Flora and History of the Tónichi Area on the Río Yaqui, Municipality of Soyopa, Sonora, Mexico

by Thomas R. Van Devender[1], Ana Lilia Reina-Guerrero[1], and George M. Ferguson[1]

Abstract

We report 431 taxa in 269 genera and 69 families for the Tónichi area. The most diverse families are Fabaceae (61 taxa); Poaceae (40 taxa); Asteraceae (36 taxa); Euphorbiaceae (27 species); Malvaceae (22 species); Convolvulaceae (20 species); Solanaceae (18 species); Boraginaceae (15 species); Apocynaceae and Cactaceae (11 species each); and Acanthaceae and Nyctaginaceae (10 species each). The most speciose genera are *Euphorbia* (15 species); *Ipomoea* (11 species); *Boerhavia* and *Cyperus* (7 species each); *Cuscuta, Physalis,* and *Solanum* (6 species each); and *Bouteloua, Portulaca,* and *Senna* (5 taxa each). There are 25 non-native species (5.8%) in the Tónichi flora.

Tónichi was the northernmost Pima Bajo Indian village upstream of Ónavas, Movas, and Nuri. A branch railroad connected Estación Corral near Ciudad Obregón to Tónichi from 1908 to 1945. The smelter at Toledo processed regional ores until 1911 when it was shut down by raiding Yaquis. During the Mexican Revolution in 1911, federal troops defeated Francisco I. Madero's rebels in the Batalla de Tónichi at Loma Maderista near Toledo.

Resumen

Se reportan 431 taxones de plantas en 269 géneros y 69 familias para la zona de Tónichi. Las familias más diversas son Fabaceae (61 taxones); Poaceae (40 taxones); Asteraceae (36 taxones); Euphorbiaceae (27 especies); Malvaceae (22 especies); Convolvulaceae (20 especies); Solanaceae (18 especies); Boraginaceae (15 especies); Apocynaceae y Cactaceae (11 especies cada una); y Acanthaceae y Nyctaginaceae (10 especies cada una). Los géneros con más especies son *Euphorbia* (15); *Ipomoea* (11 especies); *Boerhavia* y *Cyperus* (7 especies cada uno); *Cuscuta, Physalis* y *Solanum* (6 especies cada uno); y *Bouteloua, Portulaca* y *Senna* (5 taxones cada uno). La flora de Tónichi incluye 25 especies introducidas (5.8%).

Tónichi fue el asentamiento más al norte de indígenas Pima Bajo, río arriba de Ónavas, Movas y Nuri. Un ramal de ferrocarril conectó Estación Corral cerca de Ciudad Obregón con Tónichi de 1908 a 1945. La fundición de Toledo procesó minerales regionales hasta 1911, cuando fue cerrada por los ataques de los yaquis. Durante la Revolución Mexicana en 1911, las tropas federales derrotaron a los Maderistas en la Batalla de Tónichi en la Loma Maderista, cerca de Toledo.

Introduction

The northern limit of the New World tropics is in Sonora, not as often stated the Tropic of Cancer (23.37°N) just north of Mazatlán, Sinaloa. The northernmost tropical deciduous forest is in the Sierra San Javier, Sonora (28.6°N), 680 km north-northwest of Mazatlán and 300 km south of the Arizona border. Thornscrub is the tropical vegetation transitional between

continued next page

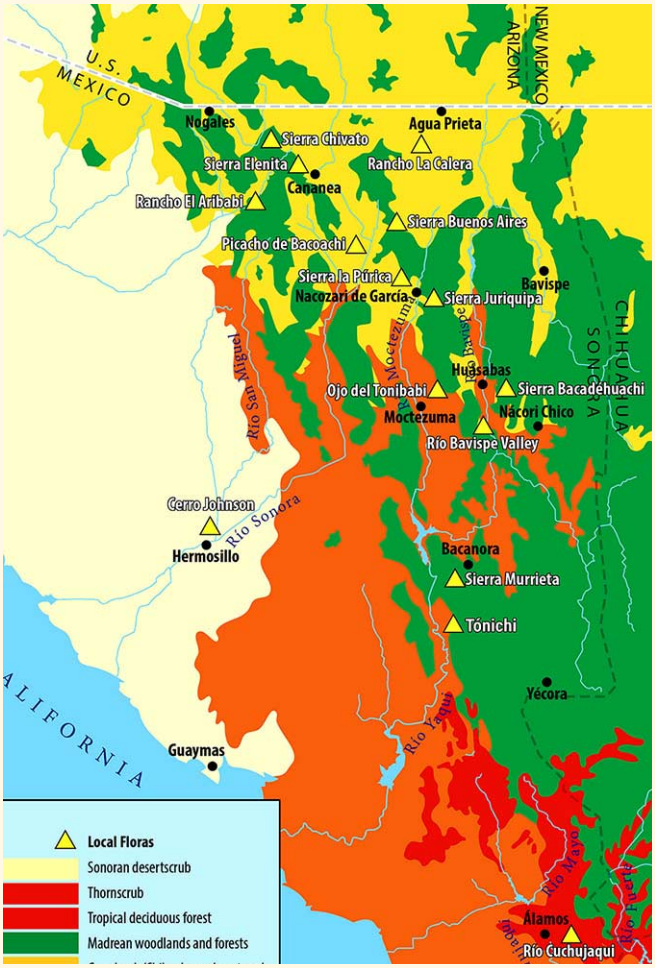
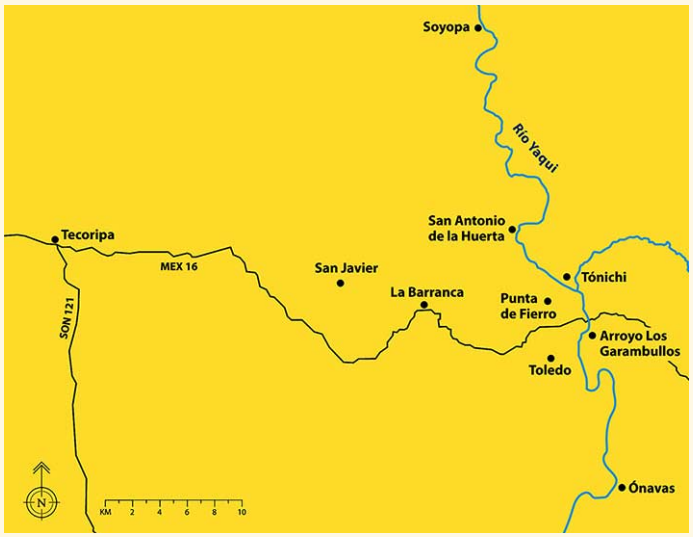


Figure 1. Map of local floras in Sonora, Mexico. Vegetation modified from Brown & Lowe (1982). *Drafted by Marina Maskaykina*

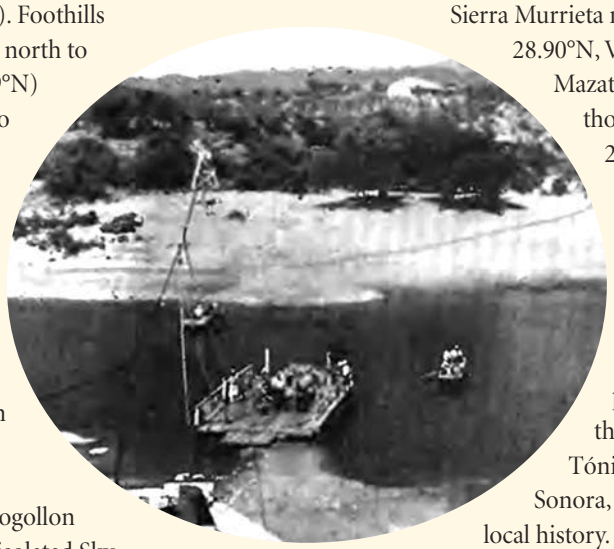
[1]University of Arizona Herbarium, Tucson, AZ, **yecora4@comcast.net, georgef@arizona.edu**.



From left Figure 2. Río Yaqui at Tónichi. Figure 3. Map of the Tónichi area. *Drafted by Marina Maskaykina.*
Inset Figure 4. Hand-propelled ferry across the Río Yaqui. Note foothills thornscrub on slopes and houses in Tónichi in background.

Flora and History of the Tónichi Area on the Río Yaqui *continued*

tropical deciduous forest and other vegetation types in Sonora (Van Devender & Reina-G. 2021). Coastal thornscrub is on the coastal plain of the Gulf of California from the Sinaloan border north to Guaymas, Sonora (27.90°N). Foothills thornscrub is inland on rocky slopes north to Angostura on the Río Bavispe (30.49°N) and near Arizpe (30.40°N) on the Río Sonora (96 to 104 km south of the Arizona border; Van Devender & Reina-G. 2021), where it merges into temperate desert grassland as winters become colder.



The Sierra Madre Occidental reaches its northern limit in the Sierra de Huachinera in northeastern Sonora (30.25°N). In the Madrean Archipelago (= Sky Island Region) between the Sierra Madre and the Mogollon Rim in central Arizona, there are 55 isolated Sky Island mountain ranges or complexes of several ranges connected by oak woodland corridors, 32 of them in northeastern Sonora (Deyo et al. 2013, Van Devender et al. 2013). Sky Islands, crowned with oak woodland or pine-oak forest, emerge from lowland 'seas' of Chihuahuan and Sonoran desertscrub, desert grassland, foothills thornscrub, or tropical deciduous forest.

Local floras published in Sonora (Figure 1) include tropical areas in the Municipality of Huatabampo (coastal thornscrub, 26.64°N, Van Devender et al. 2024a), Río Cuchujaqui near Álamos (tropical deciduous forest, 27.00°N, Van Devender et al. 2000), the Municipality of Yécora (foothills thornscrub, tropical deciduous forest, 28.40°N, Van Devender & Reina-G. 2016), Sierra Murrieta near Bacanora (foothills thornscrub, 28.90°N, Van Devender et al. 2024b), Sierra Mazatán near Hermosillo (foothills thornscrub, 29.13°N, Sánchez-E. et al. 2017), lower Río Bavispe Valley (foothills thornscrub, 29.94°N, Van Devender et al. 2018), and Rancho Las Playitas near Bacoachi (foothills thornscrub-desert grassland transition, 30.57°N, Van Devender et al. 2023). Here, we present the local flora in foothills thornscrub along the Río Yaqui near Tónichi, Municipality of Soyopa, Sonora, Mexico (Figures 2, 3, 5) and the local history.

