Juncea canola in the low rainfall zones of Victoria and South Australia.

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Brassica juncea (Indian mustard), a close relative of canola (*Brassica napus*) is being developed as a drought and heat tolerant alternative oilseed to canola for the low rainfall zones of the Australian cropping belt (Figure 1). The crop has a number of advantages over canola and will deliver the same rotational benefits as canola. As a relatively new crop, breeding, selection and agronomic research have not progressed as far as canola. Continuing research will deliver significant improvements in yield, herbicide tolerance, quality characteristics and crop management recommendations.

This crop guide covers the key areas of management of *Brassica juncea* for successful crops in the low rainfall zone. It is targeted primarily at types grown for edible oil, but the same principles apply to condiment mustard and industrial mustard. *Brassica juncea* will be referred to as juncea canola throughout this guide.

The strategies proposed are based on current research information and management experience with the crop in south-eastern Australia and is based on the New South Wales Department of Primary Industries Primefact "Juncea canola in the low rainfall zone of south-western NSW", Primefact number 782, 2nd Edition . This guide will be updated as new agronomic and variety information becomes available.

Juncea canola checklist

1. **Determine if your farm is in the appropriate rainfall zone where juncea canola would be beneficial to your farming system.**
2. **Ensure the market is stable and the price on offer is competitive with canola or other options for the paddock.**
3. **Select a paddock which is:**
   - **free of harmful herbicide residues**
   - **soil pH_{Ca} >5**
   - **has good soil structure and preferably standing stubble, *and***
   - **a low broadleaf weed population if using a conventional variety**
4. **Aim to sow in April to early May.**
5. **Aim to achieve an evenly established stand of 20–35 plants/m^2 for early sowing and 35–50 plants/m^2 for later sowing. Sowing rates of 2-4 kg/ha will generally give these densities.**
6. **Juncea canola seed is smaller than canola, so reduce sowing rates accordingly.**
7. **Sow in rows 15–30 cm wide. Wider rows can reduce yield potential.**
8. **Apply nutrition according to soil test results – in general apply 8–12 kg P/ha, 15–20 kg S/ha and 30–50 kg N/ha.**
9. **Apply crop protection products to limit impacts from pests and weeds. Read Permit PER 9343, (expiry 3/03/2012) before using any product on juncea canola.**
10. **Assess crop maturity for suitability for direct heading or windrowing. Note seed colour is yellow when mature.**

Types of *Brassica juncea*

There are three different types of *Brassica juncea* or Indian mustard that growers may have access to in the next few years.

Juncea canola has oil and meal quality similar to canola and therefore has the same market endues (Table 1). Fatty acid profiles of the oil and the level of and types of glucosinolates in the meal all meet the quality specifications for canola. The oil is edible with high levels of the desirable oleic acid and low levels of erucic acid, and the meal can be substituted for canola meal in animal diets (low glucosinolates).

Condiment mustard has different quality characteristics to juncea canola. The level of glucosinolates in the meal after crushing is much higher than juncea canola and is responsible for the 'hot and spicy' taste of table mustard. The oil has a distinct 'nutty' flavour, but the erucic acid level is sufficiently low to make it suitable for human consumption.

Industrial mustard is essentially a condiment mustard or juncea canola type that is not suited to either of the edible markets for juncea canola or condiment mustard because of the high levels of erucic acid and/or glucosinolates and/or low levels of oleic acid. Industrial mustard may have application in a number of industrial uses including the production of biodiesel.

Table 1 *Typical seed quality characteristics for canola, juncea canola and condiment mustard when grown in the low rainfall zone.*

Character	Canola	Juncea canola	Condiment mustard
Oil%	36-42	34-40	34-40
Oleic Acid%	57-63	57-63	variable
Linoleic Acid%	18-25	18-25	variable
Linolenic Acid%	8-13	8-13	variable
Erucic Acid%	<1	<1	1-20
Glucosinolates in meal (µmol/g @10%MC)	<30	<30	110-160
Allyl Glucosinolates in meal (µmol/g @10% MC)	0	<1	NA

