SOUTHERN
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GRDC GROWNOTES™

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

VETCH

SECTION 2

PLANNING

KEY POINTS | VARIETY CHOICE | AUSTRALIAN NATIONAL VETCH BREEDING PROGRAM | PLACE IN ROTATION – CONSIDERATIONS FOR FUTURE CROPS | VETCH BENEFITS TO CEREAL ROTATIONS | PADDOCK SELECTION – CONSIDERATIONS FOR A VETCH CROP

Planning

Key points

- Select varieties based on vetch species, paddock situation and end use
- Vetch should not be grown more than once within a five-year period in the same paddock; however, farmers sowing soft-seeded varieties grow vetch successfully every four years
- Vetch is a break crop for foliar and root disease in cereals and oilseeds but could carry over some soil-borne diseases, such as Sclerotinia
- Diseases of vetch can be transferred via soil, stubble or volunteers of other pulse crops
- Residues of some herbicides (such as sulfonylureas) can reduce vetch growth and yield severely

FEEDBACK

MORE INFORMATION

A paper on 'Pulse performance and agronomy update' was delivered by SARDI's Larn McMurray at the Southern Region updates held in February 2017

Please see https://grdc.com.au/resources-and-publications/grdc-update-papers

A paper on 'Image analysis to quantify pulse quality traits' was delivered by PhD student Linda McDonald at the southern region GRDC Updates held in February 2017

Please see https://grdc.com.au/resources-and-publications/grdc-update-papers

IN FOCUS

Australian National Vetch Breeding Program

The Australian National Vetch Breeding Program (ANVBP) collaborates with growers, scientists and agronomists in South Australia, Victoria, New South Wales, Western Australia and Tasmania, running trials aimed at identifying the best-performing varieties and end uses for vetch in particular areas.

There are also companies which have released vetch varieties in Australia.

ANVBP focuses on breeding varieties with:

- high yields of grain and dry matter
- resistance to rust, Ascochyta blight and Botrytis grey mould
- soft seed to avoid volunteer vetch weed problems in following crops
- lower toxins in the grain so it is suitable as a stockfeed
- varieties adapted to lower-rainfall areas where other pasture legume or pulse crops are performing poorly
- non-shattering pods.

Species and variety choice is determined by the paddock situation and end use. Vetch's place in rotation is determined by end use, weed burden, herbicide residues and disease carryover.

FEEDBACK

MORE INFORMATION

South Australian Sowing Guide 2016
www.grdc.com.au/SASowingGuide2016

Seed companies supplying vetch
Auswest Seeds, https://www.auswestseeds.com.au

Heritage Seeds,
http://www.heritageseeds.com.au/forage-pasture-3/clover-pasture-legumes/vetch

Pasture Genetics,
http://pasturegenetics.com/

For farm trial information, please see:
Emerging forage legume varieties 2013
http://www.farmtrials.com.au/trial/14135

2.1 Variety choice

Vetch varieties can be selected from three species that have different end uses. The first step in selecting a vetch variety is to consider the likely rainfall; the second is to determine end use as different species have different end uses.[1]

- Common or grain vetch – *Vicia sativa* subspecies *sativa* – forage, manure crop, grain for stockfeed, seed.
- Purple vetch – *Vicia benghalensis* subspecies *benghalensis* – forage and manure crop, seed.
- Woolly pod vetch – *Vicia villosa* subspecies *dasycarpa* and *eriocarpa* – forage and manure, seed.

Some Common vetch varieties, such as Morava$^{\Phi}$, Rasina$^{\Phi}$, Timok$^{\Phi}$ and Volga$^{\Phi}$, produce high yields of forage and grain.

Vetch species and varieties differ in their adaptation to rainfall regions, in their end-use suitability, productivity and percentage of hard seed. When selecting a vetch variety the following factors all need to be considered (see Table 1 and Table 2):

- rainfall
- suitability for early grazing
- forage and/or grain production
- suitability for stockfeed
- percentage of hard seed
- maturity – flowering in relation to frost and heat stress
- pod shatter – if for grain
- level of anti-nutritional factors for stockfeed
- disease resistance – in-crop control of foliar diseases can be expensive
- herbicide tolerance – impact depends on the herbicide, soil type and rainfall and time since application (see Section 8 In-crop management – weeds).

If vetch is sown in a mixture with cereals for cutting for silage or hay, a cereal variety with similar maturity should be selected in order to maximise quality at cutting. Vetch silage and hay should be cut in the late flowering to small pod stage (see Figure 1).

Species and varieties have similar susceptibility to insect pests (See Section 2.5.5). From early growth through to pod maturity they are susceptible to bluegreen and cowpea aphids, as well as to native budworm during pod formation and filling.

