

Date Palm Weed Assessment

By Dave & Anita Reilly



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Abstract

In September 2010 the Rural Industries & Research Development Corporation [RIRDC] released a co-funded industry publication ‘Towards an Australian Date Industry’ which we co-authored. It is intended as a guide to parties considering an entry into date farming, and others with an interest in this field.

In December 2010 the Invasive Species Council of Australia’s Feral Herald claimed the date palm was “already causing massive weed problems”. It was critical of RIRDC for its funding of R&D in the emerging date industry and for its failure to attach a caution outlining “potential weediness of new plant species” to the report.

Understandably the Feral Herald response stirred some anxiety among industry stakeholders. It caused government funding agencies to question ongoing support.

In this paper we review the extent of the alleged weed problem by identifying several national sites of historic date palm introductions to report on current status of actual on-site weed infestations, if any. Some of these introductions occurred in the 19th century with the oldest being documented in 1836. Given the many decades in which the date palm has had the opportunity to establish itself as a weed in our Australian landscape, this paper serves to measure and report on current-day date palm populations to analyse actual on-ground weed status.

It also provides some background in correct species identification, species characteristics, favoured growing environments and provides comment on weed risk factors associated with growing this plant species. Listed are some of the benefits of further developing the Australian date industry which include providing new economic opportunity in rural communities, providing crop alternatives for farmers to adopt to climate change, added food security and the supply of a highly nutritious food to support growing populations.

About the Authors

Dave and Anita Reilly are leading figureheads in the Australian date industry. They have been successful in importing world best genetics and establishing a nursery operation to distribute plant material. They are dedicated fruit growers who run evaluation trials on a wide range of varieties for the purpose of determining best commercial selections.

Dave and Anita work with many growers and institutions throughout Australia including state/territory agricultural agencies, business houses, waste water producers and student groups. Their work has been recognized internationally with receiving the Khalifa International Date Palm Award for Best New Development in Abu Dhabi in 2010.

Dave & Anita both hold a Diploma in Horticulture and an Advanced Diploma in Agriculture. They received the Rural Press South Australian Primary Producer of the Year Landcare award in 2007/08. In 2012 Dave was awarded a Nuffield Australia Farming Scholarship which enabled four months of international study of date production throughout USA, Mexico, UK, Spain, Egypt, Kuwait, Oman, India and United Arab Emirates.

Dave served two full terms (5 years) on the South Australian Murray Darling Basin Natural Resource Management Riverland Group. One of the group roles included working with field officers in prioritizing and managing weed species in our NRM region (date palm was not one). Dave has some professional experience in assessment of the critical factors in determining and controlling weed species.



Figure 1: Dave & Anita Reilly receiving the Khalifa International Date Palm Award, Abu Dhabi 2010 from H.H. Sheikh Nahayan Mubarak Al Nahayan

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Introduction

From time to time we are queried about the potential for the date palm to become a weed threat. On surveying how many times this issue of weed risk has been raised during our 20 year career with this plant species, we would say that during the first 10 years we have no recollection of this issue being raised. During the past 10 years this question has occasionally been raised, generally by an audience member during question time at one of the various presentations around Australia at which we are invited to speak.

Up until recently we were unaware of any published research or newsprint articles discussing date palms as a weed risk. However in December 2010 the Feral Herald (Invasive Weed Council of Australia) printed an article in response to the release of the Rural Industries Research & Development Corporation (RIRDC) co-funded industry publication 'Towards an Australian Date Industry' of which we were co-authors. <https://rirdc.infoservices.com.au/downloads/10-174>

The Feral Herald article describes the date palm as “already causing massive weed problems”. The article is critical of RIRDC investment into R&D funding of the emerging date industry and the fact that there is no caution outlining “potential weediness of new plant species” in this industry report. http://issue.com/invasivespeciescouncil/docs/feral_herald_edition_26/1?e=0

The release of the Feral Herald article has stirred some anxiety amongst industry stakeholders and some self assessment by government into the continuation of support for this emerging new industry.

Now that this issue of potential weed risk is in the public eye and may well influence future investment and participation in the Australian Date Industry, we feel the need to contribute this paper detailing our observations and knowledge of this plant species. We do examine claims made in the Feral Herald although our approach in writing this paper is aimed at going beyond the parameters raised in the article. We aim to provide a more comprehensive and diagnostic assessment, especially in relation to describing species characteristics in managed and unmanaged environments.

In addition to the criticism of the date palm industry by the Feral Herald, another palm species ‘Oil Palm’ (*Elaeis guineensis*) has generated much international negativity and protest surrounding large scale deforestation and displacement of endangered Orangutan populations in Indonesia and Malaysia. Perhaps the unfavourable media attention of the tropical oil palm species in South East Asia has somewhat increased environmental sensitivity to other palm species. Although the sub tropical fruit producing date palm is unrelated to the oil palm there may be a public perception of guilt by word association and that all palm named species are tarred with the same brush.

We do have industry business interests which are detailed below and we do unashamedly promote the Australian date industry. In saying that, we have tried to present this paper in a fair and balanced manner, detailing weed issues if and where they occur without exclusion.

We recommend if any individual, organization or agency is seeking an assessment of weed risk they may choose to engage an independent consultant without a perceived conflict of interest. We welcome others to use information included herein and hereby grant permission for reprinting any part of this document but would appreciate acknowledgement of photos and text used.

In this report we hope to provide the reader with some background in practical on-ground examples of the capacities, thresholds and invasiveness of this plant against a range of different environments and management scenarios.

Business Interests

The Reilly family own and operate Gurra Downs Date Company Pty Ltd based in the Riverland of SA. Our activities include:

- Operating a date palm nursery of elite varieties
- Running a variety evaluation R&D trial site
- Operating a commercial date fruit production farm
- Promoting and developing the date industry
- Growing organic wine grapes, pomegranates and figs

Although our farm is not open to the general public we do host on a pre-arranged basis many property visits from local, national and international farmers, researchers, scientists and tourists. We also accept many invitations for guest speaking roles which affords opportunity to travel around Australia and internationally to engage with other agriculturalists and land managers.

