



# Varieties

## PBR and royalties

### Plant Breeders Rights (PBR)

PBR was introduced to stimulate private investment in plant breeding by conferring ownership rights to varieties and thereby the potential to market those rights as part of a commercialisation process.

The Plant Breeder's Rights Act 1994 as amended Act no: 148 2002 gives an owner of PBR the exclusive right to sell, produce or reproduce, import, export, stock or condition the seed of a variety protected by PBR (or license another person or organisation to undertake these activities).

The rights are similar to patents or copyright, (recording ownership of the genetic material) and are administered under the Act. PBR protection can last up to 20 years for broad-acre crops.

PBR guarantees ownership of a variety but does not specify how the variety should be commercialised, or whether or where royalties should be charged. Varieties protected by PBR usually have the PBR symbol ( $\text{\textcircled{b}}$ ) displayed after their name.

In the absence of a contract stating otherwise, farmers can sell the harvest of a protected variety for direct consumption as food or feed (eg, deliver it for animal feed or to a flour mill) but they are not permitted to sell, trade or give away the variety for seed without the authorisation of the owners or licensee.

### Royalties

The concept generally referred to as 'end point royalty' collection gives the licensee the right to collect royalties on harvested grain. Some varieties currently grown by farmers use this method of royalty collection (e.g. 'Kaspa' field peas and 'Jindalee' lupins).

An end point royalty can apply to a variety without PBR.

Farmers should carefully read all documentation to be fully aware of the conditions when purchasing seed of a variety. While the restrictions in the use of seed under the PBR Act are clearly defined, other contractual arrangements may have been imposed by the licensee following agreement by the owners. For example, some contracts specify that the harvested grain must be delivered to certain collection agencies; these are commonly called 'closed loop' marketing arrangements.

### Key points

- Most new varieties are protected by PBR and/or end point royalties and so growers need to be aware of the implications.
- Seed of varieties with PBR protection can only be bought from the owner, commercial partner/ licensee or an agent (seed merchant) authorised by the owner.
- Purchase seed of a PBR cultivar in the name(s) of the entity or entities in which you intend to deliver the product. Retain invoices to prove that you have entitlement to that seed and the crop produced.
- Once purchased, growers can maintain seed of a variety with PBR protection to satisfy their seed requirements for the following seasons.
- Farmers can sell the products of a protected variety for commercial use as feed or food unless bound by a "closed loop" or other contract.
- Farmers cannot sell, trade or give away the variety for seed.
- Farmer to farmer trading of seed without authorisation of the owner will make them liable for prosecution.
- Commercial marketing arrangements between the owners and the licensee can vary between crops and varieties. Farmers must be aware of the conditions of the marketing arrangements.

*See tables on PBR and market restrictions at the end of each pulse group*

$\text{\textcircled{b}}$  = variety is protected by PBR.



## Chickpeas

### Choosing varieties

The availability of varieties resistant to ascochyta blight now provides growers with low disease risk options for growing this crop in southern Australia. Ascochyta blight of chickpeas has been a widespread and devastating disease in southern and Western Australia and is a major limitation to overcome when growing this crop unless resistant varieties are used.

Current ascochyta blight resistant varieties available to growers have some limitations in agronomic adaptation and marketability and will not suit all areas or situations. When choosing varieties to grow, it is essential to consider their susceptibility to ascochyta blight along with yield potential, price potential, marketing opportunities, flowering cold tolerance, maturity timing, lodging resistance and other agronomic features relevant to your growing region.

When comparing yields between varieties, growers need to be aware that under high ascochyta blight pressure, varieties with moderate resistance or less are likely to suffer greater yield losses than the more resistant lines, even with regular applications of foliar fungicides.

### Chickpea types

The chickpea varieties grown in Australia can be divided into two types, the larger, white kabuli types and the smaller, dark angular desi types. However within the kabuli types two market categories are emerging for Australian growers. These are the traditional large seeded kabuli markets, where large

seed size (9mm and above) is important to attract premium prices, and a small seeded (less than 8mm) bulk kabuli market.

Kabuli chickpeas, sometimes called garbanzos, have larger, rounded seeds, which are cream to white in color. The seed size can vary from 6 to 11mm in diameter with weights varying from 25 to 60g per 100 seeds - about twice the size of field peas or similar to Fiord faba beans. Kabuli types are usually sold whole and premiums are generally paid for the larger seeds. Hence, the seeds for large seeded markets are sized by grading before pricing and marketing.

The small seeded types like Genesis 090 are generally less than 8mm in size and fit into the bulk small kabuli markets that have not been supplied by Australia in the past. These markets are still being developed for Australian kabulis, but prices are expected to be at least that of desi and less than those expected for the large seeded kabuli types. Weather damage and stain from green weeds can adversely affect seed quality. Traditionally, kabuli chickpeas have generally been more sensitive to damping-off fungi than desi types and larger seeded types generally yield some 15-25% less. Smaller seeded kabuli types like Genesis 090 can produce yields similar or greater than desi types.

Desi types have angular seeds, which are usually brown, but can range in color from black to white. The seeds are about half the size of kabuli types, with 100 seeds weighing from 12 to 25g, slightly smaller than most field peas. Desi types are usually dehulled and split or ground for dhal, a thick soup used like gravy. Ground chickpeas are

TABLE 2 : A  
Kabuli Chickpea Variety Information

Variety	Height	Seed Size#	Maturity	Seedling Vigor	Lodging	Ascochyta Blight	Root Lesion Resistance	Nematode* Tolerance	Phytophthora	Botrytis Grey Mould
Genesis™114	med-tall	40-48	late	moderate	MR	MS-MR	-	-	-	S
Genesis™079	med-short	22-30	mid	high	MR	R	MS	-	S	S
Genesis™425	medium	25-32	mid	high	MR	R	MR	-	MS	S
Genesis™090	medium	25-35	mid-late	high	MR	R	MR	-	S	S
Almaz <sup>Ⓛ</sup>	medium	40-45	late	moderate	MR	MS-MR (MR in WA)	MR	-	S	S
Nafice <sup>Ⓛ</sup>	medium	40-50	late	moderate	MR	MS-MR (MR in WA)	R	-	S	S
Kimberly Large	medium	55-65	early	-	MR	VS	-	-	-	-
Bumper <sup>Ⓛ</sup>	medium	45-50	late	high	S	VS	S	-	VS	S
Macarena	medium	50-65	early	high	MR	VS	VS	-	VS	VS
Kaniva	medium	35-45	late	high	MS	S	MR	I	VS	S

# Seed size shown in grams per 100 seeds. \* Root Lesion Nematode is *Pratylenchus neglectus* (preliminary data only)

MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; MR = Moderately Resistant; R = Resistant; I = Intolerant;

- = No Information

also used for high protein flour. Larger seeds are preferred for desi types, regardless of whether they are used for splitting or whole seed end use. There is an increasing use of large, whole seeded desi types in a range of food preparations in the Indian subcontinent. A small premium has been paid for types fitting this use. Desi chickpeas have traditionally made up about 90 to 95 percent of Australian production, and nearly all is exported. Desi types are generally earlier maturing and higher yielding than the larger seeded kabuli types.

### KABULI VARIETIES (See Plate 125 Section 9)

#### Genesis™ 079

Genesis 079 is a high yielding small seeded kabuli type with resistance to ascochyta and is likely to only require fungicide sprays during podding. Genesis 079 has small seed (6-7mm) and has very high grain yields in short season environments and may be suited to crop topping of resistant rye grass in some seasons. Genesis 079 is expected to be available in 2009 through Australian Agricultural Crop Technologies.

#### Genesis™ 114

Genesis 114 is a large seeded kabuli type with moderate resistance to ascochyta, which is likely to require strategic applications of fungicides during the year. Genesis 114 has larger seed than Kaniva

(9-10mm) and has been higher yielding than Almaz and Nafice in southern Australia. Seed of this variety is expected to be available in 2009 through Australian Agricultural Crop Technologies.

#### Genesis™ 425

Genesis 425, like Genesis 090, is a small to medium sized ascochyta blight resistant kabuli type. However, Genesis 425 has phytophthora resistance similar to Howzat and superior to all other kabuli varieties and hence may provide a small to medium sized kabuli option for the northern areas of NSW. Genesis 425 is likely to require fungicide sprays only for ascochyta blight during podding for ascochyta blight to produce high quality, disease free seed. Seed of this variety is expected to be available in 2009 through Australian Agricultural Crop Technologies.

#### Genesis™ 090

Genesis 090 was the first kabuli type released in Australia with resistance to ascochyta blight. It is a small to medium seeded kabuli, having seed approximately 1mm smaller than Kaniva and therefore is unlikely to attract the higher prices of Kaniva. Genesis 090 has medium height with erect branches. Over several years of testing it has shown to be a high yielding line in both desi and kabuli trials, with and without ascochyta blight

TABLE 2 : B  
Desi Chickpea Variety Information

Variety	Height	Seed Size#	Maturity	Seedling Vigor	Lodging	Ascochyta Blight	Root Lesion Resistance	Nematode* Tolerance	Phytophthora	Botrytis Grey Mould
CICA0503	medium	18-20	mid	mod	MR	R	-	-	S	MS
CICA0505	medium	18-22	mid	mid	MR	R	-	-	S	MS
CICA0512	tall	19-22	mid-late	mod	MR	MR	-	-	MR	MS
Genesis™509	medium	14-18	early-mid	mod	MR	R	MS	-	S	MS
Genesis™510	medium	14-18	early-mid	mod	MR	R	S	-	S	MS
Genesis™508	medium	14-18	mid	poor-mod	MR	R	MR	-	S	S
Genesis™836	tall	16-20	mid	mod	MR	MS-MR	MR	-	VS	S
Flipper <sup>♠</sup>	med-tall	16-20	mid-late	mod	MR	MR (MS in WA)	MS	-	MS-MR	S
Yorker <sup>♠</sup>	medium	20-23	mid	mod	MR	MS-MR (MS in WA)	MR	-	MR	S
Kyabra <sup>♠</sup>	tall	23-27	mid-late	mod	MR	S	R	-	MS-MR	S
Sonali <sup>♠</sup>	medium	18-20	early	good	MS	MS	MR	-	VS	S
Howzat <sup>♠</sup>	medium	21-23	mid	mod	MS	S	S	MI	MS	MS
Jimbour <sup>♠</sup>	tall	19-21	late	mod	MR	S	MS	T	MS-MR	S
Tyson	medium	12-16	mid	poor	R	S	MS	MI	S	S
Amethyst	tall	14-18	mid	poor	R	S	MS	T	S	S
Moti <sup>♠</sup>	tall	18-22	early-mid	mod	MR	VS	S	T	MS-MR	MS

# Seed size shown in grams per 100 seeds. \* Root Lesion Nematode is *Pratylenchus neglectus* (preliminary data only)

MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; MR = Moderately Resistant; R = Resistant; - = No Information  
MI = Moderately Intolerant; T = Tolerant

disease pressure. Under high ascochyta blight disease pressure Genesis 090 will require fungicide protection during podding to prevent seed blemish and potential yield loss. Due to its equivalent or higher yields than desi varieties in southern Australia, Genesis 090 may offer chickpea growers a higher yielding ascochyta blight resistant alternative to desi chickpeas with potential to get higher prices than for desis. Seed is available through Australian Agricultural Crop Technologies.

#### **Almaz<sup>Ⓛ</sup>**

Almaz is a large seeded kabuli type commercialised by AWB Seeds. Seed size is generally larger than Kaniva, with superior ascochyta blight resistance than this variety but inferior to that of Genesis 090. Limited evaluation indicates it is 15-25% lower yielding than Genesis 090 in southern Australia and will generally require two to four foliar fungicide sprays to successfully grow it in this region, including a first application six to eight weeks after sowing.

#### **Nafice<sup>Ⓛ</sup>**

Nafice is a large seeded kabuli type commercialised by AWB Seeds. Nafice has the largest seed size of all commercial kabuli types hence is more likely to achieve premium prices, however there are some concerns about potential poor seed color that requires further evaluation. Like Almaz, Nafice has superior ascochyta blight resistance than Kaniva but inferior to that of Genesis 090. Limited evaluation indicates Nafice is 15-25% lower yielding than Genesis 090 in southern Australia and will require more foliar fungicide sprays than Genesis 090 to successfully grow in this region, including a first application six to eight weeks after sowing.

#### **Kimberly Large**

Released by CLIMA in WA as a replacement for Macarena due to higher yields and larger seed size in the Ord River area. Kimberly Large, like Macarena, is susceptible to ascochyta blight and is only recommended for the Ord River and central Queensland regions.

