

Date Palm Growing in South Texas

DENNIS V. JOHNSON AND JANE C. MACKNIGHT

The historic vegetation landscape of South Texas, the area south of San Antonio, contained many exotic plant species, including the date palm (*Phoenix dactylifera*). It was likely the first exotic palm to be planted in what is now Texas. Because local conditions are amenable, the palm can naturalize and persist, as it has in Baja California Sur, Mexico and Peru. Historic evidence of naturalization in the Rio Grande Valley is a spontaneously occurring date palm with offshoots growing along a canal in McAllen, shown in a postcard image from about 1907 (**Fig. 1**). Also, what were described as *wild dates* grew at La Lomita Mission in the present-day city of Mission, in 1907 (Oblate n.d.).

Only sporadic documentation could be found about the date palm's history in South Texas, in the form of technical reports, newspaper articles, old postcards and photographs, and local archival research material, which we fleshed out with field visits and interviews. Just three technical reports were published exclusively on date palm growing trials (Mortensen 1946, Wood 1942, Wood and Mortensen 1938).



1. Naturalized date palm on water supply canal, McAllen, TX. Postcard, circa 1907.

The objective of this study is to describe how the date palm reached Texas, its growth in home and farm gardens, use in landscaping, and the attempts to grow it from seed and offshoots as a commercial fruit crop. It is hoped that this historical account sheds light on the continued presence of date palms in the South Texas landscape and provides a reminder to temper optimism with scientific investigations in any effort to develop an exotic commercial crop in a new location.

This study represents the sixth and last in a series of investigations documenting historic attempts at commercial date production beyond the present locus of the United States date industry in Riverside and Imperial counties in California and Yuma County in Arizona. The initial study looked at noncommercial date growing in Arizona (Johnson et al. 2002), followed by Death Valley and Inyo County in California (Johnson et al. 2016), the Lower Colorado River Valley (Johnson and MacKnight 2019a), Borrego Springs in California (Johnson and MacKnight 2019b), and Florida and Georgia (Johnson and MacKnight 2021).

Date Palms in the New World

Domesticated in the Fertile Crescent of present-day Iraq, the date palm tree is an ancient Old World fruit crop, widely cultivated on a large scale today in the Middle East and North Africa. In date fruit cultivation, a clear distinction is made between seedling dates, those propagated from seed, and standard varieties propagated by separating offshoots from female or pistillate palms (or in a few cases male or staminate palms) or nowadays often via tissue culture. Female dates grown from seed produce fruit of variable characteristics and quality. On the other hand, vegetative propagation of standard variety female palms bear fruit that are true to type.

During the 1500s, as an element of their conquest and colonization efforts in the New World, the Spanish introduced date palms into modern Latin America in the form of seeds, and the palm was grown in the Caribbean, Mexico and Peru. By the mid-1500s, dates were growing in gardens of Central Mexico. Motivation for the introduction of the date palm was to provide food from a familiar fruit that stored well. It may also have been grown as a source of leaves, to celebrate Christian religious services on Palm Sunday (Rivera et al. 2013).

From their administrative headquarters of Mexico City, the Spanish expanded control into the vast northern expanses of New Spain. Colonization was a military-religious undertaking: soldiers to protect the advancing entourage and to establish territorial control through the building outposts, and Spanish missionaries to create agricultural settlements to attract indigenous people and convert them to Christianity. A basic component of each Spanish mission was food production: grains and vegetables, livestock, and fruit orchards of grapes, olives, figs and dates, where climatic conditions allowed.

To gain effective control of the northern reaches of New Spain involved creating three corridors of settlement.

The Eastern Corridor began in 1577 in Saltillo, Coahuila, extending north and then northeast into present-day Texas, crossing the Rio Grande at a point 35 miles (56 km) downstream from present-day Eagle Pass. This route is also referred to as El Camino Real and continues through to San Antonio and on into present-day Louisiana. Between 1682 and 1793, a chain of Franciscan mission settlements was created across the southern half of Texas including in the Rio Grande Valley (Dunmire 2004, Wright 1996).

The Central Corridor followed along the plateau in Mexico through El Paso and into New Mexico in the period 1598–1680. Temperate climates and higher elevation there precluded cultivating crops like dates, citrus, and figs.

The Western Corridor was active from the 1680s, lasted for more than a century, stretching north into Sonora, Arizona, and Baja and Alta California. Dates were among the tree crops introduced by the Franciscans at settlements along the route, reaching present-day San Diego, California in 1769 (Trent and Seymour 2010).

Date Palm Arrival in Texas

Date palm seeds are undocumented among the Old-World crops carried north along the Eastern Corridor to establish mission settlements in Texas. However, evidence exists to suggest that seedling dates were introduced to the Rio Grande Valley via this route. Mission San Juan Bautista (present-day Guerrero, Coahuila, Mexico), founded in 1700, is located about four miles (6 km) from the Rio Grande, and became known as the Gateway Mission into Spanish Texas. In 1727, an inspection of the mission noted the presence of a large orchard, enclosed within an adobe wall, with figs and other trees. A later inspection in 1756 mentions irrigated orchards, but without identifying the tree types (Weddle 1968). Photographs from the 1960s (Weddle 1991) and 1970s (Eaton 1981), portray the San Juan Bautista parish church with a mature date palm in its courtyard. An analysis of Google Earth/Streetview imagery of Guerrero from April 2009, reveals that the date palm next to the church no longer exists; however, the images of the town confirm five locations with garden-grown date palms, for a total of eight palms, two only a few years of age. It is known that when date palms are introduced into a favorable environment, they readily become naturalized, and unless intentionally exterminated, become a permanent feature in the landscape, self-propagating by offshoots and often seeds. The current presence of date palms in this small village of about 1,000 residents could be a remnant of introductions made in the 1700s.

At present, dates are grown in the oasis of Viesca, Coahuila, another mission site from 1731, located about 245 miles (394 km) southwest of Laredo. Google Earth / Streetview imagery from

