

NEWSLETTER

WINTER 2013

NUMBER 76

FRIENDS OF THE WAITE ARBORETUM INC.

www.waite.adelaide.edu.au/arboretum

FORTHCOMING EVENTS

IN THE ARBORETUM

National Tree Day

Sunday July 28 11.00 am
Free walk , meet at NW corner
of Arboretum near Gate 2.

Free Guided Arboretum walks

The first Sunday of every month
at 11.00 am.
Sunday July 7, August 4 and
September 1
Meet at Urrbrae House stairs

WHAT'S ON AT URRBRAE HOUSE

Fireside Chat with Dr Tony Rogers

Wednesday July 31 5.00 pm
Tickets \$15

Colonial Tea Dance

Sunday August 25 2 pm – 5 pm
Tickets \$15

More details at:

www.waite.adelaide.edu.au/urrbraehouse/whatson/



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Secretary: Norma Lee, **Treasurer:** Peter Nicholls
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Hakea fraseri, corkwood oak and rainbow lorikeet. Photo Terry Harvey

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FROM THE PRESIDENT

Those who attended the recent AGM were treated to a most interesting talk on native bees by Dr Katja Hogendoorn, Postdoctoral Research Associate at the School of Agriculture, Food and Wine at the University of Adelaide. A summary of the talk appeared in the Autumn newsletter.

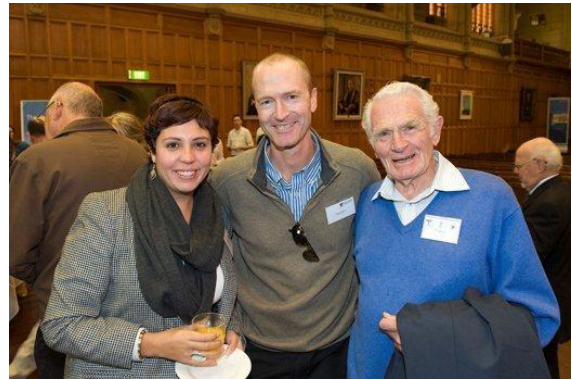
The talk followed the brief AGM where election of officers for the year took place. We welcomed Peter Nicholls back onto the Committee where he has resumed his previous position of Treasurer and new nominations, Ron Allen and Robert Boardman who have both been Arboretum guides for many years. Marilyn Gilbertson is Vice-President having taken over from Beth Johnstone who has completed her 5 years in that position. Norma Lee continues as Secretary with the added responsibility of Membership Secretary. Eileen Harvey continues as our very capable Newsletter Editor.

The twilight concert by Duo Zoco featuring guitar and oboe was very enjoyable with good numbers attending and a satisfactory profit of \$600. The Committee is grateful for the many donations made by members with some of them being very generous.



FWA President Henry Krichauff (L) and Arboretum Guide Diarshul Sandhu (R) at the University's Volunteer Recognition Event. Photo University of Adelaide

The University's Annual Volunteer Recognition Event was held in the Bonython Hall was on Friday 7th June. The strength of volunteering in the extensive range of activities to do with the University of Adelaide was well demonstrated by the size of the function and the number attending.



Long-standing Urrbrae House garden volunteer Torben Davidson (R). Photo University of Adelaide

Planet Ark's National Tree Day is on Sunday 28th July. There will be a walk, beginning at 11 am through the north western, Grey Box Woodland section, near the main drive entrance. Our next major function is the Friends' involvement in the annual Treenet Symposium on Friday 6th September. This always requires quite an involvement of FWA to help with the serving of food, organisation of the groups of delegates and of course the all-important task of conducting the tours through the Arboretum.

The early seasonal rains have been very welcome throughout the State and no more so than in the Arboretum where the long dry period from last August was having its effect. Good, steady and soaking precipitation is helping the water table and soil reserves.

Unfortunately the Death Cap (mushrooms) have started to reappear. Visitors need to be mindful of these. Also on the negative side is the unfortunate appearance in this state of the Elm Beetle. Like so many wide ranging pests and diseases, plants subjected to any stress will tend to be the ones more vulnerable to attack. Hopefully a good, wet winter will leave the elms in a more healthy unstressed state to take on the hot summer weather.