#### **Bumper<sup>Ⓛ</sup>**

Bumper is very susceptible to ascochyta blight and therefore not widely grown. Bumper produces larger sized seeds than Kaniva (45 - 50g per 100 seeds), which can be expected to attract premium prices. This must be considered along with the increased risk and management inputs required to successfully grow it.

#### **Kaniva**

Kaniva was the traditional kabuli chickpea standard in southern Australia, although its relative small seed size has made attaining a market premium for seeds over 9mm in size difficult to achieve. Kaniva is susceptible to ascochyta blight and requires an intensive fungicide strategy to grow it successfully. Almaz and Genesis 114, when available, are now better large-seeded options. Kaniva is lower yielding than Genesis 090 in both the presence and absence of ascochyta blight.

#### **Macarena**

Macarena is a Spanish variety grown almost exclusively in the Ord River area, where it produces very large seed (50 to 65g per 100 seeds) that is highly sought after by buyers. Macarena is susceptible to ascochyta blight, extremely frost sensitive, very early maturing and has medium plant height. Macarena has performed poorly in southern Australia, especially under wetter soil conditions.

#### **DESI VARIETIES**

*(See Plate 125 Section 9) (See Plate 2 : G Section 2)*

#### **CICA0503 and CICA0505 (to be named)**

CICA0503 and CICA0505 are potential releases from Pulse Breeding Australia Chickpeas for southern and Western Australia. They have high ascochyta resistance (similar to Genesis series varieties) but larger grain size and higher milling yield than Genesis 509. These mid-season varieties have been consistently high yielding (6-13% higher than Genesis 509) across southern Australia. Both varieties also have comparatively good lodging resistance that should ensure acceptable harvestability. Seed quality (mainly size, color and milling yield) is better than that of Genesis 508 and 509. If released both varieties will be commercialised through AWB Seeds.

#### **CICA0512 (to be named)**

CICA0512 is a new desi type variety from Pulse Breeding Australia Chickpeas well suited to all current chickpea growing areas in northern NSW and southern Qld. It is the first variety to combine moderate to high levels of resistance to the two key disease problems in north-eastern Australia (ascochyta blight and phytophthora root rot) as well as high yield potential. CICA0512 has a tall erect plant type, is of mid season maturity, has medium seed size with excellent milling quality and will be well suited to the direct human consumption market. CICA0512 is to be commercialised through AWB Seeds.

### **Genesis™ 509**

Genesis 509 is a high yielding and widely adapted desi chickpea with resistance to ascochyta blight. It's flowering and maturity timing is earlier than Genesis 508 and Howzat. Genesis 509 has medium plant height, and moderate resistance to lodging. Seed size will predominately be in the 5-6mm range, smaller and darker than Howzat. Genesis 509 has highest or equal highest long-term experimental yield of current commercial desi varieties across south eastern Australia. Fungicide management trials have indicated that only foliar sprays during podding are required to successfully grow this variety. Seed of this variety is available through Australian Agricultural Crop Technologies.

### **Genesis™ 510**

Genesis 510 is medium in plant height, early to mid flowering and has darker brown seed similar to Tyson. Genesis 510 is resistant to ascochyta blight and has shown very good adaptation and stable yields in Western Australian chickpea growing areas. Production of Genesis 510 will be restricted to WA only and seed of this variety is available through Australian Agricultural Crop Technologies.

### **Genesis™ 508**

Genesis 508 is medium in plant height, mid to late flowering and resistant to ascochyta blight. Yields are generally around 5-10% below Howzat, in the absence of ascochyta blight, and it is not well adapted to dry seasonal conditions. Seed quality is similar to that of Tyson. Due to poor relative performance in low rainfall environments and dry seasons, it is only likely to be an option in medium to high rainfall areas of southern Australia. Fungicide management trials have indicated that foliar sprays during podding only are required to successfully grow Genesis 508. Seed is available through Australian Agricultural Crop Technologies.

### **Genesis™ 836**

Genesis 836 is a tall, mid to late flowering variety with moderate resistance to ascochyta blight, an improvement on Howzat's resistance, but less than Genesis 508. It has been released for Western Australia where it is seen as a better adapted option than Genesis 508 although it will require more fungicide sprays to control ascochyta blight. For this reason it will not be recommended outside of Western Australia. Seed quality is slightly better than Tyson but poorer than that of Howzat.

### **Flipper<sup>®</sup>**

Released by the national chickpea breeding program in 2005 for the higher rainfall areas of north-central NSW. Flipper has moderate levels of resistance to ascochyta blight meaning it will generally require up to 4 strategic fungicides to prevent yield loss. In southern Australia grain yields have been slightly lower than Genesis 090 and 509 but higher than Genesis 508. Flipper has a medium sized light colored seed suited to whole seed and/or splitting markets. Seed of Flipper is licensed to AWB Seeds.

### **Yorker<sup>®</sup>**

Yorker is moderately resistant to phytophthora and was released in 2005 by the national chickpea breeding program for the lower rainfall areas of north-central NSW. Yorker has intermediate resistance to ascochyta blight and most likely would require an intensive fungicide management strategy for this disease in southern Australia. Yorker has a medium to large, light colored seed well suited to the whole seed export market. Seed of Yorker is licensed to AWB Seeds.

### **Kyabra<sup>®</sup>**

Kyabra was released for southern and central Queensland in 2005 and is high yielding in these environments. It is licensed to Plant Tech and highly susceptible to ascochyta blight, hence not widely tested in southern Australia. Kyabra has excellent seed quality. It has large uniform seeds light in color making it well suited to the whole seed export market.

### **Sonali<sup>®</sup>**

Sonali was released in WA in 2004 and is licensed to AWB Seeds. It was selected in WA for its ability to set seed at lower temperatures than commercial varieties. Sonali is moderately susceptible to ascochyta blight. Seed of Sonali is smaller than for Howzat and its color is only similar to that of Tyson's.

### **Moti<sup>®</sup>**

Moti was released on 2003 specifically for central Queensland through AWB Seeds. Moti is susceptible to ascochyta blight and the commercial agreement is for it not to be grown outside of central Queensland.

### Howzat<sup>(b)</sup>

Howzat is susceptible to ascochyta blight and will succumb to intense disease pressure. An integrated disease management strategy including regular applications of foliar fungicides is essential to grow Howzat successfully. Howzat is early flowering, medium to tall in height and moderately susceptible to lodging.

### Jimbour<sup>(b)</sup>

Jimbour is a desi variety that became available for Queensland and northern NSW growers in 2002 through Mount Tyson seeds. It is not considered suitable for southern Australia because of its high level of susceptibility to ascochyta blight. Jimbour is a tall, late flowering, erect desi type with good seed quality, resistance to phytophthora and suits north-eastern Australia.

### Amethyst

Amethyst is an old standard released from NSW as a higher yielding replacement for Tyson. It is moderately tall in plant height with small to medium sized seed. It is highly susceptible to phytophthora and susceptible to ascochyta blight and now outclassed in yield and quality by newer varieties.

### Tyson

Tyson was the original desi variety in Australia, but it has small and poor colored seed that is disliked by processors. It is susceptible to ascochyta blight, early to medium maturing and short in plant height.

(b) = variety is protected by PBR.

TABLE 2 : C  
**Chickpeas - Availability and Markets**

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
CICA 0512/0503/0505	expected	PBA	AWB Seeds	AWB Seeds	1800 054 433	none*
Genesis™114	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™079	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™090	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™425	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™508	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™509	none	DPI Vic	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	* Delivery to nominated receivers*
Genesis™836	none	DPI Vic	Australian Agricultural Crop Technologies	major retail outlets	02 6795 3050	Only available in WA
Genesis™510	none	DPI Vic	Australian Agricultural Crop Technologies	major retail outlets	02 6795 3050	Only available in WA*
Flipper <sup>(b)</sup>	PBR	NSW DPI	AWB Seeds	AWB Seeds	1800 054 433	none*
Yorker <sup>(b)</sup>	PBR	NSW DPI	AWB Seeds	AWB Seeds	1800 054 433	none*
Kyabra <sup>(b)</sup>	PBR	DAFWA	Plant Tech Pty Ltd	Plant Tech Pty Ltd	1800 112 400	none
Sonali <sup>(b)</sup>	PBR	Ag WA	AWB Seeds	AWB Seeds	1800 054 433	none*
Almaz <sup>(b)</sup>	PBR	CLIMA	AWB Seeds	AWB Seeds	1800 054 433	none*
Nafice <sup>(b)</sup>	PBR	CLIMA	AWB Seeds	AWB Seeds	1800 054 433	none*
Howzat <sup>(b)</sup>	PBR	NSW DPI	Australian Agricultural Crop Technologies	retail outlets	02 6796 3050	none
Jimbour <sup>(b)</sup>	PBR	QDPI&F	Mount Tyson Seeds	Mount Tyson Seeds	07 4693 7166	none
Bumper <sup>(b)</sup>	PBR	DPI NSW	Australian Agricultural Crop Technologies	retail outlets	02 6795 3050	Australian Agricultural Crop Technologies
Moti <sup>(b)</sup>	PBR	DAFWA	AWB Seeds	AWB Seeds	1800 054 433	none - available only in central Qld

\* levy payable on grain sales

## Faba and Broad Beans

(See Plate 2 : C Section 2)

It was not until the well-adapted variety, Fiord, was released in 1980 that faba beans expanded rapidly as a crop in Australia. Now when choosing varieties consider the market price, yield, disease resistance and flowering time. Yield, seeding rate, fungicide use and grain price will vary with variety and all will determine the final gross margin.

If faba beans are sown late or in low rainfall areas, the plants will be shorter and pods closer to the ground, making them more difficult to harvest. Beans respond well to early sowing with greater height and usually higher yields, providing foliar diseases are controlled. Faba beans are vulnerable to soil compaction, producing shallow roots and making them more susceptible to drought.

Variety segregation is important for marketing beans, with several size categories being identified: the Fiord types (small), Fiesta types (medium), Manafest types (medium-large) and broad beans (large). Australian faba beans are preferred by the Middle East human consumption market, with competition from France and the UK. Quality standards to meet the specifications for this market are high and product that does not meet this standard or is surplus to demand is consumed domestically in stockfeed rations, often at lower prices. To access the export human consumption markets, the Australian product must be of high quality. Our varieties like Fiesta are now well accepted, and the market signals are that the small faba beans like the old Fiord and Ascot VF varieties are no longer preferred in the Middle East.

Freedom from mechanical damage, weathering, disease staining and storage problems is essential to meet food grades. Old crop beans darken with storage and age and become unsuitable for the export market after about 9 months. They may however be suitable for splitting. The domestic feed market has always accepted beans of poorer quality or those beans traded at competitive prices. Sound beans are also finding a place in many integrated cropping and grazing enterprises as a means of finishing lambs on-farm.

### Doza<sup>♠</sup> (SP01040)

Doza is a medium sized faba bean released for the subtropical environments of northern NSW and southern Queensland. The combination of early flowering, high yield, disease resistance, uniformity of seed size and color is a significant improvement over current varieties recommended for this region. Doza has good resistance to stem collapse from frost which is an important trait in this environment. Doza has superior rust resistance to all current varieties, reasonable resistance to chocolate spot but is susceptible to ascochyta blight, and therefore not likely to have a large role in southern Australia. It is being commercialised by ABB Seeds.

### Nura<sup>♠</sup>

Nura is a medium sized faba bean moderately resistant to ascochyta blight and rust, and intermediate resistance to chocolate spot (better than Farah). All three resistance levels are better than Fiesta VF. It is susceptible to cercospora leaf spot. Nura is shorter in height than Fiesta VF and Farah and less likely to lodge, however its bottom pods are closer to the ground. This can cause

TABLE 2 : D  
Agronomic Features of Bean Varieties

Variety	Maturity	Seed Color	Seed Size (g/100)	Height	Ascochyta	Chocolate Spot	Rust	Cercospora
Doza <sup>♠</sup>	early <sup>#</sup>	buff	40-60	medium	S <sup>#</sup>	MR <sup>#</sup>	R <sup>#</sup>	-
Nura <sup>♠</sup>	early-mid	light buff	50-70	short	MR-R	MS-MR	MR	S
Farah <sup>♠</sup>	early-mid	light brown to brown	50-75	medium	MR-R	S	S	S
Cairo <sup>♠</sup>	early	light brown to brown	50-70	med-tall	VS	VS	MR-R	-
Manafest	mid	light brown	80-100	medium	VS	MS	MS	-
Fiesta VF	early-mid	light brown to brown	50-75	medium	MS	S	S	S
Fiord	early	light brown to brown	35-55	short	S	VS	S	S
Ascot VF	early	light brown to brown	35-55	short	R	VS	S	S
Icarus	mid	green	80-100	tall	VS	MR	MR	-
Aquadulce	late	light brown to brown	100-160	tall	S	MS	MS	-

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; - = No Information

# = Limited Observations, Treat with Caution

harvest problems in lower rainfall districts or with late sowing. Nura's long term yields are similar to Farah, however highest relative yields are achieved when sown early. It has good seed appearance, light buff in color, with minimal seed staining and discoloration. Nura flowers about 7 days later than Fiesta VF, but has a similar maturity. Its major advantage to growers is a likely reduction in fungicide sprays, with ascochyta blight and rust protection only required in high risk situations. Seed is available from AWB Seeds.