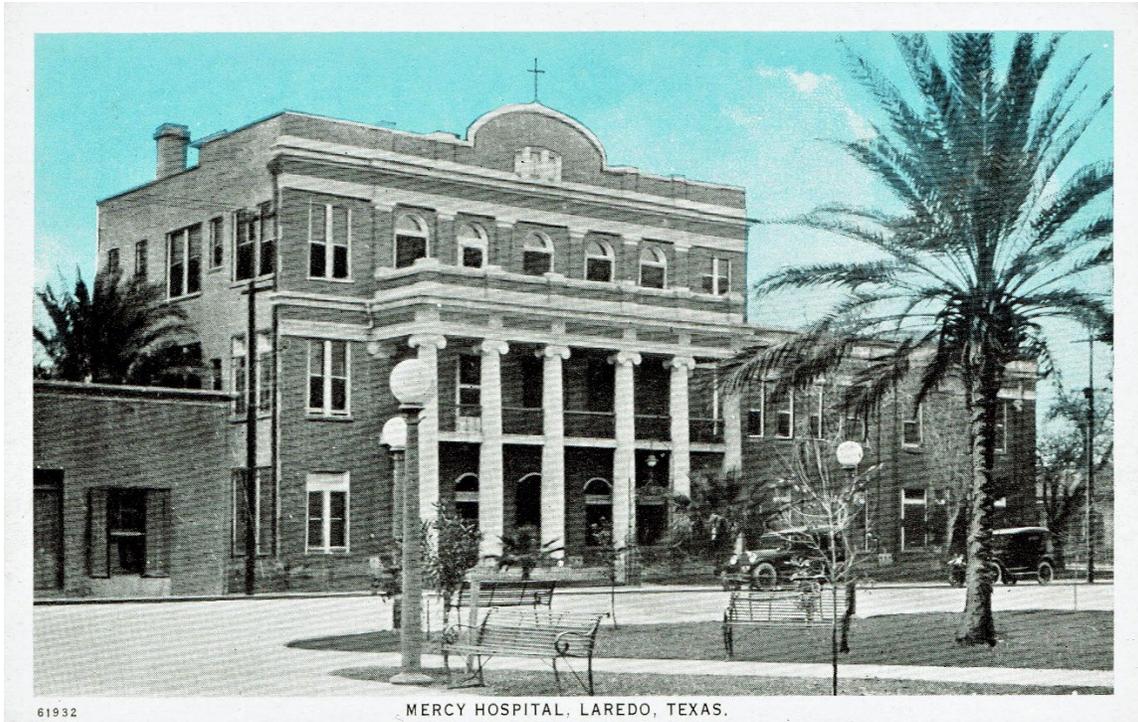
October 2014, reveals the presence of mature date palms in home gardens, a city park and as street plantings. Also, a commercial date plantation exists in Viesca, Ejido Bilbao, established in 1981 (Ortiz-Uribe et al. 2019). These examples suggest an historical association between the date palm and the Eastern Corridor through Coahuila state, which represents the most likely source of the first date palm introductions to the Rio Grande Valley, probably in the early 1700s.

The Spanish missions are the most likely historic source of dates in Texas; however, in 1731 Spanish Canary Islands immigrant farmers (10 families, 56 individuals) were brought to San Antonio directly from Tenerife via Vera Cruz, Mexico. From Vera Cruz, the immigrants travelled on foot north along the Eastern Corridor, passing through Saltillo and the Mission San Juan Bautista, and the current Winter Garden District, to their destination. In San Antonio, immigrants received grants of land and grew maize, beans and squashes, and raised livestock; fruit trees such as peaches were reportedly grown in the 1760s. Conditions were favorable to date palm growing in San Antonio; the palms were likely familiar to the immigrants because they were a cultivated exotic tree crop in their home islands (Santana and Rodríguez 1999). Conceivably, the Canary Islands immigrants could have had a hand in early introductions and cultivation of the date palm (Cox 1901, Dunmire 2004, Stuntz 2015).

Jumping ahead a century or so, from the Texas perspective, anecdotal evidence indicates that date palms were present both north and south of the Rio Grande early in the 19th century, or possibly before. Specific early evidence of date growing on the Mexican side comes from an unlikely source: then Lieutenant Colonel Robert E. Lee, in a letter to his wife, mentions seeing date palms among other fruit trees on a visit to Matamoros on December 20, 1856 (Stambaugh and Stambaugh 1954). At the time, Lee was serving in Texas as head of the U.S. Army's Second Cavalry engaged in efforts to pacify the Comanche Indians. Harvey Stiles (1908) ran a nursery in Raymondville, about 45 miles (72 km) northwest of Brownsville. An experienced traveler to northern Mexico, he speculated that dates had been grown in the Rio Grande Valley on the American side for 50 years and on the Mexican side, in Matamoros, for a century. Ernest Mortensen (1946) concurred that dates had been grown in South Texas for 50 years or more.

The American botanist Charles Sargent (1893) noted that a date palm in Laredo, Texas was bearing about a bushel of fruit, purportedly the first record of date fruit growing in the area. Jarvis Plaza, the main square in Laredo, had six date palms growing in its gardens in 1915 (LWT, 10-31-1915); a postcard photograph from about 1930 shows date palms (**Fig. 2**). Around the same time, in Nuevo Laredo, Mexico, date palms were prominently growing in historic Hidalgo Park (**Fig. 3**).

The eminent agricultural botanist and plant explorer Walter Swingle was the driving force behind the creation of a commercial date industry in the United States. In the 1890s and into the 20th



2. Ornamental date palms, Mercy Hospital, then on Jarvis Plaza, Laredo, TX. Postcard, circa 1930s.



3. Ornamental date palms, Parque Hidalgo, Nuevo Laredo, Mexico. Postcard, circa 1950s.

century, he played a key role in the USDA's importation of varietal offshoots from the Middle East and North Africa as the foundation for a date industry and provided the scientific basis for the undertaking by publishing a monograph on the crop. Swingle's studies (1901, 1904, 1928) focused on Arizona and California as having the best potential for fruit production, but also remarked that the Rio Grande Valley of Texas, from the Pecos River confluence near Del Rio to Brownsville, was suitable for date cultivation using standard varieties. Swingle singled out Fort McIntosh (present-day Laredo College) as having climatic conditions suitable for irrigated date growing but cautioned that occasional hard winter freezes could injure or even kill adult date palms. The noted British date specialist in Iraq, V. H. W. Dowson, one of the *fathers* of modern date growing, visited the Rio Grande Valley in 1926 and observed that conditions in terms of heat units were favorable for date culture, but that high humidity and rainfall precluded planting of common standard varieties (Pease 1928b). A newspaper article extolling the potential for dates as a new Texas fruit crop, referenced Swingle's work (BDH 5-23-1904).

Newspapers in South Texas ran numerous articles about the prospects of date growing. (Pease 1928a). At the 1904 International Fair in San Antonio, A. D. Childress attracted attention by exhibiting seedling date fruits he had grown in Brownsville (BDH 11-16-1904). That same year, a front-page newspaper article reiterated Swingle's optimism and emphasized that existing Texas seedling date palms could provide commercial fruit production (BDH 5-23-04). David Fairchild, USDA Bureau of Plant Industry, and noted plant explorer, visited the Lower Rio Grande Valley in 1906 and urged that offshoots of standard varieties be imported from Tunisia and Iraq for trials (SADE 4-29-1906). That same year, William Doherty (1906) described promising crops for the Rio Grande Valley and mentioned small quantities of date fruits already being produced and gave a Texas nod to Fairchild's suggestion of importing standard date varieties for trial. Also, about the same time, the USDA was distributing date seed in South Texas (SADE 3-28-07). An article on growing dates in Laredo (NYT 8-16-1907) mentions Harvey Stiles as a major proponent of date growing who recommended artificial pollination of the crop as a key means to achieve reliable commercial fruit yields. A specific example of the value of the practice is given of a date palm which bore 400 pounds (181 kg) of fruit. In South Texas by 1908, hundreds of date palms were grown, many bearing fruit (LWT 6-28-08).

