

Assessment of Dalwallinu Shire Wattles considered prospective for human food



A Report Produced For
The Shire of Dalwallinu
By Bruce Maslin and Jordan Reid

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Department of
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Our environment, our future



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Preamble

Following a request from Mr Robert Nixon, President of the Dalwallinu Shire Council, and a meeting with Shire Councillors McFarlane, Carter, Dinnie and Sanderson, CEO Crispin and Brent Parkinson, we undertook a quick assessment of the *Acacia* flora of the Dalwallinu Shire with a view to identifying those species that might have potential for cultivation as a source of commercial quantities of seed for human consumption. The work was conducted between 2-5 December 2008.

Introduction

There are about 80 different *Acacia* (Wattle) species that occur in the Shire of Dalwallinu. Ten of these species were included in *Edible Wattle Seeds of Southern Australia* (Maslin *et al.* 1998) as having some potential for development as new crop plants as a source of seed for human consumption.

From the outset it is recommended that readers familiarize themselves with Maslin *et al.* (1998) and Simpson & Chudleigh (2001) because these two works provide much valuable information relevant to the domestication of *Acacia* as human food crop in low rainfall areas. Little or no attempt has been made here to reproduce the information contained in these works (we have simply focused on identifying those species in the Dalwallinu Shire that we consider as prospective for development as new seed crops). The Shire will undoubtedly be aware that the development of a new industry is not without its problems, most of which are discussed in the above references. Notwithstanding these cautionary remarks we consider that there are some good prospective species in the Shire that might prove successful.

It is important that the Shire clearly articulate what it is attempting to achieve in relation to the development of *Acacia* as new commercial crop, and how this might be progressed. There are a number of crucial steps involved in this process and some of the major issues were identified a couple of years ago in an informal report that the first author presented to the Shire. It seems appropriate to present here a slightly edited version of the main points enumerated in that report:

Species selection (what range of species will be included?) This matter is covered by the present report.

- Seed procurement (how/where to get seed for trialing and planting purposes).
- Silviculture matters including germination techniques, seedling establishment, plant spacing, watering regime, weed control, coppicing/pruning, etc. These matters are considered to be especially important.
- Seed harvesting techniques plus seed cleaning & storage. (Seed harvesting has proved particularly problematic for others who have attempted to cultivate Wattles elsewhere in Australia.)
- Seed processing (e.g. roasting, grinding, flavour assessment).
- Seed nutrition and toxicology (it is critical to use seeds with proven nutrition value and

tested to prove that they contain no toxic compounds).

- Scale of operation (small-scale for boutique bush tucker industry vs large-scale production of seed, perhaps using broad acre approach).
- Products and marketing (e.g. local bush tucker industry, overseas markets, niche markets such as low glycemic flour, pasta, flavouring agents, etc). These matters are especially relevant if a large-scale commercial operation is envisaged.
- Monitoring and data capture. These things are important for sharing of knowledge; a performance database might be established to record silvicultural characteristics of the species, seed yield, seedling survival, growth rates, biomass production etc.
- Education and promotion (i.e. interactions with existing growers and potential markets, Dalwallinu hosting symposia to share knowledge, school tours, tourism linked to Interpretive Centre, etc).
- Future expansion possibilities (perhaps start small with a series of feasibility plots then progress to a commercial production phase).
- Costings. Clearly there is a need to know what it is likely to cost to achieve the above (including what personnel would be required).
- Benefits to Dalwallinu need to be identified. For example, employment possibilities, tourism, these activities could provide a focus on Dalwallinu for undertaking environmentally sympathetic activities, providing publicity of Dalwallinu Interpretive Centre.
- Why Dalwallinu? Need to assess the reasons as to why Dalwallinu should go this route. Some suggestions: Dalwallinu has the appropriate soils and climate for growing a wide range of the potential human food Acacias; a number of prospective species occur naturally in the Shire; infrastructural support for the initiative would be forthcoming from the Shire and from community involvement; it ties in well with another innovative project in the Shire that is exploring environmental/commercial utilisation possibilities using native flora, i.e. the oil mallee project.