#### Farah<sup>Ⓛ</sup>

Farah is a direct selection from Fiesta VF and is licensed to PlantTech. It is identical in most respects to Fiesta VF, except for its moderate resistance to ascochyta blight seed staining and more uniform seed size and color. Although the risk of suffering ascochyta blight seed staining is reduced with Farah, the risk is still present if ascochyta blight is not properly managed. Farah generally yields about the same or slightly higher than Fiesta VF in most areas of southern Australia. Farah has replaced Fiesta VF in many areas due mainly to its increased likelihood of achieving market standards for minimal seed staining.

#### Cairo<sup>Ⓛ</sup>

Cairo is derived from a selection made from an open-pollinated population of a faba bean accession in northern NSW. Cairo is recommended for northern NSW/southern Queensland where it

has high relative yields. Particular advantages in these areas include grain quality, resistance to stem collapse from frost and good rust resistance. It is similar to Fiord for chocolate spot resistance but more susceptible to ascochyta blight, hence not favoured in southern Australia. Seed size is similar to Fiesta.

#### Fiesta VF

Fiesta was released in 1998 and is early to mid flowering. It has buff colored seed, larger than Fiord. Fiesta has medium height and does not lodge readily. It is classed as susceptible to chocolate spot because it does respond to fungicide use, but is less susceptible than Fiord. Fiesta VF is more susceptible to ascochyta blight than Farah and Nura and a proactive disease management strategy is recommended to ensure market standards for clean seed are met. Fiesta VF is no longer covered by PBR.

#### Manafest

Manafest was released in 1999 for high rainfall areas. Manafest has reasonable resistance to chocolate spot and rust, but is very susceptible to ascochyta blight, which has limited its uptake. Manafest is able to tolerate soil conditions that lead to iron and manganese deficiency in Fiord. Manafest has excellent early vigor and very early branching but is later flowering than Fiesta VF. Seed is larger than Fiesta VF and light brown in color. Manafest meets specific markets for medium

TABLE 2 : E  
Faba Beans - Availability and Markets

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
Doza <sup>Ⓛ</sup>	PBR	NSW DPI	ABB Seeds	ABB Seeds (inc Grain Trust)	02 9925 0570	none*
Nura <sup>Ⓛ</sup>	PBR	University of Adelaide	AWB Seeds	AWB Seeds	1800 054 433	none*
Farah <sup>Ⓛ</sup>	PBR	University of Adelaide	PlantTech Pty Ltd	PlantTech Pty Ltd	1800 112 400	Delivery to nominated receivers*
Cairo <sup>Ⓛ</sup>	PBR	NSW DPI	Graintrust	PlantTech Pty Ltd	1800 112 400	none
Fiesta VF	terminated	University of Adelaide	PlantTech Pty Ltd	none	1800 112 400	none
Manafest	none	University of Adelaide	AWB Seeds	none	1800 054 433	none
Ascot	terminated	University of Adelaide	Seedmark	none	08 8234 9333	none
Icarus	terminated	University of Adelaide	Seedmark	none	08 8234 9333	none

\* levy payable on grain sales



sized, light colored bean seed, which may attract a premium. However, ascochyta blight, both foliar and on the seed, must be controlled.

### Fiord

Fiord has now been largely superseded due to small seed size and disease susceptibility. It is very susceptible to chocolate spot, susceptible to ascochyta blight and susceptible to rust, making fungicide applications essential for effective disease control in most districts.

### Ascot VF

Ascot VF produced a more marketable grain free of ascochyta blight seed blemish, which assisted marketing if blemishing is severe in susceptible varieties. Ascot VF is similar to Fiord in other respects, so the use of fungicides for chocolate spot control is still necessary.

### Icarus

Icarus is a medium sized green seeded faba bean released from SA but is now superseded. It has good resistance to chocolate spot but is more susceptible to ascochyta blight than other varieties. Icarus is tall, late flowering, late maturing and only suitable for high to medium rainfall areas. The green colored grain produced restricts Icarus marketing to specific market niches, predominantly for splitting.

## BROAD BEANS

The broad bean grown commercially in Australia was originally an Australian selection of the variety Aquadulce, a large seeded bean. A replacement for Aquadulce with more uniform seed color with no green seeds, along with a small reduction in ascochyta blight susceptibility and slight improvements in yield and seed size is expected in the near future.

### Aquadulce

Aquadulce is a tall, late flowering broad bean suited to areas with at least 500mm average annual rainfall. It may be susceptible to shattering at harvest, however it is more tolerant of chocolate spot and waterlogging than Fiesta VF. It is also more tolerant of iron and manganese deficiency on problem high pH soils. Aquadulce is indeterminate and will continue to flower as long as conditions are favourable. The grain is graded for markets, with a premium often paid for large seeds (65 - 70 seeds per 100g). Aquadulce must be considered a speciality bean because of its seed size and marketing differences to faba beans.

(l) = variety is protected by PBR.

## Lentils

(See Plate 2 : B & 2 : F Section 2)

Lentils are currently marketed on a variety basis with 99% purity requirement, so markets and variety are very closely linked. Two types of lentils are grown in Australia, the red and the green. Red lentils, sometimes known as small or Persian lentils, are the most commonly grown in Australia, and are sold to be split for cooking. The name red lentil is derived from the red kernel (cotyledon) that is exposed when the seed coat is removed and the seed split. The seed coat of red lentils can vary from light grey, through black to brown or red and may be speckled.

Green lentils, also known as large or Chilean lentils are used whole for cooking. Their seed coat is green to brown and the kernel color is yellow. The seed size can vary from 6 to 10mm in diameter. French green lentils are a very small, dark colored lentil with a green kernel.

To spread risks when growing lentil varieties growers need to continue to take into account differences between varieties in their yield, disease resistance and marketability. Disease management still is the primary concern when growing lentils. Botrytis grey mould (BGM) and ascochyta blight are the major diseases reducing lentil production in Australia. Variety choice is a critical component of any disease management program. Growers can spread their disease and marketing risks by growing more than one variety, providing the varieties chosen differ in their disease and marketing characteristics.

## GREEN LENTILS

### Boomer<sup>(l)</sup>

Boomer is a large seeded green lentil released as a replacement for Matilda for all lentil growing areas of Australia and is licensed to AWB Seeds. It has superior seed size to Matilda (approximately 30% larger) making it more competitive with overseas varieties on export markets. Boomer has a large plant type and can produce prolific amounts of growth making it prone to lodging under favourable growing conditions. In less favorable growing conditions its improved vigor and plant height can be an advantage. It has improved resistance to ascochyta blight and BGM compared to Matilda. Boomer will be best adapted to medium rainfall areas of southern Australia with mild finishing conditions to ensure that the large seeds can fully

form. Ascochyta blight must be managed during podding to avoid disease blemish on the seed coat. Early sowing may increase the risk of seed blemish from ascochyta blight in Boomer. Boomer is moderately susceptible to shattering at maturity. Delayed harvest can result in shattering and possible loss of grain quality.

### Tiara

Tiara was introduced into Tasmania from East Germany in 1986. It is a very late maturing green lentil that is suited to high rainfall, cool climate areas of Australia where spring sowing of crops is practiced. With spring sowing it has out yielded all current lentil varieties but it has been lower yielding when sown in autumn or early winter. Tiara is tall and has excellent early vigor. It produces a large green seed that is significantly larger than Matilda and of a seed size suitable for the large green lentil markets. It is susceptible to ascochyta blight and moderately susceptible to shattering at maturity. Tiara is licensed to AWB seeds.

### Matilda

Matilda is a green lentil released from Victoria in 1993 as a replacement for the older Canadian variety Laird, although its smaller seed size was a disadvantage on the export market. Matilda is susceptible to BGM and seed infection of ascochyta blight and is now superseded by Boomer.

## RED LENTILS

### CIPAL411 and CIPAL415 (to be named)

These advanced breeding red lentil lines from Pulse Breeding Australia (PBA) Lentils are currently

under seed multiplication with PB Seeds, Horsham, the seed partner for PBA lentil varieties until 2011. Both lines have improved tolerance to salt over Nugget, wide adaptation and have been high yielding in southern Australia. CIPAL411 is well suited to short season lentil growing environments due to its early maturity and perhaps also to its improved tolerance to boron over current varieties. Both lines have moderate resistance to seed and foliar ascochyta blight but CIPAL415 is moderately susceptible to BGM and CIPAL411 susceptible to BGM. CIPAL411 has a green seed coat and medium lens shaped seed while CIPAL415 has a grey seed coat and small to medium round seed.

### Nipper<sup>Ⓛ</sup>

Nipper is the first Australian bred lentil variety with dual resistance to ascochyta blight and BGM. This unique combination of disease resistance will make it a low cost, low disease risk option in disease prone areas. Nipper has a seed size similar to Northfield although it is grey in color. Nipper, like Northfield, flowers later than Nugget but often matures slightly earlier than Nugget. Long term yields in southern Australia show that Nipper generally yields greater than Northfield and similarly to Nugget. However, it has been lower yielding than Nugget in short season environments or situations where it produces less growth. Conversely, Nipper has been the highest yielding variety in all trials affected by BGM. Nipper has improved salinity tolerance and similar levels of boron tolerance compared to current varieties. Due to its improved disease resistance it is expected

TABLE 2 : F  
Agronomic Features of Lentil Varieties

Variety	Type	Maturity	Seed Coat Color	Seed Size (g/100)	Height	Lodging Resistance	Pod Drop	Shattering	Ascochyta Foliage	Blight Seed	Botrytis Grey Mould	Boron	Salt
CIPAL411	red	early-mid	green	4.0-5.0	medium	MR	MR	MR	MR	MR	S	MT	MI
CIPAL415	red	mid	grey	3.0-4.0	medium	MS	MR	MR	MR	MR	MS	I	MT
Nipper <sup>Ⓛ</sup>	red	mid	grey	3.0-4.0	med-short	MR	MR	MR	R	R	R	I	T
Boomer <sup>Ⓛ</sup>	green	late	green	5.5-8.0	tall	MS	MR	S	MR-R	MS	MR	MI	I
Tiara	green	v. late	green	6.5-8.5	tall	MS	MR	MS	S	S	-	-	-
Nugget	red	mid-late	grey	3.5-4.5	medium	MS-MR	MR	MS	MR-R	MS-MR	MR	I	I
Northfield	red	mid	tan	3.0-4.0	med-short	MS	MR	MS	R	R	S	MI	I
Aldinga	red	mid	green	4.5-6.0	medium	S	MR	MR	MR	MS	MS	I	MI
Cobber	red	mid	green	3.5-5.0	medium	MS	MR	MR	MR	S	MS	-	-
Digger	red	mid-late	grey	3.5-4.5	medium	MS	MR	MS	MR	MS	MR	I	I
Matilda	green	mid	green	5.0-6.0	medium	MR	MR	MS	MR	S	MS	MI	I

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible

T = Tolerant; MT = Moderately Tolerant; MI = Moderately Intolerant; I = Intolerant; - = No Information

that only one fungicide application at canopy closure will be required to effectively control BGM in most situations. Nipper is licensed to AWB Seeds.

### Nugget

Nugget has a similar flowering pattern to Digger, flowering slightly longer than Northfield. Nugget is moderately resistant to foliar infections and moderately susceptible to seed infections of ascochyta blight. It is slightly more susceptible to BGM than Digger, mainly due to its slightly larger plant size, but superior to all other varieties apart from Nipper. It has similar vigor, plant height, lodging characteristics and seed size to Digger. Under favourable conditions Nugget will grow taller than all other varieties and can also remain more upright at maturity. This can make it more susceptible to pod drop at maturity. Nugget has been the highest yielding red lentil variety in southern Australia. It is licensed to PlantTech, currently under contract to a number of different marketers.