In San Antonio, an 18-foot-tall palm, planted around 1897, was bearing heavy fruit clusters in 1908 (SAE 9-30-1908). A few years later in 1915 dates ripened on a seed-grown tree in the Main Plaza, one of many date palms then grown around San Antonio. A large date palm on the south side of City Hall was expected to yield 200 pounds (91 kg) of dates in 1924 (SAE 9-24-1915, 8-31-1924). An undated postcard of a narrow street in La Villita, an early neighborhood of San Antonio, features a date palm (**Fig. 4**).



4. Date palm at entrance to La Villita, San Antonio, TX. Postcard, circa 1940.

The Alamo Mission in San Antonio is the most iconic site of Texas history, marking the 1836 struggle for independence from Mexico. The city's first commercial center developed around the plaza facing the mission. During the late 1880s, new garden beds were planted in Alamo Plaza (Smith 1966). In 1911, the grounds fronting the old post office at the north end of the plaza featured six date palms; the last one was removed and transplanted to a city park in 1926 (SAL 7-27-1926.) During a major renovation of Alamo Plaza in about 1919, the primary garden bed was landscaped with a double row of small date palms; a post card from the mid-1920s shows the trees a few feet in height (**Fig. 5**). The dates thrived in the plaza and bore fruit until the palms were killed by a freeze in 1930 (SAE 9-19-24, 1-23-1930). The date palms were not replanted in Alamo Plaza, but elsewhere in San Antonio dates were described as flourishing in the parks and plazas (SAE 9-3-1939).

Commercial Date Production in Texas

The initial success of commercial date growing in Arizona and California after about 1900 utilized imported offshoots of standard varieties from North Africa and the Middle East. By 1925, California registered date fruit production of 320 tons (290 mt) from 740 bearing acres (299 ha)



5. Date palms in Alamo Plaza Gardens, San Antonio, TX, Federal Building and Post Office in background, circa mid-1920s. Used with permission, Library Special Collections, University of Texas, San Antonio, TX.

(Hodel and Johnson (2007); at that time production in Arizona was comparatively minor. These favorable advancements sparked strong interest in commercial production in Texas.

A state horticultural association meeting in Brownsville in 1909 included a presentation on date palm culture by W. H. F. Goome of the U.S. Plant Introduction Garden, Brownsville (BDH 1-5-1909, USDA 1911). A fruiting seedling date palm in Brownsville from about 1910 is shown in **Figure 6**.

Harvey Stiles, in addition to promoting artificial pollination to improve fruit yield, also backed the importation of standard variety offshoots for commercial growth (DESA 10-13-1906; Stiles 1908, 1911). Technical accounts from horticulturists and state agricultural experiment stations promoting dates as a new tree crop were echoed in several South Texas newspaper accounts.



6. Heavily fruiting date palm, Brownsville, TX. Postcard, circa 1910.



7. Flowering date palms, Corpus Christi, TX. Postcard, 1910s.

Fired up by the USDA's interest, date palm enthusiasts convened in Laredo, calling for a survey to determine which standard varieties were best suited to local climatic conditions and to boost commercial cultivation (LT 5-21-1926). John Nance Garner from Uvalde, a U.S. Congressman, 1902–1933, before becoming Vice President, 1933–1941, was a strong proponent of commercial date growing in Texas. Garner was instrumental in the importation of the Amir Hajj variety dates from Iraq in 1929 by inserting a special item in the USDA appropriations bill to cover the expenses of a collecting trip by Roy Nixon of the USDA Indio, CA to Iraq, and shipping costs of the offshoots (Pease 1929)

Meanwhile, the planting of seedling dates continued to be advised into the mid-1920s in Texas. Harvey Stiles's Nursery, advertised some 3,000 3-year-old plants at a cost of \$1.50 each (APP 9-17-26). Such promotions must have contributed significantly to the substantial number of seedling dates present in later years. Around 1910, locations where seedling dates were being grown for fruit and ornamental purposes included Beeville, Brownsville, Corpus Christi, Falfurrias and Rio Grande City (SADE 10-13-1906, Stiles 1911). Two date palms are shown in a postcard photograph from Corpus Christi, from the early 1900s (Fig. 7). Another postcard mailed in 1908 features a bearing date palm in Falfurrias, bagged to protect the ripening fruit bunches, evidence of the



8. Fruiting date palm with cloth bags protecting the ripening fruit, Falfurrias, TX. Postcard, mailed 1908.

advanced practices followed (**Fig. 8**). Also, in Frio County, beginning in 1914, W. O. Penn owned a farm south of Pearsall which grew vegetables and had an orchard with a half-dozen fruit tree varieties including the date palm (RC 11-29-1940) and in the 1920s the Dilley Growers Cooperative had a demonstration farm for dates, citrus and other fruit tree crops (SAL 1-9-1927).

In 1790, what is now the McAllen Ranch, located in the Rio Grande Valley about 32 miles (51 km) northwest of Edinburg in Hidalgo County, was founded and is one of the oldest continuously operated cattle ranches in the state. In the 1920s, experimental plantings of grapes, citrus, figs, olives, and dates were made, the same constellation of perennial crops that were an integral part of the Spanish mission agricultural systems. A small seedling date garden was present beside the ranch house and produced fruit in the 1940–1950s. The hard freezes experienced in 1983 and 1989 killed the date palms on the ranch (James A. McAllen Sr., pers. comm.).

The Winter Garden District

The Winter Garden District, north of Laredo, is made up of the core counties of Dimmit, Zavala, Frio, and La Salle and is known for its year-round irrigated vegetable production (Mortensen 1932). Dimmit was the most important of the counties in terms of agricultural production in the 1920s (Martínez 1995) and it played a leading role in the history of date growing in the state, based on seedling dates

The earliest record of a date palm in the Winter Garden District is from Dimmit County: a tall specimen growing in the front yard of the old Duncan Lammons Ranch in the 1950s, a few miles (km) south of Carrizo Springs. It was said to have been planted before 1880 with seed brought from Mexico (Williams 1960). The first recorded ornamental planting of dates in Carrizo Springs took place in 1915 on the courthouse grounds. Ten years later one of the palms bore 175 pounds (79 kg) of ripe fruit (CSJ 8-28-1925).

By 1910, date palms were among the principal fruit crops in Dimmit County, along with peaches, grapes, figs, plums, and berries (Texas Almanac 1910). Land development companies created several agricultural colonies in northeastern Dimmit County in the 1910–1920s to grow truck crops; examples are the Brundage, Bermuda, and Valley Wells colonies. To promote the settlements, rows of date palms were planted along the roads (Fitzsimmons 2018). The nearby colony of Palm was even named for the tree (Leffler 1995).