Henry Krichauff



Death caps,
*Amanita
phalloides*

Photo Jennifer
Gardner

IN THE ARBORETUM FROM THE DIRECTOR



Elm Avenue Photo Jennifer Gardner

Elm Avenue is slowly turning its lovely lemon yellow autumn colours. With recent rains and cool nights a variety of fungi are fruiting including the toxic Death Caps and signs warning not to pick or eat any fungi in the Arboretum have been posted on every gate.

Following an authoritative and inspirational presentation in May to the Friends of the Waite Conservation Reserve by Bob Myers on 'Replacing Weeds with Native Grasses', Bob inspected the Arboretum with Andrew Walters and myself to share his knowledge and discuss options and actions to progressively change the composition of the groundcover from the exotic annuals like capeweed which dominates at this time of year to perennial native grasses. Excellent progress has already been made in the northwest Arboretum thanks to years of dedicated effort by volunteers especially Marilyn Gilbertson and Alan Retallack with the assistance of Margaret and Ian Oliver and others.



Native grasses in the North West revegetation area
Photo Eileen Harvey

With guidance from Bob Myers we are developing a plan which will target specific areas elsewhere in the Arboretum where our next efforts will be best directed.

It will be a long term project over many years, but once native perennials are established maintenance requirements in the Arboretum should reduce.

Besides their aesthetic appeal, the advantages of perennial native grasses are that they are deep-rooted which assists water infiltration and enables them to remain green in summer reducing fire risk, maintain soil cover and improve the health of the soil. Windmill Grass *Chloris truncata* which is a hardy, C4 summer-growing, tussocky species is an excellent coloniser of disturbed and compacted soil and being low-growing requires little mowing. It is ideal for the Arboretum and a substantial patch has established around the oak collection (G13) where its vigorous growth has excluded the broad-leaved weeds. It has continued to flower through autumn and into winter. Each inflorescence produces plentiful small seeds which disperse readily and germinate rapidly.



Chloris truncata,
windmill grass. Photo
[http://
www.rbg Syd.nsw.gov.au](http://www.rbg Syd.nsw.gov.au)

Andrew has been collecting and propagating seed of this and other native species such as wallaby grasses *Rytidosperma* (synonym *Austrodanthonia*) species. If you would like to assist him with seed collection, propagation and planting please come and talk to Andrew or me.

One of the impediments to the establishment of native grasses in the Arboretum is the high seed bank of exotic grasses and broad-leaved weeds. A technique to manage weed seed banks and nutrient loads is 'scalping' or removing weed seed laden soil and humus and composting it then direct seeding or planting into the exposed soil with native grasses. This technique is suitable for open spaces away from tree roots. Other techniques to be considered include sparing, timely and judicious use of selective herbicides, slashing / mowing to reduce seed set of exotics, applying beneficial fungal inoculants and decompaction of the soil.

Acknowledgment: Bob Myers is thanked for generously sharing his expertise and practical advice regarding establishing native grasses.

Jennifer Gardner

FRIENDS OF THE WAITE ARBORETUM NEWS

A generous donation

The Committee of the FWA gratefully acknowledge the generous donation of \$1000 by Dr Barbara Hardy AO which will be used for specialist pruning of significant Arboretum specimens.

Your funds at work

Earlier in the year funds raised by the Friends were used to buy a slasher and chipper for the Arboretum. When asked how these machines were performing, Groundsperson Andrew Walters said that they are of great assistance in carrying out his work in the Arboretum. In particular, fallen branches and prunings can be chipped on site which is not only more efficient but, more importantly, gives Andrew complete control over the quality of the product and eliminates the possibility of introducing weeds. Converting material from the Arboretum into mulch, composting it and using it on site returns nutrients to the soil and helps suppress weeds.