### Northfield

Northfield was released from SA in 1995 as an ascochyta blight resistant red lentil. Northfield is more susceptible to BGM than all other varieties, but along with Nipper is the only variety with seed resistance to ascochyta blight, which means reduced disease blemish on the seed. Recommended management practices to minimise BGM infection in crops of Northfield are essential. Northfield has small round tan colored seed that

has attracted a market premium over other varieties in the past. Northfield is no longer covered by PBR.

### Aldinga

Aldinga was released from SA in 1993, and is a mid season variety moderately resistant to leaf infection from ascochyta blight, but more susceptible to BGM than Nugget. Aldinga has been found to be more prone to lodging and more sensitive to waterlogging than most other varieties. Aldinga has larger seed size than all other red lentil varieties and a light green seed coat.

### Cobber

Cobber is now superseded. It was released from Victoria in 1993 at the same time as Digger. Cobber has a green seed coat, is medium sized and produces splits that are light red to orange in color. It has had some marketing difficulty in the past.

### Digger

Digger is a medium sized lentil released from Victoria in 1993 that generally yields less than Nugget. Digger does not have the seed resistance to ascochyta blight of Northfield, but has good levels of resistance to BGM. Digger has a relatively long flowering period, which can delay crop-topping timing in some seasons and lead to lower grain yields in environments with quick dry finishes.

(D) = variety is protected by PBR.

TABLE 2 : G  
Lentils - Availability and Markets

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
CIPAL 411/415	expected	PBA	PB Seeds	retail outlets expected	03 5382 2213	To be announced*
Nipper (D)	PBR	DPI Vic	AWB Seeds	AWB Seeds	1800 054 433	Delivery to nominated receivers*
Boomer (D)	PBR	DPI Vic	AWB Seeds	AWB Seeds	1800 054 433	Delivery to nominated receivers*
Tiara	none	TAIR	AWB Seeds	AWB Seeds	1800 054 433	AWB Seeds*
Nugget	none	DPI Vic	PlantTech Pty Ltd	retail outlets	1800 112 400	Delivery to nominated receivers*
Digger	none	DPI Vic	ABB Grain Ltd	none	-	none
Cobber	none	DPI Vic	ABB Grain Ltd	none	-	none
Aldinga	none	SARDI	Australian Field Crop Assoc.	Australian Field Crop Assoc.	08 8522 4488	none
Northfield	terminated	SARDI	Australian Field Crop Assoc.	Australian Field Crop Assoc.	08 8522 4488	none
Matilda	none	DPI Vic	ABB Grain Ltd	none	-	none

\* levy payable on grain sales

## Lupins

The area sown to lupins increased as growers discovered that lupins can be grown on neutral to acid soils and higher pH soils where the level of free lime (calcium carbonate) is very low (less than 4%).

### NARROW LEAF LUPINS

(See Plates 2 : A & 2 : D Section 2)

(*Lupinus angustifolius*)

The agronomic details of the narrow leaf lupin varieties are shown in Table 2 : H & I. Lupin varieties historically fitted into early, mid and late flowering categories. The early flowering lupins now predominate, and have no vernalisation (cold period) requirement before flowering. If sown before mid April they can begin flowering in cold, frosty conditions. Mid and late types flower later because of their vernalisation requirements and so often avoid flowering during frosty conditions even if sown before mid April. In some warm areas, late types may begin to flower during heat stress periods with subsequent loss in yields.

Conventional lupins branch and flower as long as the season permits. Restricted branching types are limited in their branching habit. Later flowering types produce most of their grain yields in the primary and first lateral pod set. Early types can compensate for poor early pod set as a lesser proportion of grain yield comes from the primary and first lateral flowers.

Grain yield, area of adaptation, anthracnose resistance and resistance to other diseases and pests are the most important criteria for selection. The foliar disease anthracnose is a manageable limitation to lupin production in WA and parts of SA. It has also become a marketing issue between Victoria/NSW and SA/WA. Varieties differ in their levels of resistance to anthracnose and this is becoming an increasingly important issue in managing the risk of the disease in some areas.

All releases since 1986 have phomopsis resistance, leading to reduced levels of phomopsis infection on the stems, pods and seeds at maturity. Lupinosis is not necessarily eliminated, but the potential for stubble toxicity in early summer is reduced in proportion to the phomopsis on the stem. Toxicity may arise following summer and autumn rains.

#### Jenabillup<sup>♠</sup> (WALAN2224)

Jenabillup was released in WA in 2007, specifically for their southern districts where “black pod syndrome” regularly reduces yields. It has shown a greater tolerance and higher yields in the presence of this disorder than other varieties. “Black pod syndrome” has not necessarily been recognised elsewhere in Australia and Jenabillup has generally been lower yielding than Mandelup in southern Australia. It has only low anthracnose resistance. Seed may be available in eastern Australia in 2009. The cause of “black pod syndrome” in WA is thought to be a physiological response to climatic conditions and soil moisture. Affected lupin crops are usually high in biomass and well podded in

TABLE 2 : H  
Agronomic Features of Narrow Leaf Lupin Varieties

Variety	Year of Release	Flowering	Height	Early Vigor	Lodging	Pod loss Shattering	Seed Alkaloids	Seed Color	Seed Size	Protein Content
Jenabillup <sup>♠</sup>	2007	early	medium	medium	MR	MR <sup>#</sup>	low	light brown	medium-large	medium
Coromup <sup>♠</sup>	2006	early	tall	medium	MS	MR <sup>#</sup>	low-medium	light brown	large	high
Mandelup <sup>♠</sup>	2004	very early	tall	fast	MS	MR	low-medium	brown	medium-large	medium
Jindalee <sup>♠</sup>	2000	late	tall	medium	MR	R	medium	brown	medium-large	medium
Quilinock <sup>♠</sup>	1999	early	medium	medium	MS	MR	low	light brown	large	medium
Tanjil <sup>♠</sup>	1998	early	medium	medium	MR	MR	low-medium	dark brown	small medium	medium
Moonah <sup>♠</sup>	1997	early	tall	fast	MS-MR	MS-MR	low-medium	brown	large	medium
Belara	1997	very early	medium	medium	MS	R	very low	brown	medium	medium
Kalya	1996	early	medium	medium	MS	MS	medium	white	medium	medium
Wonga <sup>♠</sup>	1996	early	medium	medium	MR	MS	low	brown	medium	medium
Merrit	1991	early	short	medium	R	R	low	brown	medium	medium
Gungurru	1988	early	short	medium	MR	R	low	brown	medium	medium

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; - = No Information  
# = Limited Observations

spring. As the season begins to finish there appears to be a remobilisation of nutrients from the pods thus leaving the pods flat and black with small seed inside.

### Coromup<sup>Ⓛ</sup> (WALAN2173M)

Coromup was released in WA in 2006 for medium and low rainfall zones. It is a high quality narrow-leaved lupin, having large and uniform seeds with high protein. It has excellent attributes for de-hulling, producing high protein kernel meal for developing premium feed markets. Coromup is early maturing and has a good disease resistance profile that includes anthracnose and phomopsis stem blight. Coromup was reselected for its improved tolerance to metribuzin, which is similar to Mandelup. In WA it is being promoted for its high quality (i.e. high protein) rather than high yields. In the absence of bonus payments for its higher protein, the main role for Coromup may be for on-farm feed use. Seed is not likely to be available in eastern Australia until 2009 at the earliest.

### Mandelup<sup>Ⓛ</sup>

Mandelup is a tall, vigorous narrow-leaved lupin variety that is very early flowering and early maturing. This early maturity makes it a suitable variety for crop topping, with careful attention to correct timing. It has moderate resistance to anthracnose, excellent aphid resistance and moderate stem phomopsis resistance. It has good tolerance to metribuzin. Mandelup has consistently been the highest yielding variety in most areas of southern Australia, providing growers with a high

yielding alternative to all current varieties. Its tall growth habit can make it prone to lodging and possibly sclerotinia disease under high rainfall conditions.

### Jindalee<sup>Ⓛ</sup>

Jindalee was released in 2000 for medium to higher rainfall areas of NSW and SA and seed is available through AWB Seeds. It is moderately susceptible to anthracnose, resistant to phomopsis and mid to late flowering. Jindalee is moderately tall and vigorous, and has improved brown leaf spot resistance over Merrit. In SA it appears to have improved resistance to root rots and premature wilting that occurs on duplex soils with shallow underlying clay. It also appears resistant to phytophthora on acid soils of southern NSW.

Jindalee is best suited to medium to high rainfall districts with low anthracnose risk due to its relative late maturity. Jindalee has speckled seed similar to Merrit and medium seed alkaloid levels similar to Wonga.

### Quilinock<sup>Ⓛ</sup>

Quilinock is a high yielding lupin released in WA in 1999 but more susceptible to anthracnose than most lupin varieties. It is early flowering and has large seeds. Quilinock is susceptible to lodging and is suitable only to low and medium rainfall areas where anthracnose is a low risk. Quilinock is intermediate in its susceptibility to brown leaf spot and is susceptible to pleiochaeta root rot. Seed of Quilinock is speckled, similar to Merrit, but of less intensity. Grain alkaloid content is less than Merrit, as is its protein and oil content.

TABLE 2 : I

### Disease and Stress Features of Narrow Leaf Lupin Varieties

Variety	Grey Leaf Spot	Brown Leaf Spot	Pleiochaeta Root Rot	Anthracnose	CMV Seed	Phomopsis Stem	Phomopsis Pods/Seed	Drought Tolerance	Premature Wilting
Jenabillup <sup>Ⓛ</sup>	-	MR	-	MS	MR	MS-MR	R	R	-
Coromup <sup>Ⓛ</sup>	-	MS-MR	-	MR	MR	R	R	R	-
Mandelup <sup>Ⓛ</sup>	-	MS	-	MR	MS	R	R	R	-
Jindalee <sup>Ⓛ</sup>	R	MR	MR	MS	MS	R	R	MS	MR
Quilinock <sup>Ⓛ</sup>	MS-MR	MS-MR	S	S-VS	MS	MR	S	R	-
Tanjil <sup>Ⓛ</sup>	MS-MR	MS-MR	S	R	MR	MR	R	MR	MR
Moonah <sup>Ⓛ</sup>	VS	S	MS	MS-MR	MS	MR	-	R	S
Belara	VS	MS	S	MS	MS#	R	MR	MR	VS
Kalya	MR	MS-MR	MR	MS-MR	MS	MS-MR	MS	MS	S
Wonga <sup>Ⓛ</sup>	MS	MS-MR	S	R	MR	MR	MR	MS	MR
Merrit	MS-MR	MS	S	MS	MS	MR	MR	MS	MR
Gungurru	MS-MR	MS	S	MS	MS	MR	MR	S	MR

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; CMV = Cucumber Mosaic Virus; # = May escape late infection; - = No Information

### Tanjil<sup>Ⓛ</sup>

Tanjil is an early flowering, high yielding lupin released in WA in 1999. It is a slightly earlier maturing selection from Wonga that also has anthracnose resistance. Tanjil is moderately tall, vigorous and erect. Tanjil has moderate resistance to premature wilt on duplex soils with shallow underlying clay. It has moderate resistance to phomopsis and improved brown leaf spot resistance over Merrit. Tanjil has speckled seed similar to Merrit and medium seed alkaloid levels.

### Moonah<sup>Ⓛ</sup>

Moonah is an early flowering lupin released for the Victorian Mallee in 1998. It has large seeds and rapid early growth. Its anthracnose resistance is intermediate. Moonah has some drought tolerance, but is susceptible to premature wilt on some duplex soils with shallow underlying clay. Moonah has moderate resistance to stem phomopsis. Moonah is susceptible to brown leaf spot, but has some resistance to pleiochaeta root rot. Grain alkaloid content is slightly less than Danja but higher than Merrit.

### Belara

Belara was released from WA in 1997. It is very early flowering, slightly earlier maturing than Merrit and adapted to low and medium rainfall areas. It has greater resistance to phomopsis stem blight than most varieties but is more susceptible to brown leaf spot than most varieties so precautions should be taken. It is also susceptible to aphids. Belara is moderately susceptible to anthracnose. Seed alkaloid levels are very low.

### Kalya

Kalya is a broadly adapted, high yielding and aphid resistant lupin variety released from WA in 1996. It flowers slightly later than Merrit, is slower to mature

and has poor drought tolerance. Kalya is has intermediate resistance to anthracnose. It has moderate resistance to pleiochaeta root rot, but normally is less resistant to phomopsis than Merrit. Kalya has greater harvest height than Merrit, but it has slightly weaker stems. Seeds are white, with light brown marbling. Kalya has medium seed alkaloid levels.

