



Australian Pulses

At a glance

- » Australia's diverse agro-climatic zones produce a wide array of high quality pulse grains.
- » Australian grain producers are some of the most advanced adopters of technology and crop management globally, using these tools to grow highly nutritional pulses for human consumption.
- » Stringent production and processing standards ensure the production of quality, safe and clean, food-grade pulses.

PULSES ARE GRAIN LEGUMES PRODUCED FOR HUMAN CONSUMPTION AND INCLUDE LENTIL, FABA BEAN, FIELD PEA, CHICKPEA AND LUPIN. PULSES ARE AN ESSENTIAL DIETARY COMPONENT FOR MILLIONS OF PEOPLE AROUND THE WORLD DUE TO THEIR HIGH PROTEIN AND NUTRITIONAL CONTENT.

Nationally, pulses average just under 10 per cent of the total area planted to crop. In favourable production areas they can occupy as much as 25% of the total crop area. Pulses are grown in crop rotations, with cereals and oilseeds, given their ability to fix nitrogen into the soil and their contribution to sustainable and profitable farming practices.

Australian farmers, supported by pulse agronomists, use the most advanced technology and equipment to produce pulses of the highest quality. Favourable growing environments, good crop management and care in handling and processing ensure quality pulse products for consumers.





Growing pulses in Australia

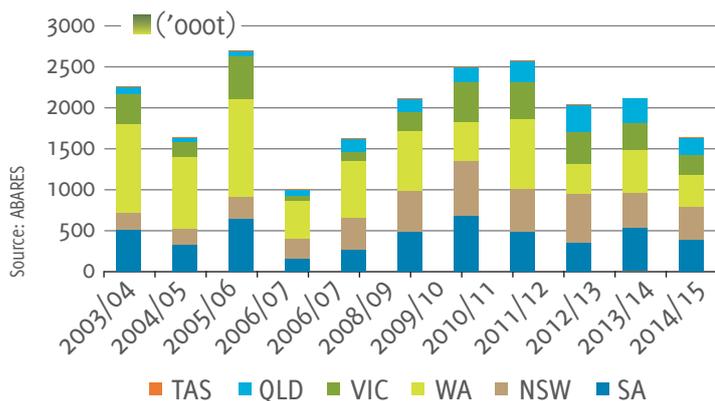
PULSES ARE AN IMPORTANT ENTERPRISE IN THE AUSTRALIAN GRAINS INDUSTRY. THEY ARE GROWN THROUGHOUT THE SOUTHERN AND NORTHERN REGIONS IN THE CRESCENT KNOWN AS THE AUSTRALIAN GRAINBELT.

Australia produces an average of 2.2 million metric tonnes (mmt) of pulses from more than 1.8 million hectares. Research and development shows there is potential to increase plantings to 4.2 million hectares. Western Australia, New South Wales and South Australia regularly produce the largest quantity of pulses in Australia.

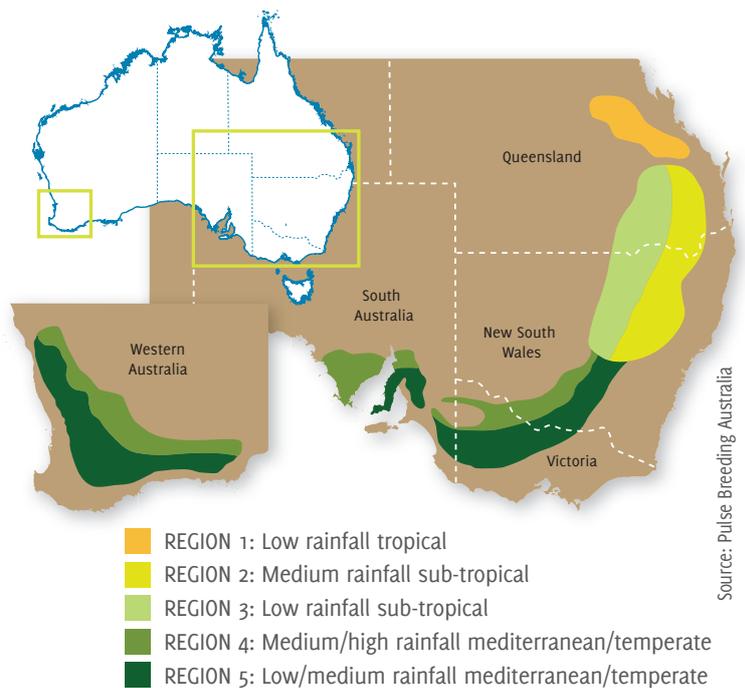
Pulses are typically planted during May and grown through the winter months of June, July and August in the northern, southern and western grain production regions of Australia. Harvest takes place during late spring and early summer from September through to January. In the northern regions, production is based around summer dominant rainfall to provide stored soil moisture during winter.