Study Area

Plants were collected in the Tónichi area along the Río Yaqui in the Municipality of Soyopa, Sonora (28.57 to 28.61°N, 109.54 to 109.58°N; 15.4 km^2; Figures 2, 6). Elevations along the Río Yaqui are 175 to 185 m. Most of the study area is at 190 to 220 m elevation, reaching 300 m on a hill east of the San Antonio de la Huerta road.

The most intensively surveyed areas were Arroyo Los Garambullos south of the MEX 16 bridge on the east side of the

continued next page

Flora and History of the Tónichi Area on the Río Yaqui *continued*

Río Yaqui, on Loma Maderista, around the ruins of the Fundición (smelter) de Toledo, and north along the road to San Antonio de la Huerta on the west side of the river. A ferry across the river connected Tónichi to the train station at Punta de Fierro before the bridge on MEX 16 over the Río Yaqui was finished in 1978 (Figure 4). The train arrived on Wednesday with merchandise and departed on Friday with processed silver, gold, local animals, corn, beans, and vegetables for Guaymas.

The Río Yaqui has one of the largest drainage basins in Sonora (Figure 2, 5, 6). Arroyo Guadalupe begins in southwestern New Mexico and flows across the southeastern corner of Arizona into Sonora. The Río Agua Prieta begins in Arizona west of Douglas, flows southeast to meet the Río San Bernardino at La Junta de dos Ríos, becomes the Río Batepito, and joins the Río Bavispe at Colonia Morelos. The Río Bavispe begins in the Sierra Madre Occidental in Chihuahua, flows west into Sonora, north around the Sierra El Tigre and south through Presa Angostura (Figure 16), Huásabas, and Granados. The Río Áros flows west from Chihuahua to meet the Bavispe north of Sahuaripa, forming the main Río Yaqui (Figure 5) which eventually enters the Gulf of California west of Ciudad Obregón. The river near Tónichi is wide and fast flowing. Before the dam above La Estrella (42 km north) was finished in 1964, creating Presa El Novillo (formally Plutarco Elías-Calles), it flooded annually. After that, water levels varied depending on releases from the dam. In 2013, an aqueduct was built to divert water from El Novillo to Hermosillo. In 2024, President López-Obrador increased the water allotment for large-scale agriculture on Yaqui lands on the coastal plain near Ciudad Obregón. Ongoing droughts have further reduced water levels in Sonoran reservoirs and rivers while tropical storms and hurricanes often bring heavy rains to Sonora. Today, water levels in the Río Yaqui near Tónichi vary from dry to flooded.

Vegetation

Habitats in the area are foothills thornscrub on rocky slopes (Figure 2, 6) and riparian areas along the river and in large arroyos. Along the Río Yaqui, deep slot canyons are incised into middle Miocene volcanic mudflow deposits of the Báucarit Formation (Cochemé & Demant 1991). Foothills thornscrub is a transitional vegetation type along a gradient from near tropical deciduous forest (closed canopy in rainy season, trees taller than columnar cacti, high rainfall) to near Sonoran desertscrub (open structure with columnar cacti if present not the tallest species, low rainfall). In the Tónichi area, foothills thornscrub is on the lower, drier end of the gradient. Dominants are the shrubs and trees *Coursetia glandulosa* (*sámota*), *Fouquieria macdougalii* (tree ocotillo, *pitillo, ocotillo macho*), *Haematoxylum brasiletto* (*brasil*), *Mimosa distachya* (*uña de gato*), and *Vachellia campeachiana* (boat-thorn acacia, *chirahui, güinolo*). *Bursera fagaroides* (*torote blanco*), *B. laxiflora* (*torote prieto*), and *V. farnesiana* (*vinorama*) are common. Other thornscrub species present are *Ambrosia cordifolia* (Sonoran bursage, *chicurilla*), *Croton flavescens* (*vara prieta*), *Jatropha cordata* (*torote papelío*), *Karwinskia humboldtiana* (*cacachila*), *Neltuma velutina* (velvet mesquite, *mezquite*), *Phaulothamnus spinescens* (*putía, tútuqui*), *Piscidia mollis* (*palo blanco*), *Pleuradenophora bilocularis* (*hierba de la flecha*), and *Randia thurberi* (*papache borracho*). Common succulents are *Agave angustifolia* (*bacanora, mescal*), *Cylindropuntia thurberi* (Thurber's cholla, *civiri*), *Opuntia gosseliniana* (*nopal duraznilla*), *O.* aff. *wilcoxii* (*nopal*), and *Stenocereus thurberi* (organ pipe cactus, *pitahaya*).

Many interesting tropical plants are mostly restricted to the narrow slot canyons, including the trees and shrubs *Cordia sonorae* (*palo de asta*), *Ficus petiolaris* (rock fig, *tescalama*), *Handroanthus impetiginosus* (*amapa*), *Hintonia latiflora* (*copalquín*), and *Plumeria rubra* (*cascalosuchil*); succulents *Agave vilmoriniana* (*amole*) and *Hechtia montana* (*magueyito*); and the woody vine *Rhynchosia precatoria* (rosary snoutbean, *ojo de chanate*). *Cochemiea grahamii* (Graham's pincushion cactus, *biznaguita, chorito, pitahayita*) is locally abundant.

continued next page

Figure 5. Río Yaqui in flood upstream from Tónichi. Note dense foothills thornscrub on slopes. *Credit: Thomas R. Van Devender.*

Flora and History of the Tónichi Area on the Río Yaqui *continued*

Foothills thornscrub becomes denser and taller on slopes above the river north of Tónichi between Soyopa and La Estrella. The closest tropical deciduous forest to Tónichi is near San Javier-La Barranca (28.57°N) in the Municipality of San Javier (ca.10 km west) and in the Municipalities of Ónavas and Yécora (13 km east; Van Devender & Reina-G. 2016, 2021).

Riparian habitats are linear mesic vegetation that transect upland habitats or local wetlands in areas where geologic or edaphic situations force water to the surface. In riparian drainages, water, seeds, and nutrients are harvested from the entire local watershed. These are high energy, unstable habitats with regular floods. Upland species are often found at low elevations in riparian habitats. Riparian species along the Río Yaqui in the Tónichi flora include the trees *Havardia mexicana* (*chino*), *Neltuma odorata* (honey mesquite, *mezquite*), *Parkinsonia aculeata (huacaporo), Pithecellobium dulce* (*guamuchil*), *Salix gooddingii* (Goodding's willow, *saúz*), *Sapindus saponaria* (*arbolío*), and *Vitex mollis* (*uvalama*); the shrubs *Ambrosia ambrosioides* (canyon ragweed, *chicura*), *A. monogyra* (*jécota*), and *Cephalanthus salicifolius* (*mimbro*); and the perennial herbs *Hydrocotyle umbellata, Ludwigia octovalvis, Persicaria maculosa, P. punctata, Rumex inconspicuus,* and *Xanthium orientale* (*guachapori*). More tropical species in Arroyo los Conejos on the road to San Antonio de la Huerta are the trees and shrubs *Brongniartia alamosana* (*palo piojo*), *Ceiba aesculifolia* (*pochote*), *Celtis iguanaea* (*vainoro garabato*), *Chloroleucon mangense* var. *leucospermum* (*palo fierro, palo pinto,* Figure 7), *Esenbeckia hartmanii* (*palo amarillo*), *Guazuma ulmifolia* (*guásima*), *Lycium berlandieri* (wolfberry, *huichurilla*), *Lysiloma divaricatum* (*mauto*), *Malpighia emarginata* (*granadilla*), *Mariosousa russelliana* (*guayabillo*), *Pachycereus pecten-aboriginum* (*etcho*), *Parthenium tomentosum* var. *stramonium (guasaraco,* Figure 8) *Senegalia occidentalis* (*teso*), *Sideroxylon occidentale* (*bebelama*), *Vachellia californica* (*vara prieta,* Figure 9), and *Zanthoxylum fagara* (*matalased*); and perennial vines *Antigonon leptopus* (*sanmiguelito*) and *Callaeum macropterum* (*batanene, matanene, gallinitas*).