### Wonga<sup>Ⓛ</sup>

Wonga is an early flowering, high yielding lupin released from NSW in 1996. It is moderately tall and vigorous. Wonga is moderately resistant to anthracnose. It has moderate resistance to phomopsis and has intermediate brown leaf spot resistance. Wonga has moderate resistance to premature wilting on duplex soils with shallow underlying clay. It also appears resistant to phytophthora on acid soils in southern NSW. Wonga has speckled seed similar to Gungurru and medium seed alkaloid levels.

### Merrit

Merrit is a selection from Gungurru released Australia wide from WA and is now superseeded. Merrit is moderately susceptible to anthracnose and similar in most respects to Gungurru but has tended to yield more consistently over a wide range of conditions.

### Gungurru

Gungurru was the first phomopsis resistant release in Australia. It resists lodging, particularly at high yields or when vegetative growth is excessive. It has resistance to grey leaf spot, and moderately high resistance to phomopsis in stems, seeds and pods.

Ⓛ = variety is protected by PBR.

TABLE 2 : J  
Agronomic Features of Albus Lupin Varieties

Variety	Year of Release	Flowering	Height	Early Vigor	Lodging	Pod loss Shattering	Seed Alkaloids	Seed Color	Seed Size
Luxor <sup>Ⓛ</sup>	2005	mid	med-tall	-	R	-	very low	white	medium
Rosetta <sup>Ⓛ</sup>	2005	mid-late	tall	-	R	-	very low	white	medium
Andromeda <sup>Ⓛ</sup>	2005	mid	medium	-	R	-	very low	white	medium
Kiev Mutant	1970's	early	medium	very fast	R	MR	very low	white	medium
Ultra	1970's	early	short	very fast	R	MR	very low	white	medium

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; - = No Information

**ALBUS LUPINS** (See Plate 2 : E Section 2)

(*Lupinus albus*)

Mediterranean white lupin (*Lupinus albus*) has seed that is flat and double the size of the narrow leafed types. They are best suited to areas with fertile, well-drained, heavier soils. They show slightly better adaptation than the narrow leaf types to alkaline soils with some free lime present. They grow very poorly on infertile soils, deep sands, waterlogged soils and low rainfall areas.

Most albus lupins varieties are very susceptible to anthracnose. They have very low levels of phomopsis in their stubble but can get infection on seed and pods. They are resistant to cucumber mosaic virus. Albus lupins tolerate brown leaf spot on heavy soils, but on light infertile sands they are highly susceptible to brown leaf spot.

Albus lupins have fitted into a limited niche market for human consumption overseas, but the seed size of current varieties is often considered too small. Market contracts are advisable given the limited size of the food markets. Surplus grain goes into lower priced stock feed markets.

Alkaloid content is now assessed on receipt of albus lupins under a new code of practice using ultra violet light. This is designed to ensure contaminants of bitter types are not present in the product, so ensuring we are not exceeding accepted alkaloid standards for sweet albus lupins. Bitterness (high-alkaloid seeds) in albus grain threatens the export and domestic markets for albus lupins. Albus growers are advised to check their sowing seed for bitter contaminants, a free testing service is available through NSW DPI at Wagga (www.dpi.nsw.gov.au or 02 6938 1999). Isolation distances from bitter albus lupin crops

(lupini beans) and also crops of old albus varieties that may have some level of contamination also need to be adhered to. When multiplying seed of new albus varieties it is recommended that the seed be sown in a paddock of narrow leaf lupins rather than in an old variety of albus lupins to avoid contamination issues.

**Luxor**<sup>Ⓛ</sup>

Luxor was released from NSW in 2005 as a high yielding albus lupin with resistance to pleiochaeta root rot and is more suited to low and medium rainfall areas. Luxor has 100% sweet (low-alkaloid) seed and management practices to avoid contamination from bitter (high-alkaloid seeds) must be adhered to, to protect the industry and secure markets. The color, seed size and protein content of Luxor is similar to current varieties enabling continued market access. Luxor is very susceptible to anthracnose and similar susceptibility to Kiev Mutant for phomopsis.

**Rosetta**<sup>Ⓛ</sup>

Rosetta was released from NSW in 2005 as a high yielding albus lupin with moderate resistance to pleiochaeta root rot over. Rosetta is later flowering than Kiev Mutant hence particularly suited to higher rainfall environments with longer, cooler seasons. Rosetta has 100% sweet (low-alkaloid) seed and management practices to avoid contamination from bitter (high-alkaloid seeds) must be adhered to protect the industry and secure markets. The color, seed size and protein content of Rosetta are similar to current varieties allowing continued market access. Rosetta is very susceptible to anthracnose and similar susceptibility to Kiev Mutant for phomopsis.

TABLE 2 : K

**Disease and Stress Features of Albus Lupin Varieties**

Variety	Brown Leaf Spot*	Pleiochaeta Root Rot	Anthrachnose	BYMV	CMV	Phomopsis Stem	Phomopsis Pods & Seed
Luxor <sup>Ⓛ</sup>	MR	R	VS	-	-	MR	S
Rosetta <sup>Ⓛ</sup>	MR	MR	VS	-	-	MR	S
Andromeda <sup>Ⓛ</sup>	MS	MS	MS	MS	I	MR	S
Kiev Mutant	MS	VS	VS	MS	I	MR	S
Ultra	MS	S	VS	MS	I	MR	S

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; I = Immune

\* = Susceptibility worse on poor soils compared with heavier soils. CMV = Cucumber Mosaic Virus;

BYMV = Bean Yellow Mosaic Virus; - = No Information

### Andromeda<sup>Ⓛ</sup>

Andromeda was released in WA in 2005 as the first albus lupin variety with an improved level of anthracnose resistance. Andromeda has significantly better anthracnose resistance than Kiev Mutant however it is still moderately susceptible to the disease and is not recommended in areas of high risk to anthracnose. Due to its later maturity than Kiev Mutant it is likely to yield less than Kiev Mutant in the absence of anthracnose, and is not being targeted outside of WA. Seed size is slightly larger than Kiev Mutant with other quality parameters similar.

### Kiev Mutant

Kiev Mutant is the standard used for albus lupins and has been widely grown in areas suited to albus lupins. It has medium seed size, is early flowering, and has very good early seedling vigor, medium in plant height and resistant to lodging. Kiev Mutant is very susceptible to anthracnose.

Seed retained for sowing should be checked for bitter contaminants.

### Ultra

Ultra is an older variety of albus lupin with characteristics very similar to Kiev Mutant. It has medium seed size, is early flowering, has very good early seedling vigor, and is medium in plant height with resistance to lodging. Ultra is very susceptible to anthracnose.

Seed retained for sowing should be checked for bitter contaminants.

## YELLOW LUPINS

(*Lupinus luteus*)

Yellow lupins have higher seed protein content than all other lupin species and also have higher sulphur amino acids and lysine levels.

### Pootallong<sup>Ⓛ</sup>

Pootallong was released in 2005 as a experimental variety of yellow lupin for Western Australia. It was primarily released for growers in the United Kingdom where it has a distinct yield advantage over Wodjil, however it also is well adapted for the south coast areas of Western Australia in particular the aluminium toxic acidic sands. It has similar quality parameters to Wodjil with a high quality seed and high protein content that offer potential for the aquaculture and stock feed industries. Pootallong has resistance to brown leaf spot, pleiochaeta root rot and Eradu patch and is immune to CMV. It is only marginally better than Wodjil for aphid tolerance and timely treatment with an aphicide is highly recommended.

### Wodjil<sup>Ⓛ</sup>

The variety Wodjil was released in WA in 1997 and was the first sweet yellow lupin adapted to Australian conditions. It was released for the highly acidic sands of WA that are especially aluminium toxic. It does not yield as well as narrow leafed lupins on most other lupin growing soils. Wodjil is very susceptible to aphids and anthracnose but is highly resistant to brown leaf spot and pleiochaeta root rot, and is immune to cucumber mosaic virus. It is tolerant of manganese deficiency, and highly efficient at extracting phosphorus from soil.

(<sup>Ⓛ</sup>) = variety is protected by PBR.

TABLE 2 : L  
Agronomic Features of Yellow Lupin Varieties

Variety	Year of Release	Flowering	Height	Early Vigor	Lodging	Pod loss Shattering	Seed Alkaloids	Seed Color	Seed Size
Wodjil <sup>Ⓛ</sup>	1997	mid	medium	medium	MR	MS	low	white	medium-small
Pootallong <sup>Ⓛ</sup>	2005	mid	medium	-	-	-	low	white	medium-small

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; - = No Information

TABLE 2 : M  
Disease and Stress Features of Yellow Lupin Varieties

Variety	Grey Leaf Spot	Brown Leaf Spot	Pleiochaeta Root Rot	Anthracnose	BYMV	CMV	Phomopsis Stem	Phomopsis Pods & Seed	Aphids	Drought Tolerance
Wodjil <sup>Ⓛ</sup>	R	MR	R	S	S	R	R	R	VS	VS
Pootallong <sup>Ⓛ</sup>	-	R	R	VS	S	I	-	-	VS	MS

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; CMV = Cucumber Mosaic Virus; BYMV = Bean Yellow Mosaic Virus; I = Immune; - = No Information





TABLE 2 : N  
**Lupins - Availability and Markets**

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
Jenabillup <sup>Ⓛ</sup>	PBR	DAFWA	WA: The Seed Alliance Group East: to be announced	ESSCO Multiseed Aust Seed & Grain to be announced	08 9045 4036 08 9071 1053 08 9651 1069 -	none* none*
Coromup <sup>Ⓛ</sup>	PBR	DAFWA	WA: Corow Seeds East: to be announced	WA: Corow Seeds -	08 9952 1088 -	none* none*
Mandelup <sup>Ⓛ</sup>	PBR	DAFWA	WA: various East: Grainstrust	WA: EDSCO Wemyss ASG COGGO Seeds Coorow Seeds WC Diamond & Co East: PlantTech Pty Ltd	08 9045 4036 08 9828 5055 08 9651 1069 08 9368 8750 08 9952 1088 08 9664 2011 1800 112 400	none* none*
Andromeda <sup>Ⓛ</sup>	PBR	DAFWA	COGGO Seeds	COGGO Seeds	08 9363 3410	none*
Luxor <sup>Ⓛ</sup>	PBR	NSW DPI	Grainstrust	ABB Seeds ( Inc Grainstrust)	02 9925 0570	none*
Rosetta <sup>Ⓛ</sup>	PBR	NSW DPI	Grainstrust	ABB Seeds ( Inc Grainstrust)	02 9925 0570	none*
Pootallong <sup>Ⓛ</sup>	PBR	DAFWA	Bullaburra Pastoral Company	Gary Hine	08 9847 2035	-
Jindalee <sup>Ⓛ</sup>	PBR	NSW DPI/ SARDI	AWB Seeds	AWB Seeds	1800 054 433	none*
Quilinock <sup>Ⓛ</sup>	PBR	DAFWA	WA: The Seed Group East: Plant Tech Pty Ltd	WA: The Seed Group East: none	08 9045 4036 -	none*
Tanjil <sup>Ⓛ</sup>	PBR	DAFWA	PlantTech Pty Ltd	none*	1800 112 400	none
Moonah <sup>Ⓛ</sup>	PBR	DPI Vic	AWB Seeds	AWB Seeds	1800 054 433	none
Wonga <sup>Ⓛ</sup>	PBR	NSW DPI	Lachlan Valley Seeds Co-op.	Auswest Seeds (NSW) Naracoorte Seeds (SA)	02 6852 1500 08 8762 1944	none
Wodjil <sup>Ⓛ</sup>	PBR	DAFWA	-	retail outlets	-	none*

\* = levy payable on grain sales

**Note:** Kalya, Myallie, Belara, Merrit, Gurgurru are no longer covered by PBR and seed may not be readily available.

## Peas (*Pisum sativus*)

The major field pea varieties grown in Australia can be divided into five basic seed quality groups.

- Dun - used for human consumption markets as well as in stock feed
- Large Whites - used for human consumption as well as in stock feed
- Small Whites - generally not suited for human consumption markets, but used for stock feed
- Maple - has speckled seed generally for bird feed markets
- Blue or Green - have green cotyledons, usually grown under contract for the canning or snack food trade.