Our proudest achievement is our success in importing world renowned date palm genetics originating from countries such as UAE, Saudi Arabia, Oman, Egypt, Morocco, Iraq and Algeria. Some of these varieties are selected for unique varietal characteristics which may for example be suited to cooler climates or early ripening fruit. These new to Australia varieties have helped extend the geographical footprint where dates can successfully be produced. For the first time we are beginning to see fruit produced from managed irrigated farms along the Murray Darling River system, QLD, NSW, VIC, SA, Swan River WA and other semi arid and Mediterranean climate areas. Previously thought had only been given to date production occurring in the isolated deserts of the arid interior.

Gurra Downs Date Company has distributed plant material to locations in each state and territory in Australia with the exception of Tasmania. Primarily we supply date palms to fruit growers, however we also supply to landscapers and garden enthusiasts who feature this handsome tree in prominent positions within suburban parks and gardens. Palms are also supplied to industrial waste water sites where the desired outcome is the utilization of industrial waste water outputs. Other uses include wind shelters and restoration of alkaline and saline areas.

The result of this wide geographic distribution of the date palm may not be compatible with those suspecting this plant could be a potential weed risk. It is hoped that through this paper and after reviewing 175 years of date palms being present in Australia, the reader will agree there is minimal additional risk associated with industry growth in managed horticultural lands.

Consideration should also be given to the benefits gained in establishing a new agricultural industry that provides economic diversity in rural communities; provides farmers with greater capacity to adapt to a changing climate; and produces a highly nutritious, high-energy food.

We will cover the weed risk of these plantings in new locations at least in some detail in this report. Please note that all of our date palm nursery stock is DNA indexed, virus screened and issued with a Phytosanitary certificate, inspected and cleared by AQIS. Each plant shipped interstate is issued with a Plant Health Assurance Certificate through Biosecurity SA for interstate movement of plant material. Location and farmer contact details for every date palm purchase is recorded.



Figure 2: Gurra Downs date plantation, Riverland SA (*Photo: A. Reilly, 2013*)

Industry Background

Date production is a very large international agricultural industry. 40 countries participate in approximately 7 million metric ton of annual global production. 2006 FAO quoted 800,000 hectares of production area but recent unofficial sources are quoting area is up to 960,000ha (2011). Australia relies almost entirely on imported fruit – approx 7000 tonne per annum. Current production area in Australia is tiny with approx 150ha, although this number is growing.

The date palm is the oldest known domesticated fruit tree. Its exact origins are not entirely known due to distribution of palms over many millennia. Some sources say the date palm evolved in ancient Babylon whilst others quote India and others again quote Persia.

The date palm holds a sacred place in the lives and cultures of indigenous people of arid and semi-arid regions around the world. This tree provides highly nutritious fruit which can be stored year round, provides shade, house building material, rope, tools, firewood and fodder for livestock - earning it the reputation as the ‘Tree of Life’ and ‘The Blessed Tree’. Largest producers include Egypt, Iran, Saudi Arabia, UAE, Pakistan, Algeria, Iraq, Sudan and Oman. New world producers are increasing production such as USA, Mexico, India, South Africa, Namibia and Australia.

Assessing date palms as a weed risk hazard

The starting point to assessing date palms as a weed risk is ensuring correct identification of the species. The true date palm *Phoenix dactylifera* has several look-alikes which are commonly mistaken for and referred to as date palms. We regularly receive email enquiry from people who send a photo of their backyard date palm wanting assistance in all manner of diagnostic and marketing services. You guessed it – more often than not, the tree is not the true fruiting date palm *Phoenix dactylifera*.

Identification

It is important to begin by identifying and describing characteristics of some of these palm species.



Figure 3: Kings Park, Perth (Photo: A. Reilly, 2007)

This photo is taken in Kings Park Perth and provides an opportunity to compare 3 palm species side by side. From right to left, the first palm is *Phoenix canariensis* or Canary Island date palm. This is the species most commonly mistaken or described as a date palm. The second palm is a *Washingtonia filifera* or cotton (or fan) palm and the third in line (with man looking at) is *Phoenix dactylifera* or true fruiting date palm.

Distinguishing Features

Date palm *Phoenix dactylifera* – is the only palm to produce an edible fruit. Its canopy is sparse with an open frond arrangement which allows sunlight penetration through to the understorey. Foliage colour is blue-green. Trunk is usually thinner and more petite than *Phoenix canariensis*.

Often palms are seen with offshoots (suckers) growing from the base or even higher up on the trunk (aerial offshoots). Offshoots commonly grow on younger palms but when the tree matures it no longer produces any more offshoots.

The palms will either be male or female, distinguished only by the appearance of the flowers. If the palm is a female then fruit maybe present. Whilst this palm does grow in a wide range of climates it prefers sub tropical, hot and dry inland regions.

Commercial production requires a climate with very low summer/autumn rainfall as ripening fruit is prone to spoilage by rain. This limits geographical footprint for commercial production.

Canary Island palm *Phoenix canariensis* – thick, heavy canopy of dark green foliage which cannot be seen through, providing total sun block out at understorey level. Fronds have huge thorns (200mm long) at base. Leaf ends are soft in comparison to those of *Phoenix dactylifera* which are sharply pointed. *Canariensis* has a thick heavy robust trunk, does not produce offshoots but massive seed production which can usually be seen germinating around base of tree. Female palm produces large clusters or bunches of fruit. This fruit is small with very little flesh between skin and seed. Seed resembles a coffee bean in appearance. Fruit has no commercial value.



Figure 4: Canary Island palm growing on riverbank in the city of Perth 2013
(Photo: D. Reilly, 2013)

The Canary Island palm is widely used as an ornamental landscaping plant and is wide-spread throughout almost every town and city in Australia; often seen in parks and town gardens and readily available from nurseries; will grow from tropical to temperate climates in close proximity to coastlines, rivers and water courses. Canary Island palms are much more common than *Phoenix dactylifera*. The Canary Island date palm has been reported to be a weed problem. An internet search identifies weed issues in the Blue Mountains (NSW) and Pacific Islands.

Washingtonia/cotton (or fan) palm – canopy comprises fan shaped leaves which shed a fibre around its margins resembling strands of cotton, hence its name. Trunk is smoother and palm is well suited to hot dry climates. This species is less likely to be confused with the true date palm but it does happen rarely.

Other palms - there are other palm species including *Phoenix sylvestris* or sugar palm which at times is incorrectly referred to as a date palm. The population base of this species is much smaller so no further defining and describing is necessary. To help describe how easily confusion can occur, we have in recent years witnessed two other unusual palm species here in Australia and we understand this occurrence is also increasing in other countries.