Figure 6. Río Yaqui in the Tónichi study area. Note foothills thornscrub on slopes. *Stenocereus thurberi* and flowering *Fouquieria macdougalii* in foreground. *Credit: Thomas R. Van Devender.*

Methods

Howard S. Gentry's *Río Mayo Plants* was an elegant introduction to the flora, vegetation, and peoples of tropical southern Sonora (Gentry 1942). The boundary of his Río Mayo region was just east of Nuri on the Río Yaqui. The first plant collections from the Tónichi area were made in 1941 by Rosamund B. Spicer while her anthropologist husband Edward H. Spicer interviewed local residents for his *Cycles of Conquest* (Spicer 1962). Raymond M. Turner, J. Rodney Hastings, and Annetta M. Carter gathered records in the Soyopa-Tónichi area in 1971 for *An Atlas of Some Plant Distributions in the Sonoran Desert* (Hastings et al. 1972). Turner was an ecologist with the U.S. Geological Survey and Hastings a meteorologist at the University of Arizona, both in Tucson. Carter was Principal Botanist at the University of California Herbarium in Berkeley. In April 1979, Laurence J. Toolin collected a few specimens along the Río Yaqui below the MEX 16 bridge. In July 1983, Van Devender, Rebecca K. Wilson, and Cecil R. Schwalbe collected plants along the Río Yaqui on a canoe trip from La Estrella to Tónichi. In March 1984 and June 1986, Ferguson visited the Tónichi area. He and Paul S. Martin visited the ruins of the Toledo smelter in March 1988, 1989, and 1990. Ferguson, Mark Fishbein, and Richard S. Felger camped in the area in 1994. The specimens collected on these trips were included in *Gentry's Río Mayo Plants* (Martin et al. 1998). The Río Yaqui area below the MEX 16 bridge was a regular camping area on trips to document the flora of the Municipality of Yécora to the east (Van Devender & Reina-G. 2016). It was also a study area in an Arizona-Sonora Desert Museum project on hummingbird plants and potential nectar corridors for the Rufous Hummingbird (*Selasphorus rufus*) in Sonora, Mexico (Van Devender et al 2004). Ornithologists William A. Calder, Karen Krebbs, and Stephen M. and Ruth O. Russell visited the area. We collected plants in the Tónichi study area on 39 trips in May, August, and September 1995; May, August, September, and November 1996; February, July, September, and November 1997; March, May, August, and September 1998; March, May, September, and December 1999; March, August, and September 2000; January, March, May, and June 2001; August 2002, August 2003; March 2004; March, April, and May 2005; August, September, October, and December 2006; May 2008; and August

continued next page

Figure 7. *Chloroleucon mangense* var. *leucospermum*. A. Flowers and leaves in Álamos, Sonora. B. Bark in the Sierra La Laguna, Baja California Sur. *Credits: Susan D. Carnahan.*

Flora and History of the Tónichi Area on the Río Yaqui *continued*

2012. Most of the collections were by Van Devender and Reina-G. Other botanists on the trips were Kim Baker, Alberto Búrquez-Montijo, J. Travis Columbus, Thomas F. Daniel, Julie A. Emmett, George M. Ferguson, Mark Fishbein, Augustín Flores-M., Samuel L. Friedman, Socorro Guerrero-E., Mark Kaib, José L. León de la Luz, Cynthia Lindquist, José Juan Pérez-N., Donald J. Pinkava, J. Mark Porter, María A. Quintana, Jon P. Rebman, Andrew M. Salywon, Barbara J. Skye, Richard W. Spellenberg, Victor W. Steinmann, Thomas Todsen, William Trauba, Leonardo Varela, Patricia West, and David A. Yetman. Specimens were deposited primarily in herbaria at University of Arizona (ARIZ), Centro de Investigaciones del Noroeste (HCIB), New Mexico State University (NMC), San Diego Natural History Museum (SD), University of Texas (TEX), Universidad Autónoma de México (MEXU), and Universidad de Sonora (USON). Additional specimens were deposited into herbaria at Austin Peay State University (APSC), Northern Arizona University (ASC), Arizona-Sonora Desert Museum (ASDM), Fort Worth Botanic Garden-Philecology (BRIT), California State University, Los Angeles (CSLA), Stover-Ebinger Herbarium, Eastern Illinois University (EIU), Universidad de Guadalajara (IBUG), Centro Regional del Bajío, Instituto de Ecología (IEB), Universidad Autónoma de México, Iztacala (IZTA), Royal Botanic Garden, Kew (K), University of Lethingbridge (LEA), University of Michigan (MICH), New York Botanical Garden (NYBG), Portland State University (PSU), National Tropical Botanical Garden (PTBG), Universidad Autónoma de Querétero (QMEX), Rocky Mountain Herbarium, University of Wyoming (RM), Universidad Autónoma Metropolitana Iztapalpa (UAMIZ), University of California at Berkeley and Riverside (UC, UCR), University of New Mexico (UNM), Wilford Laurier University (WLU), and Washington State University (WS). The records documenting the Tónichi flora are publicly available in the Madrean Discovery Expeditions (**madreandiscovery.org**) in the SEINet herbarium network. iNaturalist was searched for Tónichi area observations.

Results

We report 431 species in 269 genera and 69 families for the Tónichi area (Checklist). The most diverse families are Fabaceae (61 taxa); Poaceae (40 taxa); Asteraceae (36 taxa); Euphorbiaceae (27 species); Malvaceae (22 species); Convolvulaceae (20 species); Solanaceae (18 species); Boraginaceae (15 species); Apocynaceae and Cactaceae (11 species each); Acanthaceae and Nyctaginaceae (10 species each); Cyperaceae (9 species); Amaranthaceae (8 species); Brassicaceae and Malpighiaceae (7 taxa each); and Verbenaceae (6 species). The most speciose genera are *Euphorbia* (15 species); *Ipomoea* (11 species); *Boerhavia* and *Cyperus* (7 species each); *Cuscuta, Physalis,* and *Solanum* (6 species each); *Bouteloua, Portulaca,* and *Senna* (5 species each); and *Abutilon, Cottsia, Parkinsonia,* and *Sida* (4 taxa each).

There are 25 non-native species (5.8%) in the Tónichi flora (Checklist). The families with the most exotic species are Poaceae (8 species), and Brassicaceae, Cucurbitaceae, and

continued next page

Figure 8. *Parthenium tomentosum* var. *stramonium*. A. Trees along highway near Bacanora. B. Flowers in Arroyo Las Lamas near San José de Pimas. *Credits: Thomas R. Van Devender and Stephen F. Hale.*

Flora and History of the Tónichi Area on the Río Yaqui *continued*

Solanaceae (2 species each). *Cenchrus ciliaris* (buffelgrass) is a subshrubby grass that rapidly resprouts from each stem node and from massive roots after fire well before the next rains. Native bunch grasses regrow from the root crown after the first summer rain. Buffelgrass forms a fire-climax African 'savanna' that replaces natural vegetation dominated by native species not adapted to fire. In 2006, Ibarra-F. et al. (2009) estimated that ca. 1 million hectares of *C. ciliaris* had been planted in Sonora. Morales-R. et al. (2025) concluded that buffelgrass stands were long-lived and stable in thornscrub pastures planted 10 and 50 years ago east of San José de Pimas. Although it is a serious invasive species elsewhere in Sonora, *C. ciliaris* was present in only a few pastures and scattered individuals in the Tónichi study area in 2005. It has likely increased since then.

Cryptostegia grandiflora (rubber vine, *laurel de España*) is a robust vine with showy pink flowers and copious latex native to southwestern Madagascar (Seier et al. 2023). It was taken by Portuguese traders to India in the late 1700s where Scottish botanist William Roxburgh (1751-1815) 'discovered' it and named it *Nerium grandiflorum* related to *N. oleander* (oleander). Then it was carried to England and grown in hothouses on private estates before being donated to the Royal Botanic Garden. In 1820, the RBG botanist Robert Brown (also Scottish, 1773-1858) renamed it *Cryptostegia grandiflora*. Lacking a holotype, he designated an illustration as the lectotype (Figure 10). Today, it is a serious invasive species throughout the tropical world, including Mexico and the southeastern United States. Gentry (1942) reported that it was an ornamental in Álamos in southern Sonora that was rapidly escaping out of town along the arroyo. From there, it spread widely in tropical deciduous forest and thornscrub in Sonora as far north as Jécori on the Río Moctezuma (29.94°N) near Cumpas and the Guaymas area in the Sonoran Desert. In 2006, Micaela Franco de Encinas told us that foreign miners brought *laurel de España* as an ornamental to La Barranca or San Javier and it followed the road to Tónichi.

Noteworthy Species

Holographis pallida (Acanthaceae) is a Sonoran endemic shrub with pale yellow flowers known from coastal and foothills thornscrub tropical localities from the Álamos area north to near Soyopa (28.759°N). It was in Arroyo Los Garambullos in the Tónichi study area.

Polystemma canisferum (milkweed vine, Apocynaceae) is a Sonoran endemic perennial vine with green flowers in tropical deciduous forest and coastal and foothills thornscrub from the Álamos area north to the Sierra Mazatán (McDonnell & Fishbein 2016). A paratype was from Loma Maderista near Tónichi.

Tetramerium yaquianum (*rama del toro,* Acanthaceae) is a Sonoran endemic herbaceous perennial with pale yellow flowers known in coastal and foothills thornscrub from the Mesa Masiaca near Navojoa north to El Chinalito between Hermosillo and Ures (29.28°N) along the Río Sonora. A paratype from near La Estrella in the Municipality of Soyopa on the Río Yaqui 42 km north of Tónichi was in its description (Daniel 1986). It was collected in the study area in Arroyo Las Tinajas below the Toledo smelter.

Tradescantia gentryi (Gentry's spiderwort, Commelinaceae) was described on a Howard Gentry specimen from north of Los Mochis, Sinaloa, in tropical deciduous forest (Hunt 2007). A paratype from Arroyo Los Garambullos near Tónichi, Sonora, is the northernmost locality for the species (Hunt 2007).

Hibiscus acicularis (Malvaceae) is a canary yellow flowered shrub best known in Coahuila, Nuevo Léon, and Tamaulipas in northeastern Mexico. It is common in foothills thornscrub in central Sonora (Figure 11).

Pediomelum rhombifolium (roundleaf scurfpea, Fabaceae) is a prostrate perennial herb with brick red or salmon-pink flowers that mostly occurs in Texas and adjacent Coahuila and Nuevo León in northeastern Mexico. Its distribution in Mexico of

continued next page

Clockwise from top left Figure 9. *Vachellia californica* at Bahía San Pedro, Sonora. A. Plant. B. Branch with leaves and thorns. C. Flowers. D. Pods. *Credits: Susan D. Carnahan.*

Flora and History of the Tónichi Area on the Río Yaqui *continued*

scattered records in Baja California, Baja California Sur, Guerrero, Jalisco, and Oaxaca states suggests that it is human dispersed. The Tónichi collection is the only Sonoran record for the species.

Cyperus erythrorhizos (redroot flatsedge, *coquillo,* Cyperaceae) is widespread and common from British Columbia and Ontario, Canada, and across the entire United States. In Mexico, it is only known from Baja California (Socorro González-Elizondo, pers. comm., 2025) and Sonora at Arroyo Las Tinajas near Toledo in our study area. Considering that heavy machinery was freighted in wagons to the smelter from the United States, it could have been introduced at that time.