Methods

The main **selection criteria** we used to assess the suitability of species for inclusion in this report were the following:

- Plant ability to produce heavy, synchronously-ripening seed crops starting from a young age (about 3 years if possible).
- Plant growth form (appropriate form and height will have implications for harvesting).
- Plant growth rate and longevity (both subjectively estimated).
- Plant regeneration method (seed vs suckering) and coppicing, pollarding and stem-resprouting ability.
- Plant ecology (especially soil preferences).
- Pod position on the branches (terminal vs sub-terminal; the position of the pods may have implications to the harvesting technique).
- Seed size (small, medium or large) and their retention in pods (i.e. retained for some time following pod opening vs readily dropped: longer-retained seeds increase the window of opportunity for collection).
- Seed coat thickness (thick vs thin; we imagine that thin-coated seed would be the most desirable).
- Seed aril (presence vs absence of an aril on the seed; arils will need to be removed

when processing seed; arils may have a slight potential for producing useful by-products).

- Taste test (subjectively assessed based on green, but fully formed, seed).
- Nutritional characteristics (highly nutritious seeds without toxic compounds are essential; these data are available in literature for a few species but in most instances this information is not known).

As will be seen from the species profiles below we were not able to determine all these criteria for all the species that we considered prospective.

Using the above criteria we identified **Prospective Species** (see below) and for each one we provide information on the salient features and constraints that might have a bearing on its domestication; these data should be viewed in connection with other information that is provided in Maslin *et al.* (1998). A selection of photographs of each species is presented; additional photographs are included on the accompanying CD. We also provide an overall assessment and subjective rating (low, medium, high) of each species to indicate how well or otherwise we suspect it might perform. A *Reference population* in the Shire is also given; it is these populations that we mainly used to assemble the information that is presented in this report and they can be sampled at an appropriate time should seed be needed for trialing purposes. Under *Mature Seed* we provide an estimate as to when seed might be mature, based on weather conditions that applied in 2008 (note that the time of seed ripening is likely to vary by a few weeks from year to year depending on climatic conditions, especially temperature and the incidence and intensity of rainfall).

Species selection

Based on the above selection criteria we have identified eight species that are considered the most prospective for development as new seed crop plants in the Dalwallinu Shire. Native stands of all these species occur within the Shire. Collectively and individually these species display diversity in growth form, biological characteristics and soil preferences. It is considered important to have this sort of variation represented at this early stage of the project, especially because the cultivation, harvesting etc. techniques that might be employed are as yet largely unknown.

All eight prospective species have the ability to produce large or relatively large, regular pod crops with more or less synchronically ripening seeds. However, as is discussed in the species profiles below there is some variation in these characteristics (which is not unexpected given that we are dealing here with wild, undomesticated organisms). For example, plants of *A. anthochaera* with heavy pod crops co-occur with ones that produce little or no pods; it is not known what factors (environmental and/or genetic) are responsible for this variation. The same sort of thing occurs in *A. daphnifolia* where many plants show significant quantities of aborted seed. It will be the challenge of the project to eliminate or ameliorate these problems in order to successfully cultivate the plants and maximize seed yields.

The eight prospective species (with their subjective ranking given in parentheses) are as follows:

Acacia murrayana (high)

Acacia anthochaera (medium)

Acacia daphnifolia (medium)

Acacia victoriae (medium)

Acacia aff. *brumalis* (medium to low)

Acacia saligna subsp. *lindleyi* (medium to low)

Acacia hemiteles (low)

Acacia obtecta (low)

It should be remembered that although some of these species are ranked as 'low' they are considered more prospective than any of the other 70+ Wattles that occur in the Shire. Also, as already noted, it is important at this early phase of the project to keep the species selection as broad-based as possible because it is not known how any of them will perform under trial conditions. It is perhaps worth commenting here why *A. acuminata* (Jam) is not included on the list. Although this species has the ability to produce large pod crops our understanding is that Jam is unacceptably variable with respect to pod/seed production (mature plants can exist for a number of years without any pods being produced). Also, although *A. subrigida* is included by Maslin *et al.* (1998) as a prospective human food species it is not included here because it is very rare in the Shire and because it is categorized as a Priority 2 species on the Department of Environment and Conservation's Priority Flora List. *Acacia prainii* which is also found in the Shire and included in Maslin *et al.* (1998) is not considered as prospective as *A. hemiteles*, which is ranked here as low.