This peculiarity began in the same way with two separate fruit growers, one from Mildura and one from the Riverland, who had quite a few years earlier identified dates as a lucrative crop and decided to try growing a few. Both went to their local supermarket and purchased Medjool date fruit imported from the USA. After consuming the flesh of the fruit they planted the seed which germinated and grew strongly for a number of years. In the case of the Riverland grower, when the tree fruited, the resulting fruit didn't resemble the Medjool date and was inedible.

After the grower showed us the fruit and the tree it became apparent that the seed he germinated some years earlier was not a true *Phoenix dactylifera* but was actually a hybrid. The practise of using another pollen source is used by some growers. In this case sugar palm (*Phoenix sylvestris*) pollen had been used. In the case of the Mildura grower the Medjool seed he started with was a hybrid of *Phoenix canariensis* x *Phoenix dactylifera*. When we saw these palms they exhibited both *dactylifera* and *canariensis* traits. In fact hybrids had been created. There is discussion in the international palm community that these hybrids need to be named as a new species as they are becoming more common.

The reason for date growers using other species for pollination maybe to gain the advantage of shortening the fruit ripening period or perhaps they just ran short of *Phoenix dactylifera* pollen that season.

Correct species identification is absolutely necessary when assessing possible weed threat because each palm species has a different profile. It is unfair to generalize assessment between commercial fruit palms and ornamentals.

Explanation of the propagation of the date palm *Phoenix dactylifera*

Date palms can be grown from seed but every seed (even if *Phoenix dactylifera* x *Phoenix dactylifera*) is a brand new variety for its DNA is crossed from a combination of female and male DNA contributions – a bit like people. Each one varies eg. Individual fingerprints, and there is a lot of variation.

It is undesirable to establish a commercial fruit producing plantation from seed as resulting fruit quality will be highly variable. Furthermore, approximately 50% of seedling palms will be non-fruiting males when only approximately 5% of males are required.

Date palms can also be multiplied from the offshoots which grow from the trunk. These are genetically identical to the parent tree so can be relied on to produce same fruit characteristics. Offshoots of elite varieties have been highly valued and used to upgrade plantations for centuries and are still used for this purpose today.

In recent decades modern micro propagation techniques have been developed to produce large numbers of plants with desirable traits. This is the main way in which modern plantations expand as plant material is readily available. This method which generates plants in sterile aseptic conditions has minimal risk associated with disease and insect spread which can otherwise occur through trading offshoots from plantation to plantation. No genetic modification occurs.

A single date palm will either be a male or female. Both need to be present and flowering at the same time to achieve successful natural pollination. A single female palm which may have germinated in unmanaged lands cannot set fruit and viable seed without another palm of the opposite sex being in the neighbourhood. At best it can only grow offshoots which will eventually if left unmanaged, grow into a clump. Without another palm of the opposite sex seed will not be viable, limiting ability to spread.



Figure 5: Date palm with offshoots (Photo: D. Reilly, 2010)

Regardless of whether a date palm is generated from seed, offshoot or tissue culture, it generally looks the same, grows at the same speed and fruits with similar yield ability. From a commercial fruit production point, input costs are the same in regard to water, fertilizer, labour etc to grow fruit which is only worth \$2/kg and for fruit of elite premium varieties worth perhaps \$20/kg. This is what drives the desire to obtain best commercial varieties.



Figure 6: Date palm with fruit – a palm can produce up to 200kg per palm annually
(Photo: D. Reilly, Oman, 2012)

Before the fruit fully ripens to usually a brown colour it has some colour changes. It starts out green and changes (dependent on variety) to yellow, orange, red or even purple. There are many different and brightly coloured variations during the semi ripe stages but it can still be identified as the true date palm *Phoenix dactylifera*.



Figure 7: Red and yellow khalaal dates (Photo: D. Reilly, 2012)



Figure 8: Male flower
(Photo: D. Rosenzweig, 2006)



Figure 9: Female flower
(Photo: A. Reilly, 2013)

In the following section we provide some historical accounts of date palm introductions from as far back as 1836 and review the current spread or infestation based in the immediate area surrounding the site of these early introductions. The purpose of this is to provide the reader with examples from which they can draw their own conclusions of risk factors for this plant species to become a major weed.

Addressing Feral Herald Article

Reviewing claims made in the Feral Herald 26/12/2010, the author claims the RIRDC report ‘Towards an Australian Date Industry’ should have a section on pest risk. ‘Had one have been included in this report it would have noted date palms have been assessed as a high impact invader in Western Australia’.

We are not sure where this claim has been generated as we are unaware of any such declaration. Certainly the issue has never been raised throughout the years in which Gurra Downs Date Company Pty Ltd (GDDC) has worked with WA state government agencies in supplying date palms *Phoenix dactylifera* into WA.

The Feral Herald article presents a bleak date palm future with statements like “massive weed problems date palms are already causing”, “A new crop... could become a major weed in inland Australia”, “infestations that formed vast impenetrable thickets on riverbanks and wetlands”, “exacerbating bushfire risk”, “highly invasive tree that spreads easily by dingoes or even water birds or humans”.

In referring to the RIRDC report “Towards an Australian Date Industry” which we co-authored, the Feral Herald article contends “It is difficult to believe the report’s authors are unaware of the weed problems”.

The question we ask is “how big is this weed problem now?” What is the extent of their distribution and how does this compare to other weed species? How wide is the distribution and how bad are their impacts? What is their priority weed status? Whilst we believe we know the answers to these questions we decided to do some further research.

A Google search guided us to the relevant government website. The Department of Environment maintains a list of “Weeds of National Significance” where 32 species are listed (last updated 2012). The date palm does not appear on this list. The Department also maintains an additional ‘National Environmental Alert List’ where a further 28 species appear – but the date palm is not amongst them. The Department maintains a third level “Sleeper Weed List” but again the date palm doesn’t warrant a mention.

Further to this, all of the 56 Natural Resource Management Boards and Catchment Management Authorities who are responsible for regional weed issues do not have any restriction on this plant species being grown in their regions.