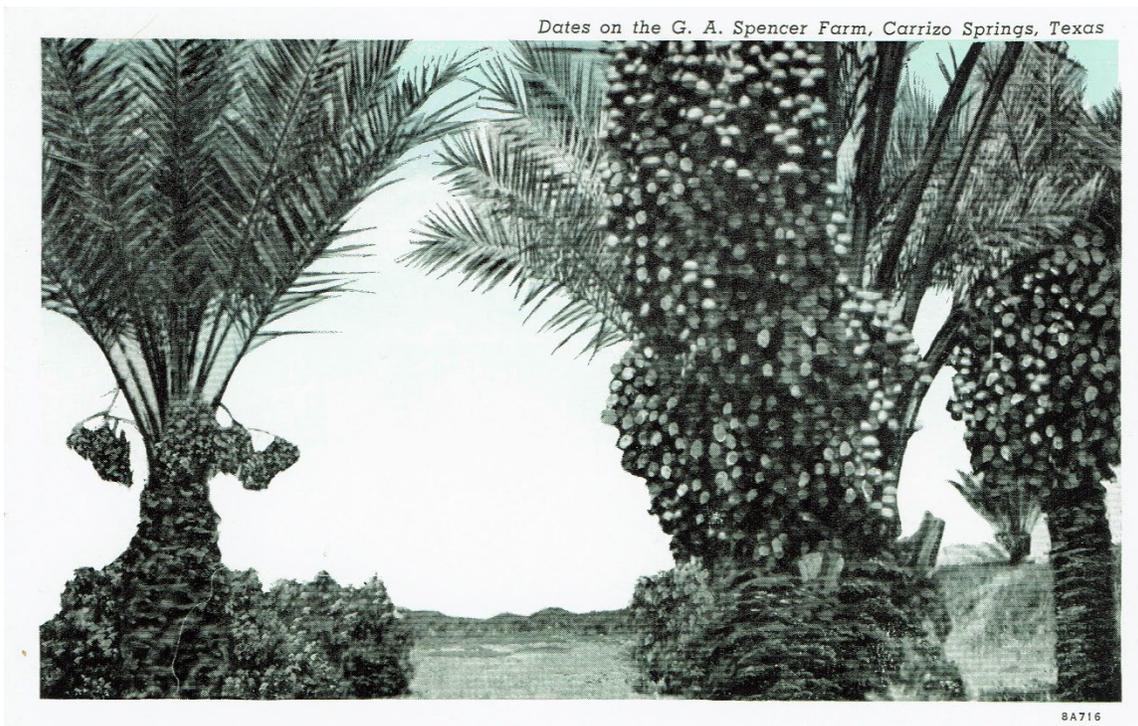
Albert Frey was one of the early date growers in the Winter Garden District. The 20-year-old Swiss immigrant arrived in Texas in 1908 and the following year purchased farmland a few miles (km) east of Carrizo Springs in Dimmit County (DCTR 1909, 1910; Texas Pass 1896–1951). Frey planted seedling dates in 1910 along with citrus and truck crops. Later photographic documentation of the date palms is provided in a newspaper article (KDT 11-13-1930) showing



9. Epps G. Knight of Dallas receiving a bunch of ripe dates at the C. W. Miller Farm, Carrizo Springs, TX in 1925. Used with permission of Dimmit County Public Library & Wade House Museum.



10. Date palms on the R. H. Price Farm, Carrizo Springs, TX. Postcard, mailed 1929.



11. Date palms on the G .A. Spencer Farm, Carrizo Springs, TX. Postcard, mid-1920s.

fruiting palms on the property, which appear to be about 20 years of age. Frey was enumerated as living on his farm in the 1920 census, but thereafter the property was purchased by C. W. Miller. The Miller Farm sold dates in San Antonio in the mid-1920s (BDH 9-5-1926) and was one of the sites visited by the Winter Garden Farms Inc., Excursion Parties in the period 1925–1928, organized to promote agricultural investment and settlement in Dimmit County. A 1925 photograph of date harvesting at the Miller Farm might derive from the November excursion of that year (**Fig. 9**).

The Miller Farm was sold to W. W. DeLange in late 1920s with the new owner providing the name Rancho de la Palma (CSJ 1-9-1930). A businessperson from Detroit, DeLange spent winters on the Rancho (VMS 8-25-1946) and improved the property and continued to produce small quantities of dates and citrus; in 1934 the Rancho had 140 date palms (GDN 3-28-1934, SAE 3-13-1932). DeLange owned the Rancho into the late 1950s. Images from 1940 of Rancho de la Palma can be viewed at the Pomona Public Library, Frasher Foto Postcard Collection, items F5204 and F5208 (<https://www.pomonaca.gov/government/departments/library>).

Another prominent seedling date grower in Dimmit County was the R. H. Price Farm (**Fig. 10**), two miles (3 km) east of Carrizo Springs, where 500 date palms were planted in 1911 (SAL 8-21-1921). In 1921, the Price Farm sold fresh dates, described as either yellow or red, in San Antonio, and said to be the first such fruit received there for commercial purposes. A postcard, likely from the 1920s, also shows bearing date palms on the G. A. Spencer Farm in Carrizo Springs (**Fig. 11**).

At the annual Texas State Fair in 1933, Dimmit County dates and citrus from Rancho de la Palma and other growers were awarded first premium for the eighth year in a row. It was noted that the Rancho received requests for commercial quantities of fruit, but they were unable to provide them (GDN 3-28-1934, ZCS 10-30-1931, 2-16-1934). The WPA Texas guide's entry for Carrizo Springs, written in the 1930s, states that local date palms bear heavily (Davis 1940).

Laredo Trials

Early in the 20th century the USDA entered into an agreement with August C. Richter, a Laredo businessperson and rancher, to establish an experimental plot of standard variety dates on a model farm he owned with his brother Charles Edward Richter on the Rio Grande just south of town (27.50° N, 99.51° W; 433 ft [132 m] elev.; Köppen BSh, warm desert climate). Charles Edward Richter travelled to California in 1907 to arrange for the shipment of 50 offshoots and date seeds for irrigated experimental trials (Charles Edwin Richter, pers. comm.). A photograph of the plot from early in the 1910s is shown in **Figure 12**. The USDA was also distributing free date seeds to Rio Grande Valley farmers at that time (SADE 3-28-1907). Silas Mason of the USDA visited the experimental garden in 1908 and found the date palms growing well (Boyden 1941, LAT 6-28-



12. Experimental planting of seedling dates, Richter Farm, Laredo, TX. Postcard 1910s.

1908, SADE 3-28-1907, Wilson 1907). Swingle travelled to Laredo in 1910 and noted the promising growth performance of the date palms on the Richter Farm (LAT 12-4-1910).

It was discovered in 1915 that the Laredo date trials were heavily infested with *Parlatoria* scale insect, accidentally introduced to the United States on imported offshoots in the 1890s, and a major pest in the early days of American date growing. To control its spread within the United States, a Federal Notice of Quarantine No. 6 went into effect on March 24, 1913, prohibiting the transport of date palms from the date-producing counties of Arizona and California, as well as Webb County (Laredo), Texas (USDA 1933). Successful treatments were conducted to eradicate the scale on the Richter Farm date palms and by 1919 no infestations were found. Follow-up field visits in 1924 and 1928 revealed no trace of the scale insect. It was noted that of the original 50 palms planted, 19 were alive and that they had produced 32 offshoots; 30 seedling dates were also counted (Boyden 1941). A 1932 news account states that a large crop of dates was expected from several hundred trees on the Richter property (DREN 8-9-1932), which is the last reference found concerning the Laredo date trials.