General notes

Developing an effective harvesting technique will be one of the more significant challenges for the project. Although all the prospective species present their pods externally on the branches (and are thus accessible for collecting) a very significant proportion of these pods are located on the sides (not the top) of the plants. It is therefore difficult to see how these species can be effectively collected using conventional harvesting equipment (hand picking is not considered practical if a large-scale industry is envisaged). *Acacia hemiteles* is a possible exception to this rule (see under this species below for discussion). Although it may be possible in some cases to prune plants to a shape to match harvesting equipment this has never been attempted to my knowledge and it is not known if it would be successful; *A. aff. brumalis*, *A. hemiteles* and *A. murrayana* are perhaps the most amenable to such a technique.

Finally, it is emphasized that this report deals only with species selection. As noted in the *Introduction* there are many facets to the successful development of a new crop plant industry. Should it be decided to further investigate the development of a Wattle seed industry in the Dalwallinu Shire it will be especially important to obtain appropriate advice/guidance on the other matters listed above before proceeding too far. Issues relating to silviculture/agronomy, harvesting, nutrition and marketing are considered as being the most crucial.

Prospective species

A summary of our findings and a selection of photographs have been compiled for each of the eight prospective species, which are arranged alphabetically by species name. This information is presented on the page numbers listed below.

| | |
|--|-------|
| <i>Acacia anthochaera</i> | 6-7 |
| <i>Acacia</i> aff. <i>brumalis</i> | 8-11 |
| <i>Acacia daphnifolia</i> | 12-14 |
| <i>Acacia hemiteles</i> | 15-17 |
| <i>Acacia murrayana</i> | 18-19 |
| <i>Acacia obtecta</i> | 20-21 |
| <i>Acacia saligna</i> subsp. <i>lindleyi</i> | 22-23 |
| <i>Acacia victoriae</i> | 24-26 |

Acacia anthochaera (Kimberly's Wattle)

Salient features

- Dense, rounded, multi-stemmed shrubs commonly 2-5 m tall (but capable of developing to a tree 7-8 m in time).
- Growth rate unknown but likely to be moderately fast.
- Probably relatively long-lived (20+ years).
- Coppicing and pollarding ability unknown but not likely; not reported to root sucker.
- Capable of producing heavy pod crops (but see comments under *Constraints* below), probably commencing from a relatively young age (perhaps about 4 years when plants are about 2 m tall).
- Pods presented externally at ends of branches and thus accessible for collection.
- Seeds medium-sized to large (about 20 000 viable seeds per kg according to Maslin et al. 1998: 57) which are retained in pods for a while following dehiscence (but are easily separated by shaking techniques or hand-stripping). Practically no seed abortion was observed this year (but in previous years seed abortion has been seen; this may be dependent upon seasonal weather conditions). A green seed taste assessment was not conducted for this species.
- In nature Kimberly's Wattle grows in red sand or loam (sometimes over clay); in cultivation near Mullewa it is reported to grow well on saline sites.

Constraints

Potentially the main problem in developing this species is its apparent variation in pod production. Field observations in 2008 showed that while some plants produced large pod crops the majority had few or no pods at all. The reasons for this variation are unknown but are unlikely to relate to the age or condition of the plants, or to water availability because we observed similar-looking plants in populations where some were heavily in fruit growing next to ones with light crops or none at all. It is therefore possible that this variation is under genetic control and for this reason it is recommended that seed for trials be taken from highest-yielding plants (as we did in for the seed we collected 2008).

In previous years some plants in the Shire have been observed to suffer damage from birds destroying the young pod crops or from seed abortion resulting from seasonal weather conditions (but neither of these problems was observed in the plants examined in 2008).

Assessment

This species could prove acceptable for domestication if consistently high-yielding plants can be developed for cultivation, and an efficient way be found for harvesting the seed crops. Although Kimberly's Wattle will probably prove the slowest-growing of the species included in this report (except *A. obtecta*) it can be expected to have acceptable growth rates. Because seeds are not readily shed as the pods open this will facilitate their harvesting by increasing the window of opportunity for their collection. It might be possible to collect seed from the ground using vacuuming technique. Because this species is related to *A. victoriae* it is likely to have desirable nutritional characteristics and would be relatively easy to promote. A spin-off benefit from using Kimberly's Wattle is that it has windbreak potential on account of its dense crown.

Rating: Medium.

Reference population: Rabbit Proof Fence Road, about 0.5 km S of Great Northern Highway (30° 00' 29.3"S, 116° 49' 14.7"E) and also, 1.2 km S of Carter Road (30° 04' 35.8"S, 116° 51' 42.8"E).