The lists and tables present varieties in alphabetical order. Section 2.1.1 to Section 2.1.3 indicate whether an improved/replacement variety is available.

1 PIRSA/GRDC (2010) Vetch: the Ute Guide. PIRSA/GRDC – https://grdc.com.au/vetch-the-ute-guide

FEEDBACK

Photo 1: *Not all vetch species are the same, nor can they all be grown for the same outputs. Variety choice must match vetch to the growing environment and end use.*

Photo: Emma Leonard, AgriKnowHow

IN FOCUS

Root mass and penetration

Root growth of vetch is often most rapid until pod development, when seeds begin to fill. After, roots continue to grow at a much slower rate until close to crop maturity. The total root length beneath pulse crops is about 10 times smaller than in cereal crops. Root length density of pulse crops rarely exceeds 1 cm of root/cm^3 of soil, even in the surface layers. This restricted rooting density has likely consequences for the uptake of water by the vetch plant.[2]

Vetch roots do not produce as much biomass as chickpea or wheat plant roots.

2 P Gregory (1988) Root growth of chickpea, faba bean, lentil, and pea and effects of water and salt stresses. In 'World crops: Cool season food legumes. Current Plant Science and Biotechnology in Agriculture Volume 5, 1988, pp 857-867, http://link.springer.com/chapter/10.1007/978-94-009-2764-3_68

FEEDBACK

Table 1: Adaptation, usage and production of varieties of vetch in the main subspecies grown in Australia based on seven trials in South Australia, 2013 to 2015.

Variety	Rainfall (mm)	Suitability for early grazing	Forage production	tonnes DM/ha	Grain production	Grain t/ha	Grain in stockfeed	% hard seed
Common or grain vetch – *Vicia sativa* ssp. *sativa*								
Blanchefleur	350-450 g <350-400 f	Good	Moderate	4.03	Good	2.15	Yes (max for pigs 20%)	5-10
Cummins	<350-450 g <350-400 f	Moderate	Moderate	-	Good	-	Yes (max for pigs 20%)	5-15
Languedoc	<350-400 g <350 f	Good	Moderate	-	Good	-	Yes (max for pigs 20%)	5-15
Morava(Φ)	400->600 g <350->600 f	Poor	Good	5.06	Good	2.16	Yes (max for pigs 25%)	0
Rasina(Φ)	350-600 g <350-450 f	Good	Moderate	4.7	Good	2.37	Yes (max for pigs 25%)	0
Timok(Φ)	<350->600 g <350->600 f	Good	Very good	5.26	Good	2.48	Yes	0-2
Volga(Φ)	<350-450 g <350-450 f	Moderate	Good	5.51	V. good	2.75	Yes (max for pigs 25%)	2-5
Purple vetch – *Vicia villosa* ssp. *benghalensis*								
Benatas[1]	350-800 f	Moderate	Good	9.71	Poor		No	low
Popany	400->600 f	Poor	Good	5.28	Poor		No	5-10
Woolly pod vetch – *Vicia villosa* ssp. *dasycarpa and eriocarpa*								
Capello(Φ)	400->600 f	Poor[2]	Very good	6.23	Poor		No	15-20
Haymaker(Φ)	400->600 f	Poor[2]	Very good	6.26	Poor		No	20-30
Namoi	400->600 f	Very poor[2]	Very good	-	Poor		No	>80
RM4(Φ)	<350->600 f	Moderate[2]	Very good	6.71	Moderate		No	2-5

Notes: 1. Source Tasglobal Seeds; 2. Graze post 10-node stage to end of flower. g = for grain; f = for fodder, DM assessments at flowering; 3. Grazed post 15 nodes to the end of flowering.
Source: SARDI Sowing Guide 2013 and 2016

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Table 2: Additional characteristics that influence variety choice.

Characteristic	Maturity	Shattering	GBC[1]	Disease rating		
				Ascochyta blight	Botrytis	Rust
Common vetch – *Vicia sativa* ssp. *sativa*						
Blanchefleur	Early	MS	0.9-1.2%	MS	S	VS
Cummins	Early-mid	MS	1.2%	MS	S	VS
Languedoc	Very early	MS	1.0-1.6%	MR	S	VS
Morava(Φ)	Late	R	0.65%	S	VS	R
Rasina(Φ)	Early	MR	0.66 -0.85%	MS	S	R
Timok(Φ)	Mid	MR	0.57%	MS	S	R
Volga(Φ)	Early	MR	0.54%	MS	S	R
Purple vetch – *Vicia villosa* ssp. *benghalensis*						
Benatas	Late	-	-	-	-	-
Popany	Very late	MR		MS	VS	R
Woolly pod vetch – *Vicia villosa* ssp. *dasycarpa* and *eriocarpa*						
Capello(Φ)	Late	R		MR	VS	R
Haymaker(Φ)	Late	R		MR	VS	R
Namoi	Very late	R		MR	VS	R
RM4(Φ)	Mid	MR		MR	VS	R