AUSTRALIAN PULSE PRODUCTION

Tonnes of pulse per year



AREAS OF PULSE PRODUCTION



The pulse industry's growth is one of the keys to the future sustainability of the whole Australian grains industry because of its importance in enhancing cereal cropping systems. Pulses provide a profitable cropping option as well as adding to the success of the whole farm enterprise as part of a longer-term cropping rotation.

Classes and standards

THE AUSTRALIAN GRAINS INDUSTRY AND GRAIN GROWERS ARE COMMITTED TO SUPPLYING PULSES WITH HIGH QUALITY, NUTRITIONAL ATTRIBUTES.

Australian pulse standards are updated each season by Pulse Australia with extensive consultation across all sectors of the Australian pulse industry. These standards hold Australia in high regard as one of the cleanest environments in the world, delivering safe food-grade grains.

The standards are for the receipt and export of pulses; and relate to characteristics such as purity, moisture content, percentage of defective seed, poor colour seed, foreign material and other factors for both 'Farmer Dressed' and 'Machine Dressed' (i.e. mechanically cleaned) product.

Visual quality charts are produced by Pulse Australia and can be used as a guide, in conjunction with the written standards. Both can be found on the Pulse Australia website www.pulseaus.com.au

Australian pulse classifications are governed by an industry standard which is also reviewed and published by Pulse Australia. In addition, Australia's status as a producer of clean food is demonstrated through the National Residue Survey that analyses export grain samples for chemical and environmental contaminants, providing proof of food safe grain.



End uses

AUSTRALIAN PULSES PROVIDE END-USERS WITH ACCESS TO A HIGH QUALITY, CLEAN PRODUCT FOR USE AS WHOLE OR SPLIT GRAIN AND/OR PROCESSING INTO A VARIETY OF FOODS.

Pulses form part of a healthy diet and are sought for their high protein, fibre and various vitamins and amino acids. Popular uses include canning, split or dahl, noodles, snack foods, fermented foods, flour, and in soups, curries, casseroles and salads.

A wide range of pulse crops are produced across Australia including dry field pea (*Pisum sativum*), dry faba bean (*vicia fabae*), chickpea (*Cicer arietinum*), lentil

(*Lens culinaris*), lupin (*Lupinus.angustifolius* and *L.albus*) and mungbean (*Vigna radiate*). Stringent quality standards have to be met for each of the various end-uses.

There are a range of other pulses grown in Australia such as adzuki beans, cow peas and black beans, and the grain legume vetch. These collectively make up less than 5% of the Australian pulse crop.

Nutritional value

PULSES ARE NUTRIENT-RICH FOODS; CONTAINING DIETARY FIBRE, PROTEIN, CARBOHYDRATES (MOSTLY LOW GLYCEMIC INDEX) AS WELL AS PHYTONUTRIENTS, B-GROUP VITAMINS AND MINERALS SUCH AS IRON, ZINC, CALCIUM AND MAGNESIUM.

Pulses and pulse foods are universally recommended as part of a healthy diet and feature prominently in some of the world's healthiest diets and longest-lived food cultures, such as Mediterranean diets.

The evidence consistently shows higher intakes of pulses are associated with a reduced risk of obesity and chronic diseases including heart disease, type 2 diabetes and some cancers – which are on the rise globally.

Pulses have huge potential to improve the diets of people and promote the health of populations globally. The Grains & Legumes Nutrition Council (GLNC) is the independent authority on the nutrition and health benefits of grains and legumes.

