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FACT SHEET

Quandong production

Introduction

The quandong (*Santalum acuminatum*) is an Australian native tree whose tart-tasting fruit can be eaten fresh or, more commonly, halved and dried and then reconstituted and used in a range of sweet and savoury products, such as preserves, sauces and chutneys, as pie filling or in cordials and liqueur. The kernel is also edible.

Limited supplies of quandong fruit are available from wild-harvest and orchard production. Fruits are 2 to 3 cm in diameter, spherical to pear shaped, with yellow to bright red skin and a relatively thin white to brown flesh (Figure 1).

Fig 1. Quandong fruit

Recent estimates of quandong tree numbers in commercial planting in Australia range from a low of around 26,000 trees to a high of around 40 to 50,000 trees. Assuming planting densities of 500 trees per hectare, this suggests an area of between 50 to 100 hectares. Most plantings consist of seedling trees and are relatively small scale, with around one-third of the total number of trees planted being grown on orchards of less than 500 trees. The largest single planting in Australia is reputed to be around 7,000 trees. While there is still much to be learned about crop management under orchard conditions, the current level of knowledge and the demand for consistent supplies of better quality fruit, combined with environmental concerns over the long-term impact of wild harvesting, means that orchard production will increase in importance.

Botany and growth patterns

The quandong plant is a shrub or small tree, up to 6 m high, with somewhat drooping branches and slender, pale green to olive leaves (Figure 2). It grows wild in South Australia, Western Australia and New South Wales, with a more restricted distribution in Queensland, Victoria and the Northern Territory (Figure 1). It is commonly found in woodland associations as scattered individuals or small groups on sands, sandy loams or gravelly ridges and occasionally on clay soils or rocky hillsides

Quandongs have the unusual habit of parasitising the roots of other plants, using a specialised organ known as a haustorium. This pad-like organ is produced on the roots of quandongs and partially envelopes and forms a connection with the roots of other plants. Quandongs seem to primarily benefit from this relationship by extracting water from their hosts. Managing this relationship is one of the major challenges in producing quandongs in an orchard situation and is discussed further, below.

Fig 2 Wild quandong tree

Fig 3 Distribution of wild quandongs

The seasonal growth pattern for Frahn's Paringa Gem [A] quandongs at Paringa in South Australia is shown in Figure 4. The timing and duration of these cycles will vary for different varieties and in different geographical areas.

Flowering occurs on one year old wood commencing in late autumn and continuing through to early autumn. Off-season flowering may also occur in response to weather conditions. Insects, including native bees and wasps, appear to be the main vehicle for pollen distribution. Although the overall position requires further study, fertility deficiencies such as self-incompatibility (i.e. the inability of flowers to successfully pollinate flowers on the same tree), reduced female fertility (a percentage of flowers with no egg cells) or reduced male fertility (a percentage of flowers with small or misshapen pollen) may be a problem in some situations. In seedling orchards some trees are observed that flower but consistently fail to produce fruit (suggesting female infertility), while in the wild isolated quandongs groves and individual trees are known which either never set fruit (suggesting either self-incompatibility or male or female infertility) or alternatively fruit very well (which suggests no fertility problems). These problems are likely to have their greatest impact in single-clone orchards, where cross-pollination is not available to compensate for any possible clonal self-incompatibility or male fertility problems. The fertility status of the currently available clones is largely unknown, though observations of Powell's No.1 indicates that, in this clone at least, fruit set may be reduced as the distance from seedling trees increases. Until the situation is clarified it may be prudent to assume that all clonal varieties benefit from cross-pollination.

Fruit grows over autumn, winter and early spring and early spring. Fruit begins to change colour from green to red in late winter and harvest usually occurs during spring. A spring vegetative flush coincides with harvest period and a second flush occurs in late summer-autumn.

Climatic and soil requirements

As can be seen from Figure 3, quandongs have a relatively wide natural distribution, from arid desert areas to Mediterranean-climate coastal regions. Most commercial plantings have occurred in the non-desert parts of this range, including around Port Augusta, in the Riverland and on the Eyre and Yorke Peninsulas in South Australia, as well as around Broken Hill in New South Wales.

These areas are characterised by hot dry summers and cool wetter winters and the plant's adaptive characteristics for drought-tolerance, it's seeming preference for lighter textured soils and the problems, such as skin splitting and root diseases, that occur under wetter conditions give indications as to the likely climatic and soil requirements for commercial production.