Note 1. GBC – gamma-glutamyl beta-cyanoalanine – an anti-nutritional factor

Key R – resistant, MR – moderately resistant, MS – moderately susceptible, S – susceptible, VS – very susceptible

Source: Rade Matic, ANVBP

Photo 2: *Morava(Φ) and Rasina(Φ) are among new Common vetch varieties, which have improved rust resistance, productivity and soft seed percentage.*

Photo: Wayne Hawthorne, formerly Pulse Australia

FEEDBACK

2.1.1 Common or grain vetch – *Vicia sativa* ssp. *sativa*

The newer varieties of Common vetch – Morava$^{\Phi}$, Rasina$^{\Phi}$, Timok$^{\Phi}$ and Volga$^{\Phi}$ – have improved rust resistance, productivity and soft seed percentage.

Blanchefleur

Description – hairy, oblong, squarish adult leaves with medium green foliage. White flowers on short stalks. Long, narrow pods containing pillow-shaped, reddish-brown mottled seed which is orange when split. Seed size is 6.6 g/100 seeds.

This market for varieties with orange cotyledon, such as Blanchefleur, is limited to domestic markets for birdseed and sowing seed for grazing and manure crops. This restriction is to prevent the substitution of vetch grain for lentil. Both vetch and lentil are on the Australian Government's prescribed grain list of Australian Quarantine Services.[3]

Prior to the release of Morava$^{\Phi}$, Blanchefleur was the preferred grain variety in areas above 350 mm rainfall. Blanchefleur has mid-maturity and is well-suited to medium to high-rainfall areas where rust is not a regular problem as it is very susceptible to rust.

Replaced by Rasina$^{\Phi}$ in low-rainfall areas and Morava$^{\Phi}$ in higher-rainfall areas.

Cummins

This is a mid to early maturing, white-flowering variety selected from Languedoc. Seed size is 6.1 g/100 seeds.

It is well-adapted to low to medium-rainfall areas, where it generally yields higher than Blanchefleur. Cummins is susceptible to rust and moderately susceptible to Ascochyta blight.

Replaced by Rasina$^{\Phi}$ in low-rainfall areas and Morava$^{\Phi}$ in higher rainfall areas.

Languedoc

Description – hairy, oblong to squarish adult leaves with medium green foliage. Light purple flowers on short stalks. Long, narrow pods containing pillow-shaped, brown-grey seed, which is beige when split. Seed size is 6.7 g/100 seeds.

This is an early-flowering and maturing variety recommended for low-rainfall areas, although it can lodge severely if there is heavy rainfall when it is ripe, making harvest difficult. Languedoc is generally higher-yielding than Blanchefleur in areas with less than 350 mm rainfall. Its hard seed content is generally around 5–10% and it is highly susceptible to rust.

Replaced by Rasina$^{\Phi}$.

Morava$^{\Phi}$

Description – hairy, oblong large adult leaves with dark green foliage. Dark purple flowers on short stalks. Very long, narrow pods containing pillow-shaped, large, dark brown seed, which is beige when split. Seed size is 8.3 g/100 seeds.

Developed in 1998 by the Australian National Vetch Breeding Program (ANVBP), Morava$^{\Phi}$ is a late-flowering vetch variety with 100% soft seeds. It has large seed and is more resistant to shattering than other vetch varieties.

Morava$^{\Phi}$ has superior grain yield to other vetches in high-rainfall areas and, in all other areas, has a higher yield than Blanchefleur, Languedoc and Cummins where rust in present.

It has a lower level of the anti-nutritional factor gamma-glutamyl beta-cyanoalanine (0.65%) than Blanchefleur and Languedoc. Morava$^{\Phi}$ produces high herbage yields. Morava$^{\Phi}$ is later flowering and maturing than Blanchefleur and grain yield will be reduced in seasons with dry finishes.

3 Australian Government Department of Agriculture and Water Resources (2016), http://www.agriculture.gov.au/export/controlled-goods/plants-plant-products/ian/03/08 Industry Advice Notice no.2003/08: Export of Split Vetch Prohibited

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Morava$^{\Phi}$ is rust-resistant, susceptible to Ascochyta blight and very susceptible to Botrytis grey mould, because it produces very high biomass in wetter areas.

