not to distract from what is inside the bottle, but to provides consumers with information to understand and appreciate what it is they are drinking.







# PUBLIC GARDENS



Left: Agave murpheyi infloresence at San Xavier del Bac Mission, founded by Father Eusebio Kino in 1692.

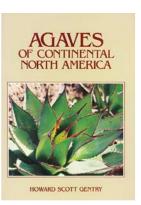
Agave shrine in the San Xavier agave garden.

Horticulturist and musician, Robert Villa serenading the agaves in the greenhouse of the historic Desert Laboratory on Tumamoc Hill.

Below: Linnea Gentry at Pima Prickly Park with her father's foundational monograph, Agaves of Continental North America, by Howard Scott Gentry.

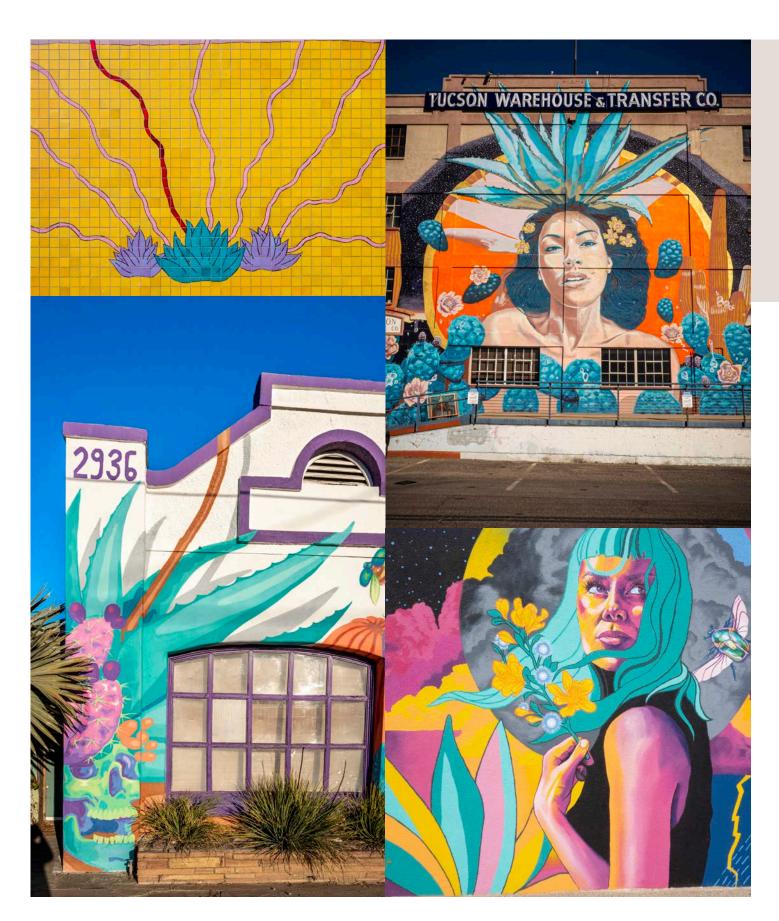
"The uses of agaves are as many as the arts of man have found it convenient to devise. At least two races of man have invaded Agaveland during the last ten to fifteen thousand years, where, with the help of agaves, they contrived several successive civilizations."

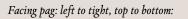
--Howard Scott Gentry





## LOCAL ARTISTS





Gary Mackender, tile mural (detail), I-10/Miracle Mile interchange.

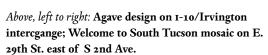
Rock Martinez, "Agave Goddess" mural, Benjamin Supply building, 100 East 6th

Rock Martinez & Fernando Leon, Plants for the Southwest mural, 2936 N. Stone Ave.

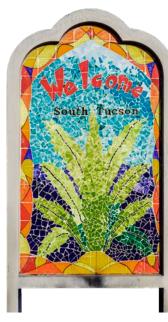
Jessica Gonzales, monsoon-inspired mural, 592 S 9th Ave.