After further research we found a report on Climate Change and Invasive Species which reviewed interaction of a workshop held in Canberra (November 2006). This workshop was attended by highly qualified individuals from prestigious institutions including CSIRO, Dept of Environment and Heritage, AQIS, Primary Industries Victoria, Universities of Griffith, Wollongong, Macquarie, Tasmania and Western Sydney, Dept of Environment and Conservation, Bureau of Rural Science, Biological Diversity Advisory Committee, National Parks and Wildlife, Weeds Cooperative Research Centre.

<http://www.environment.gov.au/resource/climate-change-and-invasive-species-%E2%80%93-review-interactions-%E2%80%93-november%202006%20workshop%20report>

The report covered climate change, invasive species and increasing fire threats to name a few. It identified an extensive list of major weed species however date palms did not rate even one mention. It beggars belief such an eminent panel drawn from a cross section of prestigious institutions could overlook the naming of date palms if indeed the date palm represents a serious weed threat to the Australian natural landscape.

We have not yet visited Millstream to see palms there but based on the Feral Herald article content we make the following comments. There is no doubt that prior to recent management actions it was fair to describe these palms as a weed infestation. The slow growing nature of the date palm means it would have taken many decades, perhaps even a century for palms to reach this height.

Park management actions have since destroyed all female palms so no more fruiting/seed generation can occur. Judging by the 100 or so male palms remaining, they too could easily be destroyed if desired. A chainsaw cut through a trunk takes only minutes and a palm does not re-shoot.

The male palms were left at the Millstream site due to community support to maintain a date palm population for heritage reasons. For this reason it is difficult for us to classify this example as a genuine weed infestation. Instead we see a well managed national park which has adopted a practical approach to removing the risk of further seed set by leaving non-fruiting males with heritage value to be enjoyed by park visitors.

The definition of a weed is ‘a plant in the wrong place’. If the remaining palms are desired by community because of their heritage value then this site can no longer reasonably be exhibited as a weed infestation. No doubt there will be some viable seeds left on the ground that will continue to germinate over time. It will be necessary to destroy new seedlings regularly or at least before they flower at approximately five years of age.

The Feral Herald also quotes Dalhousie Springs/Witjira National Park in Far North South Australia as having a palm weed problem. We do not dispute that of this one site. We do however conclude that the article lacks balance and is uncaring about presenting the full truth. Perhaps the author was in too much haste for a racy headline.

We cover the Dalhousie/Witjira weed issue in some detail in this report but before we do this, it is important to analyse the sites of the first introductions of date palms into Australia. Given these palms have been in our landscape for over 175 years there has been ample opportunity for them to escape into the environment and become a weed issue. A lot can be learnt from reviewing these early accounts of introduction, to understand the date palms behaviour, limitations and invasiveness.

In 1996 when our family first decided to grow date palms on our Riverland SA horticultural property there was very little local knowledge of cultivation available and no commercial date plantation nearby. The closest plantation was in Dave’s former home town of Alice Springs which we frequented regularly.

Jim and Trudy Luedi of Desert Fruit Co (Central Australia) were fantastic in sharing cultivation information and we are grateful to them and to the Arid Zone Research Institute (AZRI) staff who were also very helpful. Alice Springs is 1500km north of the Riverland and there was at that stage still some uncertainty as to whether Riverland growing conditions would be suitable for successful date production.

This uncertainty sent us travelling in all directions to look at date palms. We figured by inspecting as many palms in as many locations as possible, we were likely to learn about their characteristics and ultimately their ability to produce commercial fruit in the Riverland. So usually with 4 kids in tow, we

would spend school holidays driving dusty outback roads to retrace the footsteps of historical date palm sites.

Originally we were just looking at palms to see signs of fruit or potential disease issues or insect infestation but as we visited more and more sites around Australia we also became very interested in the stories behind these numerous historical plantings. So much so, that we have been documenting these stories with the intention of publishing them at some point in the future.

Twenty years on and just when we think we have heard of every last account of importation and cultivation, along comes another historic account out of the blue. We will remain patient for a while longer in the hope that we do indeed discover all accounts prior to releasing the “History of Date Palms in Australia” publication. With weed assessment in mind we revisit some of these sites.

Early South Australian introductions

In August 2013 when touring Kangaroo Island we visited the site of the old Kingscote foreshore garden. To our surprise the signage gives description of date palms which arrived on the ‘Solway’ on July 27th 1836 and were planted in the garden, flourishing along with almonds, mulberries and carob. Famously an old original mulberry tree still lives. This is the earliest known documented account of date palm importation we know of, some 177 years ago.

After an extensive look throughout the garden and township we did not observe any date palms *Phoenix dactylifera*. If there were any remaining palms they would have been very tall and very noticeable. We consider the climate of Kangaroo Island to be unsuitable for date production because they ideally require a hot climate.

We were surprised date palms were even included originally but understand the value the colony placed on this high energy fruit which can be stored all year round. We did however observe many Canary Island palms throughout the island which are thriving and have proven to be more adapted to this climate than the true fruiting date palm *Phoenix dactylifera*.



Figure 10 : Kingscote, Kangaroo Island (Photo: A. Reilly, 2013)

The next oldest documented date cultivation comes from Tanunda in the Barossa Valley. Quite by accident a friend of a friend discovered a booklet on early Tanunda history in a German library. The text was translated into English and we discovered an account from a Lutheran missionary who made favourable comments on the wide range of fruits grown in the local garden.



Landscape view from the "Palmenthal" orchard.

Figure 11: Tanunda in the 1880's' by Wilhelm Wendlandt

This booklet contained a sketch of a date palm in the 1880's. We estimate at the time of the sketch the date palm in this cool climate could already have been around 15 years old. There was no mention of where seed or plants were obtained. The original garden was over an extensive area that has since been subdivided into a farmhouse and a town park.

We are good friends with the owners of the farmhouse who have historic photos showing there were at least six palms alive some 40 years ago. Amazingly there are still two of these palms alive in what is now the town park. There are also still pear and fig trees bearing fruit at this site today.

These palms are believed to be the oldest documented, living palms in Australia and we also suspect the tallest.



Figure 12: Tanunda palms
(Photo: A. Reilly, 2008)

When we discovered this account and looked at the palms we could see that one had converted to a thicket of unmanaged offshoots which may not have had any pruning or attention for well over a century

With assistance from Barossa and Light Council we tidied up the palm clump by removing offshoots and taking back to the original single trunk so it can be enjoyed again by park users. Some offshoots were relocated back to the farmhouse to ensure longevity of this palm.