Morava$^{\Phi}$ is a PBR variety and seed can be sourced from Heritage Seeds.

Rasina$^{\Phi}$

Description – hairy, oblong to squarish adult leaves with medium green foliage. Light purple flowers on short stalks. Long, narrow pods containing pillow-shaped, dark brown speckled seed which is dark beige to greenish when split. Seed size is 6.9 g/100 seeds.

Developed in 2006 by ANVBP, Rasina$^{\Phi}$ is an earlier-flowering, soft-seeded variety that replaces Languedoc, Blanchefleur and Cummins in low to medium-rainfall areas for grain production. It has a low level of the anti-nutritional factor GBC (0.6–08%).

A significant advantage over Languedoc, Blanchefleur and Cummins is its resistance to rust. Rasina$^{\Phi}$ is not expected to replace Morava$^{\Phi}$ in higher-rainfall districts or for hay production.

Rasina$^{\Phi}$ is a PBR variety and seed can be sourced from Heritage Seeds.

Timok$^{\Phi}$

Description – dark green leaf which is convex to straight in early stage; flowers are light-violet; pods medium to long, pod width medium to wide. Seed coat brown with black speckling, with grey-brown cotyledons. Seed size is 6.9 g/100 seeds.

Released in 2013 by ANVBP, Timok$^{\Phi}$ was bred to complement Morava$^{\Phi}$ in medium to high-rainfall areas for grain and especially for silage and hay production. It is a soft-seeded variety and has a low level of anti-nutritional factor GBC (0.57%).

Timok$^{\Phi}$ has better early growth than Morava$^{\Phi}$ and will improve the reliability of vetch and economic production in cropping systems especially in medium-rainfall areas (350–450 mm per year). Morava$^{\Phi}$ is still the preferable variety for hay and silage in rainfall areas with more than 450 mm per year.

It is a high-yielding and highly rust-resistant Common vetch variety which is moderately susceptible to Ascochyta blight and susceptible to Botrytis grey mould.

Timok$^{\Phi}$ is a PBR variety and seed can be sourced from Pasture Genetics.

Volga$^{\Phi}$

Description – leaf is concave medium green to dark green; flowers are medium-violet; pods medium to long. Seed coat is brown with blue-black speckling, cotyledons are grey-brown. Seed size is 7.8 g/100 seeds.

Released in 2013 by ANVBP, Volga$^{\Phi}$ is a high-yielding grain and herbage variety for low to medium-rainfall areas. Its early flowering makes it particularly suited to shorter-season areas where the growing season finishes sharply.

It has a small proportion of hard seed and a low level of the anti-nutritional factor GBC (0.54%).

Volga$^{\Phi}$ has good initial establishment and early maturity. It is rust-resistant and moderately susceptible to Ascochyta blight. It is earlier-flowering and maturing than Blanchefleur and Rasina$^{\Phi}$.

Volga$^{\Phi}$ is a PBR variety and seed can be sourced from Heritage Seeds.

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2.1.2 Purple Vetch – *Vicia benghalensis* ssp. *benghalensis*

Benatas

Description – similar to Popany but no detailed description is available.

Developed by Tasglobal Seeds, Benetas produces high forage yields with good early spring vigour. It is later-flowering than Popany and has improved cold tolerance during vegetative growth, where it has survived to –7°C. It is also tolerant of moderate waterlogging. These characteristics make it especially suited to cooler, higher-rainfall regions.

No disease resistance data is currently available.

Benetas seed can be sourced from AusWest Seeds and Ardent Seeds in Tasmania.

Popany

Description – oblong, narrow leaves with medium to dark green foliage. Purple flowers with dark lips on stalks the length of the leaf. Medium-length brown pods containing velvety black, globular seed with a white hilum which is yellow when split. Seed size is 4.5 g/100 seeds. A small proportion of seed is hard.

Popany is a late-maturing variety good for hay and silage production in medium to high-rainfall areas.

Grain yield is significantly lower than yields of Common vetch varieties and seed size is smaller. This variety is resistant to rust but susceptible to Ascochyta blight and chocolate spot.

Popany seed can be sourced from farmer sale as well as several seed houses.

2.1.3 Woolly pod vetch

All currently available Woolly pod varieties can be grazed from 10 nodes to pod set because of anti-nutritional issues outside these growth stages.

Unlike the other vetch species, they are all moderately resistant to Ascochyta blight. If disease conditions occur they are susceptible to Botrytis grey mould.

Grain can only be sold as seed.

Capello$^{\Phi}$ and Haymaker$^{\Phi}$ – *Vicia villosa* ssp. *dasycarpa*

Description – oblong, narrow leaves with medium green foliage. Purple flowers with pink inner on stalks longer than the leaf. Short, beaked pods containing dark brown, globular seed, which are bright yellow when split. Seed size is 4.5 g/100 seeds. Moderately hard seeded.