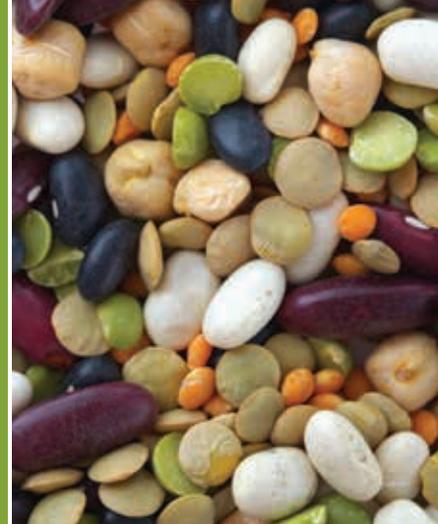
GLNC operates within Australia and also collaborates with international partners to promote grains and legumes (pulses) nutrition as part of a balanced diet through evidence-based information cultivating good health.

TABLE 1. NUTRITIONAL INFORMATION FOR PULSES PER 100G RAW*

	Chickpea	Field pea	Lupin	Lentil (red)	Lentil (green)	Faba bean	Mungbean
Energy (kJ)	986	886	1840	968	1550	1680	1800
Protein (g)	13	18	32	14	27	25	26
Fat (g)	3.8	0.8	5	0.4	2.5	1.3	2
Carbohydrate	41	40	26	44	58	57	72
Fibre (g)	17	19	15	7	10	8	12

*These values should be taken as guidelines only; values can vary with variety, conditions of growth and age of pulse Source: Pulse Australia

A snapshot of Australian pulses



Chickpea

20–35% of the annual Australian pulse crop



Chickpea is an important crop in Australia's northern farming system, but is grown across all grain regions. Annual production of approximately 600,000 tonnes focusses mainly on desi types, with limited production of small to large kabuli types. About 90% of chickpea produced in Australia is exported, with Australia commonly being the biggest global exporter.

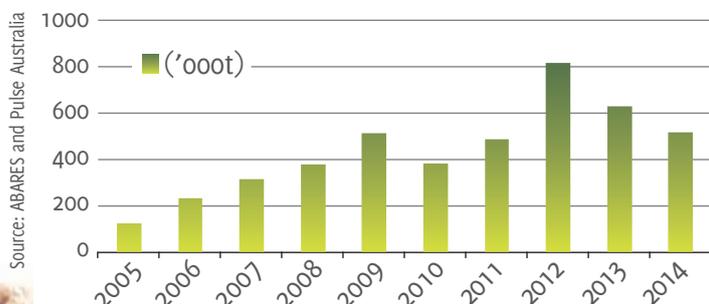
Australian production focusses on large uniform grain size, light coloured seed coats, the splitting efficiency and quality of desi chickpea, and the hydration and cooking characteristics of kabuli chickpea.

The two types of chickpea can be distinguished by seed size, shape and colour, each with different markets and end-users:

- **Desi chickpea** – small angular seeds, ranging in colour from light brown to brown. They are normally dehulled and split (dhal) and are favoured by the Indian subcontinent.
- **Kabuli** – large round seeds that are white to cream coloured and are almost exclusively used whole. They are preferred in the Mediterranean region.

AUSTRALIAN CHICKPEA PRODUCTION (Desi and Kabuli)

Tonnes of chickpea per year



Chickpea are widely used in hummus, soups, curries, casseroles, salads and sweets. They are also fried or roasted as snack food, ground for patties, processed into flour (besan), or split to create dhal, and fermented.

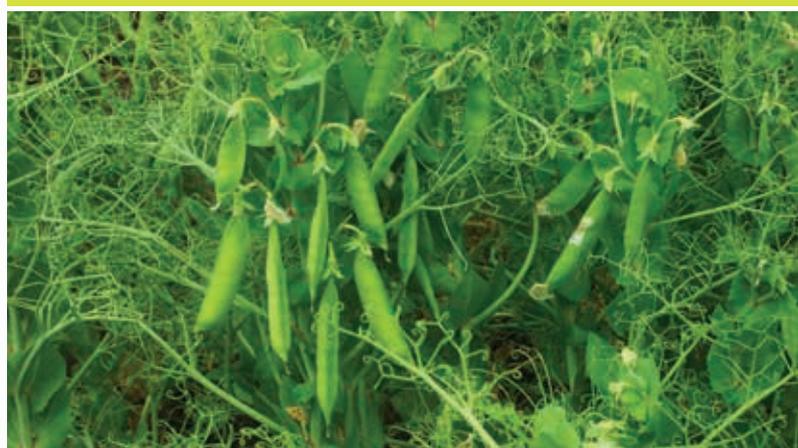
Australian chickpea provide a good source of carbohydrates and protein.

