Vetch summary 2010

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Take home messages

- *Vetch can decrease cereal diseases and pests for subsequent cereal cops.*
- *Grass-free vetch crops break the life cycle of root diseases such as cereal cyst nematode and take-all.*
- *Vetch is a multi-purpose crop that can also increase yield and quality in cereals and canola by returning significant quantities of nitrogen to the soil.*

Background

Vetch crops aimed at improving soil health and cropping sustainability. They are well suited to no-till, standing stubble systems. Vetch is a multi-purpose crop grown mostly as a disease break crop in a rotation with cereals in a wide range of soil types from light sands to heavier clay soils. Vetches (Vicia spp.) are classified broadly as either grain or forage legumes. The versatility of vetch allows it to be used for cropping, for either grain or hay production, for early grazing as green pasture, for dry grazing or for green manure. Grain vetches (common vetches) can be successfully grown in low to medium rainfall zones of southern Australia. They have poor tolerance to water logging but perform better than field peas on more acidic and hard setting soils.

Vetches fit well into cereal and canola rotations. Grass-free crops reduce cereal root diseases and have the added option of crop topping, cutting for forage or green manure to clean up grass-problem paddocks and prevent herbicide-resistant weeds from setting seed. To minimise the risk of disease, growing vetch should be limited to no more than once in four years in the same paddock.

The National Vetch Breeding Program (NVBP) tests vetch germplasm from F5 – F9 generations at five sites in SA: low rainfall (<350mm/yr) Peake and Lameroo in sandy and non-wetting soils; mid rainfall (380-400mm/yr) at Blyth on loamy sand and high rainfall (>400mm/yr) at Charlick and Kingsford Research Farms.

The program runs trials in low and medium rainfall areas to observe adaptation to abiotic stress such as water deficiency caused by drought and heat stress during the flowering/podding stage. To avoid these limitations, the germplasm requires early plant establishment, strong roots and earlier maturity (<95 days from planting to full flowering) to avoid the damaging effects of harsh finishes.

All germplasm are tested in higher rainfall areas for resistance to diseases such as rust, ascochyta and botrytis. This is important as diseases may occur more frequently in high rainfall environments. However they still present a risk in low rainfall areas in a wet year, such as 2010.

The program conducts trials of advanced lines (10 – 15 lines only) in SA, Vic, NSW and WA. Over the last five years three new lines (SA-34823, SA-34831 and SA-34883) have been selected to explore their potential as new vetch varieties in Australian crop rotations (Table 1). The new breeding lines have also been tested for their level of resistance to rust and ascochyta .

Table 1: Data from three low rainfall areas of SA (2007, 08 and 09).

Vetch variety/lines	Disease Resistance		SA low rainfall areas (<330mm)		Mean yield (t/ha)	
	Rust	Ascochyta	Grain yield (t/ha)		Dry Matter	Grain Yield
			Blyth	Lameroo		
Morava	R	MR-MR	0.6	1.2	4.4	1.0
Rasina	R	S	1.0	1.9	3.8	1.4
Blanchefleur	S	S	0.9	1.4	3.9	1.1
Languedoc	S	MS	0.8	1.8	3.2	1.3
SA-34515	MR	MS	0.9	2.6	4.0	1.5
SA-34538	MR	VS	0.5	2.0	4.0	1.2
SA-34748	VS	MS	1.1	2.6	4.5	1.9
SA-34780	MR	MR	0.8	1.7	3.9	1.2
SA-34823	R	MR	1.1	2.8	4.5	1.8
SA-34831	MR	MR	1.2	2.5	4.2	1.7
SA-34869	MR	MS	1.1	2.0	4.1	1.4
SA-34883	MR	MS	1.1	2.2	4.6	1.6
SA-35061	VS	VS	2.3	2.3	4.8	1.9

R = Resistant – disease not occurred; S = Susceptible – disease reduced > 50% yield; VS = reduce yield > 80%; MR = disease occurred but not affect the yield; MS = disease reduce yield up to 30%.

Variety performance

SA-34823 significantly out-yielded all present varieties in grain and dry matter production. SA-34823 can be used as a multi-purpose variety for grain and hay/silage.