Haymaker$^{\Phi}$ and Capello$^{\Phi}$ are selected soft seed varieties from Namoi. They are lower in grain yield but are much higher in dry matter production than Common vetch varieties in rainfall areas of more than 450 mm per year. These two varieties are very good for hay and silage production in areas where there is more than 400 mm of annual rainfall.

Both varieties are owned by Heritage Seeds.

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Namoi

Description – oblong, narrow leaves with medium green foliage. Purple flowers with pink inner on stalks longer than the leaf. Short, beaked pods containing dark brown, globular seed, which is bright yellow when split. Seed size is 4.5 g/100 seeds. Very hard seeded.

Namoi can be sourced from farmer sale as well as several seed houses.

RM4$^{\Phi}$ – *Vicia villosa* ssp. *eriocarpa*

Description – oblong, narrow leaves with medium green foliage. Purple flowers with pink inner on stalks longer than the leaf. Short, beaked pods containing dark brown, globular seed, which is bright yellow when split. Seed size is 4.5 g/100 seeds. Soft seeded.

Bred by ANVBP and released in 2014, RM4$^{\Phi}$ is a multipurpose variety that can be used for silage or hay, grazing, as a manure crop or for seed.

RM4$^{\Phi}$ has moderate early growth, better than other woolly pod varieties. It produces more dry matter than Capello$^{\Phi}$ and Haymaker$^{\Phi}$ in low and medium-rainfall areas and is also suitable for higher-rainfall areas (greater than 400 mm to 650 mm per year). Its early maturity helps RM4$^{\Phi}$ produce more dry matter than other woolly pod varieties when the growing season finishes sharply. It is excellent for improving soil nitrogen and soil structure.

RM4$^{\Phi}$ is a PBR variety and seed can be sourced from Heritage Seeds.

2.2 Australian National Vetch Breeding Program

The ANVBP collaborates with growers, scientists and agronomists in South Australia, Victoria, New South Wales, Western Australia and Tasmania, running trials aimed at identifying the best-performing varieties and end uses for vetch in particular areas.

The ANVBP allows producers and end users in different regions to observe how present varieties are performing and to evaluate potential new varieties that could be suited to those areas. The ANVBP focuses on breeding varieties with:

- high yields of grain and dry matter
- resistance to rust, Ascochyta blight and Botrytis grey mould
- soft seed to avoid volunteer vetch weed problems in following crops
- lower toxins in the grain so it is suitable as a stockfeed
- varieties adapted to lower-rainfall areas where other pasture legume or pulse crops are performing poorly
- non-shattering pods.

There are few private breeding companies producing vetch for the Australian market.

2.3 Place in rotation – considerations for future crops

To reduce the risk of disease and crop contamination, ideally vetch should not be grown more than once within five years in the same paddock and should not be sown adjacent to vetch, bean or lentil stubbles. In reality a one-in-four-year rotation has been found to be successful, especially when sowing soft-seeded varieties.

2.3.1 Disease

Vetch provides a good break crop for root and some foliar diseases of cereals and canola. It can host root-lesion and stem nematodes as well as several root diseases which can affect cereals and other pulse crops (Table 3). Carryover of some soil and stubble-borne diseases can be tested using the PreDicta® B testing service; the tests relevant to vetches measure soil inoculum levels of Rhizoctonia bare patch (see Figure 2) and stem nematode.

Because it is a close relative of other common pulses grown in the southern region, there can be some disease crossover between vetch and these pulses as well as with

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lupin (see Table 3). Disease crossover can come from adjacent crops, from stubble or from the soil, depending on the disease (see Section 3 Paddock preparation).

Table 3: Vetch diseases and potential for cross-infection from other pulses.

Disease	Vetch	Lentil	Field pea	Faba bean	Chickpea	Lupin
Ascochyta blight# (*Ascochyta fabae*)	*	^	^	**	^	^
Botrytis grey mould (*Botrytis cinerea*)	**	**	*	**	**	*
Chocolate spot (*Botrytis fabae*)	**	**	^	**	^	^
Rust (*Uromyces viciae-fabae*)	**	^	*	**	^	^
Sclerotinia stem rot# (*Sclerotinia* sp.)	**	**	*	**	**	**
Stem nematode (*Ditylenchus dipsaci*)	*	*	**	*	*	^
Viruses: non-persistent AMV, BBWV, BYMV, CYVV and PSbMV	**	**	**	**	**	**
Viruses: persistent BLRV, BWYV, SbDV and SCSV	**	**	**	*	**	**
Root rots *Fusarium* sp.	*	*	*	*	*	*
Phoma sp.	*	*	**	*	**	*
Pythium sp.	*	*	*	*	*	*
Rhizoctonia sp.	**	**	**	**	**	**