(See Tables 2 : O & P)

Pea varieties not only vary in their quality type but also in important selection criteria such as grain yield, disease resistance, maturity, standing ability, shattering resistance, weed competitiveness and tolerance to herbicides which growers need to take into consideration when selecting a variety. Growers also need to consider their individual farm and paddock situation and the access and availability of the likely target markets and make their selection on all available information.

White peas are not accepted in the dun segregation. Spherical dun types like Kaspera are also often segregated. Growers need to consider the different quality types within peas and where they can be delivered, along with the more conventional selection criteria mentioned above.

### DUN TYPE VARIETIES

(See Plate 124 Section 9)

#### Yarrum<sup>Ⓛ</sup>

Yarrum is a high yielding, powdery mildew resistant dun type released specifically for the northern areas of Australia. AGT (SunPrime Seeds) have the licence for seed sales. Yarrum is a semi leafless, short variety which flowers early in Northern Australia (later in the south) but matures quickly and similar to Kaspera. It is susceptible to downy mildew and black spot but is the only current variety with resistance to pea seed borne mosaic virus. Yarrum is best adapted to the subtropical cropping region of north eastern Australia. Yarrum has yielded lower than Kaspera in southern Australia, but may have a role in regions where powdery mildew regularly reduces yields.

#### Kaspera<sup>Ⓛ</sup>

Kaspera is semi-leafless, late flowering, resistant to shattering and has good early season vigor and

TABLE 2 : O  
Agronomic Features of Pea Varieties

Variety	Height	Leaf* Type	Flower Color	Lodging Resistance	Maturity	100 Seed Weight (g)	Seed Type	Seedcoat Color	Cotyledon Color	Shattering
SW Celine <sup>Ⓛ</sup>	medium-tall	SL	white	fair	early	20-27	smooth	creamy	yellow	MS
Boreen <sup>Ⓛ</sup>	medium-tall	SL	white	fair	mid	20-26	smooth	creamy	yellow	MS
Bundi <sup>Ⓛ</sup>	medium-tall	SL	white	good	early	20-28	smooth	creamy	yellow	R
Yarrum <sup>Ⓛ</sup>	medium-short	SL	purple	fair	mid	20-26	dimple	brown-green	yellow	MR
Sturt <sup>Ⓛ</sup>	tall	conv.	white	poor	mid	17-24	smooth	creamy	yellow	MR
Kaspera <sup>Ⓛ</sup>	medium-tall	SL	pink	fair-good	mid	20-26	slight dimple	pale brown	yellow	R
Dunwa <sup>Ⓛ</sup>	tall	conv.	purple	poor	mid	20-26	dimple	brown-green	yellow	MR
Helena <sup>Ⓛ</sup>	tall	conv.	purple	poor	mid	18-24	dimple	brown-green	yellow	MR
Parafield	tall	conv.	purple	poor	mid	21-27	dimple	brown-green	yellow	MR
Snowpeak <sup>Ⓛ</sup>	medium-tall	SL	white	fair-good	early	21-25	smooth	creamy	yellow	MS
Excell <sup>Ⓛ</sup>	medium-tall	SL	white	good	early-mid	21-27	smooth	creamy	green	MS-S
Paravic	medium-short	SL	purple	fair	early	21-27	dimple	brown-green	yellow	-
Morgan <sup>Ⓛ</sup>	tall	SL	purple	fair	late	16-22	dimple	brown-green	yellow	MR
Alma	tall	conv.	purple	poor	late	20-26	dimple	brown-green	yellow	MR
Dundale	tall	conv.	purple	poor	mid	20-26	dimple	brown-green	yellow	MR
Jupiter <sup>Ⓛ</sup>	tall	tare	white	fair-good	mid-late	28-32	rhomboid-smooth	blue-grey	green	MS

\* conv. = conventional leaf type, SL = semi leafless, tare = tare-like leaf

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; - = No Information

moderate resistance to lodging. Kaspas has had good levels of resistance to downy mildew but there is some evidence this may be breaking down in some areas of southern Australia. It is susceptible to powdery mildew and black spot. Kaspas generally starts flowering a week later than Parafield but time to maturity is similar to Parafield in many areas, and therefore can generally be successfully crop topped like Parafield. The seed of Kaspas is distinct from other dun types in that it is red brown in color and almost spherical in shape. Kaspas is very high yielding in many areas of southern Australia, however it needs to be considered carefully before use as an option in low rainfall areas or areas prone to early periods of high temperature and drought stress. This is due to its late and condensed flowering pattern. Kaspas also should be considered carefully in areas prone to frequent severe vegetative frosts due to potential for yield loss to bacterial blight. Kaspas is under contract to AWB Seeds.

#### Dunwa<sup>ϕ</sup>

Dunwa, a sister line to Parafield, was developed in SA and released in WA in 2001 for medium to high rainfall areas of WA. It has been released as a larger seeded replacement for Helena and a higher yielding replacement for Dundale and Parafield

within many areas of WA. Dunwa has a similar seed size to Parafield and like this variety is susceptible to powdery mildew, downy mildew and black spot. Dunwa is licensed to COGGO Seeds.

#### Helena<sup>ϕ</sup>

Helena was released from WA in 1999 and is licensed to PlantTech. Helena is a tall, conventional leafed type pea with mid-season maturity and the highest yielding variety in WA. Helena is susceptible to black spot, powdery and downy mildew and its seeds are slightly dimpled, brown to greenish and smaller than other dun types.

#### Parafield

Parafield continues to be a high yielding option for all areas of South Australia. Parafield is susceptible to downy and powdery mildew and black spot. Parafield due to its mid maturity timing is generally well suited to crop topping situations. Parafield remains a good option in medium to low rainfall areas where it often out yields Kaspas in drier years. It is also the preferred dun variety in situations where bacterial blight is considered a risk. Parafield has been found to be susceptible to immature pod splitting, mainly in low rainfall areas when late season rainfall occurs prior to the pods drying down. Parafield is no longer covered by PBR.

TABLE 2 : P  
Disease and Other Features of Pea Varieties

Variety	Downy Mildew*	Stem Nematode Susceptibility	Stem Nematode Tolerance	Black-spot Disease Complex	Powdery Mildew	Iron/Manganese Chlorosis	Bacterial Blight
SW Celine <sup>ϕ</sup>	MS-MR	-	-	S	S	-	-
Boreen <sup>ϕ</sup>	S	-	-	S	R	-	S
Bundi <sup>ϕ</sup>	R	-	-	S	S	-	S
Yarrum <sup>ϕ</sup>	MS	-	-	S	R	-	S
Sturt <sup>ϕ</sup>	MS	-	-	S	S	-	MS-MR
Kaspas <sup>ϕ</sup>	MR-R	-	-	S	S	-	S
Dunwa <sup>ϕ</sup>	S	-	-	S	S	S	MS-MR
Helena <sup>ϕ</sup>	S	-	-	S	S	-	MS-MR
Parafield	S	MR	-	S	S	-	MS-MR
Snowpeak <sup>ϕ</sup>	R	MR	-	S	S	R	S
Excell <sup>ϕ</sup>	MR	MR	-	S	S	R	S
Paravic	MR	MR	-	S	S	R	S
Morgan <sup>ϕ</sup>	R	MR	-	S	S	R	MS-MR
Alma	S	MR	MT	S	S	MS	-
Dundale	S	MR	MT	S	S	MS	-
Jupiter <sup>ϕ</sup>	R	MR	-	VS	S	VS	-

I = Immune; MT = Moderately Tolerant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; IT = Intolerant; MR = Moderately Resistant; V = Variable R = Resistant; T = Tolerant; - = No Information

\* Some varieties may now be susceptible to a new strain of downy mildew.

### **Paravic**

Paravic is a semi-leafless, early flowering dun type pea released from Victoria for the lower rainfall areas. Paravic is a short to medium height variety that competes poorly with weeds. It is out-yielded by Parafield and Kaska in most pea growing areas.

### **Morgan<sup>Ⓛ</sup>**

Morgan is a late maturing, small seeded, tall, semi-leafless type released out of NSW as a potential green manure or forage type due to its vigorous growth, dense canopy and highly competitive nature. Morgan has good resistance to downy mildew but is susceptible to black spot and powdery mildew. Morgan is licensed to Hart Bros Seeds, NSW. Generally yields of Morgan are lower than other varieties and therefore its main use will be as a green manure or forage option or as a grain type if sowing into a high weed situation.

### **Alma**

Alma was released in 1986 to replace Early Dun because of slightly improved tolerance to black spot over this variety. It is a late maturing conventional pea susceptible to powdery and downy mildew and with slightly dimpled, brown to greenish seeds. Alma is now superseded by newer varieties in all areas.

### **Dundale**

Dundale is a slightly earlier maturing selection from Early Dun that flowers around 10 days earlier. The seeds are brown to green and smaller than Parafield. It is susceptible to all major pea diseases and superseded by newer varieties in all areas.

## **WHITE PEA VARIETIES**

### **SW Celine<sup>Ⓛ</sup>**

SW Celine is a recently introduced white pea from overseas and is initially being targeted in the eastern states due to its white seed type. Celine has had limited yield evaluation in many areas but appears high yielding particularly in short season environments. It is an early flowering and maturing semi leafless plant type and is susceptible to powdery mildew and black spot. Seed is available through Crop Care Seed Technologies.

### **Bundi<sup>Ⓛ</sup>**

Bundi is a medium to large seeded, white type pea with improved standing ability primarily for the low rainfall areas of southern Australia. It is a sister line to Kaska with good resistance to downy mildew, resistant to pod shattering and is earlier flowering

and maturing than Kaska. It has been the highest yielding variety in many areas of southern Australia in dry years and environments and is seen as a Kaska replacement in the drier areas, providing a suitable market is found for its grain. Its early maturity means it is well suited to crop topping. Bundi is licensed to Premier Seeds.

### **Boreen<sup>Ⓛ</sup>**

Boreen was released by the University of Sydney as a high yielding powdery mildew resistant white pea specifically for the northern areas of Australia where it was superior to other white pea alternatives. It is susceptible to downy mildew and black spot and moderately susceptible to shattering at maturity. Boreen is licensed to AGT (SunPrime Seeds).

### **Sturt<sup>Ⓛ</sup>**

Sturt is a conventional leaf type, small seeded white pea similar to Parafield in height, lodging resistance and disease susceptibility. Flowering and maturity time of Sturt is similar but generally slightly earlier than Parafield. Sturt is a high yielding variety in southern Australia and appears broadly adapted and is similar in disease resistance to Parafield. It consistently yields higher than all other varieties in trials affected by frosts during flowering, indicating some level of tolerance to this stress. Sturt is more sensitive than Kaska and Parafield to label rates of both post sowing pre-emergent and post emergent applications of metribuzin on alkaline soils in SA. Sturt is licensed to Premier Seeds.

### **Snowpeak<sup>Ⓛ</sup>**

Snowpeak is a larger seeded white pea released as a replacement for Bonzer in Victoria. Snowpeak is a semi-leafless, early to mid maturing variety with good standing ability at harvest. It is susceptible to black spot and powdery mildew but has good resistance to downy mildew.

## **BLUE (OR GREEN) VARIETIES**

Blue type peas have green cotyledons, which attract a premium price from the split pea industry. Market size appears limited.

Blue peas are a specialist crop. Production is generally confined to the high rainfall areas. Most blue boiler crops are grown under contract.

Blue peas bleach in the sunlight if not harvested on maturity, giving the appearance of white peas in the sample and reducing marketability.

### Excell<sup>(b)</sup>

Excell is an early maturing, semi-leafless blue pea with exceptional standing ability allowing it to remain upright through to harvest under favourable conditions. Its seed is prone to shattering and bleaching often leading to an inconsistency in seed coat color. Timely harvest is critical if targeting premium markets. Excell has moderate resistance to downy mildew but is susceptible to powdery mildew and black spot.

### Jupiter<sup>(b)</sup>

Jupiter is a tall, early flowering, cream to white flowered, mid to late season maturing field pea. It has large rhomboid (like a cube), blue grey, smooth coated seeds (29g per 100 seeds). The cotyledons are green, and it is considered a marrowfat pea. Jupiter is best suited to areas receiving good late winter rains, but not to the high rainfall areas. It is prone to shattering if harvest is delayed. Market contracts with Unigrain in Victoria are needed to grow Jupiter.

### MAPLE PEA VARIETIES

There is no maple pea variety widely available in Australia.

(b) = variety is protected by PBR.