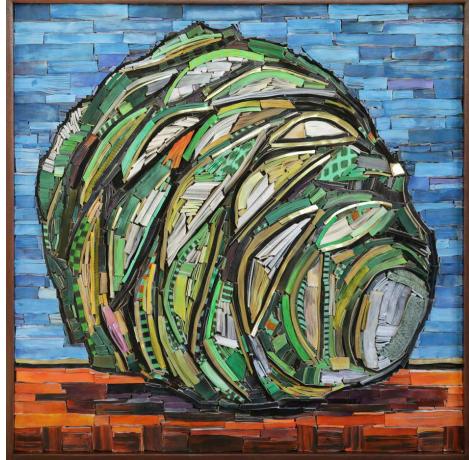




Left: Agave and quail tattoo by Lisa Cardenas, www.hauntedhands.com photo by Lisa Cardenas



Below: Agave Heart, collage/ sculpture by Nick Georgiou photo by Nick Georgiou



## **WORDS FOR AGAVES**



Paul Mirocha invited 50 Tucsonans who are regularly engaged with agaves to respond with key words that answer these three questions for a word cloud "snap shot" of our values: see above.

- In January 2022, Gary Nabhan and 1. How do agaves, magueys or century plants contribute to Tucson's public spaces, home gardens, or natural settings in ways that make our landscape distinctive?
- 2. What significant ways have mezcal, maguey, a'ud, or agaves contributed to the prehistory and history of Tucson's diverse peoples, indigenous and immigrant?
- 3. What roles may these hardy plants play in our future for Metro Tucson and our binational arid American region?

## AGAVE SPECIES GROWN IN METRO TUCSON

**Red** = Grows native in the Tucson region \(\begin{pmatrix}\) Used for agave spirits

Census: January 2022

Agave Species	In Nurseries	In Public Gardens	English	Spanish/Indigenous
Agave abisaii Vázquez & Nieves	*			
Agave aktites Gentry	*	*		Huitbori, Lechuguilla
Agave albopilosa Cabral, Villarreal, Estrada		*	White-Hair Agave	
Agave americana L.	*	*	American Agave, American Century Plant	Maguey Americano, Arroqueño, Pulquero, Sierra Negra, Sierrudo
Agave angustiarum Trel.	**			
Agave angustifolia Haw.	<b>*</b> û	<b>*</b> û		Bacanora, Chacaleño, Cu'u, Espadín, Espadilla, Tepemeto Zapupe Verde
Agave applanata Koch ex Jacobi		<b>₩</b> û		Maguey de Ixtle
Ag <i>ave asperrima</i> Jacobi	<b>*</b> û	<b>*</b> û	Rough Leaf Agave	Maguey Aspero, Bruto, Ceniz del Cerro, o Lamparillo
Agave atrovirens Karw. ex Salm-Dyck	<b>*</b> û			Maguey Pulquero, Maguey Verde Grande
Agave attenuata Salm-Dyck	*		Swan's Neck Agave, Dragon Tree Agave, Foxtail Agave	
Agave aurea Brandegee	*	*		
Agave avellanidens Trel.	*	*		
Agave azurea Webb & Starr	*	*		
Agave bovicornuta Gentry	<b>*</b> û	<b>*</b> û	Cow's Horn Agave	Masparillo, Saparí Temuchí
Agave bracteosa Watson ex Engelmann	*	*	Green Spider Agave, Candelabrum Agave or Squid Agave	
Agave cerulata Trelease	*	*	Baja Blue Agave	
Agave chiapensis Jacobi	*	*		
Agave chrysantha Peebles	*	*	Golden-Flowered Agave	
Agave chrysoglossa Johnst.	*	*		
Agave colimana Gentry	*	*		
Agave colorata Gentry	**	*		Baogoa, Mezcal Ceniza
Agave convallis Trelease	*			Jabali
Agave cryptica Starr & Davis	*			
Agave cupreata Trelease & Berger	<b>*</b> û	<b>*</b> û		Maguey Ancho, Bravo, Chine o Papalote
Agave datylio Weber	*	*		
Agave decipiens Baker	*		False Sisal	Sisal Falso
Agave delamateri Hodgson & Slauson		*	Tonto Basin Agave	
Agave deserti Engelmann	*	*	Desert Agave	Maguey del Desierto

