New Records of Naturalized and Invasive *Phoenix dactylifera* and *Washingtonia robusta* (Arecaceae) on Cedros Island, Baja California, Mexico

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Abstract

This study confirms about 105 date palms (*Phoenix dactylifera*) and 35 Mexican fan palms (*Washingtonia robusta*) (Arecaceae) naturalized and invasive on Cedros Island (one of the Pacific Islands of the Baja California Peninsula Biosphere Reserve) just off the west coast and about halfway down Baja California, Mexico. Most frequently, these palms occur at current or former habitation sites and in association with waterworks. Speculatively, palm seeds were dispersed from those locations into more remote uninhabited sites by water, gravity, or animal means. Where palm seeds encountered a favorably moist environment, they germinated, grew, and naturalized. The evidence presented of palms growing and naturalizing on Cedros covers the southeast coast and southern portions of the island and is incomplete. More remotely sensed and field data are needed to determine the extent to which exotic palms occur elsewhere on the island. The present results are a first step, newly recording for Cedros Island the cultivation and naturalization of these two invasive palm species within the Baja California Peninsula Biosphere Reserve.

Introduction

Cedros, the largest of Mexico's Pacific islands, is 38.6 km long and 17.7 km wide, positioned about 25 km west of the Baja California Peninsula. The mountainous island has a desert climate (BWh Köppen) and no perennial streams or natural bodies of water. However, on the southern and eastern slopes of Cedros Mountain, elevation nearly 1,220 m, springs are present that support riparian shrub and tree growth as well as providing good drinking water.

Indigenous people inhabited Cedros some 12,000 years ago, mainly subsisting on rich marine food resources. In historic times, Cedros was depopulated by Spanish missionaries in 1732: all surviving indigenous people were relocated to San Ignacio Mission on the Baja California Peninsula mainland. In the late 19th century, a period of mineral exploitation and commercial fishing led to the repopulation of Cedros after 1920 with the building of a fish cannery at what is

now Cedros Town, the main settlement. The island's present economy relies upon commercial fishing, sport fishing, tourism, and transshipment of sea salt evaporated on the mainland for international export. Varying estimates put the permanent population of Cedros Island at under 3000. Over the last twenty years, the rich prehistory and history of Cedros has been researched (Des Lauriers 2009, 2010; Des Lauriers and García-Des Lauriers 2006; Baxin Martinez 2020, 2023; and Baxin Martinez and Sámano Pineda 2016).

Cedros has no indigenous palms (Arecaceae), but the date (*Phoenix dactylifera*) and Mexican fan palm (*Washingtonia robusta*) have been introduced and become naturalized. Spanish missionaries introduced dates to Baja California as a fruit crop in the early 1700s. Ever since, the palm has been widely cultivated on the peninsula and has naturalized, reproducing spontaneously by offshoots and seeds. Small commercial quantities of fruit are produced from these seedling populations in San Ignacio and Mulegé. The Mexican fan palm occurs on the Baja California Peninsula with a small population in Sonora on the Mexican mainland and reproduces by seed. Both palms are well adapted to desert oasis conditions.

Dates may have first reached Cedros as provisions carried by fishermen from the Baja California mainland. Island springs provided fresh water and campsites; discarded date seeds readily germinate at water sources, forming clusters of palms. Some participants in the 1920s repopulation of Cedros came from San Ignacio where the peninsula's largest seedling date palm plantation exists; thus, they would have known the palm. Mexican fan palm seeds were likely first carried to the island for ornamental planting along with dates in Cedros Town.

The objective of this study is to survey the status of the date palm and the Mexican fan palm on Cedros Island. The intent is to document what island residents have known for a century, that beyond the limits of Cedros Town, date palms and Mexican fan palms are present in locations along the east coast and southern portion of the island in steep canyons where natural springs exist.

Materials and Methods

Published references to palms on Cedros Island are casual and vague. The Wikipedia entry for Cedros Island is a good example: "…springs on the island are usually marked by groves of palm trees" Without geographic locations or palm identity the statement is of low scientific value. The only reliable data point found is an herbarium specimen voucher (US 16147) of a pistillate date palm collected on Cedros Island by the Smithsonian botanist Joseph N. Rose in 1911. The exact collection location is unrecorded, but a note on the herbarium sheet states, "Introduced only 1 plant seen." This statement has weight, coming from a professional botanist who was on a dedicated botanical collecting expedition, and suggests that palms were indeed rare on the island at the time.

Although a visit to Cedros would have enhanced this study, travel and field work expenses precluded that option. An alternative was to search for published material, online archives, and accessible still and video film imagery to compile a state-of-knowledge benchmark.

Regarding the value of photographs and videos for this research, palms are seldom the subject of the images, typically making it difficult to discern details of the palms themselves (i.e., gender in date palms). Moreover, toponomy details are vague and geographic coordinates rarely provided. To the extent resolution permitted, Google Earth satellite imagery confirmed photographic evidence.