Mature seed (2008): Some seed ripe in second week of December but most should reach maturity in third and fourth week of December. (We collected one bag of ripe seed).

Acacia anthochaera (Kimberly's Wattle)



Upper. Plants with light pod crop (left) and heavy pod crop (right). **Centre.** Fruiting branches with near-mature pods and **insert** showing seeds retained in mature, open pods. **Lower.** Seeds with thread-like funicle.

Acacia affin. brumalis

This species is housed at the W.A. Herbarium under the phrase name *Acacia* sp. Kalannie (B.R. Maslin 7706).

Salient features

- Spindly erect shrubs 1.5-2 m tall, single-stemmed or with few slender main stems from ground level, the stems sub-straight and not or only sparingly branched until the crown which is located on upper 1/3–1/4 of the plants; crowns not dense, narrow or (in open sites away from other plants) somewhat wide-spreading; juvenile plants have sub-bushy crowns.
- Growth rate is unknown but is likely to be relatively fast.
- Probably short-lived (perhaps 5-10 years).
- Suckering does occur to a very limited extent in native stands, but (sucker growth is not as prolific as in its relative, *A. jennerae*). Stem coppicing was observed on two plants where stems were broken, the new shoots arising from below the break.
- Capable of producing reasonably heavy pod crops on short, lateral, upper branches with the pods occurring below the apex of the branchlets (but nevertheless quite accessible for collection). Pods are produced from an early age (plants 1 m tall and probably about 2 years old produced light pod crops, with the pods overtopped by the phyllodes).
- Seeds are among the smallest of the species included in this report. They are not shed immediately when the pods open but their retention ability is not as strong as in *A. murrayana* or *A. anthochaera*. There is a small aril at the end of the seed and this would need to be removed during the cleaning/processing phase. The taste of green seed is slightly nutty and not bitter (similar to *A. obtecta*).
- We did not observe any Gall Rust on the plants and only rare evidence of pod damage by birds.
- In nature this species grows in brownish yellow, well-drained sands.

Constraints

The main disadvantage of this species is its relatively small seed (but this may be off-set by the relatively large seed volume) and its probable relatively short-life span. The rather spindly nature of the plants may or may not be an advantage in domestication, it depends upon what sort of plant one is looking for.

Assessment

This species may well attain its maximum yield potential if the plants are grown relatively close together and the stems pollarded at about 0.5 to 1 m above the ground. A close spacing of plants is likely to promote a more erect growth form.

Although quite good pod crops are produced the seed volume may be less than in its closest relative, *A. daphnifolia*. The light-foliaged crown may be an attractive feature of this species in cultivation (*A. daphnifolia* crowns are much denser). We suspect that *A. aff. brumalis* would produce harvestable pod crops when plants are about 3 years old (or within about 2 years of pollarding).

Because of its stem-coppicing ability it may be possible to pollard *A. aff. brumalis* plants to produce a form with desirable characteristics for mechanical harvesting. A potential problem in doing this is that in the first year or so following pollarding the plants may possibly produce an unacceptably large amount of foliage at the expense of pod/seed production.

Acacia aff. *brumalis* would be suitable for cultivation on light-textured soils.

Rating: Medium to low.

Reference population: Scotsman Road 0.3 km E of Central Road 30° 20' 04.7"S, 117° 20' 33"E.

Mature seed (2008): Mature seed was collected from the above plants in the first week of December. However, there are plants in this population that are likely to produce more seed in the second or third week of December.

Acacia affin. brumalis



Upper. Plant in open site showing wide-spreading crown. **Lower left.** Upright plant showing narrow crown. **Lower right.** Stem coppice with new shoots developing below the broken stem,

Acacia affin. brumalis



Upper. Heavy green pod crop with **insert** showing mature pods. **Centre.** Root sucker. **Bottom.** Seeds showing thread-like funicle expanded into an enlarged aril.

Acacia daphnifolia (Northern Manna Wattle)

Until recently this species was known as *A. microbotrya* var. *borealis*.