Agave Species	In Nurseries	In Public Gardens	English	Spanish/Indigenous
Agave desmetiana Jacobi	*	*	Smooth Century Plant	
Agave durangensis Gentry		<b>*</b> û		Maguey Cenizo Durangense
Agave ellemeetiana Jacobi	*			g
Agave felgeri Gentry	*	*		Mecscalito
Agave filifera Salm-Dyck	*	*	Thread-Edge Agave	
Agave fourcroydes Lemaire		*		Henequén
Agave franzosinii (Sprenger) Sewell	*			
Agave funkiana Koch & Bouché		<b>*</b> û		Ixtle de Juamave
Agave garcia-mendozae Galván & Hern	*	*		
Agave geminiflora (Tagl.) Ker Gawl	*	*	Twin-Flower Agave	
Agave gentryi Ullrich		*	Gentry Agave	Maguey Verde
Agave gigantensis Gentry	**	*		
Agave xglomeruliflora (Engelm.) Berger	*			
Agave gomezpompae Cházaro & Jimeno-Sevilla		*		
Agave gracilipes Trelease	*		Slimfoot Century Plant	Maguey de Pastizal
Agave guadalajarana Trelease		*		Maguey Chato
Agave guiengola Gentry	**			
Agave gypsicola García- Mendoza & Sandoval	*			
Agave gypsophila Gentry	*			
Agave havardiana Trelease	**	*	Chisos Agave, Havard Agave	
Agave horrida Lemaire ex Jacobi		*	Wicked Agave	
Agave hurteri Trelease		*		
Agave impressa Gentry		*		
Agave inaequidens Koch	<b>*</b> 0	<b>*</b> û		Maguey Alto
Agave isthmensis García- Mendoza & Palma	**	*	Isthmus of Tehuantepec Agave	
Agave kavandivi García-Mend. & Chávez	*			
Agave kerchovei Lemaire	<b>*</b> 0			Cacaya, Escobeta, Jabali, Picomel, Rabo de León
Agave kristenii Vázquez & Cházaro	*			ricomer, riazo de zeon
Agave lechuguilla Torrey	*	*	Lechuguilla	Lechuguilla
Agave lophantha Scheide	<b>*</b> 0	<b>*</b> û	Thorncrest Agave	Estoquillo, Mezortillo
Agave macroacantha Zuccarini	*	*	Large Spine Agave	
Agave margaritae Brandegee		*	Magdalena Island Agave	
Agave marmorata Roezl	<b>*</b> 1		Marble Leaf Agave, Pitzometl, Tepeztate	Pitzometl, Tepeztate
Agave maximiliana Baker	<b>*</b> 0	<b>*</b> û		Maguey Chico, Lechuguilla, Niño o Raicilla