Key *This disease occurs on this crop but has not caused major damage **This disease has caused major damage on this crop
^Non host #Species differ between crops
Source: PIRSA/GRDC (2010) Vetch: the Ute Guide. PIRSA/GRDC – https://grdc.com.au/vetch-the-ute-guide

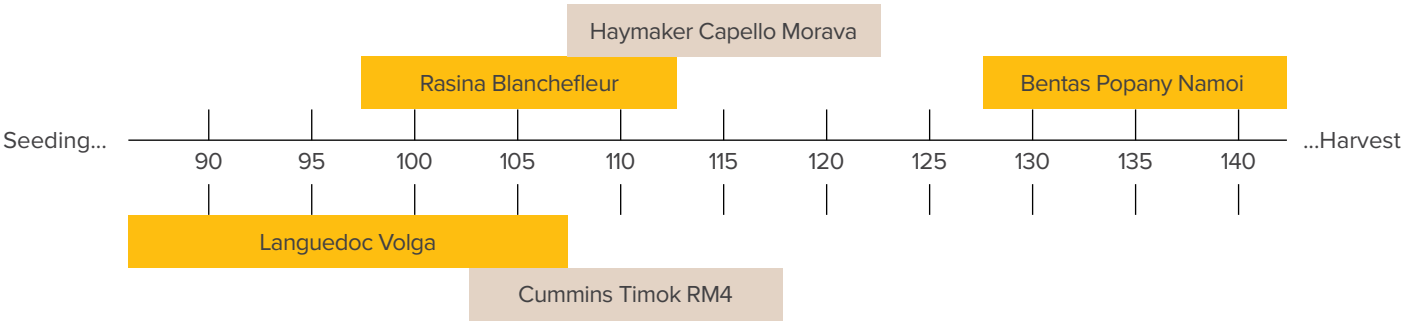

Figure 1: *Days to flowering from sowing by variety if sown on the same day*

Source Rade Mattic ANVBP

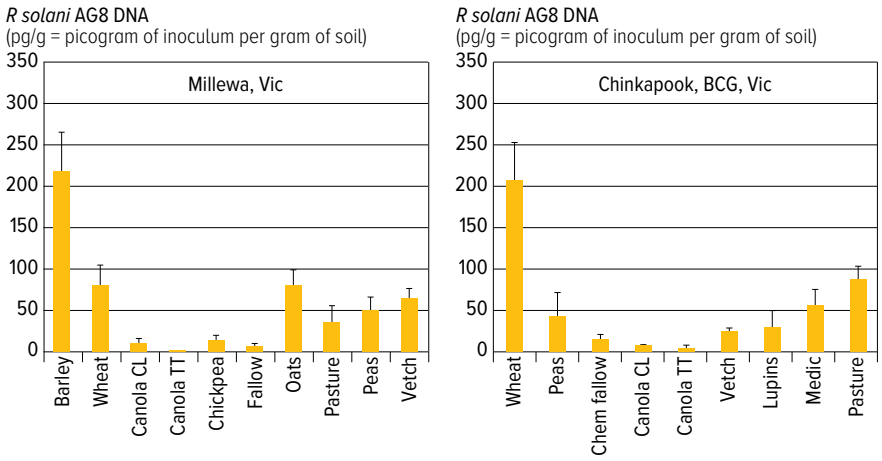

Figure 2: *The effect of crop rotation, including vetch, pea and lupin, on Rhizoctonia solani AG8 inoculum level in low-rainfall sites in Victoria in 2011. As few as five ryegrass plants/m² can maintain or increase Rhizoctonia levels in a break crop.*

Source: *GroundCover™ Supplement* 98, (2012) GRDC https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-98-may-june-2012

2.3.2 Weeds

Self-sown vetches from hard-seeded varieties can cause admixture quality problems in some crops at harvest. Separating vetch from field pea and lentil in the harvesting process can be difficult. Rotations should be designed to avoid unwanted contamination of vetch in these crops.

The control of vetch in other pulse crops still largely relies on pre-season seedbank management.

WeedSmart (https://weedsmart.org.au/) offers a suite of tools to help plan weed management for future crops on a paddock-by-paddock basis.