A 1932 USDA field survey for scale insect infestations also included a date palm survey of lands along the Rio Grande from Laredo to Brownsville (about 220 road miles [354 km]); a surprising

number of date trees (10,278) were inspected between the two points (Boyden 1941). The total likely included the six acres (2.5 ha) of dates reportedly planted in 1911 at an unidentified site in the Lower Rio Grande Valley (Texas Almanac 1911). The plant quarantine remained in force until 1936, when total eradication of *Parlatoria* scale insect was confirmed in the date-growing areas of the United States.

Weslaco and Winter Haven Trials

In the 1920s, as a precaution against the pests threatening dates, the USDA created five new planting sites, remote from the main production areas in Arizona and California, using pest-free offshoots of standard varieties to function as a repository of clean planting material for future expansion and to replace infested date palms that had to be destroyed. Along with sites in California, Arizona and Nevada, cooperative trials were created at the Texas Agricultural Experiment Station, Weslaco (26.16° N, 97.99° W; 79 ft [24 m] elev.; Köppen BSh climate), some 175 miles (282 km) downriver from Laredo (Swingle 1927,1928).

The light rainfall in the Lower Rio Grande Valley in the months of August/September as the date fruits ripened was acknowledged to be of major concern for commercial date production. With that in mind standard varieties were selected for Weslaco based on early fruit ripening before



13. Date palms at the Texas Agricultural Experiment Station, Weslaco TX, photograph from 1960/1970s. Used with permission of Museum of South Texas History, Edinburg, TX.

the rains, those which could tolerate a few rainy days during ripening and those in which fruit bunches could be cut early and then allowed to complete ripening under shelter.

Together with the offshoots, date seeds from the U.S. Date Garden, Indio CA in 1924 were germinated in the Weslaco nursery and planted out in 1926 (Texas Agr. 1926). Between 1926 and 1929, standard variety offshoots sourced from California, Arizona, and directly from Iraq (via Washington DC), were planted at the Weslaco Station. These adaptability trials involved 30 standard varieties, predominantly soft fruit types. The date palm served as a motif in the formal landscape design (Annual Report 1929) of the 120-acre Weslaco station, which was founded in 1923. About five acres (two ha) was devoted to the trials, which included seedling date palms. An undated photograph of mature date palms on the station is shown in **Figure 13**.

To diversify the date trials in Texas, another site was chosen, the Texas Agricultural Experiment station at Winter Haven (28.62° N, 99.86° W; 558 ft [170 m] elev.; Köppen BSh climate), Dimmit County, some 200 miles (322 km) northwest of Weslaco and seven miles (11 km) north of Carrizo Springs. The selection of Winter Haven was likely influenced by the modest success of seedling date gardens in the 1910/1920s in Dimmit County.

In 1932 offshoots were transplanted from Weslaco and Arizona to Winter Haven to establish another set of trials. **Table 1** identifies the date varieties planted at both sites.

By 1942, 196 date palms representing 25 standard varieties were in the ground at Weslaco (Wood 1942). Generally, the date varieties exhibited uneven annual flowering and fruiting but produced an abundant number of offshoots. In fact, none of the standard varieties fruited well in Weslaco (Nixon 1950). A major disappointment were the poor results with the Amir Hajj variety from Iraq, described as being rain-resistant in newspaper accounts (Pease 1929, Nixon 1950).

At Weslaco and Winter Haven, the rate of vegetative growth compared favorably with palms under cultivation in California and Arizona; the lack of fruiting of some varieties was believed to be due to differences in climatic and soil conditions. Results of the date palm trials at the two locations demonstrated that of the 30 standard varieties tested, the best results were achieved, as expected, with early season fruiting varieties which could be harvested before September rainfall. At Winter Haven, fruits began ripening in August in most varieties. Those best adapted to Winter Haven were the Amir Hajj variety, which showed better results there than it had in Weslaco, Hayany, Khadrawy, and Kustawy. Halawy, Koroch, Tadala, and Zahidi varieties also showed promise (Perry 1956). Dates produced at Winter Haven were marketable and in 1945, 2,000 pounds (907 kg) of date fruits were harvested (SAE 10-21-1945). At Winter Haven, date palm trials all but ceased in the 1940s, although the palms persisted into the mid-1950s (**Fig. 14**) (Perry 1956).

Table 1. Standard Date Varieties Grown Experimentally in Weslaco and Winter Haven, South Texas.

Variety Name / Fruit type: S – Soft; SD – Semidry; D - Dry	Origin and year introduced to USA*	Weslaco Station	Winter Haven Station
Allona S	Iraq 1929	0	X
Amir Hajj S	Iraq 1929	X	X
Ammary S	Tunisia 1905	0	X
Ashrasi SD	Iraq 1902	X	0
Badrayah (Bedraya) D	Iraq 1929	X	X
Bahrab S	Iraq 1929	X	0
Braim S	Iraq 1902	X	X
Dayri SD	Iraq 1913	X	X
Deglet Noor SD	Algeria 1900	X	X
Dubayni (Dubaini) S	Iraq 1913	X	0
Fursi (Fursee) SD	Iraq 1913	0	X
Halawy S	Iraq 1902	X	X
Hayany S	Egypt 1901	X	X
Jafari (Jaffary) S	Iraq 1929	X	0
Jozee (Jauzi) D	Iraq 1913	0	X
Khadrawy S	Iraq 1902	X	0
Khatuni S	Iraq 1929	X	0
Khisab (Khasab) S	Iraq 1929	X	X
Koroch S	Pakistan 1902	0	X
Kustawy S	Iraq 1902	X	X
Maktoom S	Iraq 1902	X	0
Okht Fteemy SD	Tunisia 1905	X	X
Safraia D/SD	Algeria 1900	X	0
Saidy S	Egypt 1901	X	0
Sayer S	Iraq 1902	X	0
Sukkar Nabat S	Iraq 1913	X	0
Tadala S	Algeria 1900	X	X
Tazizoot S	Algeria 1904	X	0
Thoory D	Algeria 1900	X	0
Zahidi SD	Iraq 1902	X	X

X = present; 0 = absent.

* The seven Iraqi varieties introduced in 1929 first arrived in Washington D.C. where the offshoots were quarantined and disinfected by heat treatment, then shipped to Weslaco and later Winter Haven; other varieties listed originated from progeny of earlier introductions into California.

Source: Mortensen 1946; Nixon 1950, 1957; Wood 1942; Wood and Mortensen 1938.



In addition to trials with standard date varieties, in the mid-1930s the Winter Haven Station grew thousands of seedling dates for an ambitious scheme by the state highway department to plant dates along major highways in Dimmit, Zavala, and Maverick counties (VMS 6-16-1933, WM 7-6-1934).

A final scientific study of the dates at Weslaco and Winter Haven was conducted to assess the different tolerances among varieties to *Graphiola* leaf spot, a fungus that attacks leaves and reduces fruiting capacity. A preliminary survey in 1949 was followed in 1957 by a detailed inspection. At Weslaco, the Kustaway variety was least infected, while at Winter Haven the varieties Jozee and Tadala exhibited only light infection; Nixon (1957) provided details about other varieties.

The Winter Haven Station was shuttered in 1972 with all research activities transferred to the Texas A & M Research and Extension Station in Uvalde; however, this did not include date palm research.