Figure 1 *Juncea canola experimental plot at Warracknabeal in the Victorian Wimmera, 2003 (Photo, R Norton).*

Advantages of growing juncea canola over canola in south-eastern Australia

Juncea canola is a good alternative to canola in the drier grain growing regions of south-eastern Australia for the following reasons:

1. Juncea canola appears to tolerate drier and hotter conditions during flowering and pod fill compared to canola. In very dry years, it is not unusual for juncea canola to out-yield most canola varieties by up to 30% and hence be a more reliable break crop than canola. As an example of juncea canola's stress tolerance, in the extremely dry seasons of 2004 and 2007 it yielded up to 0.3 t/ha in trials, whereas the canola was not harvested. Under dry conditions juncea canola is able to accumulate more dry matter than canola, primarily through greater leaf turgor pressures and by maintaining photosynthetic leaf area for longer. While the seeds are smaller and there are less seeds per pod, juncea canola produces more pods per plant than canola.
2. Some varieties are more vigorous in the early stages of growth than open-pollinated varieties of canola. This is an advantage when sowing in wider rows in low rainfall areas, allowing the crop to develop groundcover earlier minimizing competition from weeds and also reduce water losses from soil evaporation. Crop vigour is strongly correlated to sowing date; the earlier the crop is sown, the more vigorous the early plant growth.
3. Juncea canola is more tolerant of shattering than canola, providing the option of direct heading in some paddocks. However, the crop may show uneven maturity similar to canola, with some parts of the paddock ready for harvest ahead of others. Experience the low rainfall regions of southeastern Australia suggests that direct heading is the preferred option, but windrowing may still be needed to ensure even ripening and harvesting on time.
4. Juncea canola offers similar rotation benefits to the farming system as canola. It is an excellent break crop to minimise cereal diseases such as crown rot, Take-all and Rhizoctonia, and also reduces the number of root lesion nematodes present in the soil following harvest, particularly *Pratylenchus neglectus*. Similar to canola, the decaying root system of juncea canola releases compounds called isothiocyanates which inhibit nematode populations.
5. Juncea canola also allows similar grass weed control options to canola, and so can be used as a tool in herbicide resistance management.

Disadvantages of growing juncea over canola

1. It is likely that only selected grain delivery sites will receive juncea canola. This is because juncea canola is currently marketed through a 'closed loop' system, with receival, storage, segregation and marketing arrangements made through the contract. As the production area expands, the number of receival sites will increase.
2. The oil content of current juncea canola varieties is about 1–2½ percentage oil points lower than the best performing early maturing canola. This disadvantage may be off-set by more consistent yields in dry seasons.
3. A problem encountered in the 2007 and 2008 drought seasons was the smaller seed and lower seed weight of juncea canola compared to canola. Juncea canola seed size is normally smaller than canola but under drought conditions the seed can become very small. During the 2007 harvest, this very light seed was easily blown out the back of the header.
4. In badly drought affected crops in 2007, the crop stems were more prone to snapping, particularly following wind storms, which increased shattering and lodging and made harvesting difficult.

5. There are two Clearfield® (CL or imidazolinone-tolerant) and one conventional juncea canola types available, which limits herbicide management options. Current canola production systems give growers the option of a range of herbicide tolerance types – Triazine Tolerant (TT), Imi- Tolerant (e.g. Clearfield® or CL) and Roundup Ready®. Triazine tolerant juncea canola is presently being developed for use in Australia.
6. Observations from New South Wales in 2008 suggest that juncea canola may be more sensitive to acid soils conditions (pH_{Ca} < 5.0) than canola.

Varieties and yield performance

Currently there are commercial varieties of juncea canola, condiment mustard and industrial mustard that have been tested and found to be well adapted to the low rainfall cropping zone. Variety descriptions are given below. Yield trials over the last three years have not provided a reliable data set to compare varieties, so growers are advised to refer to the National Variety Trial results for the limited data available. (http://www.nvtonline.com.au/)

Clearfield Juncea Canola - Sahara CL Early maturing Juncea canola with exceptional vigour, probably 5-7 days earlier than Oasis CL. Bred by DPI Victoria and Viterra (Canada) released in 2009. Tested as J05Z-8960 and marketed by Pacific Seeds.