Field pea

10–15% of the annual Australian pulse crop



Field pea is a major pulse crop across the southern Australia cropping zone, with substantial production occurring in SA. The current production is approximately 400,000 metric tonnes, of which about 55% is exported. The major export market is the Indian subcontinent and the Middle East for human consumption. Some field peas are also exported to Asia and Europe for both human consumption and stock feed.





Lupin



30–40% of the annual Australian pulse crop

Lupins are an important crop in Western and Southern Australia. The major lupin crop in Australia is *L.Angustifolius*, or the Australian Sweet Lupin. The smaller crop of Australian Albus Lupin (*L.albus*) is also grown and exported. Lupins are grown in large regions of WA and across the south-eastern grainbelt, where the soil type is predominantly infertile, sandy and acidic. Australian Sweet Lupin is particularly well adapted to this soil type, where all other pulses, including *L.albus* require more fertile soil types.

Production in Australia focusses on high protein, low alkaloid (bitterness) and improved dehulling efficiency. *Angustifolius* is recognised as a valuable stockfeed and aquaculture feed source, however it is now finding its way into human foods because of the nutritional value, health benefits and growing consumer acceptance.

Angustifolius exports go to Korea, Japan, the Netherlands and Spain. Australia is the largest supplier of quality, large-seeded Albus lupin to the Middle East.

Lupin makes an attractive alternative to dry beans and soyabeans for human consumption because the protein and oil is readily digested and seeds have a high dietary fibre content. Lupins can be flaked, ground for flour, split and fermented to produce high-quality tempe, used as a snack base or in the production of protein concentrates or fermented sauces. Lupin flour is used in breads, biscuits and pasta, and lupins can also be sprouted for consumption.

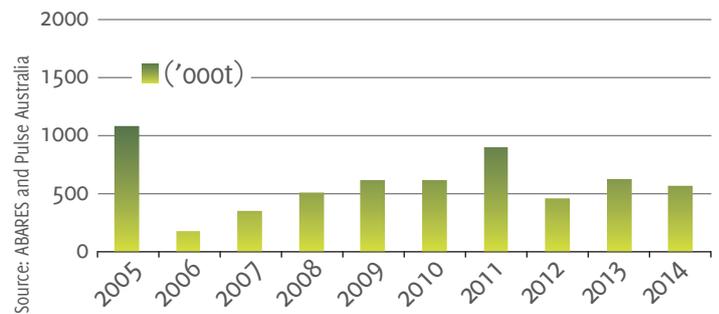
Albus lupins have the potential for processing and use in making near-white vegetable-based products because they have a low yellow pigment content.



Image courtesy of Lupin Foods Australia



AUSTRALIAN LUPIN PRODUCTION (Australian Sweet and Albus) Tonnes of lupin per year



Source: ABARES and Pulse Australia

Australian field peas are commonly used split for dahl, pre-prepared soups, fermented foods, noodles, snack food, whole for green peas for pies, mushy peas and other dishes, and for sprouts.

Field peas provide a good source of dietary proteins and energy, with a starch content ranging from 30–50%. The fat content is very low, at approximately 1%, while the content of soluble carbohydrate is high.

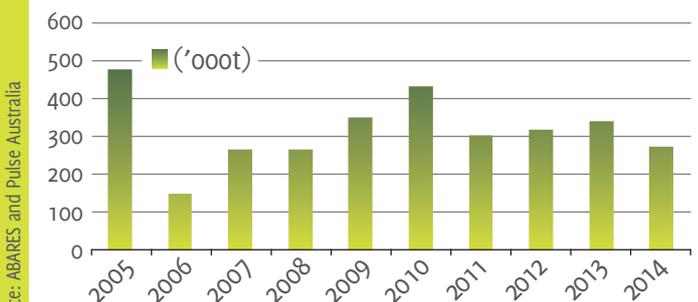
Research, industry and breeding programs target market specifications for whole and split grain size, shape and colour, whole grain milling properties and grain canning qualities.