In trials in the Mallee (2011–2013) to identify profitable rotations for brome grass control, the best brome grass control and gross margins were achieved with a sequence of vetch and Clearfield® canola or Clearfield® wheat followed by wheat (Figure 3).[4]

1. Mallee rotations that beat brome grass and make money (2013) GRDC. http://www.farmtrials.com.au/trial/16654

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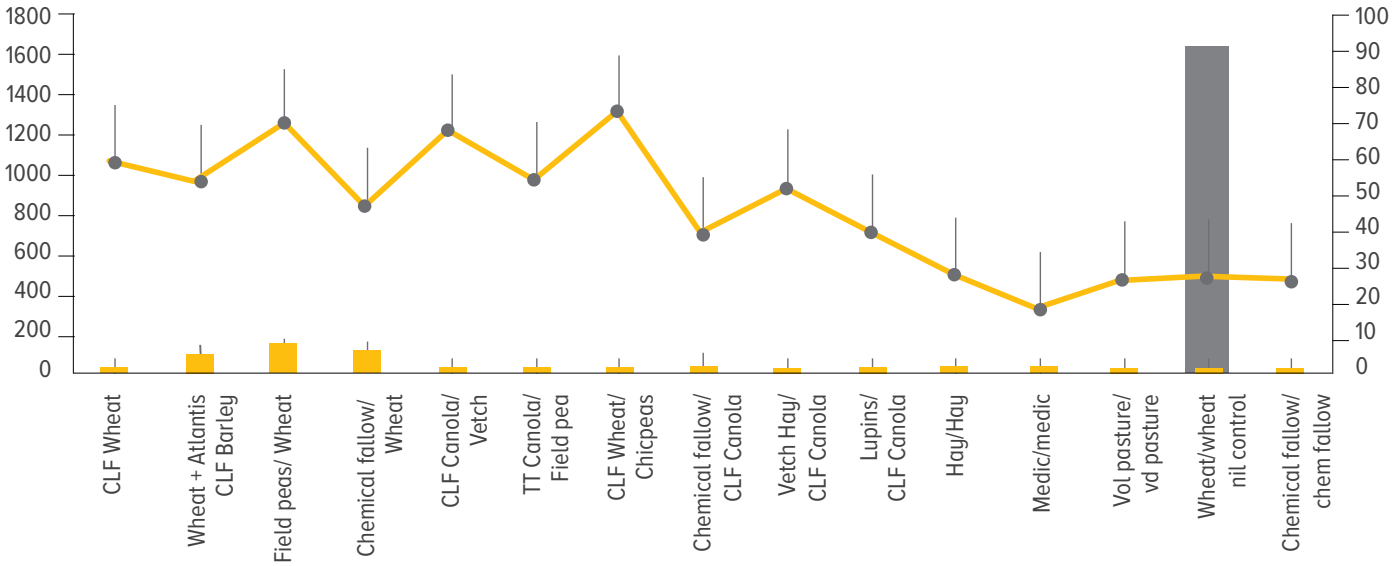

Figure 3: *Rotation impacts on gross margin and weeds in the Mallee – cumulative gross margin ($/ha) and final brome grass populations on 29 August 2013 (plants/m²) in 2011–13.*

2011–2013 GM ($/ha): P<0.001, LSD=$238, CV20%; final brome (plants/m²): P<0.001, LSD=13 plants/m², CV=18%.

Where vetch exists as a volunteer in cereals there are several herbicide options including mixes of phenoxy-based herbicides, for example MCPA, that can be used, depending on which cereal crop the volunteers are growing in. Check herbicide labels for registration for use in vetch on APVMA website.

Photo 3: *(Left) tares on the headland of a vetch crop. The control of vetch or tares in pulse crops largely relies on pre-season weed seedbank management. (Right) tares (pictured left) is a smaller, more spindly plant than modern grain vetch plants (pictured right).*

Photo: Emma Leonard, AgriKnowHow

2.3.3 Nitrogen fixation

Results from the ANVBP across five sites over three years have shown increases in soil nitrogen after vetch was grown for grain (56 kg/ha), hay (94 kg/ha) and green manure (154 kg/ha) (see Section 1, Table 2).

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2.3.4 Stubble cover

Vetch stubble residues lack bulk and provide only partial protection to the soil after harvest. Vetch stubble should either not be grazed or grazed with caution to ensure adequate stubble cover is maintained to minimise risk of wind and water erosion on sandy soils and sloping paddocks. Vetch holds the soil better than field pea as it produces more cover and surface roots.

At seeding, the stubble of unharvested crops can be a problem because the long vines build up under the seeder. This stubble may have to be harrowed or disced ahead of seeding to reduce this problem.