Clearfield Juncea Canola - Oasis CL First herbicide tolerant low-rainfall juncea canola variety in Australia. Suited to areas with rainfall below 350 mm. Pacific Seeds indicate this mid maturing variety has good protein, oil content and unique disease resistance to blackleg. Excellent pod shatter resistance allows for direct heading. Bred by DPI Vic./Viterra (Canada) and marketed by Pacific Seeds. End-point royalties apply.

Juncea canola – Dune The first juncea canola variety released in Australia. It is a conventional type that is suited to areas with rainfall below 350 mm. Pacific Seeds indicates that Dune has high oil and protein content with yield comparable to other short season canola varieties. Yellow seed coat. Excellent pod shatter resistance allows for direct heading. Unique blackleg resistance offers good protection against the disease. First tested in NVT 2007. Released in 2007. Bred by Vic DPI/Viterra and marketed by Pacific Seeds. Endpoint royalties apply.

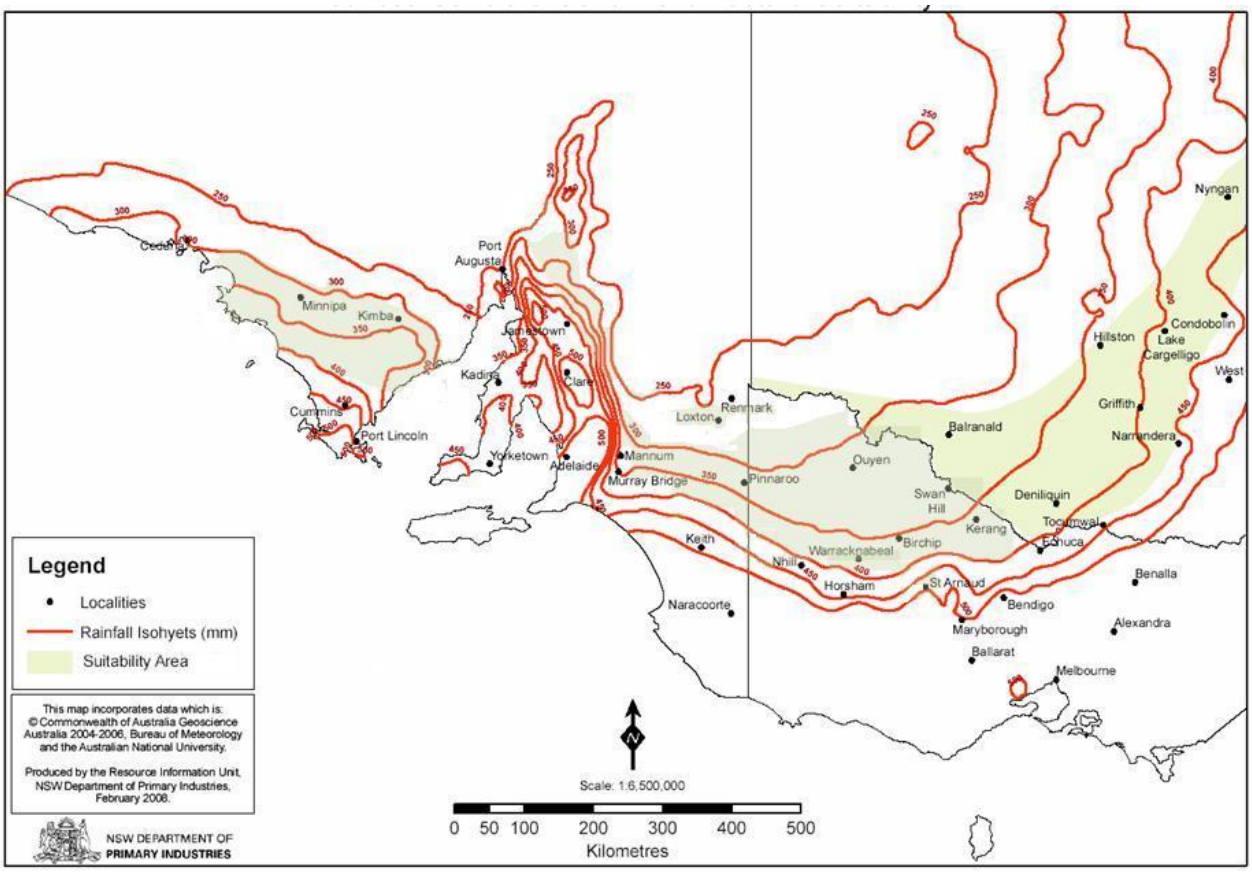

Figure 2 *Suitable production zones for juncea canola, condiment mustard and industrial mustard in southeastern Australia. Limits are suggestions only, with production risk increasing in lower rainfall areas.*

Suitable production zones

Juncea canola and condiment mustard can be grown in most of the areas where canola is currently grown. However, because of its adaptation to dry environments, the crop can be competitive with canola in cropping regions where long-term average canola yields are around 1.2 t/ha or less. Refer to Figure 2 for an approximate distribution in southeastern Australia.

In south eastern Australia this will be in areas where the long term mean annual rainfall is <400 mm. In these regions average 'in-crop' rainfall (1 May – 15 October) ranges between 175 mm and 225 mm, but, like annual rainfall, is highly variable.

Juncea canola would be preferred over canola in areas likely to receive less than 350 mm, but where there is a late break it may perform better than canola in higher rainfall zones. In areas with less than 300 mm annual rainfall, juncea canola would only be a viable option if there is an early break.

Canola is likely to out-perform juncea canola in the better seasons *i.e.* earlier sowing time, adequate subsoil moisture and favourable spring rainfall. Juncea canola can be more reliable when sowing time is delayed and/or the spring is very dry. It provides the opportunity to produce a more consistent yield.