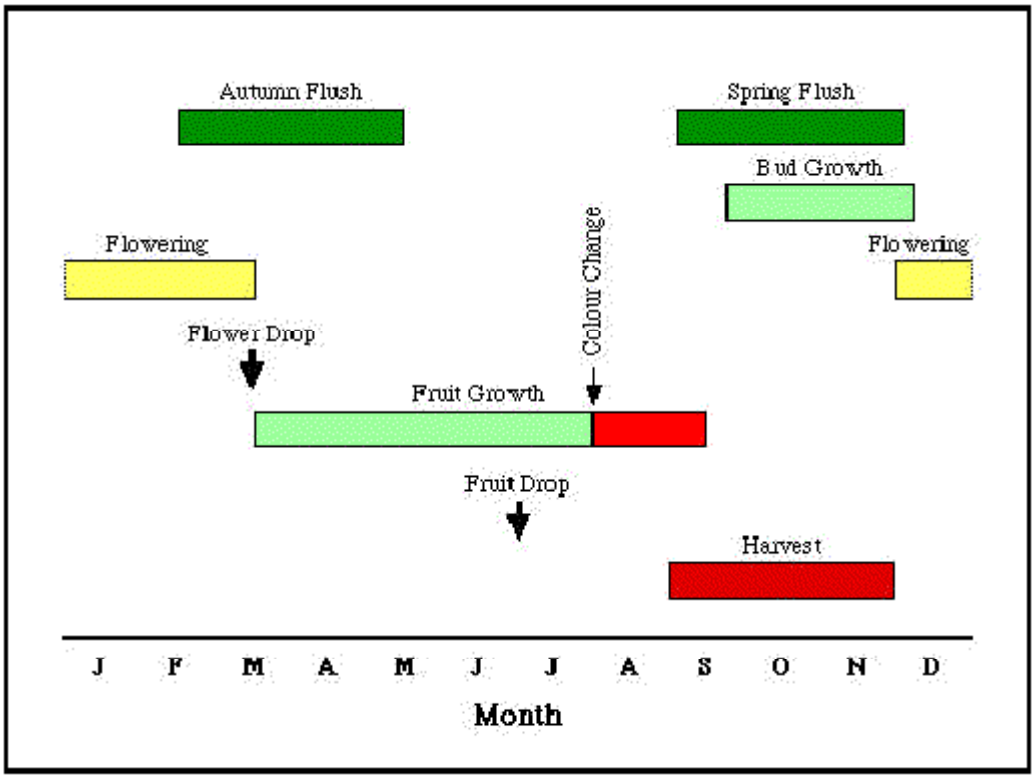

Figure 4. Seasonal growth cycle of Frahn's Paringa Gem [A] variety at Paringa, SA.

However, it is possible that commercial plantings could be successful outside of this natural and current commercial range. The environment of a plant's natural range and the plant's adaptive features to that environment are a pointer to some the basic requirements for *reproduction and survival* in the competitive wild. The aim of commercial cultivation - to produce the maximum sustainable and economic yield of marketable product, and not merely plant survival - needs to be remembered. Factors that may ultimately turn out to be important in the site selection of commercial plantations may be different from those minimal survival requirements. The ability of growers to manipulate environmental factors, such as with irrigation, and the fact that a cultivated environment removes or modifies many of the competitive factors operating in the wild, also needs to be considered.

Varieties

Because the quandong industry is relatively new, most plantings have been established using seedling trees and perhaps only 20% of plantings have been made using grafted varieties. This differs from the situation in older perennial tree crop industries, where nearly all plantings consist of vegetatively propagated material. While domesticated and wild seedling resources are valuable in preserving genetic variability and are likely to be the source of future selections, in the longer term the industry is likely to increase its use of vegetatively propagated material. The reasons for vegetative propagation are threefold - the preservation of desirable characteristics, orchard uniformity and the avoidance of juvenility.

Preservation of desirable characteristics: Except in unusual cases, most plants do not breed true-to-type from seed. The only way to consistently preserve desirable characteristics when they arise by chance or through selective breeding is via vegetative propagation.

Uniformity: Apart from straight out issues of desirable and undesirable characters, the diversity of seedling populations in traits such as plant size, fruit maturity times, susceptibility to pests and diseases, etc can cause problems in orchard management.