Andrew Walters using the new chipper bought with FWA funds. Photo Eileen Harvey

Volunteers needed to help at Treenet

The 14th Treenet National Annual Symposium will take place on September 5 and 6 and volunteers are needed to assist on the registration desk at the Wine Centre on Thursday September 5 and in various ways at the Arboretum on Friday September 6. Please contact Jennifer Gardner if you would like to be involved.

Email: jennifer.gardner@adelaide.edu.au

Phone: 8313 7405

MGS working bee

On June 23 the Mediterranean Garden Society held another working bee in the Garden of Discovery and planted 40 donated plants including *Dianella caerulea* 'Cassa Blue', *Correa alba*, *Themeda australis* (kangaroo grass), *Doryanthes excelsa* (Gymea lily) and *Goodenia* species.



MGS working bee participants enjoying a well-earned 'cuppa'. Photo Jennifer Gardner.

Rose pruning demonstration June 25.

Merv Trimper is from a well known Adelaide rosarian family. He is a former President of the Rose Society of SA and has expertise in all aspects of rose culture. On Tuesday June 25 Merv generously volunteered his time to demonstrate the pruning techniques specific to each of the different rose types. These are the techniques that he has found achieve the best results in our climate. The Tuesday morning garden volunteers were delighted to have the opportunity to see Merv at work and receive advice from him.



Merv Trimper with Tuesday morning garden volunteers. Photo Jennifer Gardner

NEW MEMBERS:

We warmly welcome the following new members

Helen Good, Erindale

Annabel Good, Magill

Dr & Mrs McAuliffe, Glenunga

A J Davidson, Summertown

Mary & Michael Cornell, Mitcham

Anne Prescott, Myrtle Bank

Katja Hogendoorn, Waite Campus

Harvey family, Fullarton

Andrew Birvé, Torrens Park

Peter Teese, Yamina Rare Plants, Monbulk Vic.
(Institutional membership)

of Tallerack, *E. pleurocarpa* and the large buds, flowers and fruit on the hybrid Pear Fruited Mallee, *E. pyriformis* x *E. youngiana* captured the attention and the cameras, of the visitors.



Guide, Diarshul Sandhu and visitors in Elm Avenue.

Photo Eileen Harvey

Diarshul told the story of the cork oak, *Quercus suber* which has the distinction of being the plant whose microscopic structure gave rise to the biological use of the term "cell". The brilliant English physicist Robert Hooke invented the microscope and in 1665 used his instrument to look at a slice of cork. The regular pattern he saw reminded him of monastic cells and the term stuck. Biologists have used the word cell for the building block of living organisms ever since.



Guide Bob Boardman and interested visitors.

Photo Eileen Harvey

Bob Boardman spoke about the importance of trees in our lives and the evolution of the gymnosperms. He talked about timber and captivated his group with stories from his long experience in forestry.

Eileen Harvey

Membership payments

Please ensure that any direct deposit (EFT) for memberships, donations etc. be clearly labelled with the name and purpose. The treasurer has received one EFT payment with no name. If you have paid a membership, but *not* received a receipt, please telephone Jennifer on 8313 7405 or email her: jennifer.gardner@adelaide.edu.au to ensure that your payment is recorded.

Fascination of Plants day walks on May 18, 2013

On International Fascination of Plants Day, May 18, Arboretum guides Diarshul Sandhu, Jenny Birvé and Bob Boardman conducted special walks in the Arboretum attended by a total of 30 visitors.

Each guide took a different approach to the topic: *The fascination of plants*. Jenny showed her group some of the trees that were flowering. The mallee section was alive with rainbow lorikeets and native noisy miners feeding on the nectar. *E. megacornuta*, Warty Yate with its bright green flowers, the grey buds



Guide Jenny Birvé leading visitors to the Bunya pine.

Photo Eileen Harvey

CONCERT BY DUO ZOCO



Jacob Cordover and Laura Karney in the Urrbrae House drawing room. Photo Beth Johnstone

Forty five lucky people convened in the drawing room at Urrbrae House on Monday 13 May for a wonderful concert. The weather outside may have been inclement, however the music performed by two very talented musicians transported those present to a different space.