Kingsville Trials

The least known date palm trials in Texas took place in Kingsville, Kleber County, independent

14. Cover of brochure from the Texas Agricultural Experiment Substation, Winter Haven TX, showing date palms lining the station entrance. Located in northern Dimmit County, the station was closer to Crystal City, Zavala County, than Carrizo Springs, hence the signage.



15. King Ranch, Kleber County TX. Photograph showing date palms, circa 1960. Used with permission of Historicimages.com.

of the USDA. The King Ranch, founded in 1853, is located on the Gulf Coastal Plain, 35 miles (56 km) southwest of Corpus Christi. Around 1904 it had a two-acre (0.8 ha) ornamental seedling date garden near the ranch headquarters, described as having more male than female trees. A photograph from King Ranch headquarters area with date palms is shown in **Figure 15**. When interest in date palms picked up in the late 1920s, the King Ranch obtained offshoots of the Deglet Noor variety from the University of Arizona and planted a 4-acre (1.6 ha) demonstration garden. The Ranch donated date palms to the recently opened Texas A & M University-Kingsville (TAMUK) (27.52° N, 97.86° W; 59 ft [18 m] elev.; Köppen Cfa, humid subtropical climate) for experimentation, as well as for ornamental plantings in the city of Kingsville (**Fig. 16**). In 1933, 24 additional offshoots were brought from Arizona for the TAMUK trials, consisting of varieties



16. Ornamental date palms, U. S. Post Office, Kingsville, TX. Postcard, circa 1960.

Halawy, Khalasa, Maktoom, Thoory, and others. A short course on dates was given at the college 1930–1932 with guest lectures by F. J. Criden of the University of Arizona and Colonel Dale Bumstead, a date grower from Phoenix (Frasier 1930; KR 7-3-1929, 5-17-1933; Lea 1957; Wilkinson 1929). The experimental date garden is noted in the WPA Texas guide entry for Kingsville (Davis 1940). No results of the Kingsville trials could be found.

In 1948, it was estimated that about 100 acres of dates were present in all of South Texas, mainly scattered plantings of seedling palms (Nixon 1951).

Discussion

Winter Haven and Laredo enjoy the best climate for irrigated date growing, in large part because the palms grown there are more precocious, and the fruits suffer less spoilage damage from rain and high humidity during the ripening phase (Mortensen 1946, Wood 1942, Wood and Mortensen 1938). An overall climatic assessment of the historic date trials conducted at Laredo, Weslaco, Winter Haven, and Kingsville shows that temperature conditions (heat units) at the four locations, are adequate over the fruit ripening season (August to November). The limiting climatic parameter is the number of rain days experienced during the four-month period; Winter Haven (Crystal City data) registers 15.4 rain days and Laredo 17.7. However, in an exceptionally rainy

year, such as 1933 in Laredo, date fruits experienced heavy damage (BBP 9-26-1933). Over the same period at Weslaco, an average of 24.4 rain days are experienced, and at Kingsville 25.0. These climatic factors account for the somewhat better results achieved with date trials at Winter Haven. By comparison, at Indio, CA, the original home of the commercial American date industry, an average of only 3.2 rain days are experienced during the months of fruit ripening (www.bestplaces.net>climate). Apart from temperature and rainfall, South Texas experiences occasional protracted hard freezes, typically in December or January, which can damage or kill date palms.

Despite the negative results, the trials did indicate which date varieties did best under the climatic conditions found in the South Texas locations. Varieties like Amir Hajj were shown to tolerate some rainfall during the ripening period and still bear quality fruits. The empirical results from Texas could be used to guide attempts at date crop development elsewhere under similar climatic zones. Looking back, Roy Nixon (1971), who was directly involved with the Texas trials in



17. Date palms planted along an agricultural field, possibly as a windbreak, Crystal City, TX. Photographed January, 2020 by Jane C. MacKnight.



18. Carrizo Springs, TX, Dimmit County Courthouse with ornamental date palms. Photographed May, 2022 by Jane C. MacKnight.

Weslaco and Winter Haven, concluded that the experiments were abandoned because the state did not have a future as a commercial producer of dates due to climatic conditions.

Had commercial date growing become a reality in South Texas, beginning in the 1980s it would have faced a serious threat from lethal decline bacterial (phytoplasma: cell-wall-less bacterium) disease spread by leafhopper and planthopper insects. Both the date palm and the ornamental Canary Island date palm (*Phoenix canariensis*) are susceptible (Miller et al. 1980). Symptoms include fruit drop, leaf and root necrosis, and ultimately death. Treatment involves tree removal, quarantine, and antibiotic injection of healthy trees (Giesbrecht et al. 2014). In early



19. Carrizo Springs, TX. Vacant lot with dead and living date palms. Photographed May, 2022 by Jane C. MacKnight.

1983, when lethal decline was first described in Texas, a remote sensing survey counted a total of 26,392 ornamental *Phoenix* palms in the Rio Grande Valley (Ingle et al. 1983). This number was not broken down by species, but it is assumed that date palm represented an unusually high percentage.

Anecdotal evidence suggests that the losses from hard freezes in 1983 (Lonard and Judd 1985) and 1989, and lethal decline disease, killed many of the date palms in the Rio Grande Valley between Laredo and Brownsville, including the date trials at the Weslaco Station. Based upon field observations in January 2020 and May 2022, and a review of Google Earth imagery of

locations where dates were previously reported to be present, the population of date palms in South Texas has experienced a precipitous decline in the last 40 years.

Current Status of Date Palms in South Texas

The Winter Garden District today has the most living evidence of previous date growing. The dates present in Dimmit and Zavala counties likely derive from landscaping efforts with seedling dates from the 1930s. Both Crystal City (**Fig. 17**) and Carrizo Springs have a few dozen date palms in their urban landscapes (**Figs. 18–19**) and surrounding areas. The Bel-Asher House in Asherton, eight miles (13 km) southeast of Carrizo Springs, apparently has been landscaped with date palms since construction in 1910 (**Fig. 20**). The land, which was the site of the former Winter Haven Experiment Station, was sold to a private party in 1982 and is currently farmed. A recent photograph (**Fig. 21**) shows relict date palms along the old station's entrance that survive without receiving care. The farms located east of Carrizo Springs mentioned earlier that grew seedling dates in the early decades of the 20th century no longer exist because of urbanization. Of the dates palms planted at the 1920s agricultural colonies in northeast Dimmit County, none survive.

At present, scant evidence remains in the Rio Grande Valley of the early plantings of dates for landscaping, backyard fruit production, and experimental trials. No date palms are present at the Weslaco Station. Ornamental date palms—lost to hard freezes or disease—have been replaced with the preferred climatically hardier and more disease-resistant desert fan palms (*Washingtonia*), native Texas sabal palms, and other palms (Haney 2017). For example, North Main Street in McAllen was once lined on both sides with date palms, but they have been replaced by other palm species.