Salient features

- Shrubs or small trees 3-4 m tall, single-stemmed or dividing into a number of somewhat crooked stems at or up to about 1 m above the ground, the crowns are dense to sub-dense. Reported to be a hardy species that is drought- and frost-tolerant.
- Growth rate is moderately fast.
- Root suckering observed in many natural stands but this does not appear to be too extensive; suckering may therefore not present a serious problem in cultivation.
- Basal coppicing is likely but stem-coppicing following pollarding is unknown.
- We suspect that this species would have a productive life span of about 10-15 years.
- Large pod crops are produced on many plants in natural stands (but seed is often aborted – see under *Constraints* below). However, not all plants produce large volumes of pods; we observed a significant range of variation for this character in the Shire with some plants (which did not appear to be sucker regrowth) being completely sterile. Under *A. microbotrya* Maslin *et al.* 1998: 37 reported that about 14 000 viable seeds per kg are produced, and the seed has been used as a food item by Australian Aborigines; *A. daphnifolia* is likely to be much the same.
- Seeds are large but seem not to be held in mature pods for very long after the pods open (therefore the window of opportunity for collecting seed while on plant is not large). There is an enlarged aril at the end of the seed and this would need to be removed during the cleaning/processing phase.
- In nature *A. daphnifolia* is an ecologically adaptable species. It is commonly found on heavier soils (sandy loams to loamy clays) in lower parts of the landscape but it will also grow on lighter soils such as granitic sand at Xantippe cricket pitch. Being a disturbance opportunist this species is often found along road verges where it can form localized clumps; it has a scattered distribution in the Shire.
- This species has been used in direct seeding programs for regeneration and shelter belt plantings in northern wheatbelt (Maslin *et al.* 1998: 35).

Constraints

The main potential problem with this species appears to be the variation between plants with respect to the volume of pods produced, and also the common occurrence of aborted seeds on many plants. Sometimes all pods on a plant contain aborted seed, but sometimes only a low percentage are aborted. As with pod production in *A. anthochaera* it is not known if this variation is under environmental or genetic control (but we suspect the latter because the variation just described can occur between individual plants in the one population, e.g. at Xantippe cricket pitch). It is therefore recommended that seed for trialing taken from high-yielding plants with the least amount of aborted seed.

Another potential problem relates to the fact that the seed seems not to be held in the pods for long once the pods are ripe. Therefore, the window of opportunity for collecting seed while pods are on the plants is likely to be quite small. However, it might be possible to collect seed from the ground using vacuuming technique.

Assessment

This species has potential for development as a seed crop because these are hardy, ecologically adaptable and relatively fast growing plants. Importantly *A. daphnifolia* has the potential to produce large pod crops with large seeds. Therefore, subject to the development of plants with consistently large pod crops of non-aborted seed, the seed being palatable, nutritious and non-toxic, and acceptable method of seed harvesting being developed, then

this could be a reasonably good species to use.

Rating: Medium.

Reference population: Xantippe Cricket Pitch, 0.5 km along track off Struggle Street 30° 16' 14.8"S, 117° 01' 46.4"E.

Mature seed (2008): Mature seed should be present on the above plants in about the third or fourth week of December.

Acacia daphnifolia (Northern Manna Wattle)



Upper. Plants with heavy pod crop (foreground) and light pod crop (background). **Centre left.** Heavy pod crop (but all seeds aborted). **Centre right.** Pods green (with good seed) and brown (seed aborted). **Lower left.** Good seed. **Lower right.** Aborted seed.

Acacia hemiteles (Tan Wattle)

Salient features

- Hardy, multi-stemmed, rounded or obconic shrubs 1-2 m tall, the crowns dense.
- We suspect that this species will have a life-span of about 15-20 years.
- Growth rate should be moderate to moderately fast.
- Coppicing and pollarding ability unknown; suckering unlikely.
- Reasonably large quantities of synchronous-ripening pods are produced; good pod crops can be produced on plants about 1.5 m tall (and estimated to be about 5 years old). Some variation observed in fecundity with high-producing plants co-occurring with ones having light pod crops. Mature pods can be terminal on the branches or overtopped by the phyllodes. We did not observe any pod damage due to birds.
- Seeds relatively small and with no aril; 30 000 to 40 000 viable seeds per kg according to Maslin et al. 1998: 77. The seeds are readily dropped as mature pods open. A green seed taste assessment showed the seed to be non-bitter but with little flavour.
- In nature this species has a wide edaphic range, growing on sand, loam or clay soils.

Constraints

This species may possibly not produce sufficient quantities of seed to warrant its domestication; furthermore, the seed is relatively small. Also, because the seed is dropped soon after the pod ripens there is only a small window of opportunity to harvest seed; vacuuming seed from ground beneath the plants would be impractical because of the growth form of the shrubs. The growth rate of Tan Wattle may be less than many other species included in this report (we estimate that it may take up to about 4 or 5 years before the first harvestable crops would be produced). Although destructive harvesting to collect seeds may not adversely affect the plants, it may encourage the production of large quantities of foliage at the expense of seeds.