Delayed bearing due to juvenility: Seedling plants often go through a juvenile period of several years before reaching maturing and commencing bearing. In some plant species this juvenile stage is also accompanied by other undesirable characteristics, such as thorniness.

Vegetative propagation material, such as graftwood, is taken from mature plants and does not revert to this juvenile stage. Bearing may thus commence several years sooner than is the case for seedlings.

The following are some of the varieties of quandongs currently available and their descriptions, as supplied by their breeders or distributors. The performance of individual plantings of any of these varieties may vary from these observed descriptions, given different combinations of management, planting environments and rootstocks.

Frahn's Paringa Gem [A]: This variety was selected by Dudley and Lyla Frahn of Paringa, South Australia and commercially released in March 1999, after 20 years observations of the mother tree. It is described as:

Tree habit: Compact, vigorous and non-suckering on its own roots.

Fruit quality: Rich, cherry-red skin colour and light coloured flesh. Freestone, with high flesh to stone ratio. Delicious quandong flavour with no 'meaty' aftertaste.

Other characteristics: Compressed ripening time aids harvesting. Improved resistance to Quandong Moth and skin splitting.

Yields: High yielding, precocious, no sign of alternate bearing habits. The yield performance of the mother tree has been:

Table 1. Yield performance of Frahn's Paringa Gem [A] (in Kg Cut & Dried Fruit)

Tree age - years	4	5	6	7	8	9	10	11	12	13	14	15
Mother tree yield	0.67	1.19	1.62	2.44	3.93	3.26	4.33	3.88	5.14	6.38	7.28	11.45

Frahn's Paringa Gem [A] planting material is exclusively available from Australian Native Produce Industries Pty Ltd, Paringa, South Australia ('phone 08 8595 8008) under a contract production arrangement.

Powell's No.1: This variety was selected by Brian and Faye Powell of Quorn, South Australia and commercially released in 1994. It is described as:

Tree habit: Vigorous and healthy with a pendulous habit.

Fruit quality: Deep burgundy skin colour. Round, with short but distinct neck. Fruit large when crops are moderate, medium when crops are heavy. Freestone. Very fine textured flesh with outstanding flavour.

Other characteristics: Resists skin splitting.

Powell's No.1 planting material is exclusively available from Taverna Tulloch & Partners, Quorn, South Australia ('phone 08 8648 6117).

CSIRO selections: The CSIRO began investigating the horticultural potential of quandongs in 1973. Seeds were collected from a number of regions including the Flinders Ranges and Yorke Peninsula in South Australia and Perth, Western Australia. Assessment and selection of seedlings were made from plantings at Quorn and Paringa in South Australia and Merbein and Koorlong in Victoria.

Sunraysia Nurseries established a planting of 15 varieties from the CSIRO selection program at Gol Gol, NSW and have been observing and propagating these varieties since 1993-4.

The varieties and their reported performance are:

Table 2. CSIRO selections – characteristics and performance.

Variety	Skin Colour	Flesh Colour	Flavour[1]	Fruit Size	Flesh %[2]	Yield Whole Fruit[3]	Calc. Yield Fresh Flesh[4]	Est. Yield Dried Flesh[5]
CS 1-8	Red	Yellow	S2, A2	Large	65%	3-5kg	2.0-3.3kg	0.5-0.8kg
CS 4-13	Pink	Yellow	S2, A1	Medium	53%	7-9kg	3.7-4.8kg	0.9-1.2kg
CS 5-1	Red	Brown	S1, A3	Medium	58%	3-5kg	1.7-2.9kg	0.4-0.7kg
CS 5-18	Red	Yellow	S2, A2	Medium	57%	5-7kg	2.9-4.0kg	0.7-1.0kg
CS 6-16	Cream	Yellow	S4, A3	Medium	58%	3-5kg	1.7-2.9kg	0.4-0.7kg
CS 6-18	Pink	Yellow	S4, A1	Small	62%	3-5kg	1.9-3.1kg	0.5-0.8kg
CS 7-3	Pink	Yellow	S3, A4	Medium	74%	3-5kg	2.2-3.7kg	0.6-0.9kg
CS 7-7	Red	Brown	S1, A3	Small	61%	5-7kg	3.1-4.3kg	0.8-1.1kg
CS 8-12	Red	Yellow-Brown	S2, A3	Medium	65%	5-7kg	3.3-4.6kg	0.8-1.1kg
CS 9-26	Red	Brown	S3, A2	Large	60%	5-7kg	3.0-4.2kg	0.8-1.1kg
CS 10-5	Red	Brown	S3, A1	Large	60%	7-9kg	4.2-5.4kg	1.1-1.4kg
CS 11-1	Red	Brown	S4, A2	Large	64%	5-7kg	3.2-4.5kg	0.8-1.1kg
CS 23	Red	Yellow	S2, A1	Large	69%	7-9kg	4.8-6.2kg	1.2-1.6kg
CS 56	Red	Brown	S4, A3	Medium	56%	7-9kg	3.9-5.0kg	1.0-1.3kg
P 39	Pink	Yellow	S4, A2	Small	69%	7-9kg	4.8-6.2kg	1.2-1.6kg