Figure 13: Before..... *(Photo: D. Rosenzweig, 2006)*



Figure 14: After..... *(Photo: D. Rosenzweig, 2006)*

These palms have had ample opportunity over 150 years to escape into the environment and become a massive weed problem. However not one date palm is growing wild anywhere around the park grounds or creeks running through surrounding lands.

The same cannot be said about the wild olive trees which have totally infested both sides of the creek running alongside and are now springing up in the parkland. In fact when we pruned back the mass of old palm fronds we discovered an olive tree had established itself within the date palm thicket.

The conclusion we draw is that in this Barossa Valley environment the date palm is not an invasive plant species. On the other hand the olive trees have proven to be much more invasive and aggressive than the slow growing date palm.



Figure 15: Note olive tree trunk out-competing date palm clump (*Photo: D. Rosenzweig, 2006*)



Figure 16: Tanunda palms and wild olives (*Photo: A. Reilly, 2013*)

Hermannsburg Mission, Northern Territory

Hermannsburg Lutheran Mission 130km west of Alice Springs is the earliest documented site of a date plantation in the Northern Territory. These palms were established in the 1880's from seed which was sent by Baron von Mueller, Director of the Botanic Gardens in Adelaide.

There has been continuous occupation of the site. The mission school and church operated over many decades and there is a fantastic legacy of photographic history which has been collected. These photos allow for some monitoring throughout the decades, providing some indication of the date palm population.

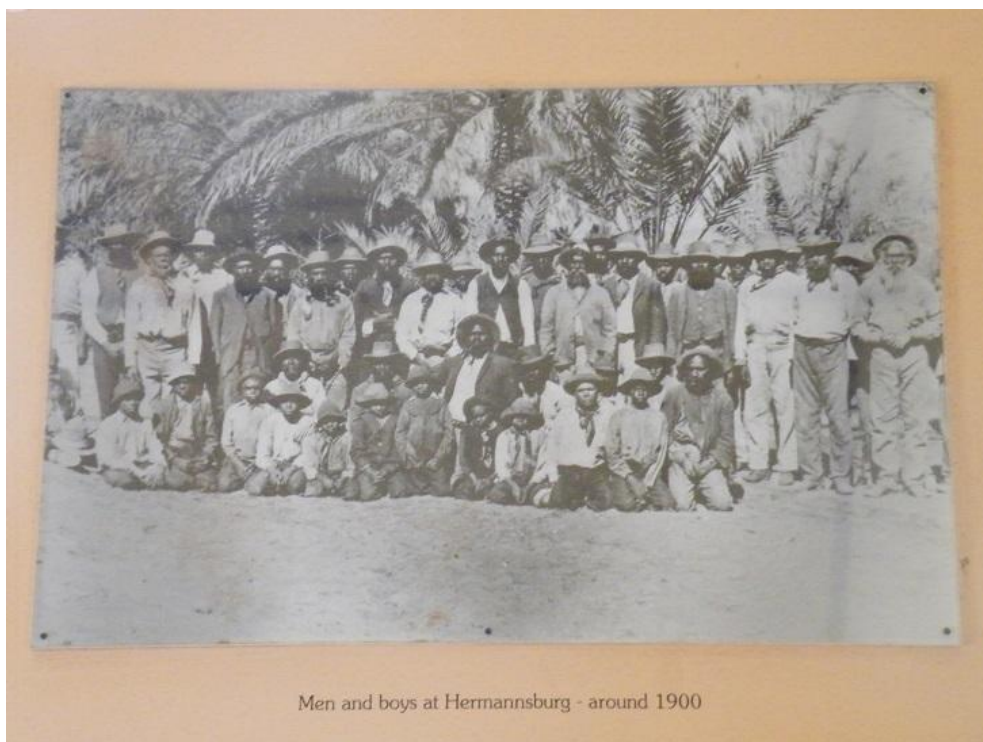


Figure 17: Hermannsburg date garden, circa 1900

We have visited this site several times in recent decades and can report that the total population of palms doesn't seem to have noticeably changed. We estimate perhaps 3-4 dozen palms and judging by historic photos this has not dramatically changed over a century.

We have other historic photos of these palms in full fruit and can conclude that at this site on the Finke River floodplain there is no evidence either by spread of seed or growth of thicket that date palms have become an invasive weed problem.

Upon close examination of Figure 18 you may notice blackened palm trunks. These palms are prone to regular bushfire events as the introduced Buffel Grass is now the dominant plant species throughout much of this landscape. It presents a far greater widespread bushfire risk than do isolated stands of slow growing date palms.



Figure 18: Hermannsburg date garden - on close examination you may notice Buffel Grass in foreground *(Photo: A. Reilly, 2012)*

Lake Harry/Hergott Springs

The next location for weed assessment is a date palm project initiated and run from 1884-1916 by the government of the Colony of South Australia. In June 1884 discussions were taking place in Parliament about opening up agriculture around the state. As part of this process it was decided to plant date palms in the far north alongside the overland telegraph line.

Seeds were germinated at the botanic gardens in Adelaide and then sent to Hergott Springs (now Marree) where they were irrigated from a bore. Thousands of palms were planted and in a short number of years the first fruits proved to be very encouraging. Every year a report of their progress was tabled in the South Australian Parliament.