Assessment

Tan Wattle is the lowest-growing of the species included in this report and therefore it may offer opportunities/potential for development that is absent from the other prospective species. For example, it may be possible to shape the plants by pruning to produce a growth form amenable to seed-collection using conventional harvesters. However, it is not known if sufficient quantities of pods would subsequently be produced, noting also that the seed is reasonably small. An advantage of considering this species is that it forms hardy shrubs that are ecologically adaptable. Therefore, despite its perhaps relative slow growth rate and relative low volume of small seed production (with seeds soon shed from mature pods) it is considered best not to select against Tan Wattle at this early stage. Tan Wattle has been used for soil stabilization and revegetation in various parts of the wheatbelt and goldfields but sometimes it has shown variable results (see Maslin *et al.* 1998: 76, 78).

Tan Wattle is related to *A. prainii* which also occurs in the Shire but which grows to a much taller plant; *A. prainii* is included in Maslin et al. (1998) along with *A. hemiteles* as a lesser known species that may possibly have some prospects for development as a human food crop plant.

Rating: Low.

Reference population: Rabbit Proof Fence Road, 5 km S of the Kalannie – Dalwallinu road 30° 19' 50.2"S, 116° 57' 19.2"E.

Mature seed (2008): Mature seed should be present on the above plants in about the third week of December.

Acacia hemiteles (Tan Wattle)



Upper. Population on Rabbit Proof Fence Road. **Centre.** Obconic shrub. **Lower.** Rounded shrub with crown extending to the ground.

Acacia hemiteles (Tan Wattle)



Upper. Moderately heavy pod crop with **insert** showing seed with thread-like funicle. **Lower left.** Branch showing phyllodes overtopping pods. **Lower right.** Pods (immature) terminal on branchlets.

Acacia murrayana (Murray's Wattle)

Salient features

- Openly branched shrubs or small trees usually to about 5 m tall (the plants sampled for this report were rather spindly shrubs about 1.5 m tall), single-stemmed or sparingly branched at base, the crown foliage can be light or dense (probably young, actively growing plants in open sites have the densest foliage).
- Fast growth rate (probably attaining about 2 m in 2 or 3 years).
- Plants reported as having life-span of (10-25 years).
- Coppices well; likely to re-sprout following pollarding (but needs testing); has sucker-ing ability (but perhaps not likely to cause problems in plantations).
- Good pod crops produced (even plants at 1-2 years old have light crops); harvestable crops might be available at about 3 years. Pods are held terminal on the branchlets and are accessible for harvesting.
- Seeds moderately large, retained in pods for some time after pod opening (thus facilitating collection); the seeds would be easy to remove from the pods following harvesting. Reported to produce 18 000 – 27 000 viable seeds per kg (Maslin *et al.* 1998: 22). Only slight evidence observed of seed damage by birds; scarcely any seed abortion observed. The taste of green seed is slightly astringent.
- In nature this species favors sandy soils.

Constraints

It is possible that if pruning or other silvicultural techniques are used to shape the plants it may result in unacceptably large volumes of foliage being produced at the expense of pods. Also, the slight astringency in seed taste is something that needs further investigation.

Assessment

Murray's Wattle was one of the two species considered by Maslin *et al.* (1998) as having the most promise for development as a human food crop plant. This adaptable species is likely to be easy to establish and it displays rapid growth when planted on favourable sites (it should do best on well-drained sands, loams and texture-contrast soils; water-logged sites should be avoided; see Maslin 1998: 23 for further details); declining stands could probably be regenerated by coppicing. The plants are likely to be amenable to pruning to facilitate pod production and collection using conventional mechanical harvesters. Murray's Wattle produces good crops of moderately large seeds from an early age; seed collection will be facilitated because the seeds are not dropped quickly as the mature pods open. The seeds have good nutritional characteristics and there are many reports of the them having been consumed by Australian Aborigines (see Maslin *et al.* 1998: 22 for details).

Because *A. murrayana* is a relative of *A. victoriae* (which is the main plant species used in the bush tucker industry) it is likely to display all the benefits of that species, but with the significant advantage of not having the spiny thorns which make the handling of *A. victoriae* so problematic.