Notes:

1 Flavour ratings: S1 = low sweetness - S5 = high sweetness
A1 = low acidity - A5 = high acidity

2 Fresh flesh as % of fresh whole fruit weight.

3 Annual yield of 5 to 7 year old trees.

4 Calculated from whole fruit yield X flesh %.

5 Estimated from fresh flesh yield X 25%.

It should also be noted that variety CS 4-13 has shown itself to be very frost intolerant.

Sunraysia Nurseries can be contacted on telephone 03 5024 8502.

Managing the host-parasite relationship

A fundamental question in the orchard production of quandongs is - *how is the host-parasite relationship going to be managed?*

Quandongs are able to survive without a host and some orchards have been established with no species present and with a bare orchard floor maintained, eliminating weeds and thus potential hosts. However, research and observation indicates that growth is improved if a host is present, though ultimate effect on yield, management costs and complexity and orchard economics of providing withholding a host has not yet been studied.

Most orchards have been established on the assumption that a host is beneficial and plants for purpose are provided. Even if no host species are deliberately provided it is known that quandongs parasitise a wide range of plants, so that any adjacent vegetation is a candidate and likely to parasitised. This means routine operations such as problem weed control need special care. It is that translocated herbicides, such as glyphosate, could be passed from target weeds to quandongs, causing damage. Even mechanical cultivation or the use of knock-down herbicides, such as could be detrimental to quandongs if they have established connections to the weeds being removed Soil residual herbicides, such as Surflan, which destroy germinating weeds before they can parasitised, may be a possible future management option, although their use in quandongs has not studied and no products are currently registered for this purpose.

Future weed management is likely to be easier if, as far as possible, particular problem weeds controlled prior to planting.

In the wild, quandongs may utilise a wide range of host plants, including acacias, bluebush (*Mairiana* sp.) and saltbush (*Atriplex* sp.). Host species that have been commonly used in plantings myoporum, kikuyu grass, clovers, prostrate lucerne, acacias and melaleucas. In nursery trials with plants, the use of *myoporum parvifolium* as a host species has resulted in good growth rates. The form of myoporum, which is a prostrate mat-forming shrub usually less than 10 cm tall, is also suited use as a weed-suppressing ground cover in orchards.

Although it has not yet been studied, it is likely that as plantings age there may be a need to provide range of hosts that more closely match the size of the quandong plants, from small herbaceous in early years to shrubs and trees in later years. Tree windbreaks may have a dual role in this case also need to be considered as part of the whole host-parasite management equation.

Orchard layout and establishment

Between and within row spacing is governed by machinery access requirements, variety growth expected growth rates and how quickly the grower wants to achieve maximum canopy development. Closer spacings will achieve maximum canopy area (and thus maximum yields) earlier in the planting's life, at the expense of greater planting material and possibly pruning costs. Conversely, wider plantings will cost less to establish but take longer to achieve maximum canopy development and yields. Between row spacing is commonly in the 4 to 6 metre range while between-plant spacing within the rows from around 2 to 4 metres.

In plantings of clonal varieties the use of seedling or different variety pollinator trees is probably desirable, given the current uncertainty over self-incompatibility or reduced male infertility. A ratio pollinator trees to clonal trees of 1 to 8 is commonly used in other crops, such as plums, with a problem. This ratio allows every clonal tree to be adjacent to a pollinator. The pattern is :

C	**C**	**C**	**C**	**C**	**C**
C	**P**	**C**	**C**	**P**	**C**
C	**C**	**C**	**C**	**C**	**C**

C = Clonal tree **P** = Pollinator tree

Other patterns in use involve complete rows of pollinators, which may also incorporate host plants. In any layout the possibility that the flowering times of some pollinators may not coincide with the clonal variety or the pollinator may itself have reduced male fertility needs to be considered and topworking of these trees may be necessary in the future.