In high rainfall regions, because of its rapid growth, juncea canola can be sown in spring.

Paddock selection and crop establishment

There are a number of key management decisions that will influence the success of your crop.

Avoid herbicide residues: Juncea canola, like canola, is very sensitive to residues from Group B (e.g. Glean®, logran® and Ally®) and Group c (e.g. atrazine and simazine) herbicides. Adhere to plant-back periods following use of these herbicides and plan ahead when applying any residual herbicide. While not completely tolerant, the Imi-tolerant Oasis CL and Sahara CL will have more tolerance of Group B herbicide residues, but will still be sensitive to Group C herbicides. Group I herbicides such as MCPA are extremely damaging if they drift onto juncea canola.

Soil types: Juncea canola will grow on most soils in south-eastern Australia, including moderately acid to alkaline soils present in the Wimmera, Mallee, Eyre Peninsula. It will grow in sand or clay textured soils, and appears to tolerate soils with excess free carbonates. Acid soils (pH_{ca} < 5.0) should be checked for aluminium levels and limed if necessary. Sodic soils which crust over after rain can reduce plant establishment and are best avoided or ameliorated with gypsum prior to sowing. Like canola it is quite sensitive to waterlogging.

Juncea canola, like canola, can have root development severely restricted by hardpans where the roots can turn and grow horizontally above the compacted layer (Figure 3).

Seasonal moisture supply: In Victoria and South Australia, most of the moisture used by the crop is provided by in-crop rainfall. Sowing into a paddock with minimal subsoil moisture is risky, as the crop will be totally reliant on growing season rainfall to produce a profitable yield. The plant has a vigorous tap root and it is able to extract moisture from deep within the profile, allowing the crop to be better buffered against the hot, dry conditions which can occur in the spring. Juncea canola plants can access deep moisture even with moderate levels of salinity in the subsoil.

Figure 3. *Subsoil constraints such as hard pans can severely restrict root development, access to subsoil moisture, and hence yield. (Photo B Haskins)*

It is important that there is enough moisture in the seedbed as the small seed of juncea canola will germinate quickly but will require additional water for good establishment. Dry sowing is generally not recommended in the low rainfall zone.