Duo Zoco is an exciting ensemble in which Jacob Cordover (Spain/Australia) and Laura Karney (Spain/USA) bring together the diverse elements of the oboe and guitar. Duo Zoco has been heard in concert in Canada, Australia, England, the USA, Germany, France, Italy and Spain. The Spanish derivative of the Arabic word for market, *zoco*, was a place where a myriad of sights, sounds, smells and tastes of the exotic mingled. It is in this spirit that the oboe and guitar come together, merging to play an eclectic mix of musical styles, from baroque to romantic, classical to contemporary, and from European to the Americas. Duo Zoco creates an experience of exotic sounds, musical textures and atmospheres.

Because there is little repertoire originally written for this combination of instruments, Duo Zoco began collecting repertoire and have discovered a plethora of works that suit the combination of sounds beautifully. Many of the arrangements have been done by the musicians

Zoco Duo

Jacob Cordover, guitar & Laura Karney, oboe / cor anglais

- | | |
|---|---|
| Cavatina Serenata Española
from the opera <i>Erminia</i> | - Antonio Gandini (1786 - 1842) |
| Sonata in D minor
Op. 2 No. 3 | - Niccolò Paganini (1782 - 1840) |
| Histoires
i. The Crystal Cage
ii. The Leader of the Golden Tortoises
iii. The Little White Donkey | - Jacques Ibert (1890 - 1952)
(arr. Cordover/Karney) |
| Gymnopédie no. 1
Gnossienne no. 1 | - Eric Satie (1866 - 1925) |
| Córdoba
for solo guitar | - Isaac Albéniz (1860 - 1909)
(arr. J. Williams) |
| Coplas del Pastor Enamorado | - Joaquín Rodrigo (1901 - 1999) |
| Siete Canciones Populares Españolas | - Manuel de Falla (1876 - 1946)
(arr. Cordover/Karney) |
| i. El Paño Moruno
ii. Seguidilla Murciana
iii. Asturiana
iv. Jota
v. Nana
vi. Canción
vii. Polo | |
| Milonga No. 5 "Emigrante" | - Fernando Carlos Tavoraro |

themselves, and their diverse repertoire now includes baroque sonatas, early classical arias, romantic lieder, Argentinian tango and contemporary works. Their belief in the development of classical music has led Duo Zoco to commission and premiere several works by both up and coming and well established composers.

The programme for Urrbrae is included here for your interest. The simple words on the page do give a taste of style, but the music as it was played, was in fact a means of transport to a beautiful mind space. These two brilliant musicians gave those present a very enjoyable musical experience, one to induce both excitement and serenity. Quite unique and very special.

Beth Johnstone

OUT OF SIGHT BUT NEVER OUT OF MIND: ROOTS AND THEIR FRIENDS

A tree's root system performs several functions for the tree. First the roots must securely anchor the tree to the soil. Secondly, the roots are required to facilitate the absorption of minerals and water to meet the tree's needs. Thirdly the roots act as a site for the storage of plant food reserves such as starch, and a site where certain growth hormones are synthesised (Pallardy, 2008).

The absorption function of roots is the focus of this article, in particular the association that these roots have with mycorrhizal fungi. In many ways I believe that the tree's root system and indeed the tree itself cannot be considered without including the volume of soil and its main constituents which encompass the tree's root system. By outlining this aspect of a tree's environment I want to examine what implications may arise in respect to the practical day to day maintenance in the Arboretum.

With the majority of trees, once established, the root system can best be pictured as a horizontal plane not far below the surface of the soil. The roots occupy an area usually two to four times greater than that below the tree's outer canopy (the drip line) (Harris et al 2004). In most cases after ten years or so the tap root is no longer present and the majority of roots are no deeper than 20 or 30 centimetres (Moore, 2012). This mass of roots consists of structural and absorbing roots with some roots descending (sinker roots) down where the soil environment permits.