In Laredo, descendants from the USDA experimental date plantings on the Richter Farm in the early 1900s endure in irrigated pasture (**Fig. 22**). Along the thoroughfares between Laredo and Brownsville, a few mature ornamental date palms can be observed in the larger towns. Although most of the date palms are gone, they bequeathed a legacy in the form of a popular thoroughfare name. A cursory survey of street maps of towns and cities between the two points revealed 14 settlements with date palm street names.

North of the Rio Grande Valley, the formerly popular ornamental date palms today are difficult to find. A single mature date palm is growing in the town of Dilley, 70 miles (113 km) southwest of San Antonio, likely the result of a demonstration farm in the location a century ago. Date palms once adorned the streets, parks, and university at Kingsville, but none from the early plantings survive.



20. Bel-Asher House, Asherton, TX, ornamental date palms. Photographed May, 2022 by Jane C. MacKnight.



21. Former Winter Haven Experiment Station entrance showing relictual date palms. Photographed January, 2020 by Jane C. MacKnight.



22. Richter Farm, Laredo TX. Relictual seedling date palms from early 1900s experimental trials. Photographed May, 2022 by Jane C. MacKnight.

At the present time, South Texas is unsuited for commercial date culture, but nevertheless the palms can be grown for artisanal fruit production and landscaping, preferably in sheltered, south-facing locations. Date palms remain among the suggested ornamental palms for South Texas and are available from nurseries. Mature Medjool variety dates are recommended because they can withstand the occasional low winter temperatures. Instances of contemporary landscape date



23. Kingsville TX, recent planting of dates as street trees. Photographed May, 2022 by Jane C. MacKnight.

palms in South Texas, which survived the 2021 freeze, were observed at a motel in Laredo, an industrial park in Mission and in a recent street tree planting in Kingsville (**Fig. 23**).

Conclusion

Promoters of commercial date cultivation in South Texas were aware that climatic conditions were not ideal for the crop for two major reasons: unfavorable rainfall patterns during fruit ripening and occasional hard winter freezes. This adverse assessment is based upon current conditions. Twenty-first century global climate change is predicted to have an impact on South Texas, bringing about higher summer temperatures and lower precipitation amounts overall and creating dryer conditions more favorable to date palm cultivation under irrigation. However, rainfall patterns also are expected to become more erratic, and the winters harsher (Kort 2013). In this scenario, future conditions for commercial date growing in the state will continue to be doubtful. Nevertheless, with the advent of new date palm biotechnologies and the prospects of molecular breeding they bring, it may be possible to create new genetic varieties with greater tolerance to rainfall during the critical season of ripening.

Appendix

In 1890, 12 offshoots of unidentified variety originating from Egypt were shipped by the USDA from Tucson, Arizona to Nathan Spatcier, an agricultural entrepreneur in Las Cruces, New Mexico for trial planting. Las Cruces has an elevation of 3,900 feet (1,189 m) and a Köppen BWk cold desert climate; the palms did not survive the low winter temperatures (Toumey 1898).

Literature Cited

Newspapers (accessed via *NewspaperArchive.com*)

APP: Aransas Pass Progress
BBP: Brenham Banner-Press
BDH: Brownsville Daily Herald
CSJ: Carrizo Springs Javelin
DESA: Daily Express San Antonio
DREN: Del Rio Evening News
GDN: Galveston Daily News
KDT: Kerrville Daily Times
KR: Kingsville Record
LT: Laredo Times
LWT: Laredo Weekly Times
NYT: New York Times
RC: Rusk Cherokeean
SADE: San Antonio Daily Express
SAE: San Antonio Express
SAL: San Antonio Light
VMS: Valley Morning Star, Harlingen
WM: Weimar Mercury
ZCS: Zavala County Sentinel, Crystal City

Journals, Books

Annual Report. 1929. Texas Agric. Exp. Sta. Rep. 42: 27.

Boyden, R. L. 1941. Eradication of the Parlatoria date scale in the United States. USDA Misc. Pub. 133. Washington, DC.

Cox, I. J. 1901. The early settlers of San Fernando. Quart. Texas State Hist. Assoc. 5(2): 142–160.

Davis, J. F. (ed) 1940. Texas a guide to the Lone Star State (WPA). Hastings House, New York.

DCTR. 1909, 1910. Dimmit County tax rolls.

- Doherty, W. 1906. And nothing but the truth: achievements of farmers and truck growers. *Gulf Coast Mag.* 2(2): 33–47.
- Dunmire, W. W. 2004. *Gardens of New Spain*. University of Texas Press, Austin, TX.
- Eaton, J. D. 1981. Guerrero, Coahuila, Mexico: a guide to the towns and missions. *Index Texas Archaeology*, Vol. 1981, Art. 25.
- Fitzsimons III, H. A. 2018. *A rock between two rivers*. Trinity University Press, San Antonio, TX.
- Frasier, C. K. 1930. College to experiment with dates. *Kingsville Record*, 10-15-1930.
- Giesbrecht, M., G. Schuster, and K. Ong. 2014. Date palm lethal decline in Texas landscapes. *Texas A & M Agrilife Ext. Pub.* EPLP-012, 6/14.
- Haney, J. 2017. History of the palms, McAllen Texas. Facebook South Texas History Public Group, December 9, 2017.
- Hodel, D. R. and D. V. Johnson. 2007. Imported and American varieties of dates in the United States. *Univ. Calif. Agric. Nat. Res. Pub.* 3498. Oakland, CA.
- Ingle, S. J., J. B. Kreasky, M. R. Davis, and W. G. Hart. 1983. Remote sensing survey of palms with respect to suspected lethal decline in South Texas. *J. Rio Grande Hort. Soc.* 36: 35–39.
- Johnson, D. V., E. Joyal, and R. K. Harris. 2002. Date palm varieties in Arizona. *Fruit Gard.* 34(5): 6–9; 26.
- Johnson, D. V., J. C. MacKnight, and S. Zona. 2016. Date palms of Furnace Creek Ranch and China Ranch in Inyo County, California. *Fruit Gard.* 48(5): 6–15.
- Johnson, D. V. and J.C. MacKnight. 2019a. A history of date palms in the Lower Colorado River Valley. *J. Southwest* 61(4): 863–879.
- Johnson, D. V. and J. C. MacKnight. 2019b. Date palms in the Borrego Springs, California landscape. *Palm J.* 219: 44–47.
- Johnson, D.V. and J. C. MacKnight. 2021. Historic cultivation of date palm (*Phoenix dactylifera* L.) in Florida and Georgia. *Palms* 65(3): 147–154.
- Kort, W. 2013. *Climate change impacts on agriculture in the Rio Grande River Basin*. Center for Water Policy, University of Wisconsin, Milwaukee.
- Lea, T. 1957. *The King Ranch*. Little Brown, Boston.