Rating: High.

Reference population: 0.3 km along sandy track on east side of Great Northern Highway; this track intersects the Highway 1.6 km N of Wanarra East Road turnoff (or 25.5 km N of Goodlands Road turnoff) 29° 33' 50.4"S, 117° 09' 08.7"E.

Mature seed (2008): Mature seed was present on the above plants in first week of December (we collected bulk sample from a range of plants). We expect that most of the remaining seed will be lost by the second or third week of December.

Acacia murrayana (Murray's Wattle)



Upper left. Adolescent multi-stemmed shrub. **Upper right.** Juvenile shrub. **Lower.** Fruiting branch showing pods terminal on branchlets and **inserts** showing seeds not readily dropped from open pods.

Acacia obtecta

Salient features

- Hardy, multi-stemmed, rounded or obconic shrubs 1.5-3 m tall and up to about 4 m across, crowns dense (not unlike *A. anthochaera*), the upper branches are much divided creating a lot of twiggy biomass.
- Growth rate unknown (but will probably prove reasonably slow).
- Probably does not sucker; coppicing/pollarding ability unknown (but we suspect that these are unlikely).
- Plant probably long-live (20-30 years).
- Capable of producing moderately good pod crops (however, crops observed in 2008 might be more prolific due to seasonal conditions); the pods are born towards the ends of the terminal branches.
- Seeds are large but have a very thick seed coat; there is no aril developed on the seeds which seem to be retained in pods following pod opening (but this needs to be confirmed by observation of more mature pods than we have seen). While many pods possess some aborted seed these are not overly numerous; we did not observe evidence of seed having been damaged by birds. A green seed taste assessment showed the seed to have a pleasant, slightly nutty flavour, but there was an excessive amount of hard seed coat present.
- In nature this species grows on a variety of soil types ranging from sand to loam or clay; it probably will tolerate some salinity.

Constraints

Probable slow growth rate and lack of ability to manipulate plants through coppicing/pollarding. Difficulty in collecting seed. Thick seed coat.

Assessment

Despite large seeds and (at least in 2008) reasonable pod crops being produced by this species, and probable long life-span the things that mitigate against using this species are: (1) the thick seed coat which substantially reduces the amount of edible cotyledon per seed; (2) its probable slow growth rate and probable limited scope for manipulating the plants to enhance pod production and collection (this is probably a 'what you see is what you get' sort of species), and (3) difficulty in collecting seed. Very little is known about this species. For example, there is no information on the seed nutritional/anti-nutritional characteristics, and despite reasonably good pod crops being produced on at least some plants in 2008 it is not known if such crops would be produced reliably each year.

Rating: Low.

Reference population: R. Nixon property about 9 km due ENE of Kalannie 30° 20' 22.0"S, 117° 12' 05.4"E.

Mature seed (2008): Mature seed should be present on the above plants in about the third or fourth week of December.

Acacia obtecta



Upper. Mature, dense shrubs. **Centre.** Fruiting branches with moderately heavy pod crop, **insert** showing near-mature pods (some seed aborted). **Lower left.** Mature seed with thread-like funicle. **Lower right.** Green seed abortion has occurred.

Acacia saligna subsp. lindleyi (Lindley's Coojong)

Acacia saligna is currently being revised taxonomically. It now has four subspecies and the one that occurs in the Dalwallinu Shire (and is widespread throughout the wheatbelt) is subsp. *lindleyi*. It is probable that most of the information provided under *A. saligna* in Maslin *et al.* (1998) applies to a different subspecies, namely, subsp. *saligna*. Subspecies *saligna* normally grows to a taller plant with more woody biomass than subsp. *lindleyi*, however, insofar as pod production and seed characteristics the two subspecies are likely to be very similar except that subsp. *lindleyi* will probably produce few pods because of its lower stature

Acacia saligna was considered by Maslin *et al.* (1998) as having some promise for the production of commercial quantities of seed for human consumption. The information presented in that work is reasonably comprehensive and will not be repeated here. *Acacia saligna* subsp. *lindleyi* is not common in the Dalwallinu Shire and therefore was not able to be adequately assessed by us. Furthermore, anecdotal evidence suggests that cultivated stands in the Shire readily collapse when plants are a relatively young age, presumably because of their ability to rapidly deplete available ground water. Nevertheless, *A. saligna* seems to have general utilisation potential (e.g. fodder, biofuel, reconstituted wood products) and has been extensively trialed in the wheatbelt by this Department, Department of Environment and Conservation. Subsp. *lindleyi* should therefore be included in preliminary trials for human food should these be established in the Shire.