Chloroleucon mangense (Fabaceae) is in tropical Mexico from Chiapas and Yucatán north along the Pacific coast to Sonora and in the Cape Region of Baja California Sur. It is a small tree with white flowers in the spring dry season (Figure 7A). The bark begins green but turns to mottled light and dark brown after peeling (Figure 7B). *Chloroleucon mangense* var. *leucocephalum* is common in tropical deciduous forest in the Álamos area (Martin et al. 1998, Van Devender et al 2000). The northernmost locality is in the Sierra Mazatán (Sánchez-E. et al. 2017).

Ctenodon petraceus (northern jointvetch, Fabaceae) is a yellow flowered shrub in tropical western Mexico from Guerrero north to Sonora (Martin et al. 1998). The northernmost locality is Arroyo Los Garambullos near Tónichi.

There are six species of *Ficus* (Moraceae) in tropical deciduous forest in southern Sonora (Martin et al. 1998). *Ficus petiolaris* is widespread in tropical Mexico north to central Sonora and the Cape Region in Baja California Sur. *Ficus. p.* subsp. *palmeri* is in Baja California and the Guaymas area in Sonora while *F. p.* subsp. *petiolaris* occurs in rocky habitats in numerous scattered areas in southern and east central Sonora. The northernmost Sonoran locality is in the Sierra El Tigre (30.63°N). Its growth form ranges from trees with elegant white roots strangling cliff faces in tropical deciduous forest (Figure 12) to dwarf shrubs in crevices on rocky canyon walls.

Loeselia amplectens (Polemoniaceae) is a subshrub with whitish flowers with magenta spots found in tropical western Mexico from Guerrero north to Sonora. The northernmost locality near Tónichi is the only record for Sonora.

continued next page

Flora and History of the Tónichi Area on the Río Yaqui *continued*

Pisonia capitata (*vainoro garabato,* Nyctaginaeae) is a densely spiny shrub in tropical habitats on the west coast of Mexico from Jalisco north to Tepache, Sonora (29.55°N). It is common in tropical deciduous forest along the Río Cuchujaqui near Álamos in southern Sonora (Van Devender et al. 2000).

Pithecellobium dulce (Fabaceae) is a riparian tree native to the Pacific coast and adjacent highlands of Mexico (Figure 13). It is introduced and often invasive in Florida, the Caribbean, Hawaii, India, Cambodia, Thailand, southern Asia, and elsewhere. It was carried from Mexico to the Philippines in the Manila galleons, but the Spanish were more interested in ornamental and useful plants than taxonomy. It was 'discovered' and described as *Mimosa dulcis* by Scottish botanist William Roxburgh in his flora of the coast of Coromandel, India (Roxburgh 1798). He thought it was introduced from the Philippines and native to East Indies. In the Philippines and India, it is called Manila tamarind and Madras thorn. In Sonora, it is called *guamuchil.* Because of its edible fruit and medicinal uses, its native distribution in Sonora is difficult to know, even when it occurs away from human developments. The stomach of a catfish *(Ictalurus pricei* x *I. punctatus*) caught in the Río Yaqui near Tónichi was full of *P. dulce* fruit.

History of Tónichi

In 1622, Jesuit missionary Diego de Vandersipe built the Nuestra Señora del Pópulo de Toninizi church in Tónichi (Nentvig 1971, Figure 14). The Pima people were reported to be peaceful, devoted farmers who readily accepted Christianity. Nentvig (1971) said that the populations of Tónichi were mixed Eudeve and Pima in 1750–1767. Tónichi was a major indigenous settlement.

The indigenous languages spoken in southern Arizona and northeastern Sonora were part of the widespread Uto-Aztecan language family. The Pima language was similar to O'odham in Arizona and Sonora and Tepehuan in Chihuahua, Durango, and Sinaloa. Jean B. Johnson's 1939–1940 study of the Yaqui language (Johnson 1962) reported that the people in Tónichi spoke Eudeve, a variation of the Ópata language. This reflected the Ópata expansion from the northeast into large areas north and west of Tónichi (Spicer 1962). The name Tónichi came from the Eudeve words *toni* (hot) and *tzi* (boiling)

Tónichi was the northernmost Pima Bajo Indian village on the east side of the Río Yaqui in southeastern Sonora upstream of Ónavas, Movas, and Nuri (Spicer 1962). Farther east, Pimas lived in the Sierra Madre Occidental at Maicoba and Yécora, Sonora, and Yepachic, Chihuahua. West of the Río Yaqui, Pimas were at

From left Figure 10. Lectotype of *Cryptostegia grandiflora. Drawing by J. Ridgway in 1820.*

Figure 11. *Hibiscus acicularis* on Rancho as Playitas, Sonora. *Credit: Guillermo Molina-P.*

Cumuripa, San José de Pimas, San Marcial, Suaqui Grande, and Tecoripa. Campbell W. Pennington studied the surviving material culture of the Pima Bajo in Ónavas (Pennington 1979).

In the 1870s, wagon roads to haul merchandise and ores from mines went from Estación Torres near Hermosillo south to Ortiz and north along the Río Yaqui to Cumuripa, La Dura, and Tónichi (Nelson 1910). Wagon roads were expensive to build and maintain and often raided by the Yaquis. In 1880–1882, Ferrocarril de Sonora between Guaymas and Nogales was built by an American company. This established Hermosillo as permanent capital of Sonora and moved ore from mines at La Dura, Suaqui Grande, and Minas Prietas and coal from mines at La Barranca and San Marcial (**https://es.m.wikipedia.org/wiki/Ferrocarril_de_Sonora**). In 1897, William C. Greene was awarded a concession from Southern Pacific to build railroads south of Cananea. His company was Ferrocarril Cananea, Río Yaqui y Pacific. Greene was the wealthy, influential American owner of the rich copper mine in Cananea. He died in 1904 but the railroad from Estación Corral near Ciudad Obregón through La Dura (Figure 15) to Punta Fierro across the river from Tónichi was constructed in 1907 to 1910 (Wilson & Rocha 1949). The railroad branch was finally closed in 1945. The 2020 census reported 280 people living in Tónichi.

In 1910, mining in Sonora was set to have a revival in the Districts of Ures, Hermosillo, and Sahuaripa (Wilson 1910). The Mix-Rayall mining concession was prevented from prospecting from Tecoripa and Cumuripa to San Antonio de la Huerta and Tónichi by Yaqui attacks. Development of the ill-fated Toledo smelter near Tónichi was stalled due to lack of funds and scarcity of ores but was revamping and restarting in 1910 (Nelson 1910). In August 2006, Tónichi resident Micaela Franco de Encinas told us that the smelter was a big operation with heavy machines transported from the U.S. in carts. Ore was processed from

continued next page

Flora and History of the Tónichi Area on the Río Yaqui *continued*

mines at La Colorada, San Javier, San Antonio de la Huerta, and others. She saw bars of silver and gold stamped with Toledo and the date. About 20 worker families were living in adobe houses near the smelter. In 1911, raiding Yaquis from Bacatete killed the American manager Barney and many workers, including her grandfather, and permanently closed the smelter. The tower of fire-hardened bricks was still standing in 2006. During the Mexican Revolution in 1911, federal troops defeated those of Francisco I. Madero near Toledo in the Batalla de Tónichi (Camín 1984). Today, local residents call the site Loma Maderista.

Discussion

Detailed local floras are crucial to understanding regional plant distributions, ecology, and biogeography. The Tónichi flora is a mixture of different biogeographic affinities. Species typical of tropical deciduous forest in the flora include the trees *Ceiba aesculifolia, Brongniartia alamosana, B. nudiflora, Diphysa occidentalis* (*güiloche*), *Handroanthus impetigenosus, Lonchocarpus hermannii, Lysiloma divaricatum, L. watsonii,* and *Parthenium tomentosum* var. *stramonium* (Figure 8); the shrubs *Croton flavescens, Euphorbia cymosa* (*candelilla, jumete*) *Heliotropium hartwegianum* (*hierba prieta*), *Malpighia emarginata,* and *Plumeria rubra*; perennial herbs *Abutilon mucronatum* (*malva*) and *Bastardiastrum cinctum* (*malva blanca*); and the succulents *Opuntia pubescens* (*siviri chucha*) and *Pachycereus pecten-aboriginum.*

Figure 12. *Ficus petiolaris* on Río Guajaray north of Álamos, Sonora in 1994. Note massive white roots on cliff. Human scale is Mark Fishbein. *Credit: Mark A. Dimmitt.*

Tónichi species that are widespread in tropical deciduous forest, thornscrub, and Sonoran desertscrub include the trees and shrubs *Bursera fagaroides, B. laxiflora, Fouquieria macdougalii, Guaiacum coulteri* (*guayacán*), *Haematoxylum brasiletto,* and *Parkinsonia praecox* (*palo brea*)*;* the perennial herbs *Abutilon abutiloides* (*pintapán*) and *Turnera diffusa* (*damiana*); and the succulents *Agave angustifolia, Cylindropuntia thurberi,* and *Stenocereus thurberi.*

Tónichi species more common in Sonoran desertscrub are the shrubs *Coursetia glandulosa, Encelia farinosa* (*hierba del vaso*), *Fouquieria splendens, Jatropha cordata, Mimosa distachya, Phaulothamnus spinescens,* and *Pleuradenophora bilocularis* while the tree *Olneya tesota* (desert ironwood, *palo fierro*); the shrub *Jatropha cardiophylla* (limberbush, *sangrengado*); and the succulents *Cochemiea mainae* and *Cylindropuntia fulgida* (*choya*) are typical Sonoran desertscrub species.

