



Quinoa

Australians consume much more quinoa than is grown in the country, with most domestic demand met by imported product. Until 2014, global demand exceeded global production.

Cafes, bakeries and kitchens are abuzz with quinoa. Apart from being a new and exciting food ingredient, there are claims of many health benefits. Quinoa is the only plant food that contains all of the essential amino acids; and it is gluten free. Growing consumer interest potentially presents a new cropping opportunity for Australian farmers and the grains industry.

Scientists have described five main types of quinoa, based on its adaptation to different agro-ecological conditions in the Andes region of South America, from high altitude mountain plains to saline coastal flats. Due to its high genetic diversity and its adaptability to a wide range of environments, quinoa has the potential to be grown in many parts of the world.

Farmers and researchers across the globe, including Australia, have grown many different lines of quinoa, with varying results, from very successful to outright failure. Success in Australia involves identifying the best lines to grow and sorting out best management practices; and making sure consumer interest in the seed of this emerging crop continues and grows.



QUICK FACTS

- Quinoa is a new crop for Australian farmers, and as such does not have a widely-established supply chain from paddock to plate.
- Growing interest in quinoa and its apparent suitability to Australian cropping systems has instigated stage two of the RIRDC-funded project *Quinoa as a new crop in Australia*.
- Access to seed of known characteristics and performance in Australian farming environments is a significant factor limiting the development of quinoa in Australia.
- Industry growth requires suitable varieties and guaranteed seed integrity for the success of future enterprises and the reputation of Australian-grown quinoa.
- The saponin-containing layer of quinoa seed must be removed before consumption, and new growers need to determine how they will undertake that process.
- The price of quinoa has been a roller-coaster ride for farmers. Surging worldwide popularity was matched with lucrative returns but oversupply in 2014 has significantly reduced price.

Opportunities and challenges in Australia



Growing quinoa in Australia

Potentially, quinoa is a new crop for farmers in northern and southern Australia. It is adapted to a wide range of environments and its short growing season is a good fit with existing cropping programs.

A small number of growers has demonstrated that quinoa can be grown successfully in Australia. Starting with their own seed and growing and selecting suitable types (quinoa is notoriously variable), these growers have identified lines suited to their own locations.

Recognising the potential for quinoa in Australia but aware of the genetic minefield, the Rural Industries Research and Development Corporation (RIRDC) initiated stage two of the project, *Quinoa as a new crop in Australia*, in 2015. In cooperation with state departments of agriculture and growers, the project will identify lines suitable for Australian conditions at eleven sites across the continent, from the subtropical north west to the temperate south east.

While quinoa is similar to canola or other small-seeded crops to grow and manage, the quinoa project will also refine agronomy practices such as nutrition, irrigation, pest and weed management.

Crop management at five sites for RIRDC quinoa evaluation trials¹

	South East South Australia	Northern Western Australia	Wheat belt Western Australia	Lower south west Western Australia	Katherine Northern Territory
Growing season	130–160 days	100 days	160–190 days	140 days	100–110 days
Sowing time	September–October	April	April–June	September–October	May
Soil temperature	~ 18°C	~ 35°C	—	—	—
Seed bed	Clover paddock	Cultivated	Wheat stubble	Cultivated, levelled	Sabi grass stubble
Seeding rate	3 kg/ha	3 kg/ha (beds)	4–8 kg/ha	5–10 kg/ha	2–8 kg/ha
Sowing depth	—	1–2 mm	10 mm	10 mm	—
Equipment	Air seeder on small seed settings	Air seeder on small seed settings	Air seeder – knife points and press wheels	Pasture seeder – knife points	Cone seeder – knife points and press wheels
Sowing fertiliser	25 kg N/ha 28 kg P/ha	50 kg N/ha 56 kg P/ha +Zn	11 kg N/ha 11 kg P/ha +Cu +Zn	19 kg N/ha 18 kg P/ha	22 kg N/ha 24 kg P/ha 50 kg K/ha
Topdressing fertiliser	100 kg N/ha	—	30–60 kg N/ha	33 kg N/ha 25 kg K/ha	60–120 kg N/ha
Irrigation	Yes	Yes	Rain-fed only	Yes	Yes
Weeds	Rye grasses Fat hen Radish General broadleaves	General cropping weeds	Rye grass Wild radish Toadrush	Fat hen Various others	Sabi grass Amaranth Cavalcade
Pests	Rutherglen bug Aphids Mirids	Loopers Heliothis Caterpillars Rutherglen bug Mirids	Nil	Rutherglen bug Other sap-sucking insects yet to be identified	Nil
Windrowing	Yes	Yes	Chemical desiccation	No	No
Harvest	Conventional grain harvester	Conventional grain harvester	Conventional grain harvester	Conventional grain harvester	Conventional grain harvester
Yield	2.7 t/ha	2.5 t/ha	0.0–0.4 t/ha ²	3.0 t/ha	1.2 t/ha
Stubble	Stems are light and hollow and the stubble breaks down quickly				

¹Information generalised for 2015 and/or 2016 seasons — refer to the publication *Quinoa — Opportunities and challenges in Australia* for more detail; ²Record cold winter and spring impacted on seed production

Ancient food, modern favourite

After thousands of years of cultivation and consumption by the Andean people, quinoa is experiencing a phenomenal surge in popularity around the world.