Rating: Medium to low.

Reference population: 10.8 km from Moora Hotel on the Moora – Miling road 30° 35' 54.6"S, 116° 06' 25.4"E.

Mature seed (2008): Mature seed should be present on these populations in the third or fourth week of December.

Acacia saligna subsp. lindleyi (Lindley's Coojong)



Upper. Plants with moderate pod crop. **Centre.** Cultivated stand at Katanning (1 year old plants). **Lower left.** Mature pods. **Lower right.** Mature seed with small aril.

Acacia victoriae (Elegant Wattle)

Salient features

- Sturdy, often somewhat straggly, prickly shrubs or small trees commonly 2-5 m tall (the Kalannie plants we inspected were about 10 years old, 2-2.5 m tall and 2-3 m wide), dividing at ground level into 2 to 4 main stems which commence branching relatively close to the ground, the stems and main branches are somewhat crooked while the terminal branches are somewhat twiggy (the plants we observed at Kalannie had a number of dead terminal branches caused perhaps by windburn or salt burn; furthermore, there was evidence that many of these plants had been grazed by kangaroos: the relevance of these observations to this report is that it is the terminal branches where the pods are produced), the crown sub-dense or dense.
- Growth rate relatively fast.
- Relatively short-lived (perhaps 15-20 years).
- Coppices well; probably would resprout following pollarding (but the resultant new growth may possess numerous sharp spines).
- Readily root suckers (especially in wet areas), sometimes forming thickets (the Kalannie plants that we observed had small sucker growth, about 5-10 cm tall, up to about 3 m from the adult plants).
- Pods occur towards the ends of the branchlets on relatively long racemes which often extend beyond the phyllodes, thus making them relatively easy to collect. (Some of the Kalannie plants had good pod crops but most had light to moderate crops.)
- Seeds are retained in pods for some time after pod opening (thus facilitating collection) but would be easy to remove from the pods following harvesting. Reported to produce about 24 000 viable seeds per kg (Maslin et al. 1998: 27).
- In nature this species is most commonly found on clay or loam soils, especially in water-gaining sites.

Constraints

A major problem in using this species is its prickly nature (a pair of small, sharp spines occur at the base of many phyllodes); generally the young plants are more spiny than mature ones. While some spineless forms of *A. victoriae* apparently occur, these are not found in the Shire. (*Acacia glaucocaesia* from the Pilbara is a very close relative of *A. victoriae*, it is spineless or has very few spines.) As with *A. anthochaera* there may be genetically determined variation between the plants with respect to the numbers of pods produced.

Assessment

A major advantage of this species is that it is currently the one that is primarily used in the bush tucker industry and therefore there exists an established market for the seed. The seeds have good nutritional characteristics and there are many reports of them having been consumed by Australian Aborigines (see Maslin et al. 1998: 27 for details). The development of high pod-yielding, spineless forms of this species would certainly improve the attraction of using this species. However, there is an extremely small genetic pool of naturally occurring *A. victoriae* in the Shire and any such silvicultural development would necessitate the introduction of forms from elsewhere; this in turn would raise weed and pollen pollution issues.

In some rangeland areas *A. victoriae* is a useful fodder plant, therefore, a possible by-product from using this species might be the production of stock feed.

Rating: Medium.

Reference population: Plants cultivated on R. Nixon's property east of Kalannie, 30° 23' 21.7"S, 117° 10' 23.9"E.

Mature seed (2008): Mature seed should be present on the above plants around January (R. Nixon, pers. comm.).

Acacia victoriae (Elegant Wattle)



Upper. Adolescent shrub with sub-dense crown, **insert** showing prickly stipules. **Centre.** Adolescent shrub with dense crown. **Lower.** Two year old plants in cultivation at Morawa.

Acacia victoriae (Elegant Wattle)



Upper. Fruiting branches with green pods (note some dead terminal branches). **Lower.** Mature papery pods with **insert** showing seeds retained in open pod.

References

Maslin, B.R., L.A.J. Thomson, M.W. McDonald and S. Hamilton-Brown (1998). *Edible Wattle Seeds of Southern Australia A review of species for use in semi-arid regions*. pp. 108. (CSIRO Publishing Australia.)

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