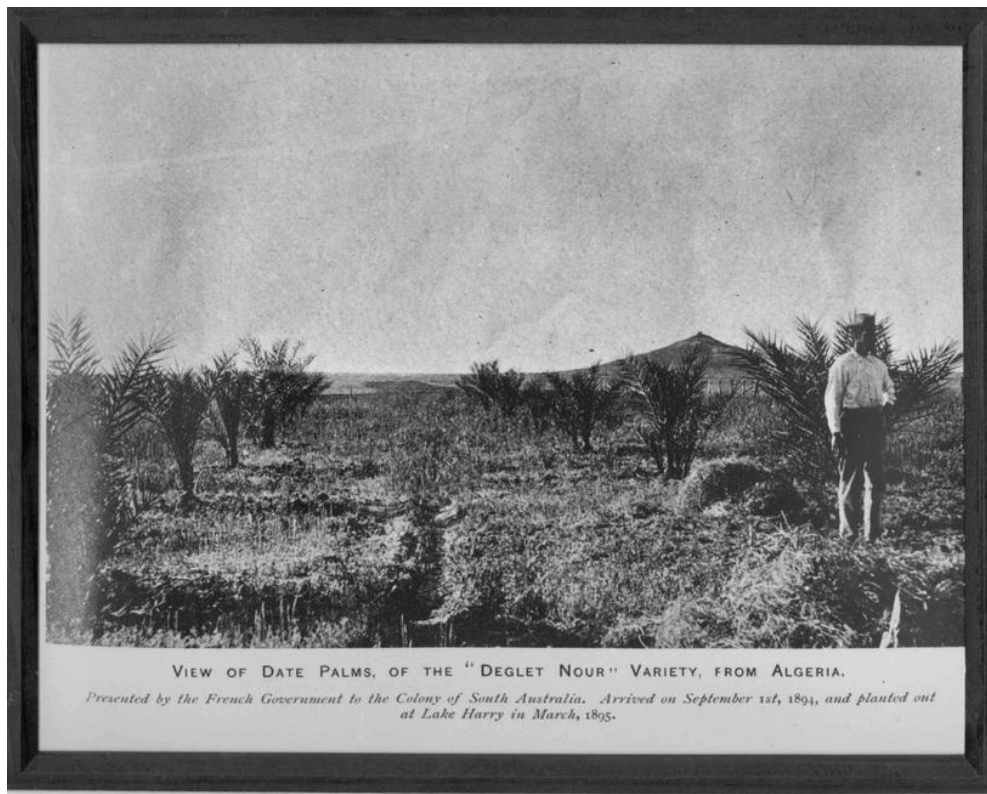


Figure 19: Lake Harry plantation

After this initial success it was determined by government that elite varieties should be grown. In 1891 an Afghan man from Marree was commissioned to sail to Karachi to purchase and import best varieties. The following year 236 offshoots arrived and were transported to Hergott Springs.

There was a great deal of information sharing between the Colony and the French Government as the French with their Saharan territory were authorities on date production. In an exchange for some of our Eucalypt and other native plant species the French government gifted 100 Deglet Noor date palms and several males. 50 of these were shipped to NSW to be grown and 50 to Lake Harry, 20 miles from Hergott Springs.

As Hergott Springs was now fully planted up more land for this project was gazetted at Lake Harry, Coward Springs and Oodnadatta where more date plantations were established. Hergott Springs and Lake Harry continued to provide excellent results with high quality dates being produced for 25 consecutive years, the fruit being sold locally and through Adelaide.

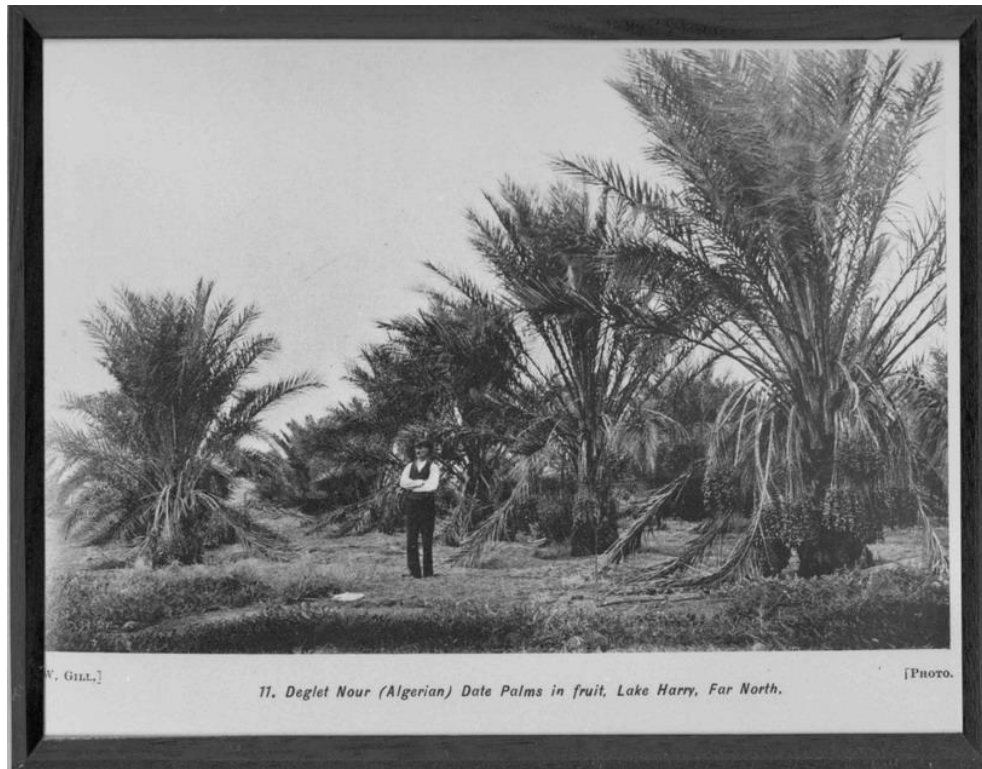


Figure 20: Lake Harry plantation, 1912

In 1914 the Parliament concluded that due to the harsh environment in the far north such as high alkalinity and dust storms, for future industry growth, production would be transferred to the Murray River. All the palms were abandoned except the highly prized Deglet Noor variety which was transplanted in the Riverland during 1915/16.

At the time these plantations were abandoned there was a setting of some 3000 healthy date palms spread over several locations - Hergott Springs, Lake Harry, Coward Springs and Oodnadatta. These palms were very well established and bearing fruit each year. Add to this the carpet of viable seed on the ground from fallen fruit, just waiting to germinate.

So given the date palms reputation to withstand drought, salinity and extreme temperatures including bushfires, what would you expect to see at those locations now - all these years after being abandoned since 1916? Perhaps an impenetrable thicket of thorns and combustible fibre or perhaps wild seedlings germinating far and wide throughout the desert landscape?

The answer is zero plants surviving because date palms need an abundant water supply. They can tolerate droughts for a period of time but once they have exhausted their reserves they die. These palms were irrigated from bores and once the bores were turned off the palms died a while after. It can be concluded there is zero chance of this plant species becoming an invasive species in harsh arid lands where there is no water available and low irregular rainfall patterns.