Quinoa is an edible seed produced by the annual plant, *Chenopodium quinoa* Willd. The plant was cultivated to provide a major food source for the people of the Andes region of South America, from Colombia to Argentina, up to 10,000 years ago.

Spanish explorers and colonists considered quinoa as "food for Indians" and its cultivation was forbidden due to the seed being used to produce an alcoholic drink consumed in indigenous religious ceremonies. Subsequently, the Spanish forced the Incas and other Andean people to grow wheat instead.

In the 1990s, government programs implemented in several South American countries encouraged the resurgence of cultural traditions, which included the cultivation and consumption of quinoa. At the same time, quinoa became very popular in developed countries.

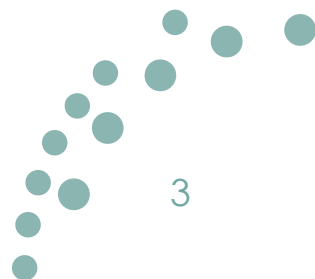
Quinoa is a tasty and easy-to-use base ingredient for many dishes, and much of its popularity is driven by the perception that quinoa is a 'super food'. The marketability of the product is also enhanced by 'fair trade' credentials and South America's traditional organic production system.

Almost all quinoa produced globally comes from Peru and Bolivia, as at 2016.

The versatility and genetic diversity of quinoa as a crop has attracted the attention of many. Quinoa is notable for its tolerance of adverse environmental conditions, including salinity, frost and drought.

Its adaptability (and underlying genetic diversity) attracts policy makers and scientists around the world, as quinoa has potential to be a crop well-adapted to regions where scarcity of water resources and increasing salinisation of soil and water are primary causes of crop loss; and climate predictions suggest that these conditions will be greater in the future.

For the farmer and agronomist, quinoa offers benefits to crop rotations, by providing a break crop for intensive rotations that are often dominated by cereals. Quinoa also offers the potential to be a cash crop with its short growing season; however production in Australia faces a number of challenges.



Essential considerations

Quinoa is an exciting new crop opportunity for Australian grain growers, but with no established industry guidelines and standards, a new enterprise must be carefully researched and planned.

Marketing

- As with all new agricultural enterprises, a well-planned marketing strategy is as important as good agronomy.
- Growers must identify their own customers and develop their own supply chain — there is no established marketing, delivery or handling systems as there is for cereals, oilseeds and pulses.
- Manufacturers have diverse requirements in terms of seed colour and size — seed produced must meet these requirements.
- Australian consumers use relatively little quinoa and there is great need for education to develop regular purchase and consumption habits.

Reputable seed

- Quinoa is a highly variable plant, and the same variety may grow differently in different environments and different production systems.
- Success depends on seed that will produce plants and subsequent seed with consistent attributes and quality to reliably produce a marketable product.
- Industry development requires clearly identified varieties that produce seed that meets market requirements.
- Potentially, seed certification would offer confidence to growers and buyers.

Processed seed

- The bitter-tasting saponin occurring on most quinoa seed must be removed for most market segments. Poorly processed seed provides a bad consumer experience, harming product reputation and repeat sales.
- New growers must be prepared to invest in seed-processing equipment or establish links with existing facilities.

Agronomy

- Quinoa is a new crop in Australia and the appropriate agronomy is still being determined, drawing on the experience of trial work, industry pioneers and overseas knowledge.
- The most significant agronomy challenge is that there are almost no herbicides, insecticides and fungicides registered for use in quinoa crops in Australia (as at December 2016).
- Cultural and manual weed control methods are necessary until trial work and industry can support a case for registration of a range of herbicides for use across Australia.
- Hot and cold temperatures at flowering may have devastating effects on quinoa production in some seasons, under Australian conditions.

Further reading

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This fact sheet is based on publicly available information and interviews with industry participants and experts. The content is general in nature and should not be relied upon solely for application to individual businesses.

Credits for crop photos

Mark Warmington, pages 1 & 3
Amanda Pearce, page 4.