TABLE 2 : Q  
**Peas - Availability and Markets**

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
SW Celine <sup>(b)</sup>	PBR	Svalof Weibull AB	Access Genetics	Crop Care Seed Technology	1800 993 573	none*
Boreen <sup>(b)</sup>	PBR	NZ Inst. Crop & Food Res.	Univ. Sydney	AGT (SunPrime Seeds)	02 6881 6210	none*
Bundi <sup>(b)</sup>	PBR	DPI Vic	Premier Seeds	Premier Seeds	02 6851 5573	none
Moonlight <sup>(b)</sup>	PBR	NSW DPI & DPI Vic	Premier Seeds	Premier Seeds	02 6851 5573	none
Sturt <sup>(b)</sup>	PBR	DPI Vic	Premier Seeds	Premier Seeds	02 6851 5573	none
Yarrum <sup>(b)</sup>	PBR	NZ Inst. Crop & Food Res.	Univ. Sydney	AGT (SunPrime Seeds)	02 6881 6210	none*
Kaspa <sup>(b)</sup>	PBR	DPI Vic	AWB Seeds	AWB Seeds	1800 054 433	Delivery to nominated receiver*
Dunwa <sup>(b)</sup>	PBR	AgWA	COGGO Seeds	COGGO Seeds	08 9363 3410	none*
Excell <sup>(b)</sup>	PBR	DPI Vic	Harvest Grain	none	-	none
Helena <sup>(b)</sup>	PBR	AgWA	PlantTech Pty Ltd	retail outlets	1800 112 400	none
Morgan <sup>(b)</sup>	PBR	NSW DPI	Hart Bros Seeds	Hart Bros Seeds	02 6924 7206	none
Parafield	terminated	SARDI	PlantTech Pty Ltd	retail outlets	1800 112 400	none
Snowpeak <sup>(b)</sup>	PBR	DPI Vic	Harvest Grain	none	-	none
Jupiter <sup>(b)</sup>	PBR	Cambridge Plant Breeders	Unigrain	Unigrain	03 5345 6224	Unigrain

\* = levy payable on delivered grain sales

**Note:** Parafield and Paravic are no longer covered by PBR and seed may not be readily available.

## Vetch

The versatility of vetch as a valuable plant on the farm is becoming increasingly obvious. Traditionally vetches were sown as mixes for hay, or grown for grazing only on land that could never be cropped. Now vetches are being used for disease break crops in the rotation, grain crops, grain for stock feed, hay production and green and dry grazing. Grain markets are generally very small and growers are advised to secure a market prior to sowing a crop for grain.

Disease management is critical when growing a vetch crop regardless of end use. Botrytis grey mould (BGM) is a major problem particularly where high amounts of vegetative growth have occurred. There is little difference between vetch varieties for resistance to BGM and the use of fungicides is generally difficult and uneconomic. However, the use of fungicides in high value vetch crops may be justified. Agronomic management strategies like delaying sowing and reducing seeding rates are critical to reduce disease levels.

Only the grain vetches (*Vicia sativa* and *V. ervilia*) will be detailed in this handbook. The grain vetches have been grown across the lower to mid rainfall cereal areas since they were revived as an option in the mid 1980's. Grain yields have generally been similar to pea yields in these areas.

### COMMON VETCH

(*Vicia sativa*)

The pods of the common vetches are buff colored, narrow and usually around 50 mm long. Pods are bumpy as the seeds within are prominent. There are usually 6 to 8 seeds per pod. Grain of the vetches is pillow shaped with a mottled brown seed coat. The weight of the grain is 6 to 7 grams per 100 seeds. When split the seed color is beige to orange.

Protein levels of vetches are at the high end of pulses, ranging from 28 to 30 percent protein.

The main use of vetch grain is as stock feed. Sheep and cattle will readily consume vetch grain. For pigs vetch should be restricted in the growing and finishing rations because common vetch seeds contain a toxin gamma-glutamyl-beta-cyanoalanine (BCN).

### Love 2<sup>Ⓛ</sup>

The Love (low toxin vetch) series is being developed by Max Tate at the University of Adelaide. They are designed to have a unique white seed coat for quality assurance. This will distinguish them unequivocally from all other dark seeded vetches, especially the highly toxic L-canavanine-containing vetches such as Namoi and Popany. It has a beige cotyledon. Love 2 was granted PBR in 2007. Like Languedoc, Love 2 is early flowering, and has been specifically developed for low rainfall WA conditions. It has had limited evaluation at this stage.

### Rasina<sup>Ⓛ</sup>

Rasina is a new soft-seeded vetch from the SARDI Vetch Breeding Unit with potential to replace Languedoc and Blanchefleur in low to medium rainfall areas. Along with Morava, it is a preferred variety for areas prone to rust infections. Rasina is earlier flowering than Blanchefleur and approximately 10-15 days earlier flowering than Morava. Rasina is resistant to ascochyta blight and rust and has a lower anti-nutritional factor than Blanchefleur. It has potential as a grain crop to replace Morava, Languedoc and Blanchefleur in low to medium rainfall areas, however it is not expected to replace Morava in higher rainfall districts or where Morava is used for hay production. Rasina has distinctive uniform dark brown speckled seed coat with greenish colored cotyledons.

TABLE 2 : R  
Characteristics of Vetch

Cultivar	Cotyledon Color	Seed (g/100)	Toxin Level Range* (mg/Seed)	Leaf Rust	Flowering	Flower Color	Ascochyta	Botrytis Grey Mould	Shattering	Hard Seed Percentage
Love 2 <sup>Ⓛ</sup>	Beige	5.8	0.4-0.63	-	Early	White	-	-	MS	-
Rasina <sup>Ⓛ</sup>	Green	7.0	0.62-0.75	R	Mid	Purple	R	S	MR	Low
Blanchefleur	Orange	6.6	0.74	S	Mid	White	MS	S	MS	Low
Languedoc	Beige	6.7	0.6-0.84	VS	Early	Purple	S	S	MS	Low-med
Cummins	Beige	6.1	0.6-0.84	S	Early	White	S	S	MS	Low-med
Morava <sup>Ⓛ</sup>	Beige	8.3	0.6-0.77	R	Late	Purple	MR	VS	MR	Nil

\* Toxin level range = gamma-glutamyl-B-cyanoalanine (BCN) Data courtesy Max Tate, University of Adelaide

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; - = No Information

**Morava<sup>Ⓛ</sup>**

Morava is a rust resistant late flowering vetch with a nil hard seed content released in SA in 1998. Grain yield is superior to other commercial vetches in the high rainfall areas. It is larger seeded and more resistant to shattering than other vetch varieties. The anti nutritional factor (BCN) levels are generally lower than for Blanchefleur. Morava generally produces higher herbage yields than all other vetch varieties except for Namoi. Morava is later flowering and maturing than Blanchefleur, and grain yields will be reduced in environments prone to spring drought, dry finishes or areas prone to late disease outbreaks of BGM. Morava is moderately resistant to ascochyta blight.

**Languedoc**

Languedoc is an early maturing vetch that originated in Algeria. It is reasonably well suited to low rainfall areas (250 to 400 mm) although it can lodge severely making harvest difficult. It is susceptible to rust and ascochyta blight and has a hard seed content of around 5-10%.

**Blanchefleur**

Blanchefleur is a mid maturing vetch that originated in France. Being later in flowering and maturity than Languedoc, it is best suited to the 400 to 500 mm rainfall areas. Blanchefleur has white flowers and orange cotyledons. Forage production is greater than that of Languedoc. Blanchefleur is susceptible to rust and moderately susceptible to ascochyta blight.

**Cummins**

Cummins is a mid to early maturing, white flowering variety selected out of Languedoc. It is well adapted to lower rainfall areas. It is susceptible to rust and ascochyta blight.

**BITTER VETCH**

Bitter vetch (*Vicia ervilia*) is a fully domesticated grain forage legume crop with a branched plant habit similar to lentils. Bitter vetch has the potential to become a versatile, multi purpose crop similar to common vetch and lathyrus. Bitter vetch grain contains no known toxins or chemicals that reduce palatability. Early vigor of bitter vetch is extremely poor making it poorly adapted to low rainfall areas. There may be a potential market for export as seed for forage production, but so far production levels in Australia have proven uneconomic. Bitter vetch grain when split resembles red lentils, but the bitterness needs to be removed by leaching with boiling water before it is acceptable for human consumption.

**Cazar<sup>Ⓛ</sup>**

Cazar was the first cultivar of bitter vetch species (*Vicia ervilia*) to be named in Australia. It is protected by PBR, but commercial quantities of seed are no longer available. Seedmark evaluated the potential of bitter vetch in export markets, but found that it was not economical for growers to produce it for these markets compared with common vetch. Cazar flowers later than Languedoc vetch, has very slow winter growth, is short in harvest height and often severely lodges. It is susceptible to aphids. Yield evaluations in SA have shown that Cazar is generally around 50% of the grain yield of Parafield field peas.

Ⓛ = variety is protected by PBR.



TABLE 2 : S  
**Vetch - Availability and Markets**

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
Rasina <sup>Ⓛ</sup>	PBR	SARDI	Seedmark	PlantTech Pty Ltd	1800 112 400	none except see sales
Morava <sup>Ⓛ</sup>	PBR	SARDI	PlantTech Pty Ltd	retail outlets	1800 112 400	none except seed sales
Love 2 <sup>Ⓛ</sup>	PBR	Adelaide Uni	to be confirmed	to be confirmed	-	-

## FENUGREEK

(*Trigonella foenum-graecum*)

Fenugreek is one of the oldest spice crops known, and in Australia is grown as a multi purpose legume crop. It requires inoculation with the specific *Trigonella* strain of inoculum for nodulation (See Page 3 : 2). The seed has a strong, pleasant and distinctive curry like smell. Fenugreek is grown either as a green manure crop or for the seed. However seed markets are limited and volatile, so a market contract or storage facilities would be desirable if producing for the spice market. Price can be related to seed color and quality but is primarily determined by the size of the Indian crop. Marketing of the seed for export as spice requires testing of the seeds for contamination and the presence of aflatoxins and pathogens such as salmonella, coliform and *E. coli* bacteria.

Fenugreek thus serves as a possible cash crop, as a cereal disease break crop in the rotation, green manure, green or dry grazing, or hay production.

### Various varieties

Different varieties or types are available through the contracting companies and many have no specific variety names. Flowering time and seed quality differs between them, so check with your supplier as to what line is best to grow for your area. All varieties of fenugreek grown in Australia appear to be occasionally subject to powdery mildew (*Erysiphe polygoni*), cercospora blight (*Cercospora traversiana*), phoma, phytophthora and rhizoctonia (*Rhizoctonia solani*). The major disease of fenugreek in southern Australia is bacterial blight (*Pseudomonas syringae*). There are some varietal differences to this disease. Current varieties do not appear to differ in their susceptibility to lucerne flea, red-legged earth mite, native budworm and cowpea aphid.

Four varieties have been released in recent years from a University of Melbourne-AWB Seeds germplasm evaluation program. AWB Seeds has the commercial rights to these varieties but they have been sub licensed to different companies. The usual arrangement is that they are grown under contract with all production (except own seed requirements) returned to the licensed company. Each company may have variations on this arrangement. A fifth variety has been released by Seedmark with similar restrictions but no end point royalty. Un-named varieties are more likely to be able to be freely traded without market restrictions.

### Power

Power is a high yielding variety of fenugreek, grown for grain production, with good early vigor and medium seed size and good color. Grain quality is very acceptable to the spice market. Power is one of four varieties released from the University of Melbourne program and was the most consistent performer in the program. Wimmera Grain Company has recently acquired the licence for Power. Seed will be available to growers in 2008 for production under a joint marketing arrangement with Wimmera Grain Company.

### Might

Might is a later flowering variety of fenugreek, with high dry matter production, and suited to green manuring and grain production. It is one of four varieties released from the University of Melbourne program. Wimmera Grain Company has recently acquired the licence for Might. Only limited seed is available.

### L-29

The variety L-29 is a later flowering fenugreek selected by Seedmark and grown for seed production. L-29 grows to about 70-80cm tall in most locations, producing reasonable amounts of dry matter. Disease and pest susceptibility are similar to other types of fenugreek, but it flowers up to two weeks later than most. Seed size is generally larger, but its color is similar to most fenugreek types. The L-29 variety of fenugreek can only be grown under contract to Seedmark.

### A150147

A150147 was selected from the University of Melbourne evaluation program and can be grown under contract to Wimpak (Minyip, Victoria) with seed returning to Wimpak. It is earlier flowering and maturing than the unnamed fenugreek variety and is short in height with a high harvest index. It has small grain size, has good seed color and has yielded well in dry seasons.