Quandongs can be difficult to establish and significant post-planting losses are often reported. Minimising root disturbance and damage at planting is an essential first step in reducing these losses. Rough handling that disturbs the rootball should be avoided and the technique of 'teasing out' roots after removing trees from their nursery containers at planting *must not* be employed. One planting technique that has been reported to be successful when using rigid plastic containers involves cutting the nursery container in two, vertically, and then lowering the container and plant into the planting hole. The container halves act as a 'splint' for the rootball while the hole is backfilled, and then carefully removed.

Providing an immediate irrigation as well as shade, wind and vertebrate pest (such as rabbit) protection are also important in reducing losses.

Nutrition

Like many native plants, the quandong in its natural habitat can survive on poor infertile soils. However, also like many native plants, in commercial cultivation a higher nutrient regime is likely to be required to produce good plant growth rates and help improve production potential.

As in most areas of quandong production, the optimal fertilizer program for plantation production has yet to be determined. One grower's program that has been reported to have resulted in good growth rates and colour on an alkaline sandy loam soil is a fortnightly fertigation, during the growing season, of around 29 litres per hectare of liquid fertilizer with an NPK analysis of 9:4:6, plus trace elements. This equates to an application of around 2.6 kg/ha of nitrogen, 1.2 kg/ha of phosphorus and 1.7 kg/ha of potassium per fortnight or, assuming a growing season of 7 months, of around 18 kg/ha of nitrogen, 8 kg/ha of phosphorus and 12 kg/ha of potassium per annum.

Another program recommended by CSIRO involves blood and bone and iron chelates, applied in spring and autumn.

While as yet there are no well-established standards for interpretation, the use of soil analysis prior to planting and plant tissue analysis for established trees hold promise as methods for establishing and refining fertilizer requirements and programs.

Water requirements

While some quandong plantations have been established as dryland enterprises, it likely that future commercial development will be concentrated on irrigated production, using undertree systems such as drippers, microjets or microsprinklers.

As yet, little is known about the optimal irrigation regime for quandongs or how the irrigation of the host-parasite association should actually be managed (should irrigation decisions be based on the requirements and conditions of the quandong or of its host(s)?). However, growth stages are likely to impact on the quandong's need for water and the flowering and early fruit set periods are times when it could be expected that water deficits would be detrimental to good yields. As the fruit reaches maturity, excess water can result in skin splitting in susceptible varieties. General overwatering may contribute to the incidence of root diseases.

Whatever watering regime is implemented it is important that producers establish objective means of monitoring and recording soil moisture conditions. Such monitoring will help establish and document the current regime's performance and provided data and pointers for improvement. Visual tree symptoms, such as signs of stress, should not be used as a guide as to when to water. By the time that trees are showing obvious visual symptoms it is highly likely that tree growth and/or yield is being detrimentally affected.

Of the types of soil moisture monitoring devices commonly used, tensiometers are probably the least expensive and are relatively easy to use and interpret. A tensiometer is basically a water filled tube, with a porous ceramic tip at the bottom and a stopper and vacuum gauge at the top. The instrument is installed in the soil so that the ceramic tip is at the depth where the moisture content is to be measured. As the soil dries it draws water out through the ceramic tip, creating a partial vacuum inside the tensiometer, which is registered on the gauge. When the soil is irrigated, water is drawn back into the tensiometer and the gauge reading drops.

The tensiometer does not measure soil moisture content directly, but instead measures how firmly water is held by the soil. In dry soil, water is held tightly and plants have to work harder to extract moisture. As soil moisture content increases, less force is required to extract the water. It is like squeezing a wet sponge - at first it is easy to squeeze out the water, but it gets harder and harder as the sponge dries.

For tree crops like quandongs two tensiometers are installed at each measuring station, which should be located just inside the drip line of the tree, on the northern side. The shallow unit should have its sensing tip near the top of the root zone and is used to indicate when to start irrigation. The deep unit has its tip near the bottom of the root zone and is used to determine when to stop irrigating.