Retained stubble: Juncea canola, like canola, is very susceptible to sand blasting, and is easily damaged or killed by even moderate sand blasting up until the 4–6 true leaf stage. Sowing into retained stubble will provide adequate protection against sand blasting on lighter soil types. Stubble aids in moisture conservation during the fallow period and early crop establishment. Stubble cover minimises damage caused by soil movement (rain drop splash and sheet erosion) when the crop is very young.

Sowing time: Generally, for most crops the earlier the crop is sown the higher the potential yield. Early sown juncea canola crops will have stronger stems and more vigorous root systems, allowing the crop to flower and fill seeds before the onset of the hotter and drier conditions of mid spring. An early sowing time is important with juncea canola to enable the crop to maximise its dry matter by mid flowering, providing a solid platform for seed filling when flowering ends.

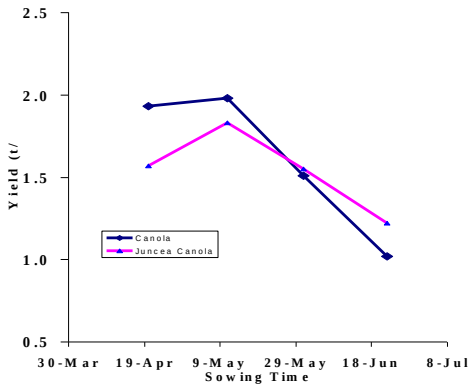

Figure 4 *Yield of canola and mustard in response to sowing time at Condobolin Agricultural Research Station (Source, N Fettell).*

However, if sown too early juncea canola can grow too tall, be more prone to disease pressure, the canopy can become rank, and the crop is more at risk of frost damage as pod

filling is occurring too early. In addition there may be difficulty in harvesting a very bulky crop. A time of sowing trial conducted at Condobolin in 2000 highlighted the importance of early sowing time, but not too early, to maximise yields (Figure 4). As a general rule, sowing time should be similar to an equivalent early maturing canola. Further trials are underway to determine the optimum sowing time for juncea canola in different environments.

Based on limited grower experience with commercial crops in 2007 and 2008, juncea canola is a good option from early to mid-April until the end of May or early June. Generally canola will perform better than juncea canola with earlier sowings, while the reverse occurs at later sowings. Individual varieties may vary slightly, but this mid-April to end-May is a typical sowing window for South Australia and Victoria.

Plant establishment: Limited data suggests that plant population targets for juncea canola are similar to canola. Aim for an established plant population of 20–35 plants/m^2 for early sowing and 35–50 plants/m^2 for later sowing. This may equate to between 2 and 4 kg seed/ha, depending on seed size. Juncea canola seed is typically only 75%–95% the size of canola, so seed size needs to be checked and seeding rates reduced from those of canola to achieve the same plant population.

Equally important as plant population is to achieve a uniform plant density. Getting an even plant establishment is essential for a successful crop, as it provides better competition against weeds, allows more even moisture and nutrient utilisation and promotes even crop maturity and ripening across the paddock.

Juncea canola seeds are quite small and should not be sown too deep. To achieve an even plant stand aim to sow at a depth of approximately 2–3 cm into good moisture. Ensure sowing speeds are not too fast to minimise soil throw onto the neighbouring rows. Also ensure proper tyne breakout, so that the tyne operates at a constant depth across the seeder width and across soil types. Low breakout causes uneven row depth and patchy establishment.

Ensure stubble is moved to the side of the sowing row, as thick stubble will reduce establishment. Sowing points should be narrow enough to handle stubble without causing stubble and soil to drag and also deliver the seed to a constant depth without excessive seed bounce. It is essential that the seed is buried behind the tyne, and air flow from air seeders is not excessive, causing the small seeds to be blown from the seed row.

Innovative growers are inter-row sowing using precision guidance equipment as a suitable sowing technique for no-till farming systems. \The use of press wheels is advisable in most situations. Press wheels minimise excess soil being dragged on top of the small seeds, ensuring a constant seed depth and good seed-soil contact.

Dragging harrows is not recommended unless the seed depth can be kept uniformly shallow.