Of the tree's root system the absorbing function is carried out by delicate root hairs which are located behind the root tips and the region of cell elongation where they arise as projections of root epidermal cells and greatly increase the roots surface area for absorbing (Moore, 2012). These delicate root hairs are very short lived, in some cases a matter of days, and because of their very fine structure they are easily damaged by changes in the edaphic (soil) environment (Moore, 2012). That environmental change can be the result of waterlogging, drought and increases in soil bulk density through compaction.

The great majority of trees form symbiotic associations with mycorrhizal fungi. These fungi

greatly alter the roots and significantly enhance the roots ability to carry out the absorbing function. The two forms of mycorrhizae are endomycorrhizal or arbuscular mycorrhizae (AM) and ectomycorrhizal fungi (ECM). These fungi have been living in association with plant roots for millions of years. In the case of AM, fossilised evidence suggest they were present some 440 - 410 million years ago and ECM some 250 million years ago (Smith and Read, 2008). The AM grow within the root cells and greatly improve the trees ability to absorb nutrients such as phosphorous and zinc and in return the tree provides the AM with sugars. These AMs are very small and you need a microscope to see them.



Photograph of *Pinus silvestris* grown in an observation chamber showing the roots and associated *Suillus bovinus* mycorrhizal fungi. Photograph kindly supplied by Prof. Sally Smith, University of Adelaide.

In contrast, ECMs grow around the roots and root cells and in the majority are in symbiosis with woody perennials. The mycelium of The ECM can venture out way beyond the reach of root hairs and in return for sugars they confer on the tree a massive increase in the roots' absorbing surface area. This is shown in the photograph of *Pinus silvestris* grown in an observation chamber. Most eucalyptus species

form ECM which may account for the minimal root hairs found on examining these roots. The ECMs' mycelia can be observed with the naked eye as indeed can the fruiting bodies which arise from these mycelia close to the surface of the soil. The photograph shows some fruiting bodies of a bolete fungus which maybe have a mycorrhizal association with the historic *Pinus canariensis* growing at the edge of the Urrbrae House lawn.



Photo Andrew Walters



Underside of one of the fruiting bodies showing tubular structures which contain the spore producing cells. Photos Eileen Harvey

The mycorrhizae have been growing in harmony with trees for millions of years and improve a tree's ability to survive particularly in periods of stress, e.g. drought, but they also provide the tree with a protective function. This may arise because the mycorrhizae are able to outcompete pathogenic fungi and create an inhospitable environment for disease causing fungi to colonise roots (Moore, 2011).

As far as maintenance in the Arboretum is concerned, the question is, what can be done or

indeed avoided to protect these mycorrhizal associations with trees and make them thrive.

In my view the most significant measure would be the minimisation of vehicular traffic in the Arboretum at times when the risk of soil compaction is high. Increases in soil bulk density in the region of root and fungal mycelia can cause death to these delicate structures by decreasing oxygen levels for their respiration. This increase in compaction can create an edaphic environment that is more susceptible to waterlogging and the consequential anaerobic conditions. Unfortunately most of the requirement for mowing is during the seasons when soils are vulnerable. This needs careful monitoring.

Care needs to be observed with the use of chemicals including herbicides, pesticides and fungicides. In particular those chemicals which are systemic and involve soil drenching and the uptake by tree roots. Other positive measures include mulching under trees and growing native grasses and groundcovers that require less frequent mowing and maintenance.

Tree roots and their associated mycorrhizal fungi perform an essential service in maintaining and protecting our trees' health. They deserve care and respect from all of us, from those who maintain and manage the trees to those who walk in their shade and enjoy their beauty.

Acknowledgement

The kind assistance by Prof. Sally Smith FAAS of the University of Adelaide is gratefully acknowledged.

References

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- Smith, S. E. and Read, D.J. (2008) *Mycorrhizal Symbiosis* 3rd ed. Academic Press, New York, NY

Andrew Walters

THE ALEPPO PINES.