Australia produces mostly dun type field pea, with some minor production of blue and white types. The major field pea varieties can be divided into four main groups:

- **Dun field pea** (including Kaspa types) – spherical and dimpled, red-brown to greenish-brown in colour with yellow cotyledons, suited to human and stockfeed consumption.
- **Blue field pea** – round, translucent seed coat and green cotyledons, suited to specialised uses such as canning for human consumption.
- **White field pea** – round, cream coloured with yellow cotyledons, suited to splitting and flour for human consumption.
- **Maple field pea** – round, brown, mottles or speckled varieties with yellow cotyledons, suited to stock and bird feed.



AUSTRALIAN FIELD PEA PRODUCTION Tonnes of field pea per year



Source: ABARES and Pulse Australia



Lentil

10-15% of the annual Australian pulse crop



Australia is a major exporter of high quality lentil grain, principally red lentil but also green and other niche types. Lentil are exported to all parts of the world particularly the Indian subcontinent, Asia and the Middle East. Production of close to 250,000 tonnes annually occurs almost exclusively in SA and Victoria.

Lentil grown in Australia are divided into two groups based on cotyledon colour.

- **Red lentil** have a red cotyledon and are the most commonly grown type in Australia. Red lentil range in seed size from small to large, and in shape from rounded to lens types. Destination markets differ in their preference to the various sizes and shapes of lentil grain. For example Sri Lanka prefers large; Bangladesh small; and medium sized red lentil often go to India.
- **Green lentil** have a yellow cotyledon and the seed size of current varieties is medium or large. Traditional green lentil destinations have been to Algeria, the Americas (Colombia, Mexico, Venezuela, Brazil, Chile) and Europe (Spain, Turkey, Greece, Italy).

Green lentils go into the whole seed edible market and as such need to be light in colour with no weather damage. Size is critical.

Each type has distinct uses and markets. Improved physical seed characteristics and processing qualities are a major objective of the lentil breeding program in Australia. The size, shape and colour of grain, splitting yield and colour of splits in red lentil and seed coat colour retention and cooking characteristics in green lentil continues to improve.

Faba and broad bean

10-15% of the annual Australian pulse crop

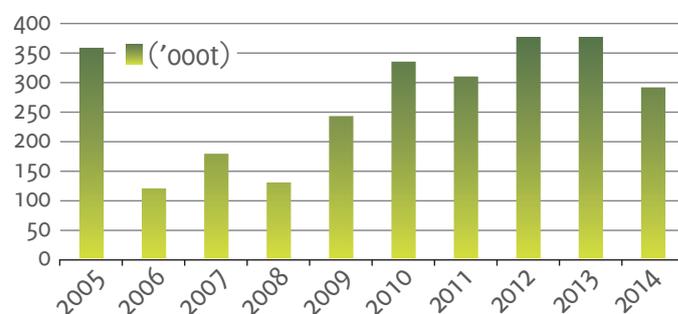


Faba beans are cultivated in SA, Victoria and NSW, with a small production area in WA. They are a cool-season crop, planted in autumn and harvested in late spring or early summer (October-December) with more than 300,000 tonnes produced annually. Broad beans are grown across south-west Victoria and south-east SA. They are sown between late April and the end of June.

The Australian faba and broad bean industry has grown steadily and is among the top five producers in the world. Australia is currently the world's leading exporter of faba beans, supplying a third of faba beans traded internationally.

Faba beans are exported as either whole or split product. They are generally consumed whole, canned, split or milled into flour.

AUSTRALIAN FABA AND BROAD BEAN PRODUCTION
Tonnes of bean per year



Source: ABARES and Pulse Australia



Image courtesy of Alberta Pulse Growers

Australian producers take pride in targeting uniform seed size, with a lightly coloured, buff seed coat, high splitting quality, hydration cooking and canning quality.

Broad beans, and some faba beans, are cleaned and graded to size before exporting in bags or containers. Large seeded varieties are often used for human consumption as a green vegetable. Value adding in the form of canning, splitting and preparation as a snack food services niche markets.