Admittedly, this study of exotic palms is limited to the southeast and southern portions of Cedros Island. A review of satellite imagery of the entire island was undertaken, but inconclusive because of low resolution and shadows in valley areas. However, additional small populations of palms may well exist elsewhere on the island.

Results

The frequency of cultivated and naturalized palms on Cedros Island serves to define primary and secondary locations, and respective sites within them.

Primary Locations (PL)

PL1. Cedros Town (28.10333300; ¯115.17194400). The first permanent settlement on the island was founded in 1922 when a fish cannery was built. As the town grew to its present population of about 1200, a few ornamental palms were planted to beautify the sere waterfront site. Contemporary photographs reveal various garden plantings of a total of 16 or more mature date palms along with a lesser number of Mexican fan palms (**Fig. 1**). Recently, Mexican fan palms were planted along Tepic Beach (Video 1 00:11). Given the documented earlier presence of the date palm, it was probably the first palm species planted in Cedros Town.

PL2. El Morro (28.03750000; ¯115.18694444). Created in 1967 as a company town in association with expanded sea salt transshipment facilities, El Morro is located about 6.5 km south of Cedros Town. Scattered date and Mexican fan palms landscape houses and commercial buildings; about 15 to 20 specimens of each palm are visible in online imagery (Videos 2, 3).

PL3. Aguaje Vargas (28.14333333; ¯115.22972222). Its location is marked on some maps. The largest of the island's springs sits at an elevation of about 610 m on the western slope of Mount Cedros, about 8 km from Cedros Town. It was developed in the 1920s as the town's primary water source through a pump, a series of cisterns, and surface piping. A resident caretaker managed the water source, and a fruit garden was planted around it which today includes about a dozen mature date palms with some bearing offshoots (**Fig. 2**). The palms are discernable on Google

1. Cedros Town, Cedros Island, Mexico. Visible are ornamental date palms and Mexican fan palms. © 2019, courtesy of Israel Baxin.

Earth imagery. Two young trunkless Mexican fan palms are at Aguaje Vargas (Video 4 22:09). A vista from above the spring shows its date palms (Video 5 15:19) and close-up views of the palm grove (Video 5 23:08).

PL4. Aguaje de la Palma. (28.11805556; ¯115.18055556). This spring is located on the island's east coast in a side canyon up Cañada Honda, about 518 m from the sea but not visible from it. An historically important potable water source, its location is marked on some maps. Images of the spring reveal a cluster of four or five mature date palms (Online photos 1). Water seekers visiting the spring may account for the presence of date palms.

PL5. Aguaje la Palmita. (28.12416667; ¯115.17472222). Also occasionally called Vizcaino's Spring on some maps it is on the east coast at the mouth of a steep canyon at the water's edge. This historic spring is the most visible and best known on Cedros (**Fig. 3**). During Spanish colonial times it was an easily accessible water source and today is a popular anchorage for pleasure boats. A

2. Aguaje Vargas, Cedros Mountain, Cedros Island, Mexico. Date palms in a fruit garden at the spring site. 2019, courtesy of Israel Baxin.

cluster of at least eight mature date palms, some with offshoots, grows around the spring. Humans likely introduced these palms.

Secondary Locations (SL)

These locations of mostly date palms occur as one to a few specimens at other sites along the east coast, as well as in canyons leading down from Mount Cedros. The toponomy of coastal locations is approximate but can be refined with Google Earth geographic coordinates, which is not so inland where excursion video locations are imprecise.

SL1. Ojo de Agua, a 4.2 km tourist hiking trail from Cedros Town stretches north along the shore and goes up a canyon to a spring. At about 90 m elevation a trail photo shows two mature date palms and an offshoot, as well as a Mexican fan palm (Online photos 2). Human use of the spring as a water source may account for the presence of the palms.

3. Aguaje la Palmita, Cedros Island, Mexico. This spring has a long history as a water source. © 2019, courtesy of Nasheli Baxin.

SL2. In another canyon just north of Cedros Town, at (28.10333333; ¯115.18944444) a mature date palm is growing in the extreme environment of a steep rugged ridge (**Fig. 4**). The top of a second date palm is partially visible below it. Animals must have carried date seed to such an inaccessible and inhospitable site, where a small seep or spring sustains growth.

SL3. A secondary location related to Aguaje Vargas is higher in elevation with a smaller spring and abandoned waterworks. An abandoned dwelling and three mature date palms with fruits as well as offshoots are present (Video 5 1:17–1:51). Between this higher spring and Aguaje Vargas itself, an apparently spontaneous mature solitary date palm occurs (Video 5 2:53). Below Aguaje Vargas in elevation, along the waterworks, at least four spontaneous Mexican fan palms are present with seedlings around them (Video 5 25:24–25:53, 29:22) and in a background shot, a presumed spontaneous mature date palm (Video 5 29:31).

4. Canyon ridge north of Cedros Town, Cedros Island Mexico. Two mature date palms growing in an extremely hostile site. © 2023 iNaturalist Mexico, courtesy of Juan Cruzado Cortés.