Tensiometer gauges are graduated in centibars. As a generalisation, the readings can be interpreted as meaning:

ZERO: The surrounding soil is completely saturated with water, regardless of the soil type. Zero readings can be expected after a heavy rain or deep irrigation. A persistent zero reading indicates poor drainage or a damaged instrument.

0-10 CENTIBARS: Water held by soil in this range drains off within a few days. Persistent readings in his range indicate poor drainage.

10-20 CENTIBARS: Ample moisture and air in the soil for the growth of most plants. If irrigation is in progress, it should be stopped when the deep gauge drops to 10, since any further water will be quickly drained from the root zone and wasted.

20-40 CENTIBARS: Irrigation required for most crops in sandy soils.

40-60 CENTIBARS: Irrigation required in for most crops in medium textured soils, too dry for most crops in sandy soils.

60-80 CENTIBARS: Irrigation required for most crops in heavy clay soils. Too dry for most crops in sandy or medium textured soils.

A tensiometer reading of 70 to 80 as the decision point to commence watering in quandongs has been used by some growers, however this is a very high (dry) reading, particularly on sandy soils, and its appropriateness is open to question.

Canopy management

The main canopy management practices likely to be employed involve some pruning early in life to establish a desired tree shape. This may involve developing a single straight stem, particularly if mechanical harvesting is envisaged, avoiding narrow and weak crotch angles between branches, which are prone to splitting under crop loads and windy conditions, and removing other tree structure problems, such as crossed branches. Pruning should be early and light to avoid the need to remove significant growth later on.

Pests and diseases

Pests: The Quandong Moth (*Paraepermenia santaliella*) is the crop's most significant insect pest. It lays its eggs in the calyx of the fruit (the outer whorl of floral parts, just below the petals). The larvae which hatch early in the season feed on developing buds and the reproductive parts of flowers and may have a role in reducing fruit set. Later hatched larvae burrow in to the fruit where they feed there for the majority of their development. The significant ensuing fruit damage results in a downgrading in quality and may have a role in accelerating fruit drop.

Currently, the only chemical control available for quandong moth control is dimethoate (400g/L A.I. at the rate of 75mL/100L) for which the Australian Quandong Industry Association has obtained a usage permit.

Trials at Whyalla indicate that, in a season of low pest pressure, a monthly program of sprays beginning in mid-January results in very low levels of infestation in fruit, as do programs that involve only one spray, either in early June or early August or two sprays, in early June and again in early August.

Orchard hygiene, involving the destruction of fallen fruit which is often infested with larvae, may also assist in the control of quandong moth.

Other minor pests reported on quandongs include foliage-eating caterpillars, a sap-sucking insect, possibly the Acacia tree hopper - *Sextius virescens*, and scale insects. An eriophyid mite has been reported infesting trees in the Port Augusta area during autumn, causing fruit blemish and, possibly, fruit drop. Related fruit-blemishing mites infest citrus (Citrus bud mite,

Citrus rust mite, Brown citrus rust mite) and grapes (Grape leaf blister mite, Grape leaf rust mite), where natural enemies, such as predacious mites and thrips, hover fly larvae, ladybirds and lacewings are important in control. In these crops control is also achieved with sulphur sprays, where warranted.

A shoot tip die-back has also been observed in quandongs and is attributed by some growers to a mite, although there is some question as to the accuracy of this identification.

Diseases: The death of trees is a relatively common and serious problem in some orchards and has been attributed to root fungal diseases, such as phytophthora and pythium, and/or waterlogged soil conditions. The symptoms seem to be of two forms, a slow death which is characterised by progressive leaf yellowing and leaf fall and which ultimately ends with a dead bare skeleton (similar to the symptoms of phytophthora root rot in avocado) and a more rapid death, where the leaves die, turning reddish-brown, but stay attached to the tree (similar to the 'sudden death' syndrome in citrus). On the assumption of a fungal cause for these conditions, phosphorous acid has been used in nursery and field situations and is reported to have an effect.

However, as far as is known, the susceptibility of quandongs to phytophthora and pythium root rots has never been scientifically established, nor has the symptoms associated with waterlogging been elucidated. Work in this area is required to establish the exact cause of tree deaths and effective preventative and curative measures.

Harvesting and handling

Fruit should be harvested as soon as they begin to ripen, which is usually indicated by skin colour change. Seedling trees and some varieties may have an extended fruit ripening period, requiring multiple picks.