Lentil are predominately used for human consumption and have quicker cooking times than other pulses. They are cooked in soups and casseroles, patties and loaves; split for dhal, soups and purees; deep fried as snack foods; and as flour combined with cereal flour to make bread and cakes.

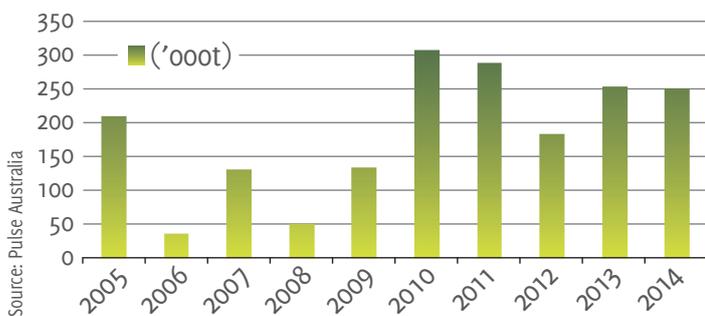
In red lentil, the seed coat colour ranges from light grey through to brown. The distinctive orange/red cotyledon or kernel is seen when the seed is dehulled or split. Split red lentil are consumed in curries and are boiled to make Indian dahl and lentil soup. Whole red lentil are used where the seed coat is removed but the cotyledon remains intact.

Lentil flour is used to make pappadams or added to cereal flour to make breads, cakes and baby foods. Immature pods and sprouted seeds may also be eaten as vegetables.

Green lentil are also referred to as brown, yellow, Chilean or Continental lentil. Seed coat ranges in colour from green to brown and the cotyledons are yellow. Large-seeded green lentil are consumed whole in many traditional Middle Eastern dishes.

AUSTRALIAN LENTIL PRODUCTION (Red and green)

Tonnes of lentil per year



Source: Pulse Australia

Egypt is the biggest importer of Australian faba bean, followed by Saudi Arabia and the United Arab Emirates. Beans are also exported to southern Europe and South East Asia where they are roasted and used as a snack food. Faba and broad beans are also used for cooking and baking in soups, purees, snack food, breakfast food and gruel. They can be ground to make falafel or tameya and can be sprouted. In China, faba beans are used to make extruded starch products such as vermicelli and sauces.

Faba beans provide a good source of carbohydrate and protein, but low amounts of fats. They also provide the recommended daily allowances of all essential minerals except calcium.



Mungbean



<5% of the annual Australian pulse crop

Mungbean is grown in the summer-dominant rainfall areas of northern New South Wales and Queensland from September to April. Australia primarily produces large seeded shiny green mungbean with a small amount of large dull seeded and small seeded shiny green mungbean being produced, a small amount of black gram (mungo) is also produced. About 95% of mungbeans produced in Australia are exported, predominantly to the Indian subcontinent, Asia and North America.

Exports of the highest quality grain are achieved by an in-field grower support network of accredited agronomists. The Australasian breeding program focuses on varieties with evenness of flowering, seed size and maturity, that produce maximum quality and productivity under dryland and irrigated, spring and summer growing conditions.

Australian mungbean quality focuses on evenness of seed size, colour and low hard seededness. Bright even colour, varietal purity and size are critical issues for Australian mungbean markets.

Mungbean are split for dahl, as flour to make noodles, breads, biscuits, cakes and pappadams, cooked in soups and porridge, and fermented in idli and dosa and as sprouts.

Processing and grading in Australia ensures the highest level of food safety is maintained across the entire industry. Quality assurance systems are in place for improved traceability, and a high level of market confidence is maintained. Grain is graded, cleaned, bagged and packed into shipping containers.

This forms part of a unique marketing system for mungbeans in Australia where, under Department of Agriculture Quarantine regulations, all mungbean destined for export must be cleaned and packaged at a registered mungbean processing establishment. They also have to be handled in accordance with the industry code of hygienic practice. This is an enforceable, inspectable and auditable process designed to maintain the integrity of the health regulations relating to the product. The Australian Mungbean Association outlines the minimum export standards.



Marketing and export markets

AUSTRALIA EXPORTS A SUBSTANTIAL VOLUME OF PULSES EACH YEAR, PROVING FAVOURABLE OVER COMPETITORS BECAUSE OF CONSISTENT, HIGH QUALITY COMMODITY PRODUCTION.