If the seedbed becomes wet and sticky, seed and soil may stick to the press wheel and be scraped to the surface. Under these conditions it is usually time to stop sowing and wait for the soil to dry.

Dry sowing is generally not recommended in the low rainfall zone. The practice is considered too risky for the following reasons;

- insufficient rainfall after sowing may result in a split germination, with uneven growth affecting subsequent operations;
- there is no opportunity to get a pre-sowing weed kill;
- on soils that are prone to crusting, heavy rainfall can seriously reduce emergence;
- it is possible that germination and crop establishment occurs too late for a profitable crop.

Row spacing: The optimum row spacing for juncea canola is similar to wheat and canola. In the low rainfall zone, row spacing is usually a compromise between what is suitable for the crop and what is manageable with minimum or no-till seeders. In most instances 30 cm row spacing is a good compromise. Both row spacing and plant population are subjects of current research. Trials in 2007 indicated that 30 cm row spacing was better than 60 cm. When sown in 60 cm rows juncea canola yielded slightly less, and had a higher frequency of lodging than the 30 cm spacing. The 60 cm spacing also resulted in less stubble after harvest, increasing the risk of soil erosion.

Crop nutrition

There is no information to suggest current juncea canola varieties have different nutritional requirements to canola. Some early research conducted in the Mallee of north west Victoria suggested that nitrogen requirements were lower than for canola, but until further trial work indicates otherwise, fertiliser rates normally applied to canola in the low rainfall regions should also be used on juncea canola.

Selected nitrogen and phosphorus trials conducted in the Mallee region of Victoria when the crop was first evaluated are presented in Tables 2, 3 and 4. Juncea canola may have better salt and boron tolerance than canola and may be able to better respond to N on sites where these problems occur (Table 3).

Depending on soil test results, target application rates are likely to be about 8–12 kg P/ha and up to 30–50 kg N/ha. Agronomy trials are currently examining the response to nitrogen fertiliser in 2008. Sulphur is also an important nutrient and should be applied as sulphate sulphur (e.g. Gran Am) at 15–20 kg S/ha. These rates are similar to canola.

Zinc responses are soil type specific and are common in the alkaline soils of Victoria and South Australia. In these situations, a zinc supplemented fertiliser at sowing is advisable.

Table 2 *Seed yield response for three mustard lines to 40 kg N applied as urea at seeding (Source, G Castleman).*

		Mean seed yield (t/ha) 1992/93		
		Applied nitrogen (N) (kg/ha)		
Variety	**Maturity**	**N0**	**N40**	**Mean**
Pusabold	Late	1.44	1.39	Ns
TM-18	Early	1.17	1.41	Sign
CSIRO-6	Mid	1.53	1.75	Sign
Mean		1.38	1.51	

Table 3 *Seed yield response of B. juncea (JN004) to 40 N banded urea (t/ha) on a soil with high subsoil boron at Warracknabeal in 2003. (Source, R Norton)*

	Mean seed yield (t/ha)		
Treatment	**Canola**	**Wheat**	**Juncea canola**
No nitrogen	1.94	2.97	1.55
40 N	2.04	3.03	1.81
	No response	No response	Significant response

Table 4 *Seed yield response of an early maturity B. juncea (Cv. CSIRO-1) to rates of pre-drilled phosphorous applied at sowing (Source, G Castleman).*

	Mean seed yield (t/ha)			
Year	**0 kg P/ha**	**5 kg P/ha**	**10 kg P/ha**	**20 kg P/ha**
1993	1.18	1.37	1.28	1.40
1992	1.35	1.48	1.52	1.71
Mean	1.27	1.43	1.40	1.56

Crop Protection

Permit PER 9343, (expiry 3/03/2012) allows most crop protection products registered for canola to be used on juncea canola. Users can obtain a copy of the permit at the APVMA website.
http://services.apvma.gov.au/permits/response.jsp

Users must carefully read the permit and comply with all conditions of the permit before applying any crop protection products to juncea canola.