### Wimmera Sungold (A150118)

Wimmera Sungold has a large darker colored seed and is high yielding. This variety was selected from the University of Melbourne evaluation program and can be grown and marketed in joint arrangement with Wimmera Grain Company (Rupanyup, Victoria) or its nominees. It is early flowering with a medium growth habit, high biomass and high yield making it a suitable dual purpose variety, however, the darker seed color may limit export opportunities.



## LATHYRUS

(*Lathyrus spp*)

Lathyrus is recognized as a versatile, multi purpose crop similar to vetch, but with less disease and pest problems. Lathyrus is being used for cereal disease break crops in the rotation, grain crops, grain for stockfeed, hay production, green manuring and green or dry grazing. There are several Lathyrus species that have been evaluated for their potential as grain and forage crops.

*Lathyrus sativus*, known as grass pea, is grown overseas for forage and the grain used for animal and human food. It is the most commonly grown lathyrus for grain.

*Lathyrus ochrus*, known as Cyprus vetch, is usually grown for forage and animal feed.

*Lathyrus cicera* (narrow leaf lathyrus) is a weak stemmed, climbing annual similar to vetches, with two leaflets and one tendril per leaf. The single red or pink flowers are self-pollinating. The flat pods contain two to six squarish seeds (100 seed weight of 5-9g). Grain protein levels are from 25 to 29% with high lysine content.

Narrow leaf lathyrus has slow prostrate winter growth with spring growth being faster and more erect. Winter growth is equal to vetch, but slower than field peas. Flowering occurs later than Alma field peas.

Narrow leaf lathyrus is adapted to districts with above 300 mm average annual rainfall. They can be grown successfully over a range of soil types, from sandy loams through to clays, and slightly acidic to alkaline soils (pH 6 to 9 measured in water), although it prefers calcareous loams and clays. The crop is reported to tolerate water logging and can grow well on hard setting soils.

Lathyrus species contain a neurotoxin, 3 - (N-oxayl) - L - 2, 3 - diamino proprionic acid (ODAP), which can result in paralysis of the lower limbs in humans and animals by affecting the central nervous system. This condition, known as "lathyrism", is associated with *Lathyrus sativus* where the grain is a major proportion of the diet over an extended period and the ODAP levels exceed 0.5%. The ODAP levels in narrow leaf lathyrus are lower than in other lathyrus species. They may vary with climatic conditions, soil type and soil fertility. There are no known toxins in the green plant or stubble.

### Ceora<sup>Ⓛ</sup>

Ceora is Australia's first *Lathyrus sativus* cultivar and was released from CLIMA in WA in 2004.

Ceora was released as a low cost, low input multi-purpose legume crop for grain, forage, hay or green manure. It has superior tolerance to water logging and infertile soils compared to most other legume species. Ceora is also relatively drought, disease and insect resistant. Ceora is semi erect, medium in plant height and flowers and matures at a time similar to field pea. Ceora has white flowers with dark blue flecking in the centre. Its grain is angular in shape with a greyed orange colored seed coat and a yellow cotyledon. Ceora grain has a relatively low ODAP content and a protein content of around 30%. Seed is licensed to EDSCO and Coorow Seeds.

### Lath-BC

Lath-BC lathyrus was commercialised in 1997 and the first variety available in Australia. It has poor early vigor compared with vetch, but produces good spring growth. Lath-BC has red flowers. The seed coat is mostly brown to green and the internal seed color bright yellow. Seed size is comparatively small (100 seed wt of 6g) and ODAP levels are 0.13%. Early sowing is essential to maximise growth.

### Chalus

Chalus is a Syrian line released by CLIMA from WA in 1998. It is slightly earlier maturing than Lath-BC and has low ODAP levels of below 0.09%. It has produced better grain yields than Lath-BC, but has poorer early vigor. Seed size is larger than Lath-BC.

Ⓛ = variety is protected by PBR.

### Narbon bean

(*Vicia narbonensis*)

The versatility of narbon bean (*Vicia narbonensis*) as a multi purpose crop similar to vetch and lathyrus became possible with the first commercial variety available. The narbon grain contains a sulphur compound gamma - glutamyl - S - ethenyl - cysteine (GEC) that reduces the palatability and grain intake for pigs and poultry.

### Tanami

Tanami is the first cultivar of narbon bean to be released in Australia. Tanami flowers later than Dundale peas, and is of similar grain size and protein to Dundale peas. Seed filling is rapid. Seeds are dark brown with a prominent white hilum. Tanami has good early vigor more comparable with peas than common vetch or Lathyrus. It is of medium height, lodges at harvest,

but is easier to harvest than conventional peas. It appears resistant to most pests and diseases, but will be susceptible to chocolate spot in higher rainfall areas.

Tanami grain is only suitable to feed to ruminants because of its GEC content. Markets for the grain need to be developed, but it can be a valuable ruminant stock feed as grain or forage.

Tanami narbon bean is best suited to the 300 to 500 mm rainfall areas with neutral to alkaline soils where grain yields will be about 70% of Dundale peas.

Grower guides are available on growing and feeding Tanami narbon beans.

TABLE 2 : T  
**Characteristics of Alternative Legumes**

Crop	Variety	Flowering	Early Vigour	Height	Lodging	Seed Size	Pod and Seed Shedding	Drought Tolerance	Seed Quality Factors	Aphid Resistance	General Diseases
Narrow Leaf Lathyrus	Lath-BC	late	low	medium	VS	small	S	R	BCN toxin	MR	MR
Narrow Leaf Lathyrus	Chalus	late	low	medium	VS	small	S	R	BCN toxin	MR	MR
Narrow Leaf Lathyrus	Ceora	medium	low	medium	MS	small	-	R	ODAP low	-	MR
Narbon Bean	Tanami <sup>Ⓛ</sup>	late	high	medium	MS	medium	MS	R	GEC, palatability	MS-MR	MR
Bitter Vetch	Cazar <sup>Ⓛ</sup>	late	very low	short	VS	small	S	MS	bitterness	VS	MR
Fenugreek	unnamed	med-late	medium	medium	MS	small	MR	MS	color	MS	S#
	Might	medium	high	medium	S	large	MR	MS	yellow	MS	MS#
	Power	late	high	tall	MR	medium	MR	MS	yellow	MS	MS#
	L-29	late	medium	tall	MS	medium	MR	MS	-	MS	-
	A150147	medium	-	med-short	MR	small	MS	-	yellow	-	MS#
	Wimmera Sungold	med-late	-	medium	MR	large	MR	-	deep yellow	-	MS-MR#

R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible; # = Bacterial Blight Rating  
- = No Information

TABLE 2 : U  
**Alternative Legumes - Availability and Markets**

Variety	PBR	Licensee or Agency	Commercial Partner	Seed Supplying Agents	Telephone	Market restriction
Ceora	PBR	CLIMA	EDSCO Coorow Seeds	EDSCO Coorow Seeds	08 9045 4036 08 9952 1088	none
Lath-BC	withdrawn	B Correll	none	none	08 8837 6202	none
Chalus	none	CLIMA	none	none	08 9380 2505	none
Tanami	terminated	DPI Vic	none	none	03 9217 4200	none
Cazar <sup>Ⓛ</sup>	PBR	CLIMA	Seedmark	none	08 9380 2505	
Fenugreek unnamed	none	-	various	various	-	none
Might	none	Melbourne Uni	AWB Seeds	Wimmera Grain Company	03 5385 5344	Wimmera Grain Company
Power	none	Melbourne Uni	AWB Seeds	Wimmera Grain Company	03 5385 5344	Wimmera Grain Company
L-29	none	-	Seedmark	Seedmark	08 8234 9333	Seedmark
A150147	none	Melbourne Uni	AWB Seeds	Wimpak Pty Ltd	03 5385 7055	Wimpak Pty Ltd
Wimmera Sungold	none	Melbourne Uni	AWB Seeds	Wimmera Grain Company	03 5385 5344	Wimmera Grain Company

**Grain legumes - healthy seed and crops.**



Plate 2:A  
Lupins - 1 Kiev Mutant, 2 Gungurru, 3 Warrah



Plate 2:B  
Lentils - 1 Laird (green), 2 Aldinga (red),  
3 Kye (red), 4 Red Splits.



Plate 2:C  
Beans - 1 Aquadulce Broad Beans, 2 Icarus Beans,  
3 Flord Faba Beans.



Plate 2:D  
Healthy narrow leaf Lupins.



Plate 2:E  
*Albus Lupins.*

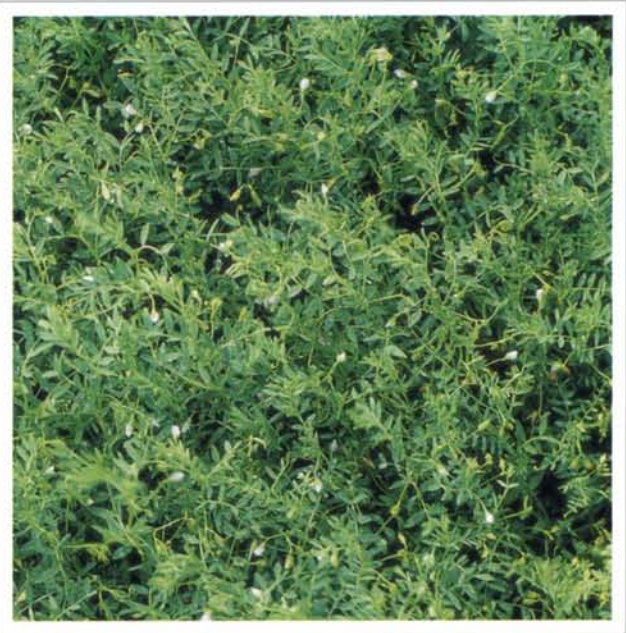


Plate 2:F  
*Healthy red Lentils.*

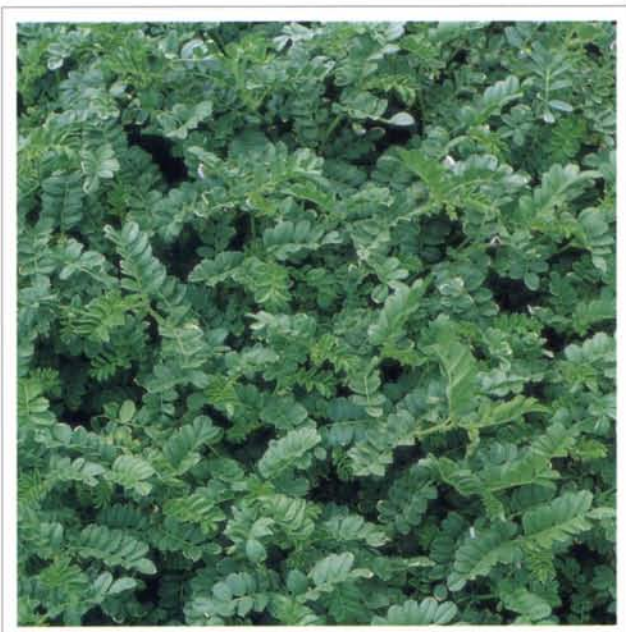


Plate 2:G  
*Healthy Desi Chickpeas.*

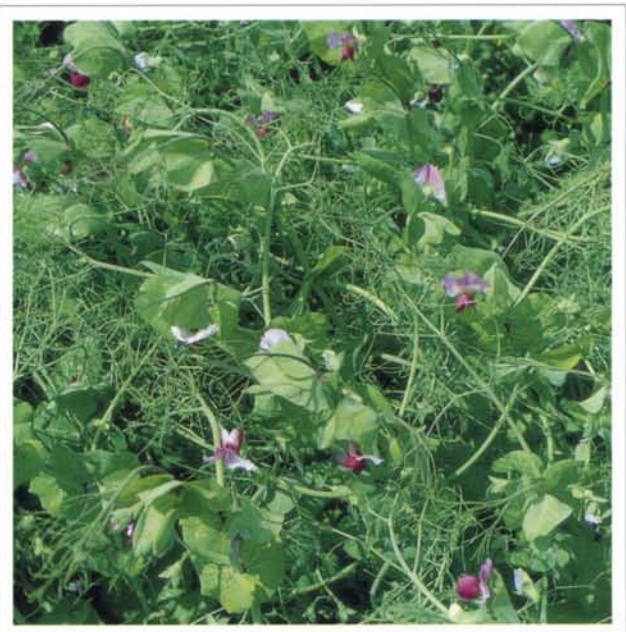


Plate 2:H  
*Glenroy Peas - a semi leafless variety.*