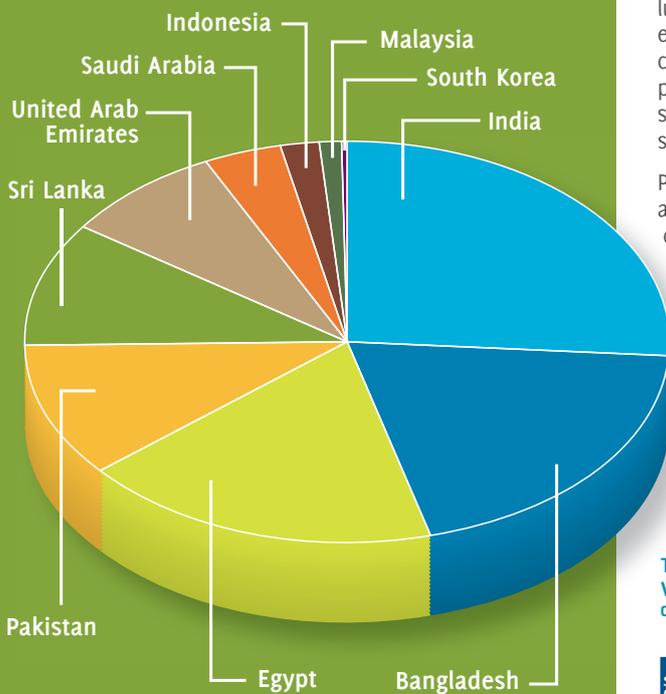
Between 2010–11 to 2013–14 about 60% of pulses produced in Australia were exported.

A large proportion of the Australia pulse crop is exported to international markets, with the majority of exported grain used for human consumption.

Australia benefits from ongoing investment in storage and handling equipment ensuring modern, efficient and safe storage, transport, processing and export of pulses to provide the highest quality of pulse grain. Australian pulses have relatively low moisture status at delivery, making storage and processing easier and reducing the risk of weather damaged grain, due to harvest occurring into summer.

The Australian pulse export market is fully deregulated. Pulses can be purchased in processed form from a number of companies in Australia. Alternatively, pulses can be exported as whole grain in bulk shipments or packaged into containers and bags to countries where market access has been approved.

TOP 10 EXPORT DESTINATIONS Inclusive of 2010 – 2014 seasons



Source: Australian Bureau of Statistics



Australian Export Grains Innovation Centre

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Australian Grain Note: Pulses



Research and development

AUSTRALIA HAS A LONG TRADITION OF SUBSTANTIAL INVESTMENT IN DEVELOPING A RANGE OF PULSE CROPS SPECIFICALLY SUITED TO MEET THE QUALITY REQUIREMENTS OF INTERNATIONAL CUSTOMERS.

Pulse Breeding Australia is a world-class Australian breeding program for chickpea, field pea, faba bean, lentil and lupin. It has a vision to see pulses expand to greater than 15% of the cropping area; to underpin the productivity, profitability and sustainability of Australian grain-farming systems.

Public and private plant breeders, agricultural researchers, agronomist and chemists work closely with processors and marketers ensuring the current high quality of Australian pulses is maintained and further improved with new varieties. Australian breeders, researchers and industry representatives meet regularly to review new germplasm and market preferences and developments.

There are extensive breeding and evaluation sites coordinated nationally and located in the major cropping zones across Australia.

Laboratory research on pulses based on digital image analysis has focussed on improvement in objective measurements of size, colour and seed blemishes for lentils, field peas and faba beans. This has the potential to greatly improve criteria for breeding selection as well as receipt and trading standards for the industry. Analysis of cooking quality, particularly time, is also being researched in order to improve end-use quality of pulses.

Pulse Australia is the peak industry body, independent and non-political, acting as a catalyst for the development of the pulse industry and engaging all sectors from growers and agronomists to researchers, merchants, traders and exporters.

This Australian Pulses Grain Note is proudly supported by the State Government of Victoria, Pulse Australia and the Grains & Legumes Nutrition Council. Their contribution is greatly acknowledged.



Department of Agriculture and Food



GRDC
Grains Research & Development Corporation

AEGIC is an initiative of the Western Australian State Government and Australia's Grains Research and Development Corporation