Weed control

Weed control strategies in juncea canola are similar to canola. Weed control will be more difficult when growing varieties with no herbicide tolerance. The new herbicide tolerant Clearfield varieties, Oasis CL and Sahara CL will make weed control easier as the herbicide Intervix® may be used. However the costs of post-emergent herbicides are sometimes considered too expensive to be used in the regions where juncea canola is grown. Breeding programs are currently developing triazine tolerant varieties of juncea canola.

Because of limited weed control options, ensure the paddock chosen has low weed pressure, especially broadleaf weeds. If necessary apply one or two knockdown herbicides before sowing to reduce weed numbers. This strategy may be needed when the autumn break occurs early. Known problem weeds are the mustard species, wild turnip, wild radish and fumitory, although most broadleaf weeds will result in a yield penalty if not controlled.

Figure 5 *Broadleaf weeds such as mustard species and fumitory can be a problem in juncea canola. (Photo B Haskins)*

A residual herbicide for grass weed control such as trifluralin is best 'incorporated by sowing' (IBS) with a knife point/press wheel seeding system. The IBS technique allows a 'hot blanket' of herbicide to be thrown in between the plant rows to aid in weed control. The plant row itself may have little if any herbicide but weed control is achieved by crop competition. When using the IBS technique, it is extremely important to vary sowing speed according to the width of soil throw, so that each tyne is not throwing soil into the neighbouring seed row. If soil throw does occur, significant crop damage will result.

Grass weeds can be easily controlled by Group A 'fop' and 'dim' herbicides, so long as weeds are not resistant to this chemistry.

Whilst clopyralid (e.g. Lontrel®) has been used extensively in canola for thistle and capeweed control, crop safety trials with juncea canola have shown a very narrow safety margin, and in a small number of instances resulted in a 5%–10% yield penalty. Therefore there could be a small trade-off when applying Lontrel® to juncea canola. Experience has shown that early crop application (2–4 leaf) reduces the risk of yield loss compared to a later (6–8 leaf) crop application.

Insect pests and viruses

Juncea canola is subject to the same range of pests as canola and there is no evidence that the crop is more tolerant to specific pests. However, because the crop is likely to be grown in low rainfall environments, the range of pests and populations of specific pests will be different to canola grown in medium-high rainfall environments.

Earth mites are a common pest at establishment but aphids can be a problem at this time as they suck sap from small plants and transmit viruses. Autumn aphid numbers can be high in some regions, particularly with early sowing after summer rainfall. Therefore early sown crops are more predisposed to attack.

Aphids are the main vector in the spread of viruses. The main viruses likely to occur in juncea canola are Beet western yellows virus, Turnip mosaic virus and Cauliflower mosaic virus. The main control techniques include using seed treated with imidacloprid (e.g. Gaucho®), controlling perimeter broadleaf weeds and particularly summer growing Brassica weeds, and sowing into standing cereal stubble. Standing stubble has been shown to reduce virus problems in pulse crops as the stubble deters aphid entry into the crop. Seek advice before spraying aphids in a vegetative crop.

Spring aphid infestation is common in canola when spring conditions are dry and warm. As juncea canola is adapted to low rainfall, warmer environments of the cropping belt, expect to see aphids in the crop as it matures. Control recommendations are the same as for canola.

Figure 6 *Viruses diseases such as Turnip mosaic virus are more prevalent in northern NSW. (Photo R Bambach)*

Heliocoverpa and Diamondback moth can also be expected in juncea canola and may warrant control measures when threshold numbers are exceeded.

All insecticides registered for canola are allowed under permit (PER 9343, expiry 3/03/2012).

Diseases

Blackleg: Juncea canola can be infected with the blackleg fungus, but has its own particular resistance pattern, which can be similar to some patterns in canola. Blackleg types that infect juncea canola are already present in Australia and management should aim to minimize disease carryover. Because of this, the recommendations for managing blackleg in juncea canola are essentially the same as for canola. Ensure there is 500 m separation from last season's juncea or canola stubble and only grow juncea canola or canola 1 year in 4 in the same paddock. Blackleg is considered a lesser problem in the low rainfall zone, so fungicide seed dressings are generally not necessary.