Shared Species. The percentages of species in the Tónichi thornscrub flora shared with other tropical floras in Sonora is insightful: *e.g.,* Municipality of Yécora (70.9%), Río Cuchujaqui (62.1%), Sierra Mazatán (60.5%), lower Río Bavispe Valley (49.1%), Municipality of Huatabampo (45.3%), Rancho Las Playitas (35.5%), and the Sierra Murrieta (32.8%). The flora of the Municipality of Yécora in eastern Sonora has the entire gradient from lowland foothills thornscrub and tropical deciduous forest to upland oak woodland and pine-oak forest (Van Devender & Reina-G. 2016). The Río Cuchujaqui flora in the Municipality of Álamos in southern Sonora (Van Devender et al. 2000) is representative of tropical deciduous forest. Foothills thornscrub is below oak woodland with Sonoran desertscrub on the west side of the Sierra Mazatán in central Sonora (Sánchez-E. et al. 2017). The flora of the lower Río Bavispe Valley east of Huásabas is foothills thornscrub and riparian vegetation along the river (Van Devender et al. 2018). The flora of the Municipality of Huatabampo in southern

continued next page

Flora and History of the Tónichi Area on the Río Yaqui

continued

Sonora is coastal thornscrub (Van Devender et al. 2024a). The vegetation of Rancho Las Playitas flora near Bacoachi in the Municipalities of Arizpe and Bacoachi is transitional between foothills thornscrub and desert grassland (Van Devender et al. 2023). Rich foothills thornscrub is below oak woodland in the Sierra Murrieta in Municipality of Bacanora (Van Devender et al 2024b).

These percentages are influenced by several factors. Tropical deciduous forest is well-developed in the Municipality of Yécora and along the Río Cuchujaqui. Also, these areas and the Sierra Mazatán have been exceptionally well collected. The lower Río Bavispe Valley and the Municipality of Huatabampo are direct thornscrub comparisons but reflect floristic differences and variability in this widespread vegetation type (Van Devender & Reina-G. 2021). The Rancho Las Playitas flora is in the transition between the New World tropics and the northern temperate zone and reflects declining tropical affinities northward as winter temperatures decrease. The fewer shared species with the Sierra Murrieta flora is interesting and probably reflects inadequate inventory in the rich thornscrub zone at the base of the mountain.

The richest tropical floras in Sonora are in tropical deciduous forest. Gentry (1942) and Martin et al. (1998) are the primary floristic references for tropical deciduous forest in the Río Mayo region in southern Sonora. The only local flora restricted to this vegetation type is the Río Cuchujaqui (Van Devender et al. 2000). The total of 736 taxa in 46 km^2 along 42 kilometers of river is diverse, but there are many more species in the uplands away from the river, especially in the Sierra de Álamos. Considering that thornscrub is a xeric version of tropical deciduous forest, most thornscrub species are present in more tropical vegetation. Two previous local thornscrub floras in Sonora are in the Municipality of Huatabampo (529 taxa, Van Devender et al. 2024a) and the lower Río Bavispe Valley (401 taxa, Van Devender et al. 2018). The total taxa (431) in the Tónichi thornscrub flora is similar but from a much smaller, intensely collected area (15.4 km^2) with diverse microhabitats.

Many tropical deciduous forest dominants near Álamos (Van Devender et al. 2000) are in shady slot canyons or mesic arroyos in the Tónichi study area, including *Brongniartia alamosana, Ceiba aesculifolia, Chloroleucon mangense* var. *leucocephalum, Handroanthus impetiginosus, Lysiloma divaricatum,* and *Pachycereus pecten-aboriginum.* Other tropical deciduous forest trees close to the Tónchi study area elsewhere in the Municipality of Soyopa or in the adjacent Municipalities of

Figure 13. *Pithecellobim dulce* fruit near Álamos, Sonora. *Credit: Stephanie A. Meyer.*

Ónavas or San Javier include *Coulteria platyloba* (S. Watson) N. Zamora (*palo colorado*), *Heliocarpus attenuatus* S. Watson (*samo baboso*), *Ipomoea arborescens* (Humb. & Bonpl.) G. Don (tree morning glory, *palo blanco*), and *Senna atomaria* (Humb. & Bonpl.) H. S. Irwin & Barneby (*palo zorillo*). Several noteworthy species in the study area, including *Chloroleucon mangense, Ctenodon petraeus, Ficus petiolaris, Guaiacum coulteri, Handroanthus impetiginosus, Lonchocarpus hermannii, Loeselia amplectens, Pisonia capitata,* and *Pithecellobium dulce,* are at the northern end of their distributions along the tropical Pacific coast of Mexico. *Holographis pallida, Polystemma canisferum,* and *Tetramerium yaquianum* are endemic to Sonora and *Pholisma culiacana* (*hongo*) and *Tradescantia gentryi* are endemic to Sonora and adjacent northern Sinaloa. *Cyperus erythrorhizos, Loeselia amplectens,* and *Pediomelum rhombifolium* are the first records for the species in Sonora. The biotic affinities of *Hibiscus acicularis* and *Pediomelum rhombifolium* are with Texas and northeastern Mexico. *Cyperus erythrorhizos* is a southern record of a northern temperate species. This flora strongly supports thornscrub as a tropical vegetation type derived from tropical deciduous forest (Figure 16).

Acknowledgments

Profesor Rogelio Amaya-Coronado, Manuel Cazares, Armida Encinas-Franco, José Isedo-Esparza, Micaela Franco de Encinas, Cronista Blanca Rosa López-Martínez, Esther Martínez, Maria Teresa Tecolote-Armenta, and Altagracia Valenzuela provided common names of plants and information about the history of Tónichi. Specimens were identified by Daniel F. Austin (*Ipomoea*), Rupert C. Barneby (Fabaceae), J. Brasher

continued next page

Figure 14. Church and gazebo in the plaza in Tónichi in 2005. *Credit: Thomas R. Van Devender.*

Figure 15. Train from La Dura to Tónichi. Note foothills thornscrub on slopes.

Flora and History of the Tónichi Area on the Río Yaqui *continued*

(*Cryptantha*), Lincoln Constance (*Phacelia*), Mihai Costea (*Cuscuta*), Alfonso Delgado-S. (Fabaceae), Mark Fishbein (Apocynaceae), Richard S. Felger (general), G. Flores-F. (*Senna*), Paul A. Fryxell (Malvaceae), Rosaura Grether (*Mimosa*), M. Socorro González-E. (Cyperaceae), Ronald L. Hartman (Caryophyllaceae), James R. Henrickson (*Portulaca*), Philip D. Jenkins (general), Matthew B. Johnson (Fabaceae), David H. Lorence (Rubiaceae), Mahinda Martínez (*Physalis*), Guy Nesom (Asteraceae), Donald J. Pinkava (Cactaceae), J. Mark Porter (Polemoniaceae), John and Charlotte Reeder (Poaceae), Eric H. Roalson (Cyperaceae), Aarón Rodríguez-Contreras (Solanaceae), Richard M. Spellenberg (Nyctaginaceae), Leticia Torres-Colín (Fabaceae), Gordon C. Tucker (Cyperaceae), Billie L. Turner (Asteraceae), Victor W. Steinmann (Euphorbiaceae), Oscar Tellez (*Sphinctospermum*), Rebecca K. Wilson (general), and George Yatskievych (Lennoaceae, Pteridaceae). A review by Susan D. Carnahan greatly improved the manuscript. Susan D. Carnahan, Mark A. Dimmitt, Stephen F. Hale, Stephanie A. Meyer, Guillermo Molina-Padilla, and Caroline Treadway allowed the use of their photos. The Arizona-Sonora Desert Museum supported the field trips to Tónichi and Yécora. Greater Good Charities supports the understanding of the biogeography of Sonora with its Madrean Discovery Expeditions database. Marina Maskaykina at Greater Good Charities drafted the maps.

Literature Cited

Brown, D.E., and C.H. Lowe. 1982. Biotic communities of the Southwest [map]. Scale 1:1,000,000: General Technical Report RM-78. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado.

Camín, H.A. 1964. Insurrecci n Maderista en Sonora Noviembre 1910 – Junio 1911. Pg. 9–71 *in* Temas Sonorienses de los Simposios de Historia. Gobierno del Estado de Sonora, Hermosillo.

Cochemé, J., and A. Demant. 1991. Geology of the Yécora area, northern Sierra Madre Occidental, Mexico. Geological Society of America Special Paper 254.

Daniel, T.F. 1986. Systematics of *Tetramerium* (Acanthaceae). *Systematic Botany Monographs* 12:102–103.

Deyo, N.S., A. Smith, E. Gilbert, and T.R. Van Devender. 2013. Documenting the biodiversity of the Madrean Archipelago: an analysis of a virtual flora and fauna. Pp. 292–299 *in* G.J. Gottfried, P.F. Ffolliott, B.S. Gebow, L.G. Eskew, and L.C. Collins (compilers). Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III and 7th Conference on Research and Resource Management in the Southwestern Deserts. 2012 May 1–5, Tucson, AZ. Proceedings RMRS-P-67. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Gentry, H.S. 1942. Río Mayo Plants. Carnegie Institute of Washington Publication 527, Washington, D. C.

Hunt, D.R. 2007. A new species of *Tradescantia* (Commelinaceae) from Mexico. *Kew Bulletin* 62:141–142.

Ibarra-F., F., M.H. Martín-R., F.G. Denogean-B., and R. Aguirre-M. 2009. Buffelgrass, cattle, and the Sonoran Desert. Pp. 375–381 *in* T.R. Van Devender, F.J. Espinosa-G., B.L. Harper-L., and T. Hubbard (eds.), Invasive Plants on the Move. Controlling them in North America. Proceedings of Weeds Across Borders 2006 Conference, Hermosillo, Sonora, May 25–28, 2006; Tucson, AZ.

Martin, P.S., D. Yetman, M. Fishbein, P. Jenkins, T.R. Van Devender, and R.K. Wilson. 1998. Gentry's Río Mayo Plants, University of Arizona Press, Tucson.