The trees known as Aleppo Pines until the mid 20th century are now split into three, or according to some taxonomists, five species. Two major ones have over-lapping distributions: *Pinus halepensis*, which retains the common name 'Aleppo', occurs mainly in the western Mediterranean zone, *Pinus brutia*, the Brutian or Calabrian Pine, is present mainly in the north-east Mediterranean and Black Sea zone. The third species *Pinus eldarica*, occurs in an eastern semi-arid zone extending from Syria to Iran, with outliers as far as Afghanistan. All three are in the *Halepensis* Group in Section *Halepoides* because of their close taxonomic conformity.

Section *Halepoides* pines⁹ have older bark on the trunk breaking into flat plates, mid-brown to grey in colour, often deeply furrowed by a network of fissures to reveal a orange-red underbark. The smooth bark on branches and younger shoots is a conspicuous silver-grey that reflects sunlight. Needles are in pairs, 10 -15 cm long but only 1 mm broad. The crown of these pines is typically 'open', allowing sky to be readily visible. The cones are similar in size, too, conical-ovoid in shape, about 11 cm long with a largest diameter of 4.5 - 5 cm.



P. halepensis cone (L) parallel to branch and pointing to root of branch. and *P. brutia* cones (R) at right angles to branch. Photos Eileen Harvey

The most visible distinction between Aleppo and Brutian Pines is the markedly different angle between the cone and the main axis of the branch and this is not apparent until cones are well-developed (about one year after flowering and pollination occurs). Cones usually form in pairs, 3s or 4s. In *P. halepensis* the stem of the cone elongates and curves so that the cones lie parallel to the branch¹, pointing towards the root of the branch: in *P. brutia* cones develop almost stem less (sessile) and point out at right angles. Flowering does not begin until the eighth year, in open grown individuals and is later in trees in closed stands. The

most extensive of the three species in area are the Aleppo and Brutian Pines².

The other feature that distinguishes *P. halepensis* from *P. brutia* is their history of exploitation. Aleppo Pine has been heavily exploited for much of the last two millennia, particularly associated with the eras when wood was the preferred, or only, material for all kinds of construction, but also for the supply of pitch, its resin, which had manifold uses and was tapped, and traded as much as timber in antiquity. The original common French name⁴ probably reflects Crusaders' acquaintance with it in the 13th century AD for use in armaments and castle construction. The long history of exploitation extends from at least the 7th Dynasty in Egypt to the 20th century AD. This has much relevance to the nature of the Aleppo Pine we find today in South Australia. Because of their different history and fortunes in SA, the two species will be discussed separately.

***Pinus halepensis*, Mill. - Aleppo Pine** (syn, Pin de Jérusalem; Pin d'Alep (Fr); Pino d'Aleppo (Ital)).

The first Aleppo Pines to reach South Australia were of the species *P. halepensis* in the strict sense, and were planted in 1846, on the newly established estate at Highercombe⁶ along with several other conifers obtained by a Mr Ross. He supplied seed to the infant Woods & Forests Department in 1877 and these were planted from 1878 at Wirrabara and Bundaleer Forest Reserves with further plantations to follow⁸. Aleppo Pine is now described as a small to medium tree, often less than 15 m tall to 25 m tall in favourable situations. Judged by the height in the closed plantations at Wirrabara, the first parents had capacity to grow readily to 25 m.

The 'form' or habit of these trees has not been ideal for forestry purposes. Most Aleppo Pines from the same original source were planted in rows in windbreaks (as along the south fence at Urrbrae Agricultural High School) or as single specimen 'park' trees (as at the Angas family's estate 'Birksgate'). Almost all have similar poor growth habit, heavy branches and forked trunks. Even when grown in plantations, the Aleppo Pine lacked the straight trunks and single main leaders needed for long merchantable logs and good quality timber. I assessed the last of these plantations in 1963 prior to them being clear-felled (before

replacement with *Pinus radiata*). The main trunk forked often several times in many of them and there were no vertical trunks, all bending at the base before reaching near upright shape, but usually over-compensating into an elongated S-shape.