SL4. East Coast. On the shore (28.19027778; ¯115.16055556), Google Earth imagery shows a sizable white structure, surrounded by vegetation including two mature date palms. Farther south, a smaller white-colored building (28.16527778; ¯15.15694444) is present at San Carlos which has three mature date palms growing nearby. Both sites appear unoccupied; no visible road access suggests they are fisheries related.

SL5. Cañada Hondo (28.11750000; ¯115.17777778). At its mouth on the shore an apparent fishing camp is visible, shaded by two mature date palms (**Fig. 5**) which give the Las Palmitas anchorage its name. Not the site of a spring, the palms likely survive by tapping ground water in the Cañada Hondo bed.

SL6. Aguaje del Ranchito. This spring is located on a hill north of Cedros Town, the site affording a view of the town below. Waterworks lead down the adjacent canyon slope. A single date palm (Video 6 17:04), three trunkless individual Mexican fan palms (Video 6 18:49; 18:54), and a mature date palm with offshoots (Video 6 21:58) are seen. The palms' presence could relate to waterworks activities.

5. Las Palmitas anchorage, Cañada Hondo, Cedros Island, Mexico. © 2016, courtesy of Randy Fraser, Online Cruising Guide.

6. Aguaje Número 1. Spring above Cedros Town, one of the town's major former water sources. Note the aboveground water pipe at the top of the image. © 2019, courtesy of Nasheli Baxin.

SL7. Aguaje Número 1. (Manantiales de aguas cristalinas) A spring above Cedros Town is surrounded by about eight date palms (**Fig. 6**). Present are: mature date palms with offshoots (Video 1 11:58, 13:16); two mature date palms (Video 1 17:23); a group of three mature date palms (Video 1 18:32); and another of six mature dates with offshoots (Video 1 24:18). A frame extracted from Video 1 shows spontaneous growth of a small Mexican fan palm and a trunkless date palm (**Fig. 7**). As with the previous location, waterworks activities might account for the palms; no evidence of settlement exists.

SL8. Sorpresa Aguaje Nuevo. This "surprise" spring is located up a canyon from the Torreon neighborhood of Cedros Town. Huerta del Gato, a fenced private fruit garden with a cluster of trunkless date palms (Video 7 3:49), and two mature date palms grow near uninhabited structures in a valley basin (Video 7 19:19). A spontaneous solitary date palm seedling struggles to survive on a bank of rock debris (**Fig. 8**)

SL9. Laguna de la Toma Vieja. A vehicle and foot trek up a canyon to an old reservoir near Cedros Town, with springs and waterworks below it. Two mature date palms with offshoots are at an abandoned house accessible by road (Video 8 4:55) and a cluster of spontaneous date palms is at a higher elevation (Video 8 10:53).

SL10. Subimos al Oasis del Pacifico Norte Mexicano is a spring above Cedros Town with waterworks extending below. A cluster of mature date palms and two mature Mexican fan palms occur at an abandoned house site (Video 9 6:43).

SL11. Maravilloso Aguaje (also popularly called Aguaje de Catarina). A hike down a canyon toward San Augustine fishing camp is documented in Video 10. Spring sites sustain a cluster of three date palms bearing ripe fruit with offshoots (Video 10 13:15) and four dates with offshoots (Video 10 13:58). Visible at lower elevations are waterworks along with an abandoned camp building, but without palms present.

The video imagery examined in this study reveals extensive waterworks in the respective canyons. These appear neglected, no doubt the result of construction in Cedros Town of a desalinization plant in 2016 which provides an alternative source of freshwater.

Discussion

This study confirms about 105 date palms (*Phoenix dactylifera*) and 35 Mexican fan palms (*Washingtonia robusta*) naturalized and invasive on Cedros Island (one of the Pacific Islands of the Baja California Peninsula Biosphere Reserve) just off the west coast and about halfway down Baja California, Mexico. Most frequently, these palms occur at current or former habitation sites and in association with waterworks. Speculatively, palm seeds were dispersed from those locations into more remote uninhabited sites by water, gravity, or animal means. Where palm

7. Canyon above Cedros Town, Cedros Island, Mexico. Spontaneous growth of Mexican fan palm (foreground) and date palm (background). © 2025, photograph extracted from Ivan Versatil Video 1, frame 17:52.

8. Canyon above Cedros Town, Cedros Island, Mexico. Spontaneous solitary date palm seedling. © 2025, photograph extracted from Ivan Versatil Video 7, frame 14:39.

seeds encountered a favorably moist environment, they germinated, grew, and naturalized. The evidence presented of palms growing and naturalizing on Cedros covers the southeast coast and southern portions of the island and is incomplete. More remotely sensed and field data are needed to determine the extent to which exotic palms occur elsewhere on the island. The present results are a first step, newly recording for Cedros Island the cultivation and naturalization of these two invasive palm species within the Baja California Peninsula Biosphere Reserve.

A postscript. Four young ornamental palms are growing beside the small airport terminal in El Morro (Video 11 3:29). These are tentatively identified as the queen palm (*Syagrus romanzoffiana*), a common ornamental. Native to temperate regions of seasonal rainfall in southern South America, it is unlikely to become invasive on Cedros.

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