McDonnell, A., and M. Fishbein. 2016. *Polystemma canisferum* (Apocynaceae, Asclepiadaceae): a distinctive new gonoloboid milkweed vine from Sonora, Mexico. *Phytotaxa* 246:78–84.

continued next page

Flora and History of the Tónichi Area on the Río Yaqui

continued

Figure 16. Sunset view of Presa Angostura on the Río Bavispe (upper Río Yaqui tributary) from the Sierra El Tigre. *Credit: Caroline Treadway.*

Morales-R., D., R.M. Anulo-C., C.I. Ortega, and F.I. Molina-F. 2025. Does buffelgrass have a long permanence in an established pasture? An analysis of the population dynamics of this exotic grass in central Sonora, Mexico. *Ecologies* 6(3):48.

Nelson, C.N. 1910. San Javier, an old silver district of Sonora. *The Engineering and Mining Journal* 90:660–661.

Nentvig, J. 1971. Descripción geográfica, natural y curiosa de la Provincia de Sonora. Pp. 51–230 *in* G. Viveros (ed.). Descripción Geográfica…. de Sonora. Publicaciones del Archivo General de la Nación, Mexico, D.F.

Pennington, C.W. 1979. The Pima Bajo of Central Sonora, Mexico. The Material Culture. University of Utah Press, Salt Lake.

Roxburgh, W. 1798. *Mimosa dulcis. Plants of the Coromandel Coasts.* 1(4):67–68.

Sánchez-E., J.J., A.L. Reina-G., and T.R. Van Devender. 2017. Lista anotada de la flora vascular de la Sierra de Mazatán (Huérfana), centro de Sonora. *Phytoneuron* 35:1–44.

Seier, M.K., A. Rapini, K.M. Pollard, R.W. Barreta, and H.C. Evans. 2023. Tracing the origins and tracking the movements of invasive rubber vines (*Cryptostegia* spp., Apocynaceae). *NeoBiota* 89:95–133.

Spicer, E.H. 1962. Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533–1960. University of Arizona Press, Tucson.

Turner, R.M., J.E. Bowers, and T.L. Burgess. 1995. Sonoran Desert Plants. University of Arizona Press, Tucson.

Van Devender, T.R., S. Avila-V., M. Emerson, D. Turner, A.D. Flesch, and N.S. Deyo. 2013. Biodiversity in the Madrean Archipelago of Sonora, Mexico. Pp. 10–16 *in* G.J. Gottfried, P.F. Ffolliott, B.S. Gebow, L.G. Eskew, and L.C. Collins (compilers). Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III and 7th Conference on Research and Resource Management in the Southwestern Deserts. 2012 May 1–5, Tucson, AZ. Proceedings RMRS-P-67. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Van Devender, T.R., W.A. Calder, K. Krebbs, A.L. Reina-G., S.M. Russell, and R.O. Russell. 2004. Hummingbird plants and potential nectar corridors for the Rufous Hummingbird in Sonora, Mexico. Pp. 96–121 *in* G.P. Nabhan, R.C. Brusca, and L. Holter (eds.), Conserving Migratory Pollinators and Nectar Corridors in western North America, University of Arizona Press, Tucson.

Van Devender, T.R., S.L. Friedman, A.C. Sanders, and A.L. Reina-G. 2024a. Coastal thornscrub flora and vegetation in the Municipality of Huatabampo, Sonora, Mexico. *Plant Press Arizona* 47(2):31–48.

Van Devender, T.R., and A.L. Reina-G. 2016. The tropical Madrean flora of Yécora, Sonora, Mexico. *Phytoneuron* 7:1–23

Van Devender, T.R., and A.L. Reina-G. 2021. The vegetation of Sonora, Mexico. *Phytoneuron* 67:1–22.

Van Devender, T.R., A.L. Reina-G., S.D. Carnahan, J.L. Anderson. F.W. Reichenbacher, S.F. Hale, R.A. Villa, and G. Yanes-A. 2024b. Preliminary flora of the Sierra Murrieta, Sonora, Mexico. *Desert Plants* 39:10–32.

Van Devender, T.R., A.L. Reina-G., S.F. Hale, S.D. Carnahan, G. Molina-P., and J.A. Salazar-M. 2023. Preliminary flora of El Picacho de Bacoachi-Rancho Las Playitas, Sonora, Mexico. *Plant Press Arizona* 46(1):34–46.

Van Devender, T.R., A.L. Reina-G., and J.J. Sánchez-E. 2018. Preliminary flora of the Río Bavispe Valley, Sonora, Mexico. *The Plant Press* 41(2):43–53.

Van Devender, T.R., A.C. Sanders, R.K. Wilson, and S.A. Meyer. 2000. Vegetation, flora, and seasons of the Río Cuchujaqui, a tropical deciduous forest near Álamos, Sonora, México. Pp. 36–101 *in* R.H. Robichaux and D.A. Yetman (eds.). The Tropical Deciduous Forest of Álamos: Biodiversity of a Threatened Ecosystem in Mexico. University of Arizona Press, Tucson.

Wikipedia. 2025. **https://es.m.wikipedia.org/wiki/Ferrocarril_de_Sonora**

Wilson, I.F., and V.S. Rocha. 1949. Coal deposits of the Santa Clara district near Tónichi, Sonora, Mexico. U.S. Geological Survey Bulletin 962-A, Washington, D.C.

Wilson, W.L. 1910. Revival in Ures, Hermosillo, and Sahuaripa Districts. *The Engineering and Mining Journal* 90:660–662.

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 1 of 6*

An asterisk (*) denotes non-native status.

Pteridophytes

PTERIDACEAE

Astrolepis sinuata (Lag. ex Sw.) D.M. Benham & Windham subsp. *sinuata*

Astrolepis windhamii D.M. Benham

Hemionitis lozanoi (Maxon) Christenh.

Hemionitis lemmoni (D.C. Eaton) Cristenh.

Myriopteris pringlei (Davenp.) Grusz & Windham var. *pringlei*

SELAGINELLACEAE

Selaginella sartorii Hieron.

Selaginella wrightii Hieron.

Dicots

ACANTHACEAE

Carlowrightia arizonica A. Gray

Carlowrightia pectinata Brandegee

Dicliptera resupinata (Vahl) Juss.

Elytraria imbricata (Vahl) Pers.

Holographis pallida Leonard & Gentry

Justicia candicans (Nees) L.D. Benson

Ruellia intermedia Leonard

Tetramerium nervosum Nees

Tetramerium tenuissimum Rose

Tetramerium yaquianum T.F. Daniel

ACHATOCARPACEAE

Phaulothamnus spinescens A. Gray

AIZOACEAE

Trianthema portulacastrum L.

AMARANTHACEAE

Alternanthera stellata Uline & Bray.

Amaranthus palmeri S. Watson

**Chenopodiastrum murale* (L.) S. Fuentes, Uotila & Borsch

Chenopodium neomexicanum Standl.

Dysphania ambrosioides (L.) Mosyakin & Clements

Gomphrena serrata Pav. ex Moq.

Gomphrena sonorae Torr.

Tidestromia lanuginosa (Nutt.) Standl.

APIACEAE

Daucus pusillus Michx.

Hydrocotyle umbellata L.

Eryngium nasturtiifolium Juss. ex F. Delaroche

Spermolepis lateriflora G.L. Nesom

APOCYNACEAE

**Cryptostegia grandiflora* (Roxb.) R. Br.

Cynanchum ligulatum (Benth.) Woodson

Funastrum clausum (Jacq.) Schltr.

Funastrum heterophyllum (Engelm. ex Torr.) Standl.

Gonolobus arizonicus (A. Gray) Woodson

Metastelma arizonicum A. Gray

Polystemma canisferum McDonnell & Fishbein

Polystemma tristiflora (Standl.) L.O. Alvarado & S. Islas

Plumeria rubra L. var. *acutifolia* (Poir.) Woodson

Ruehssia edulis (S. Watson) L.O Alvarado

Vallesia glabra Link

ARISTOLOCHIACEAE

Aristolochia watsonii Wooton & Standl.

ASTERACEAE

Ambrosia ambrosioides (Cav.) W.W. Payne

Ambrosia confertiflora DC.

Ambrosia cordifolia (A. Gray) W.W. Payne

Ambrosia monogyra (Torr. & A. Gray) Strother & B.G. Baldwin

Baccharis salicifolia (Ruiz & Pav.) Pers.

Bebbia juncea (Benth.) Greene

Brickellia brandegeei B.L. Rob.

Brickellia coulteri A. Gray

Coreocarpus sonoranus Sherff var. *sonoranus*

Diaperia verna (Raf.) Morefield

Eclipta prostrata (L.) L.

Encelia farinosa A. Gray ex Torr.

Erigeron velutipes Hook. & Arn.

Flaveria sonorensis A.M. Powell

Galinsogeopsis spilanthoides Sch. Bip. var. *saxosa* (Brandegee) Lichter-Marck

Galinsogeopsis spilanthoides Sch. Bip. var. *spilanthoides*

Gamochaeta americana (Mill.) Wedd.

Gamochaeta stagnalis (I.M. Johnst.) Anderb.

Helenium thurberi A. Gray

Laennecia coulteri (A. Gray) G.L. Nesom

Logfia filaginoides (Hook. & Arn.) Morefield

Melampodium appendiculatum B.L. Rob.

Melampodium sericeum Lag.

Parthenium hysterophorus L.

Parthenium tomentosum DC. var. *stramonium* (Greene) Rollins

Pectis filipes Harv. & A. Gray

Pectis papposa Harv. & A. Gray

Pectis prostrata Cav.

Perityle californica Benth.

Porophyllum gracile Benth.

Porophyllum ruderale (Jacq.) Cass. subsp. *macrocephalum* (DC.) R.R. Johnson

**Sonchus oleraceus* L.

Symphyotrichum expansum (Poepp. ex Spreng.) G.L. Nesom

Thymophylla concinna (A. Gray) Strother

Verbesina encelioides (Cav.) Benth. & Hook. f. ex A. Gray subsp. *exauriculata* (B.L. Rob. & Greenm.) J.R. Coleman

Xanthium orientale L.

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 2 of 6*

BIGNONIACEAE

Handroanthus impetiginosus (Mart. ex DC.) Mattos

Tecoma stans (L.) Juss. ex Knuth var. *angustata* Rehder

BIXACEAE

Cochlospermum gonzalezii (Sprague & L. Riley) Byng & Christenh.