Harvesting may be performed by hand picking of individual fruits, by hand using tools to knock the fruit from branches and on to ground sheets, or (potentially) by totally mechanised methods such as those used in olives and some nut crops.

Following harvest, fruit may be sold as whole fresh product or further minimally processed by freezing whole, halving and freezing or halving and drying, depending on market requirements.

Yields

Quandong yields are commonly expressed on a per tree basis, either in terms of the number of fruits or kilograms whole fresh fruit or kilograms cut and dried fruit. Because fruit weight, flesh percentage and moisture content varies it is not possible to use a universal conversion factor between these means of expressing yield. To give some idea of the relationship between these ways of expressing yield, figures for the various components of fruit is shown below for an average of ten fruit samples measured by the CSIRO at Quorn.

Table 3. Fruit components – weight and percent.

Component	Weight in Grams	% of Whole Fresh Fruit Weight
Whole fresh fruit	5.9	100%
Stone	2.2	37%
Water lost in drying	2.7	46%
Dry flesh	0.9	15%

In the example above, 1,100 fresh fruit would weigh around 6.5 kilograms, which would equal 1 kilogram of cut and dried fruit. By comparison, in the Frahn's Paringa Gem [A] variety an average of 850 fruit are required to produce 1 kilogram of cut and dried product. Because of this

variability, it is recommended that the weight of cut and dried fruit, which is common means of handling and marketing the product, be used as the normal means of expressing yield.

The yields achievable by individual growers may vary significantly, depending on varieties, production area and management practices and skills. As an indication high, medium and low yield scenarios for improved varieties are shown below. These suggestions are derived from the performance of the Frahn's Paringa Gem [A] mother tree.

Table 4. High, medium and low yield scenarios for improved varieties.

Tree Age – Years	4	5	6	7	8	9	10	11	12	13	14	15
High yield scenario	0.75	1.25	1.75	2.25	3.00	3.75	4.50	5.25	6.25	7.25	8.50	10.00
Medium yield scenario	0.25	0.75	1.25	1.75	2.25	2.75	3.25	4.00	4.75	5.50	6.75	8.25
Low yield scenario	0.00	0.25	0.50	0.75	1.25	1.75	2.25	2.75	3.50	4.25	5.00	6.50

Economics

As plantation production of quandong is still in its infancy, the economics of production are still unclear. However is likely that the high prices received in the past for (mainly) wild-harvested fruit are not sustainable for the volumes expected from increases in plantation production.

Recently, a large proportion of fruit has been utilised for liqueur production, which has paid a high price, of around $40 per kilogram (cut & dried fruit) to secure product. Eventually, as this outlet is satisfied and production rises, the price is likely to fall and a figure in the order of $10 to $15 has been mooted as the long-term sustainable price for mainstream processing outlet fruit. Higher prices are likely for better quality retail or food-service market fruit.

Industry organisation and support

The Australian Quandong Industry Association Inc. produces a quarterly newsletter (*Acuminatum*) and technical publications and conducts an annual conference and other activities, as well as liaising with researchers and government. It can be contacted by mail at :

AQIA
PO Box 236
Upper Sturt
SA 5156

Website: www.aqia.mtx.net

Further reading

The Australian Quandong Industry Association has range of publications for sale, including:

Direct seeding and planting germinated seed
Grafting techniques, rootstock selection, hosts and after-care
Establishing a quandong orchard
Quandong production
An assessment of the commercial potential of quandong varieties in Broken Hill

Further information on native crops is contained in the other publications in this series:

Australian Native Citrus – Wild Species, Cultivars and Hybrids
Bush Tomato Production
Miscellaneous Native Food Crops – Davidson and Illawarra Plums
Miscellaneous Native Food Crops – East Coast Tree Species with Potential in SA
Miscellaneous Native Food Crops – Herbs and Vegetables with Potential in SA

Mountain Pepper Production
Muntries Production
Native Food Background Notes
Native Food Crops – Frequently Asked Questions
Native Food Crops – Sources of Information
Quandong Production
Sunrise Lime Dieback
The Native Food Industry in SA
Wattleseed Production

These fact sheets are also available for download from the Australian Native Produce Industries website at www.anpi.com.au

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Anthony Hele, Industry Development Consultant – Native Foods, a position jointly funded by Primary Industries and Resources South Australia and Australian Native Produce Industries Pty Ltd. The position aims to assist in the sustainable economic development of the native foods industry in South Australia.

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