Heavy crops of cone and seed. Photo Eileen Harvey

In addition all the trees from this introduction bear regular heavy crops of cones and seed. This has caused them and their offspring, planted in the Mid-North and Eyre Peninsula, to become a pest plant. The seed dynamics are interesting. About one-third of cones remain closed in the crown and only open after a fire. The rest open in the second summer, as usual in the Genus *Pinus*, but they remain viable for less than a

year. They germinate readily and succeed where there has been ground disturbance and burning. In rural areas ploughing and burning off are frequent bushfire prevention practices and this has allowed the pines to invade roadside verges and cause problems for rural Councils.



Pinus halepensis planted in 1962 at J. Hill's property, south of Maitland. Trees were 18 years old when the photo was taken. Photo Robert Boardman.

A second introduction of Aleppo Pines appears to have been made after the First World War: possibly someone who made a pilgrimage to Turkey in 1920 or about then, to visit Gallipoli, brought some pine cones from the vicinity. Several *P. halepensis* were planted in the War Memorial Grove at Maitland³.

Others of similar appearance dating from the same time appear at Urrbrae Agricultural High School and at Carrick Hill. All of these bear overabundance of cones too. The Arboretum is fortunate in having an exceptionally good tall specimen planted in 1929,



P. halepensis near gate into Claremont Avenue. Photo Terry Harvey

but probably of the same later source. It is by the pedestrian gate into Claremont Avenue.

These features, the poor form and heavy cone crops, suggests a serious deficiency in the genetic quality of the seed of early colonial imports. When one looks at the history of exploitation of the Aleppo Pine it seems likely that these inferior quality seeds were collected by the early colonists either from Cadiz in Spain or more likely from Marseilles in France, ports they would have visited on their voyage out to Australia. To understand why the Aleppo Pines growing in those regions are of inferior genetic quality we need to study their history.

We know from prehistoric records that Aleppo Pine was the source of resin (pitch) used to embalm the dead as long ago as the 5th century BC in Egypt. The pitch is believed to have been imported from the nearest sources, probably from present day Palestine/Israel where agriculture had been established by that time.

The drastic exploitation of Aleppo Pines, however, arose in the Bronze Age⁵ where wealth had been acquired by Greek city states from which they

attempted to expand their influence by means of sea power. Athenian wealth depended on naval power and that power depended on access to good shipbuilding timber. In the war between Athens and the Peloponnesian League (431-405 BC), the armada sailed out of Piraeus and was defeated and destroyed. Having lost power, not only did the Athenians have to find new crews but also find new sources of timber to renew their ships.

The fleet destroyed had been built of Cedar of Lebanon, *Cedrus libani*, the timber of choice at the time. Supplies were limited by its relatively small occurrence in Lebanon and NW Syria. By the time of Biblical accounts of the building of Solomon's Temple at Jerusalem, cedar had become so scarce that it could only be afforded by builders of such a significant project; definitely not affordable for building ships.

The qualities exhibited by cedar in antiquity (and shown exquisitely by 'true' mahogany from Central America, *Swietenia* spp., and by teak, *Tectona grandis*) were uniform swelling and shrinkage in each dimension with wetting or drying, so that all joints remained tight at all times. For shipbuilding and cabinet-quality furniture especially, choice of trees from secondary species tends to focus on careful selection of individual trees likely to have acceptable shrinkage/swelling characteristics. Unfortunately, most conifers, as in Aleppo Pine, have higher shrinkage in the longitudinal direction (parallel to the main axis of the stem) than radially or tangentially. The problems arise when poor choices result in sawn or cut timber (boards, planks, beams, etc.) warps and twists when drying out. This is why seasoning timber is valuable despite the time it takes, especially when it is done in naturally the open air.

So, after their defeat the Athenians had to accept the second best, which was Aleppo Pine from their own coastal forests. This entailed people seeking out the most suitable pine trees. Trees selected had to grow vertically with a single trunk and a large but balanced crown to provide boards and planks that would not warp. Strong curved branches provided ready-made ribs on which the hull planking could be fastened⁷. The experienced people who found and selected such trees were an integral part of a boat-building industry. The result was creaming of the natural forest of its best trees and future parents.