BORAGINACEAE

Cordia sonorae Rose

Cryptantha barbigera (A. Gray) Greene

Eucrypta chrysanthemifolia (Benth.) Greene var. *bipinnatifida* (Torr.) Constance

Eucrypta micrantha (Torr.) A. Heller

Heliotropium angiospermum Murray

Heliotropium hartwegianum (Steud.) Halse & Feuillet

Heliotropium macrostachyum (DC.) Hemsl.

Johnstonella angustifolia (Torr.) Hasenstab & M.G. Simpson

Johnstonella grayi (Vasey & Rose) Hasenstab & M.G. Simpson var. *cryptochaeta* (J.F. Macbr.) Hasenstab & M.G. Simpson

Myriopus volubilis (L.) Small

Nama coulteri A. Gray

Nama hispida A. Gray

Nama jamaicensis L.

Nama stenocarpa A. Gray

Phacelia gentryi Constance

BRASSICACEAE

Descurainia pinnata (Walter) Britton

Dryopetalon runcinatum A. Gray

Lepidium lasiocarpum Nutt.

Lepidium oblongum Small

**Nasturtium officinale* W.T. Aiton

**Sisymbrium irio* L.

Tomostima cuneifolia (Nutt. ex Torr. & A. Gray) Al-Shehbaz, M. Koch & Jordan-Thaden

BURSERACEAE

Bursera fagaroides (Kunth) Engl. var. *elongata* McVaugh & Rzed.

Bursera laxiflora S. Watson

CACTACEAE

Cochemiea grahamii (Engelm.) Doweld

Cochemiea mainiae (K. Brandegee) P.B. Breslin & Majure

Cylindropuntia fulgida (Engelm.) F.M. Knuth

Cylindropuntia leptocaulis (DC.) F.M. Knuth x *C. thurberi* (Engelm.) F.M. Knuth

Cylindropuntia thurberi (Engelm.) F.M. Knuth

Mammillaria standleyi Orcutt

Opuntia aff. *wilcoxii* Britton & Rose

Opuntia gosseliniana F.A.C. Weber

Opuntia pubescens H.L. Wendl. ex Pfeiff.

Pachycereus pecten-aboriginum Britton & Rose

Stenocereus thurberi (Engelm.) Buxbaum

CAMPANULACEACE

Diastatea ternera (A. Gray) McVaugh

Nemacladus orientalis (McVaugh) Morin

CANNABACEAE

Celtis iguanaea (Jacq.) Sarg.

Celtis pallida Torr.

CARYOPHYLLACEAE

Cerastium texanum Britton

Drymaria glandulosa C. Presl var. *glandulosa*

Loeflingia squarrosa Nutt.

Silene antirrhina L.

CLEOMACEAE

Cleome melanocarpa S. Watson

Cleome tenuis S. Watson

**Cleome viscosa* L.

CONVOLVULACEAE

Cuscuta americana Thunb. ex Engelm.

Cuscuta corymbosa Ruiz & Pav. var. *grandiflora* Engelm.

Cuscuta desmouliniana Yunck.

Cuscuta legitima Costea & Stefanovic

Cuscuta tuberculata Brandegee

Cuscuta umbellata Kunth

Distimake palmeri (S. Watson) A.R. Simões & Stables

Evolulus alsinoides (L.) L.

Ipomoea aristolochiifolia G. Don

Ipomoea bracteata Cav.

Ipomoea costellata Torr.

Ipomoea dimorphophylla Greenm.

Ipomoea hederacea Jacq.

Ipomoea muricata (L.) Jacq.

Ipomoea nil (L.) Roth

Ipomoea purpurea (L.) Roth.

Ipomoea scopulorum Brandegee

Ipomoea ternifolia Cav. subsp. *leptotoma* (Torr.) J.R.I. Wood & Scotland

Ipomoea triloba L.

Jacquemontia pringlei A. Gray

CRASSULACEAE

Graptopetalum rusbyi (Greene) Rose

CUCURBITACEAE

**Citrullus lanatus* (Thunb.) Matsum. & Nakai

**Cucumis melo* L. var. *cantalupo* Ser.

Cucumis melo L. var. *dudaim* (L.) Naudin

Cucurbita argyrosperma C. Huber subsp. *sororia* (L.H. Bailey) Merrick & D.M. Bates

EUPHORBIACEAE

Acalypha aliena Brandegee

Acalypha havanensis Müll. Arg.

Acalypha ostryifolia Riddell

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 3 of 6*

Argythamnia serrata (Torr.) Müll. Arg.

Croton flavescens Greenm. var. *brandegeeanus* Croizat

Croton texensis (Klotzsch) Müll. Arg.

Euphorbia albomarginata Torr. & A. Gray

Euphorbia capitellata Engelm.

Euphorbia cymosa Poir.

Euphorbia dioscoreoides Boiss.

Euphorbia florida Engelm.

Euphorbia gracillima S. Watson

Euphorbia graminea Jacq.

Euphorbia heterophylla L

Euphorbia hirta L.

Euphorbia hyssopifolia L.

Euphorbia pediculifera Engelm.

Euphorbia petrina S. Watson

Euphorbia polycarpa Benth.

Euphorbia setiloba Engelm. ex Torr.

Euphorbia thymifolia L.

Jatropha cardiophylla (Torr.) Müll. Arg.

Jatropha cordata Müll. Arg.

Manihot angustiloba (Torr.) Müll. Arg.

Pleradenophora bilocularis (S. Watson) Esser & A.L. Melo

**Ricinus communis* L.

Tragia nepetifolia Cav

FABACEAE

Astragalus nuttallianus DC. var. *austrinus* (Small) Barneby

Brongniartia alamosana Rydb.

Brongniartia nudiflora S. Watson

Caesalpinia pulcherrima (L.) Sw.

Calliandra eriophylla Benth.

Calliandra humilis Benth. var. *humilis*

Chamaecrista nictitans (L.) Moench subsp.. *nictitans*

Chloroleucon mangense (Jacq.) Britton & Rose var. *leucospermum* (Brandegee) Barneby & Grimes

Coursetia caribaea (Jacq.) Lavin var. *caribaea* (Jacq.) Lavin

Coursetia glandulosa A. Gray

Crotalaria pumila Ortega

Ctenodon fascicularis (Schltdl. & Cham.) A. Delgado

Ctenodon petraeus (B.L. Rob.) A. Delgado

Dalea elata Hook. & Arn.

Dalea pringlei A. Gray var. *multijuga* Barneby

Desmanthus covillei (Britton & Rose) Wiggins

Desmodium procumbens (Mill.) C.L. Hitchc. var. *exiguum* (A. Gray) Schub.

Desmodium rosei B.G. Schub.

Desmodium scopulorum S. Watson

Desmodium tortuosum (Sw.) DC.

Diphysa occidentalis Rose

Erythrina flabelliformis Kearney

Galactia wrightii A. Gray

Haematoxylum brasiletto H. Karst.

Havardia mexicana (Rose) Britton & Rose

Hoffmannseggia glauca (Ortega) Eifort

Indigofera jamaicensis Spreng.

Indigofera suffruticosa Mill.

**Leucaena leucocephala* (Lam.) de Wit

Lonchocarpus hermannii M. Sousa

Lysiloma divaricatum (Jacq.) J.F. Macbr.

Lysiloma watsonii Rose

Marina alamosana (Rose) Barneby

Marina palmeri (Rose) Barneby

Mariosousa russelliana (Britton & Rose) Seigler & Ebinger

Mimosa distachya Cav. var. *distachya*

Mimosa distachya Cav. var. *laxiflora* (Benth.) Barneby

Neltuma odorata (Torr. & Frém.) C.E. Hughes & G.P. Lewis

Neltuma velutina (Wooton) Britton & Rose

Olneya tesota A. Gray

Parkinsonia aculeata L.

Parkinsonia florida (Benth. ex A. Gray) S. Watson

Parkinsonia praecox (Ruiz & Pav.) Hawkins

Parkinsonia x *sonorae* (Rose & I.M. Johnst. ex I.M. Johnst.) Hawkins & Felger

Pediomelum rhombifolium (Torr. & A. Gray) Rydb.

Phaseolus acutifolius A. Gray var. *latifolius* Freeman

Piscidia mollis Rose

Pithecellobium dulce (Roxb.) Benth.

Rhynchosia minima (L.) DC.

Rhynchosia precatoria (Humb. & Bonpland. ex Willd.) DC.

Senegalia occidentalis (Rose) Britton & Rose

Senna covesii (A. Gray) H.S. Irwin & Barneby

Senna hirsuta (L.) H.S. Irwin & Barneby var. *glaberrima* (M.E. Jones) H.S. Irwin & Barneby

Senna obtusifolia (L.) H.S. Irwin & Barneby

Senna occidentalis (L.) Link

Senna pallida (Vahl) H.S. Irwin & Barneby var. *shreveana* H.S. Irwin & Barneby

Sesbania herbacea (Mill.) McVaugh

Sphinctospermum constrictum (S. Watson) Rose

Vachellia californica (Brandegee) Siegler & Ebinger

Vachellia campeachiana (Mill.) Siegler & Ebinger

*Vachellia farnesiana (*L.) Wight & Arn.

FOUQUIERIACEAE

Fouquieria macdougalii Nash

Fouquieria splendens Engelm.

KRAMERIACEAE

Krameria erecta Willd. ex J.A. Schultes

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 4 of 6*

LAMIACEAE

Cantinoa mutabilis (A. Richard) Harley & J.F.B. Pastore

Condea albida (Kunth) Harley & J.F.B. Pastore

Hedeoma nana (Torr.) Briq.

Salvia lasiocephala Hook. & Arn.

Salvia misella Kunth

Vitex mollis Kunth

LENNOACEAE

Pholisma culiacana (Dressler & Kuijt) Yatsk.

LOASACEAE

Gronovia scandens L.