Figure 21: Dave with date palm trunk remnants at Lake Harry, July 2003 – a site where 3000 date palms once thrived. (Photo: A. Reilly, 2003)

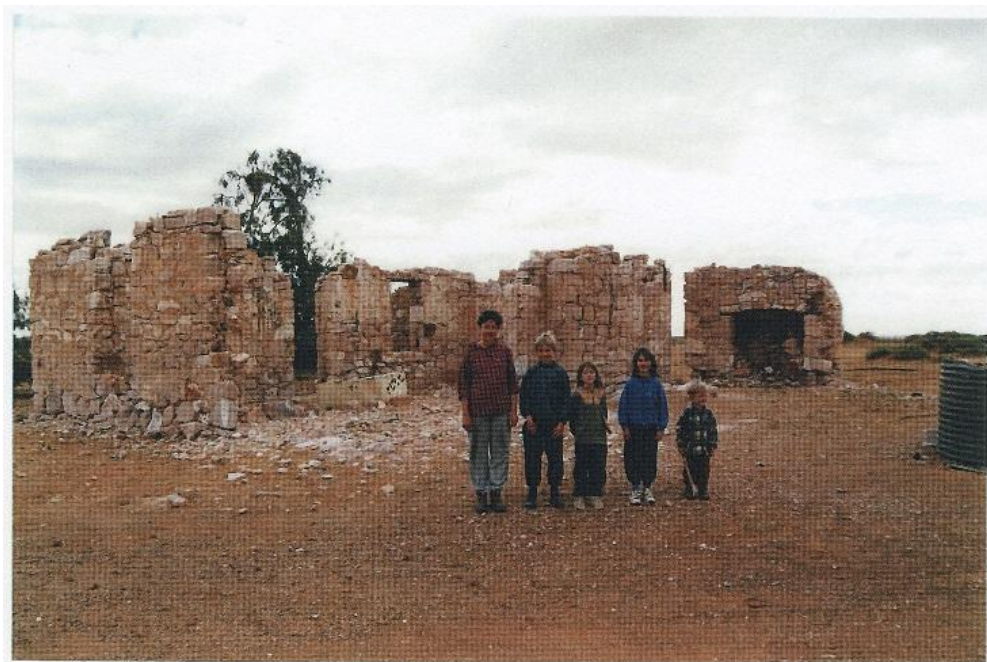


Figure 22: Anita and children at Foreman's ruins, Lake Harry, July 2003 (Photo: D. Reilly, 2003)



Figure 23: Hergott Springs site of government plantings 1891 (Photo: A. Reilly, 2003)

Coward Springs

At Coward Springs where there is still occupation, there are approx 12 palms surviving at the camp ground. A bore provides enough moisture to keep them alive. These palms remain as single trunk, attractive trees still producing fruit. They provide some shade in the camp ground which is eagerly snapped up by caravan owners looking for relief from the heat. After more than a century there are no on-site weed problems or wild stands of palms in the surrounding landscape.



Figure 24: Coward Springs (Photo: A. Reilly, 2003)



Figure 25: Lake Harry palms being transferred to the Riverland

Of the Deglet Noor palms transferred to the Riverland only four remain. Dave recently pruned and tidied them in preparation for their centenary celebration – 100 years in the Riverland. Incidentally there are no wild palms, thickets or weed issues resulting from these palms which still fruit each year.



Figure 26: Remaining Deglet Noor palms at Lake Bonney, Riverland (Photo: D. Reilly, 2013)



Figure 27: Date Palms at Lake Bonney with native hedge growing at base
(Photo: D. Reilly, 2013)

Note in Figure 27 the adjoining landowner has no difficulty establishing a hedge of native shrubs at the base of palms. Conclusion: palms allow sunlight through canopy to support understory species and do not dominate.



Figure 28: Date palms at Lake Bonney
(Photo: D. Reilly, 2013)

Note the clumping bamboo growing at base. Conclusion: bamboo is the dominant species in this setting.

Dalhousie/Witjira National Park

It is very rare to find water in the remote arid interior. Mound springs are a natural phenomenon where pressurized water from the Great Artesian Basin pushes up to the surface and discharges run off. Some springs are tiny puddles and others are Olympic swimming pool size. They are called Mound Springs because the sediment in the water builds up to form a mound above surrounding ground level from which water flows.

These springs occur in a line from south west Queensland through South Australia to coastal Western Australia. They have been crucial for the survival of indigenous people for many thousands of years. The cattle industry and white settlement also depended upon these springs and Muslim Cameleers followed this line of springs when establishing pioneering transportation routes. Date seeds were planted by Cameleers and white settlers along these mineral rich springs. So what is the current-day status?

Despite expectations to the contrary, weed infestation rarely ranks problem status, especially on privately operated properties. Palms survive in some locations but are valued for their historic significance – a reminder of the camel transportation routes of an era long past.

The critical difference is that these lands are managed and weed problems are dealt with. *Phoenix dactylifera* is slow-growing, prominent in the landscape and dependent on reliable water - traits very favourable for control. The fibrous structure of the date trunk renders the destruction of nuisance palms far from onerous or expensive.

Dalhousie Springs National Park is an exception. Here the date palm can genuinely be described as an invasive weed problem. Why is this? How bad is it? And what is being done about it?

Date seed was planted by early white settlers in 1899 at the Dalhousie Springs site. Dalhousie at that time was a large cattle lease. It is very likely that early cameleers also planted seed or offshoots at some of the many outlying springs.

Since this time and with an abundant water supply, the dates thrived. Individual trees formed offshoots which grew into thickets, in some cases totally surrounding the springs to the point where after a century or so, access to the edge of the spring waters was no longer possible. This interfered with the ability of the traditional indigenous owners to access some of their sacred sites for ceremonies etc. Further, the fruit which fell from the trees were eaten by feral animals such as camels, donkeys plus native birds and dingos which passed droppings at other springs complete with viable seed.

Other negative impacts of these wild palm groves include increased water usage and shading of surface water, affecting overall biodiversity in a very sensitive local environment which has taken thousands of years to evolve. In this environment wild date palms are undesirable and need to be controlled. These infestations have largely been unmanaged for more than a century largely because of great isolation. In recent years management efforts have resulted in good control measures.