Through the centuries that followed naval and sea trade routes expanded and more and more prime quality wood was taken from the ever deteriorating stands of Aleppo Pine, until only resin-tapping was continued. Consequently, it is not surprising that the seeds collected from the Mediterranean region by early colonists and brought to South Australia proved to be such a disappointment.

On a personal note, I saw *P. halepensis* growing naturally in a wadi in the Gebel Ackdar, or Green Mountain of Cyrenaica, to the west of Derna, It grew on the lower slope below vertical/overhanging rock walls, access from the narrow, cultivated, coastal plain below was prevented by a waterfall of over 40m height. Each tree, although spaced apart, and growing with wild oleanders, was almost perfect in shape. Although I have visited Israel, Greece, Malta, Tuscany in Italy and the south of France since, I have never seen their equal.

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2. Map source: E. Little, 1966. Distribution of *Pinus* species. U.S. Department of Agriculture, Forest Service.
3. Author, personal records
4. Loudon, J. C. 1842. Encyclopaedia of Trees and Shrubs, Hardy Trees and Shrubs Native and Foreign; abridged edn. F. Warne & Co. London.
5. Meiggs, Russell, 1982. "Trees and Timber in the Ancient Mediterranean World." Oxford University Press.
6. Highercombe estate, on the crest of the scarp overlooking northern Adelaide is now a golf course.
7. This is clearly demonstrated, for example, at the Shoalhaven Boat Museum near Nowra on the south coast of NSW. The local builders employed assessors who searched for straight, hefty trees and forked spotted gums and Sydney blue gums, specifically felled. They built coasters, ships for trade with Sydney and Newcastle in the 19th C.
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9. Russel, George. The Project Gutenberg eBook of "The Genus *Pinus*." pp.77-78. at <http://www.gutenberg.org/files/26798/26798-h/26798-h.htm>

Robert Boardman

WHAT TO SEE IN JULY, AUGUST & SEPTEMBER IN THE ARBORETUM



The Warty Yate, *Eucalyptus megacornuta*, has flattened peduncles bearing clusters of buds with long, opercula which fall to reveal bright lime green stamens. Origin WA.



Hakea tephrosperma, Hooked Needlewood, has white flowers in September and large (2-3 cm) woody fruits which may be smooth or pusticulate as shown. Origin drier parts of SA, NSW, Qld.



Eriobotrya deflexa, the Bronze Loquat has terminal clusters of small, fragrant white flowers in spring followed by small inedible fruit. It is particularly attractive in winter with bright coppery red new leaves which can be 20 cm long. Origin Taiwan. Photo Jennifer Gardner

Photos Eileen Harvey except where otherwise credited.



Nuxia floribunda, the Vlier has sweet scented flowers which attract numerous bees. It has a non-invasive root system and can be grown near to buildings and pavement. Origin Africa.



Arytera divaricata, Rose Tamarind, is a rainforest tree with limp pale pink new leaves and timber so hard that it is known to break axes. Origin NSW, Qld. Photo Jennifer Gardner.



Eucalyptus caesia subsp. *caesia*, is a very attractive winter flowering mallee. The buds, stalks and fruits are silvery grey and the pendulous flowers are in groups of 3s. The tan outer bark curls into small quills to reveal the pale greenish new bark. Origin WA.



The brightly coloured Crimson Mallee, *Eucalyptus lansdowneana* subsp. *lansdowneana* has buds and fruit in umbels of 7s in terminal clusters on leafless sections of twigs. Origin SA



Hakea cristata, is a dense prickly leaved shrub with white flowers in winter and pink new growth in spring. Good bird refuge. Origin WA



Quercus ithaburensis new leaves
Photo Jennifer Gardner

Quercus ithaburensis, Tabor Oak has beautiful pale green new growth in winter. The tiny green male catkins and female flowers are wind pollinated and are followed by fruits which take 18 months to ripen. The acorn is held in a cupule which has long backward pointing scales. Origin Mediterranean.

Tabor Oak fruit