Agave Species	In Nurseries	In Public Gardens	English	Spanish/Indigenous
Agave mckelveyana Gentry	*	*	McKelvey's Century Plant	
Agave megalodonta Garcia- Mendoza & Sandoval	*		Shark Tooth Agave	Mezcal Espumosa
Agave microceps (Kimnach) Vázquez & Cházaro	*			
Agave mitis Mart	*	*	Apple Green Agave	
Agave montana Villarreal	<b>*</b> û	<b>*</b> û	Mountain Agave	
Agave moranii Gentry	*	*		
Agave multifilifera Gentry	*	*	Chahuiqui Century Plant, Shaggy Head Agave	Chahuiqui
Agave murpheyi Gibson	*	*	Hohokam Agave, Murphey's Agave	
Agave nickelsiae Gosselin ex Roland-Gosselin	*	*	King Ferdinand's Agave, Nickel's Agave	
Agave nuusaviorum García- Mendoza	<b>*</b> û			Papalomé
Agave obscura Schiede ex Schlechtendal	*	*		
Agave ocahui Gentry	*	*	Ocahui Agave	Ocahui
Agave ornithobroma Gentry		*		
Agave oteroi Starr & Davis	*	*		
Agave ovatifolia Starr & Villareal	*	*	Whale's Tongue Agave	
Agave pablocarrillo Vázquez	*			
Agave pachycentra Trelease	*			
Agave palmeri Engelmann	<b>*</b> û	<b>*</b> û	Palmer Agave	Bermejo, Chino, Lechuguilla del Norte, Maguey de Tlalcoyote
Agave parrasana Berger	*	*	Cabbage Head Agave	
Agave parryi Engelmann	*	*	Huachuca Agave, Parry Agave	Mezcal Yavapai
Agave parviflora Torrey in Emory	<b>*</b> ů	<b>*</b> û	Small Flowered Agave	Mezcal Sbari
Agave peacockii Croucher	*			
Agave pelona Gentry	*	*	Bald Agave	Mezcal Pelón, Verde Pelón
Agave petrophila García-Mend. & Martínez	*	*	Rock-Loving Agave	
Agave phillipsiana Hodgson		*	Grand Canyon Century Plant	
Agave pintilla González	*			
Agave polianthiflora Gentry	*	*	Polianthes Red Flower Agave	Chahui
Agave potatorum Zucc	<b>*</b> 🖒	<b>*</b> û		Tobalá China, Tobalá Orejón
Agave pringlei Engelmann ex Baker		*		
Agave pygmaea Garcia-Mendoza	*		Dragon Toes	Tobalá
Agave quiotepecensis Garcia- Mendoza	*			
Agave rhodacantha Trel.	<b>*</b> û			Barril Gordo, Cuishe, Mexicano Amarillo, San Martín, Yocojigua

Agave Species	In Nurseries	In Public Gardens	English	Spanish/Indigenous
Agave salmiana Otto ex Salm- Dyck	<b>*</b> û	<b>*</b> 0		Maguey de Pulque, Maguey de Montaña
Agave sanpedroensis Hodgson & Salywon				
Agave schidigera Lemaire	*	*	Splintered Age Agave	
Agave schottii Engelmann	*	*	Shindagger	Puercoespín, Shindagger
Agave sebastiana Greene	*	*		
Agave seemanniana Jacobi	<b>*</b> û			Tobalá Chato
Agave shawii Engelmann	**	*	Coastal Agave, Shaw's Agaver	
Agave shrevei Gentry	<b>*</b> 0	<b>*</b> 0		Mezcal Blanco, Mezcal Ceniza Morao, Lechuguilla del Sur
Agave simplex (Gentry) Salywon & Hodgson		*	Snow Agave	
Agave sisalana Perrine		*	Sisal	Sisál
Agave sobria Brandegee	*	*		
Agave striata Zuccarini	*	*	Espadin, Needle Leaf Agave	
Agave stricta Salm-Dyck	*		Sea Urchin Agave	
Agave stringens Trelease	*			
Agave temacapulinensis Vázquez & Cházaro	*			
Agave tenuifolia Zamudio & Sánchez	*			
Agave tequilana Weber	<b>*</b> û	<b>*</b> 0	Blue tequila	
Agave titanota Gentry	*	*	Alabaster Cenutry Plant	
Agave toumeyana Trelease	*	*	Toumey Agave	
Agave utahensis Engelmann		*	Utah Agave	
Agave valenciana Cházaro & Vázquez	*	*	Raicilla	
Agave vazquezgarcia Cházaro & Lomelí	*	*		
Agave verdensis Hodgson & Salywon		*	Sacred Mountain Agave	
Agave victoriae-reginae Moore	*	*	Queen Victoria Agave	
Agave vilmoriniana Berger	*	*	Octopus Agave, Turn of the Century Plant	Amole, Jagűé
Agave vizcainoensis Gentry	*			
Agave weberi Cels ex. Poiss.	<b>*</b> û	<b>*</b> û	Weber's Century Plant	Maguey Liso, Maguey de Mezcal
Agave wercklei Weber ex Wercklé		*		
Agave wocomahi Gentry	<b>*</b> û	<b>*</b> û		Totosá, Wocomahi
Agave xylonacantha Salm-Dyck	**	*	Woody Spine Agave, Plant,	Maguey Diente de Tiburón
Agave yavapaiensis Hodgson & Salywon		*	Page Springs Agave	
Agave zebra Gentry	*			
TOTALS: 125	103	90		