White rust: This disease is more prevalent in Juncea canola than it is in canola, but is not considered a problem in southern Australia. The weed shepherds purse is a host of white rust.

Sclerotinia: The fungal disease Sclerotinia is not likely to be a problem in the low rainfall cropping zone. It is however, more likely to occur in canola crops in medium-high rainfall areas. It is favoured by warm, wet and humid conditions in spring. The host range of the disease includes most broadleaf weeds and broadleaf rotation crops including chickpeas, field peas, lupins and faba beans. Crop separation and rotation guidelines are similar to managing the disease in canola.

Figure 5 *Dark spots are common on B. juncea but do not affect yield. (Photo R Norton)*

Black Spotting: Growers may see black lesions on the leaves of juncea canola (Figure 7). The cause of these spots is unknown but the effect on crop yield is thought to be minimal.

Harvest management

The principles for harvesting juncea canola are similar to canola. Aim to harvest a clean, evenly ripened grain sample at a moisture content of no more than 8%.

Direct heading: Juncea canola can be direct headed as it is less prone to shattering than canola. Direct heading is more suitable for crops of less than 1.5 t/ha that mature evenly and are not excessively tall. Once the crop is ripe for harvesting, delays must be avoided as juncea canola will still shatter if adverse conditions prevail.

Windrowing: Where uneven maturity is expected, windrowing may be of value. As well as creating even maturity, windrowing enables harvest and delivery to be scheduled with other farming operations.

As with canola, windrowing can occur when the seed moisture content reaches 30%–35%, and when 60%–70% of seeds have changed colour and are firm. Windrowing before this stage results in unripened seeds which are small and pinched, and windrowing too late may promote ripe pod shattering. Seed colour changes from translucent green to yellow, as opposed to canola that turns brown then black as the seed ripens.

Under low yielding conditions, windrowing – as well as being expensive – can result in the rows being blown around the paddock by strong winds.

Desiccation: An alternative to windrowing is to desiccate the crop. Desiccation can only be done by aerial application. Apart from promoting more even crop ripening it is also used to control weeds such as thistles which could cause harvesting difficulties. Desiccation is expensive and most of the time avoidable by windrowing. Reglone® is the only product permitted (PER9343, expiry 3/03/2012) as a pre-harvest desiccant.

Marketing options

In the immediate future, juncea canola will be marketed through a 'closed loop' system. Contracted growers will be advised about delivery centres as well as delivery standards and payment options are the same as for canola. There are no area contracts.

Condiment mustard is currently only grown under contract in New South Wales. Export markets are not well developed, so any production beyond domestic requirements could become a liability for the grower. Major markets in NSW are Palos Verdes at Cowra and Yandilla at Wallendbeen.

Markets for industrial mustard are still being developed. If the oil quality of the mustard destined for industrial use does not meet quality standards of either juncea canola or condiment mustard then marketing options become extremely limited.

The Australian Oilseeds Federation (AOF) established a juncea canola working group to oversee market and quality issues. The AOF has recognised market choice protocols. See the AOF website www.australianoilseeds.com/ for more information. For juncea canola the market and quality issues are currently being managed through a 'closed loop' marketing arrangement. Condiment mustard seed markets have similar 'closed loop' systems in place.

Over time, as production increases, ongoing quality assessment will occur and formal discussions with export markets will be entered into.

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NSW DPI, Condobolin

Paul Parker, District Agronomist,
NSW DPI, Young

Richard Roger, Senior Geospatial Officer,
NSW DPI, Orange

John Sykes, Research Leader (Pulse and Oilseed Genetics and Improvement), NSW DPI, Dubbo

Further information and industry contacts

Publications

Winter Crop Variety Sowing Guide 2009, Vic DPI
Weed Control in Winter Crops 2008, NSW DPI
Insect and Mite Control in Field Crops, NSW DPI
Juncea canola, the new low rainfall low cost canola, Pacific Seeds

Website
www.dpi.nsw.gov.au/agriculture
Virus diseases in canola and mustard,
Agnote DPI/495

Australian Oilseeds Federation
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