2.3.5 Soil moisture reserves

In crop sequencing trials, vetch consistently fixed more nitrogen and used more water than pea, probably because of its longer growing season and greater dry matter accumulation. However, an early manure crop or cutting as silage results in more water remaining in the profile for the following crop than if vetch was grown to maturity and harvested as grain.[5]

2.4 Vetch benefits to cereal rotations

- Increased yields of following cereal crops.
- Allows an extended phase of cropping.
- Decreases many cereal diseases – grass-free vetch crops break the life cycle of root diseases, crown rot, take-all and Rhizoctonia.
- Controls grass weeds – cutting for forage, using grass-selective herbicides or manuring can be used with vetches to control weeds, such as brome grass and barley grass, which are difficult to control in some other crops.
- Allows for crop-topping to prevent herbicide-resistant weeds from setting seed.
- Available soil nitrogen is improved.
- Well-adapted to no-till, standing-stubble systems aimed at improving soil structure and fertility.

2.5 Paddock selection – considerations for a vetch crop

2.5.1 Soil type

Vetch will grow on a wide range of soil types from light sandy soils to heavier clay soils.

On light sandy soils the Common and Woolly pod varieties perform well. All perform well on loam clay soils but the best production comes from soils with good fertility.

Vetch prefers alkaline soils (pH 5.2–8.2) but the variety Benatas, for example, can perform on slightly more acidic soils.[6]

Common vetch will not survive prolonged waterlogging. The vetch subspecies Purple vetch and Woolly pod will tolerate waterlogging and survive better than other crops, such as oats.

Vetch is moderately sensitive to salinity and can have difficulty accessing water and nutrients from saline layers in the soil. Soil chloride levels >600 mg/kg have been found to reduce root growth in crops such as chickpea, lentil and linseed.

Vetch is classified among the medium group for sensitivity of all field crops to sodic soil conditions.

5 M Peoples (2012) Ground Cover Supplement 98, (2012) GRDC https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-98-may-june-2012

6 C Gazey, Jennifer Carson (2016) Managing Soil Acidity – WA Fact Sheets, Department of Agriculture and Food, Western Australia. http://www.soilquality.org.au/factsheets/managing-soil-acidity-western-australia

FEEDBACK

2.5.2 Herbicide residue

Rotations must also take into account herbicide residues and plant-back requirements in relation to soil pH, texture and organic matter content especially after drought conditions. Herbicide residue impacts are more pressing where rainfall has been minimal and in many cases where the soil type is heavier.

It is very important to know the chemical history of the paddock for at least two seasons. This includes knowledge of:

- the chemical used
- the group to which the chemical belongs
- the plant-back periods
- the soil pH (which affects the half-life and longevity of herbicides)
- rainfall
- other requirements for specific herbicide breakdown (check labels).

Residues of sulfonylureas (clorpyralid) and imidazolinones (Group B) can be particularly harmful in alkaline soils. Always check withholding periods. For example, there is a 10-month withholding period for sowing vetch after the use of the Group B herbicide active ingredient imazethapyr.

2.5.3 Sowing into cereal stubble

Vetches grow well when sown after cereal or oilseed crops. Paddocks with adequate standing stubble cover provide a trellis lifting the crop off the soil surface, which is good for grain crops.

If sowing for hay crops, stubble cover is also good to provide early protection. But stubble should be rolled to the surface to minimise incorporation with the cut hay.

2.5.4 Disease

Controlling foliar diseases in vetch can be expensive. Effective disease management relies on variety and paddock selection, plus the use of clean seed, best agronomic practice and the strategic use of fungicides (Section 7 In-crop management – disease).

Time of sowing and seasonal conditions influence the incidence of foliar disease, particularly Botrytis grey mould (BGM). A dense canopy is conducive to BGM in a wet season.

See Table 3 for the potential disease carryover from other crops in the rotation. A four-to-five-year break from vetch and disease carryover crops is required to minimise disease transfer and vetch should not be sown adjacent to vetch, bean or lentil stubbles.

2.5.5 Insect pests

Vetch varieties show little difference in their pest susceptibility. Generally damage from pests of emerging crops, such as snails, slugs, millipedes and earwigs, is not a major problem. This is partly because vetch cotyledons do not grow above the soil surface, so plants can reshoot underground if the tops have been eaten off.

All current vetch varieties are susceptible in early growth stages to redlegged earth mite and lucerne flea. Most are susceptible to bluegreen and cowpea aphids from early growth through to pod maturity, as well as to native budworm during pod formation and filling (see Section 6 In-crop management – pests).

2.5.6 Cross-pollination

If Woolly pod vetch crops are to be used as seed, they should be planted more than 400 m from other varieties to reduce the risk of cross-pollination. Common vetch varieties are self-pollinated and do not need to be planted more than 50 m from other vetches.