- Leffler, J. 1995. Palm, TX Handbook of Texas. Texas State Historical Association.
<https://www.tshaonline.org/handbook/entries/palm-tx> Accessed: March 24, 2022.
- Lonard, R. I. and F. W. Judd. 1985. Effects of a severe freeze on native woody plants in the Lower Rio Grande Valley, Texas. *Southwestern Naturalist* 30(3): 397–403.
- Martínez, Jr. Q. 1995. The Winter Garden of southwest Texas: its development from 1884 to 1929. MS History Thesis. Texas A & M University, Kingsville, TX.
- Miller, M. E., M. E. Maxwell, and J. Amador. 1980. Lethal yellowing of *Phoenix canariensis* and *P. dactylifera* in the Rio Grande Valley. *J. Rio Grande Hort. Soc.* 34: 89–95.
- Mortensen, E. 1932. The Winter Garden Region of Texas. *Texas Agric. Exp. Sta. Circ.* 62, p. 28.
- Mortensen, E. 1946. Date palm culture in the Texas winter garden. *Texas Agric. Exp. Sta. Prog. Rep.* 1007.
- Nixon, R. W. 1950. Imported varieties of dates in the United States. *USDA Cir.* 834. Washington, DC.
- Nixon, R. W. 1951. The date palm - “tree of life” in the subtropical deserts. *Econ. Bot.* 5(3): 224–301.
- Nixon, R. W. 1957. Differences among varieties of date palm in tolerance of *Graphiola* leaf spot. *Plant Dis. Rep.* 41(12): 1026–1028.
- Nixon, R.W. 1971. Early history of the date industry in the United States. *Date Growers’ Inst. Ann. Rep.* 48: 26–30.
- Oblate, n.d. La Lomita: the mission that made Mission, Texas. <https://ost.edu/la-lomita-mission-made-mission-texas/>
- Ortiz-Uribe, N., R. Salomán-Torres, and R. Krueger. 2019. Date palm status and perspective in Mexico. *Agriculture* 9: 46. <http://dx.doi.org/10.3390/agriculture9030046>
- Pease, C. H. 1928a. More about the edible date palm. *Valley Farmer*, Mercedes, March 5, 1928.
- Pease, C. H. 1928b. Now, maybe we’ll grow dates. *Farm and Ranch*, Dallas, March 31, 1928.
- Pease, C. H. 1929. Offshoots of the Amir Hadj rain-resistant date shipped to the Valley Experiment Station. *Valley Farmer*, Mercedes, June 20, 1929.
- Perry, B. A. 1956. Welcome to the Texas Agricultural Experiment Station Substation No. 19, Crystal City, Texas. *Texas Agric. Exp. Sta. Misc. Pub.* 187.

- Rivera, D., D. Johnson, J. Delgadillo, M. H. Carrillo, C. Obón, R. Krueger, F. Alcaraz, S. Ríos, and E. Carreño. 2013. Historical evidence of the Spanish introduction of date palm (*Phoenix dactylifera* L., Arecaceae) into the Americas. *Genetic Res. Crop Evol.* 60(4): 1433–1452.
- Santana Santana, A. and J. M. Rodríguez Toledo. 1999. Introduction and Dispersion of *Phoenix dactylifera* in the Canarian Archipelago: Elements of Discussion. *Acta Hort.* 486: 297–302.
- Sargent, C. S. 1893. Notes. *Gard. Forest* 6: 400 (September 20, 1893).
- Smith, H. S. 1966. History of Alamo Plaza from its beginning to the present. M.A. Thesis. Trinity University, San Antonio, TX.
- Stambaugh, J. L. and L. J. Stambaugh. 1954. The Lower Rio Grande Valley of Texas. The Naylor Company, San Antonio, TX.
- Stiles, H. C. 1908. Semi-tropic fruits in Texas, dates. *Texas Dept. Agric. Bull.* 8, July–August 1908, pp. 238–240.
- Stiles, H. C. 1911. Hardy palms for Texas planting. *Texas Dept. Agric. Bull.* 22. November – December 1911, pp. 181–184.
- Stuntz, J. A. 2015. Spanish law and women in colonial Texas 1719–1821, pp. 30–52 *In*: Turner, E. H., S. Cole, and R. Shapless (eds.), *Texas Women: Their Histories, Their Lives*. University of Georgia Press, Athens, GA.
- Swingle, W. T. 1901. The date palm and its culture. *Yearbook USDA 1900.* pp. 453–490. Washington, DC.
- Swingle, W. T. 1904. The date palm and its utilization in the southwestern states. *USDA Bureau Plant Ind. Bull.* 53. Washington, DC.
- Swingle, W. T. 1927. Date growing: a new industry for the southeast states. *Yearbook USDA 1926,* pp. 302–305. Washington, DC.
- Swingle, W. T. 1928. Date plantings free from pests begun in irrigated southwest. *Yearbook USDA 1927.* pp. 274–276. Washington, DC.
- Texas Agr. 1926. *Texas Agric. Exp. Sta. 39th Ann. Rep.*, p. 81.
- Texas Almanac. 1910. Bexar, Colorado and Dimmit counties. *Galveston-Dallas News.* pp. 147, 168, 178.
- Texas Almanac. 1911. Texas date palms. *Galveston-Dallas News.* p. 204.

Texas Pass. 1896–1951. "Texas, Passenger and Crew Lists Arriving at Various Ports, 1896-1951", Database. *FamilySearch*. <https://familysearch.org> : 30 April 2021.

Toumey, J. W. 1898. The date palm. *Ariz. Agric. Exp. Sta. Bull.* 29. Tucson, AZ.

Trent, H. and J. Seymour. 2010. Examining California's first palm tree: the Serra palm. *J. San Diego Hist.* 56(3): 105–120.

USDA. 1933. Announcements relating to date-palm scale insect quarantine (no. 6, pp. 95–96). USDA Bureau of Plant Quarantine, Oct–Dec. 1932. Washington, DC.

USDA. 1911. USDA Bureau Plant Ind. Bull. 20. Washington, DC.

Weddle, R. S. 1968. *San Juan Bautista: gateway to Spanish Texas*. University of Texas Press, Austin, TX.

Weddle, R. S. 1991. *San Juan Bautista: gateway to Spanish Texas*. University of Texas Press, Austin, TX.

Wilkinson, W. L. 1929. Date palms successful in Kleberg County. *Kingsville Record*, 9-11-1929.

Williams, C. S. 1960. A history of Dimmit County, Texas. MA History Thesis. Sul Ross State College, Alpine, TX.

Wilson, J. 1907. The modern alchemist. *Nat. Geo. Mag.* 18(12): 781–794.

Wood, J. F. 1942. Date palm culture in the lower Rio Grande Valley. *Texas Agric. Exp. Sta. Prog. Rep.* 794.

Wood, J. F. and E. Mortensen. 1938. Adaptability studies with date palm in southeast Texas. *Amer. Soc. Hort. Sci. Proc.* 35: 231–234.

Wright, R. E. 1996. *Spanish Missions*. Texas State Historical Association.
<http://www.tshaonline.org/handbook/online/articles/its02>

Dennis V. Johnson and Jane C. MacKnight are consultants specializing in plant sciences.
djohn37@aol.com

Text © 2022 by D. V. Johnson and J. C. MacKnight.

Photographs © 2022 by the authors or each institution.

Publication Date: 15 June 2022.

PalmArbor: <http://ucanr.edu/sites/HodelPalmsTrees/PalmArbor/>

ISSN 2690-3245

Editor-In-Chief: Donald R. Hodel

Hodel Palms and Trees: <http://ucanr.edu/sites/HodelPalmsTrees/>