Figure 29: Dave with Travis Gotch, August 2006 (Photo: D. Rosenzweig, 2006)

Travis is GAB Springs Project Officer with the Arid Areas Catchment Water Management Board. Figure 29 shows a trapping program looking for any exotic insect pest infestation present within the Dalhousie Springs date palm population. Pleasingly no introduced insect pests were detected.



Figure 30: Remnants of controlled date palm stand (Photo: D. Rosenzweig, 2006)

Travis and indigenous landowners showing Dave control measures where palm stands are first burned to gain access and then trunk is chain-sawed through, which kills the palm outright.



Figure 31: Dave with burnt palms, August 2006 (*Photo: D. Rosenzweig, 2006*)

Interestingly when a large clump is burnt it reveals an array of twisted and crawling trunk sections created by the growing offshoots which when shaded out by above canopy, grow along the ground until they emerge from the shade into the sunlight. This may take decades to achieve.



Figure 32: Dave with tall stand of palms before burning (*Photo: D. Rosenzweig, 2006*)



Figure 33: Same clump now that has been controlled. Only male palms left for heritage value
(Photo: A. Reilly, 2012)



Figure 34: Same clump now that has been controlled. First burned then cut through with chainsaw
(Photo: A. Reilly, 2012)



Figure 35: Dingo droppings with seed (Photo: D. Reilly, 2006)

Note the seed on ground. This will continue to germinate for many years and regular control measures will be needed to ensure springs do not again become overgrown.

This site has clearly demonstrated the problem in this environment that date palms can create. We also believe that in an era of 4 wheel drives it is much easier to access remote springs and use chain saws to control wild palms. This is all much more achievable now as opposed to a century ago. Helicopters/light planes and chemical use may also help with identification and control.

Other general comments we would make about this species *Phoenix dactylifera* becoming a major weed species

While Dalhousie Springs has proven to be a weed infestation, it is the only genuine infestation we are aware of on the entire Australian continent. It should be noted that there are no commercial date plantations in this region. Strict water allocations exclude water extraction for horticultural purposes from the South Australian Great Artesian Basin zones.

From a commercial fruit production perspective the arid interior presents many challenges - great isolation, poor soil fertility, distance to market, poor infrastructure, low population base to source staff and high fuel costs. It is unlikely that production will occur in these remote lands.

Commercial date plantations are now being established in existing horticultural regions. These are managed lands in populated areas. The true fruiting date palms have been present in these towns and districts for many decades with early introductions, such as the palms in the Barossa Valley in the 1860's; the Riverland Deglet Noor in 1915-16; the importation of date palms from India by the Chaffey Brothers to the Mildura district in Victoria; and the Deglet Noor palms sent to NSW in the 1890's.

Even with all the history of palms in these managed, populated districts we are unaware of any, not even one example, which can be pointed out as a site where there is a genuine weed infestation of *Phoenix dactylifera*. We challenge anyone who would describe this plant as a potential massive weed risk to firstly identify the correct species then point out an existing problem site as a demonstration of invasiveness.

Further consideration

Australia imports between 5000-7000 tonne of date fruit per year. Much of this fruit is sold on the seed which remains viable. This fruit is distributed the length and breadth of our country through supermarkets and green grocers. Every town and city in Australia has been selling dates on a daily basis for decades. This source of seed/date palms is already being spread via school lunch boxes, picnic hampers, camping and trekking rations discarded from car windows and placed in landfill and rubbish dumps.

The lunchbox seed drop hasn't created urban jungles of weed infestation as some predict. Why then should the threat of weed problems from managed plantations deter investment in an industry of such promise?

The sheer number of viable seeds distributed nationwide every year dwarfs by far the risk associated with the relatively small number of elite varieties of date palms Australian farmers are planting and managing.

Australian Quarantine Inspection Service permits the importation of date fruit on the seed. Every state government allows the importation of date palms (with plant treatment requirements). All of the 56 NRM and CMA regional bodies have no restrictions on this plant species being grown in their regions.

In our opinion, from the approx 2800 escaped introduced plant species which invade our environment the date palm is very, very low on the list as a problem weed. The date palm has a very slow growth rate, long time to fruit production, needs to have both male and female trees present to create viable seed, has a tall habit making it easily seen and is easy to control by chainsaw or chemical. From the date growing countries we have visited to study date production there has been no discussion on weed issues. These include USA, Mexico, Spain, Egypt, Kuwait, Oman, India and UAE.

Further expansion of this tree species as a managed commercial fruit bearing crop is very low risk and claims otherwise are unfounded and embellished.

Environmental benefits of this most useful tree.

The date palm can withstand extremes in temperature and may well have an increasingly important role to play in future food production in a changing climate, providing greater food security benefits.

Tolerance of salinity in comparison to many other horticultural crops allows for irrigation drainage and industrial waste water re-use while helping combat desertification by reducing wind and soil erosion.

The palm creates a canopy which acts as a living greenhouse allowing inter-planting with other crops in a microclimate with reduced evapo-transpiration rates.

The emerging date industry offers new economic diversity for rural communities, providing employment and tourism opportunities.

Summary

We should extract what lessons we can from the early planters but be mindful they operated with a meagre bank of knowledge and in times much different from our own. To see the practices of the 19th century as a blueprint for contemporary planning would be folly.

The early endeavours could hardly have taken place in a less promising setting. Not much was understood about the date palm and the times pre-dated the combustion engine, mass education, the telephone, radio, comprehension of a strange new land... The miracle is that our forbears achieved a tenth of what they did.

They did bequeath us isolated palm weed infestations. That there were not substantially more relates to the nature of the palm.

It stands tall and un-miss-able in the landscape, grows very slowly and takes years to produce viable seed. The palm needs an opposite-sex partner as an agent to create fruit and viable seed.

It is quite vulnerable – deprive it of water and it will eventually die. A chainsaw cut through the trunk kills the palm outright.

Eradication of infestation is dependent only the willingness of parties to fund it.

A further bonus is that the map of REMOTE Australia has changed substantially since the early days. What was classified as remote now would be rated in many cases, as regional, and in some, as outer suburban.

With satellite photography, aviation, four-wheel drive vehicles and recreational outback trekking, palm weed-infestation has nowhere to hide.

Gloom and doom merchants should not hold sway. Fear should not be peddled to the detriment of regional prosperity and substantial inputs to the national economy.

Phoenix dactylifera is an unlikely weed pest.

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