Mentzelia aspera L

MALPIGHIACEAE

Callaeum macropterum (Moc. & Sessé ex DC.) D.M. Johnson

Cottsia californica (Benth.) W.R. Anderson & C. Davis

Cottsia californica (Benth.) W.R. Anderson & C. Davis x *C. gracilis* (A. Gray) W.R. Anderson & C. Davis

Cottsia gracilis (A. Gray) W.R. Anderson & C. Davis

Cottsia linearis (Wiggins) W.R. Anderson & C. Davis

Echinopterys eglandulosa (A. Juss.) Small

Malpighia emarginata DC.

MALVACEAE

Abutilon abutiloides (Jacq.) Garcke ex Hochr.

Abutilon incanum (Link) Sweet

Abutilon mucronatum J. Fryxell

Abutilon reventum S. Watson

Anoda pentaschista A. Gray

Anoda reticulata S. Watson

Ayenia filiformis S. Watson

Bastardiastrum cinctum (Brandegee) D.M. Bates

Ceiba aesculifolia (Kunth) Britton & Baker f.

**Gossypium hirsutum* L.

Guazuma ulmifolia Lam.

Herissantia crispa (L.) Briz.

Hibiscus acicularis Standl.

Hibiscus biseptus S. Watson

Malvastrum coromandelianum (L.) Garcke

Melochia tomentosa L.

Sida abutilifolia Mill.

Sida alamosana S. Watson ex Rose

Sida ciliaris L.

Sida rhombifolia L.

Sphaeralcea coulteri (S. Watson) A. Gray

Waltheria indica L.

MARTYNIACEAE

Proboscidea altheifolia (Benth.) Decne.

Proboscidea parviflora (Wooton) Wooton & Standl.

MENISPERMACEAE

Nephroia diversifolia (DC.) L. Lian & Wei Wang

MOLLUGINACEAE

Mollugo verticillata L.

MORACEAE

Ficus petiolaris Kunth

NYCTAGINACEAE

Allionia incarnata L.

Boerhavia coccinea Mill.

Boerhavia coulteri (Hook. f.) S. Watson

Boerhavia erecta L.

Boerhavia purpurascens A. Gray

Boerhavia spicata Choisy

Boerhavia triquetra S. Watson

Boerhavia xantii S. Watson

Commicarpus scandens (L.) Standl.

Pisonia capitata (S. Watson) Standl.

ONAGRACEAE

Eremothera chamaenerioides (A. Gray) W.L. Wagner & Hoch

Eulobus californicus Nutt. ex Torr. & A. Gray

Ludwigia octovalvis (Jacq.) P.H. Raven

Oenothera kunthiana (Spach) Munz

Oenothera primiveris A. Gray

OXALIDACEAE

Oxalis latifolia Kunth

PAPAVERACEAE

Argemone ochroleuca Sweet

Eschscholzia californica Cham. subsp. *mexicana* (Greene) C. Clark

PASSIFLORACEAE

Passiflora foetida L.

Turnera diffusa Willd. ex Schult.

PHRYMACEAE

Erythranthe floribunda (Lindl.) G.L. Nesom

Erythranthe unimaculata (Pennell) G.L. Nesom

PLANTAGINACEAE

Nuttallanthus texanus (Scheele) D.A. Sutton

Sairocarpus costatus (Wiggins) D.A. Sutton

Schistophragma intermedium (A. Gray) Pennell

Stemodia durantifolia (L.) Sw.

Stemodia palmeri A. Gray

Veronica peregrina L. subsp. *xalapensis* (Kunth) Pennell

POLEMONIACEAE

Dayia sonorae (Rose) J.M. Porter

Linanthus jonesii (A. Gray) Greene

Loeselia amplectens (Hook. & Arn.) Benth. ex DC.

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 5 of 6*

POLYGONACEAE

Antigonon leptopus Hook. & Arn.

Persicaria maculosa A. Gray

Persicaria punctata (Elliott) Small

Rumex inconspicuus Rech. f.

PORTULACACEAE

Portulaca halimoides L.

Portulaca oleracea L.

Portulaca pilosa L.

Portulaca suffrutescens Engelm.

Portulaca umbraticola Kunth

RANUNCULACEAE

Clematis drummondii Torr. & A. Gray

RESEDACEAE

Oligomeris linifolia (Vahl) J.F. Macbr.

RHAMNACEAE

Karwinskia humboldtiana (Willd. ex Schult.) Zucc.

RUBIACEAE

Cephalanthus salicifolius Bonpl.

Galium proliferum A. Gray

Houstonia prostrata Brandegee

Houstonia wrightii A. Gray

Hintonia latiflora (DC.) Bullock

Randia thurberi S. Watson

RUTACEAE

Esenbeckia hartmanii B.L. Rob. & Fernald

Zanthoxylum fagara (L.) Sarg.

SALICACEAE

Salix gooddingii C.R. Ball

SAPINDACEAE

Cardiospermum corindum L.

Sapindus saponaria L.

SAPOTACEAE

Sideroxylon occidentale (Hemsl.) T.D. Penn.

SCROPHULARIACEAE

Buddleja sessiliflora Kunth

SOLANACEAE

Calibrachoa parviflora (Juss.) D'Arcy

Capsicum annuum L. var. *glabriusculum* (Dunal) Heiser & Pickersgill

Datura discolor Bernh.

Lycium berlandieri Dunal

**Nicotiana glauca* Graham

Nicotiana obtusifolia M. Martens & Galeotti

Physalis acutifolia (Miers) Sandw.

Physalis crassifolia Benth.

Physalis grisea (Waterf.) M. Martínez

Physalis hederifolia A. Gray

Physalis leptophylla B.L. Rob. & Greenm.

Physalis pubescens L.

Solanum deflexum Greenm.

Solanum erianthum D. Don

Solanum grayi Rose

Solanum houstonii Martyn

Solanum lumholtzianum Bartlett

**Solanum lycopersicum* L.

TALINACEAE

Talinum sonorae D.J. Ferguson

TAMARICACEAE

**Tamarix chinensis* Lour.

URTICACEAE

Parietaria pensylvanica Muhl. ex Willd. var. *hespera* (B.D. Hinton) S.L. Welsh

VERBENACEAE

Glandularia gooddingii (Briq.) Solbrig

Glandularia pumila (Rydb.) Umber

Lantana camara L.

Phyla nodiflora (L.) Greene

Priva lappulacea (L.) Pers.

VIOLACEAE

Pombalia attenuata (Humb. & Bonpl. ex Willd.) Schulze-Menz

VITACEAE

Cissus cf. *trifoliata* (L.) L.

ZYGOPHYLLACEAE

Guaiacum coulteri A. Gray

Kallstroemia californica (S. Watson) Vail

Kallstroemia grandiflora Torr. ex A. Gray

Kallstroemia parviflora Norton

Monocots

AMARYLLIDACEAE

Hymenocallis sonorensis Standl.

ASPARAGACEAE

Agave angustifolia Haw.

Agave vilmoriniana A. Berger

BROMELIACEAE

Hechtia montana Brandegee

COMMELINACEAE

**Commelina diffusa* Burm. f.

Commelina erecta L.

Tradescantia gentryi D.R. Hunt

CYPERACEAE

Cyperus erythrorhizos Muhl.

**Cyperus iria* L.

Cyperus ochraceus Vahl

**Cyperus rotundus* L.

Cyperus squarrosus L.

Cyperus subsquarrosus (Muhl.) Bauters

Cyperus surinamensis Rottb.

Eleocharis montevidensis Kunth

Fimbristylis annua (All.) Roem. & Schult.

CHECKLIST: Tónichi Area, Municipality of Soyopa, Sonora *page 6 of 6*

POACEAE

Aristida adscensionis L.

Aristida ternipes Cav. var. *ternipes*

Bouteloua aristidoides (Kunth) Griseb.

Bouteloua barbata Lag. var. *barbata*

Bouteloua barbata Lag. var. *sonorae* (Griffiths) Gould

Bouteloua diversispicula Columbus

Bouteloua repens (Kunth) Scribn. & Merr.

**Cenchrus ciliaris* L.

Chloris virgata Sw.

**Cynodon dactylon* (L.) Pers.

**Dactyloctenium aegyptium* (L.) Willd.

**Digitaria bicornis* (Lam.) Roem. & Schult.

Digitaria horizontalis Willd.

Dinebra panicea (Retz.) P.M. Peterson & N. Snow subsp. *brachiata* (Steud.) P.M. Peterson & N. Snow

Dinebra panicoides (J. Presl) P.M. Peterson & N. Snow

Dinebra viscida (Scribn.) P.M. Peterson & N. Snow

Diplachne fusca (L.) P. Beauv. ex Roem & Schult. subsp. *fascicularis* (Lam.) P.M. Peterson & N. Snow

**Echinochloa colona* (L.) Link

Eriochloa aristata Vasey

Enneapogon desvauxii P. Beauv.

**Eragrostis cilianensis* (All.) Vignolo ex Janch.

Eragrostis pectinacea (Michx.) Nees var. *pectinacea*

Festuca octoflora Walter var. *hirtella* (Piper) Hitchc.

Festuca octoflora Walter var. *octoflora*

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.

**Melinis repens* (Willd.) Zizka

Muhlenbergia arizonica Scribn.

Muhlenbergia microsperma (DC.) Kunth.

Muhlenbergia minutissima (Steud.) Swallen

Panicum alatum Zuloaga & Morrone var. *minus* (Andersson) Zuloaga & Morrone

Panicum hirticaule J. Presl var. *hirticaule*

Paspalum paniculatum L.

Paspalum squamulatum E. Fourn. ex Hemsl.

**Phalaris minor* Retz.

Setaria grisebachii E. Fourn.

Setaria liebmannii E. Fourn.

Setariopsis auriculata (E. Fourn.) Scribn.

Setariopsis latiglumia Scribn.

Urochloa arizonica (Scribn. & Merr.) Morrone & Zuloaga

Urochloa fusca (Sw.) B.F. Hansen & Wunderlin