SA-34831 is predominately intended as a grain line. It is a smaller plant than Morava and SA-34823 and achieves maturity earlier than Morava, Rasina and Blanchefleur. This line out-yielded all present varieties in lower rainfall areas (< 350mm/yr) for grain production in 2010.

SA-34883 is a multipurpose variety intended for mid-high rainfall areas (>350mm/yr). Ascochyta susceptibility means that, for grain production, this variety is suited to a mid rainfall area rather than high.

SA-34748 and SA-35061 both performed well in the trials, displaying large plants with early vigour. They were, however, extremely susceptible to botrytis and ascochyta. Both lines have been included in the re-crossing program for new vetch varieties for possible release by 2014/15.

SA- 34515, SA-34538, SA-34780 & SA-34869 Further testing of these lines is required before selection for a new variety can be confidently released.

Observations for trial sites from 2007 – 2010

The below average rainfall during 2007 – 08 meant that diseases such as rust, ascochyta and botrytis did not occur at any site, making disease ratings difficult.

In 2009 all five sites - Blyth, Peake, Lameroo, Kingsford and Charlick - received average rainfall. At Kingsford and Charlick, recorded infections of ascochyta and botrytis occurred around podding, but did not reduce yield by more than 5 –10%.

All experimental sites in 2010 received 20-40% above average rainfall. A good early start to the season across all sites produced excellent early growth and this, combined with good ongoing rainfall, produced significant spring growth and ample hay yields at all sites. As a result of the significant biomass, ascochyta and botrytis were observed in the crop from flowering to maturity. Rust was also observed. The diseases infected plants during late podding stage, but did not significantly reduce yield, even on susceptible lines.

Harvest across all sites was interrupted by larger rainfall events (90mm in 1 day at Kingsford). Yields were not significantly affected in general, although grain was discoloured, affecting its appearance. Shattering and sprouting were not a problem at any of the sites, even after significant rain.

We are expecting to see yield reductions because of ascochyta and botrytis in all susceptible germplasm.

Agronomic recommendations: seeding rates and herbicides

Weed management in vetch is problematic, with only a few herbicides registered for in-crop weed control, few control broadleaf weeds. Good knowledge of possible weed burdens will help identify potential vetch paddocks and herbicides that may need to be applied prior to crop emergence. Herbicide options for broadleaf weed control (registered in vetch) are listed in Table 2. These herbicides have been used for the last 10 years in trials, with no record of any damage to common vetch. They are safest when applied as a post-sow pre emergence treatment rather than at post emergence stage. Simazine is still not registered for common vetch crops. Trifluralin should be incorporated by sowing and provides a range of broadleaf and grass control when used in combination with post-sowing, pre-emergent applications of Diuron/Simazine and Metribuzin.

Most grass herbicides can be applied in a tank mix with insecticides (see recommendations from pesticide labels). Spraying herbicides should be avoided when vetch is at the flowering stage, as it will severely affect yield.

All registered chemicals and recommended rates are available in the *Grain Legume Handbook*.

Table 2. Recommended herbicides for common vetch varieties.

Recommended herbicides/stage		
Broad leaf and grass control	**Mostly broadleaf and some grass control**	**Specific for grass control**
Pre plant	**Post Plant Pre-emergence**	**Post emergence**
Trifluralin	Diuron	All recommended grass herbicides for vetch

It is recommended to conduct a germination test on vetch seed, particularly weather- damaged grain intended for sowing this year, as germination rates may be affected by prolonged exposure to moisture.

Table 3: Recommended plant densities for different rainfall zones.

End use	For grain production		For hay production	
Annual Rainfall	**<350mm**	**>350mm**	**<350mm**	**>350mm**
Target plant density (plants/m^2)	45-55	55-65	60-65	70-80

Summary

Trials have been running from 2007–2010 and in that time we have experienced variable climate and growing seasons. 2010, a wet year, enabled us to assess how these different varieties perform under high disease pressure.

Morava, Rasina, Blanchfleur and Languedoc can be grown for various end-uses (forage, hay, grain, green manure or grazing). These varieties have shown no differences in palatability for grazing.

After the 2010 yield data is analysed, we will know more about the effect of specific diseases on each variety, and the expected yield penalty from such a disease event in the absence of fungicides. This relates to a line/variety being resistant or tolerant. A resistant line will not suffer disease, whereas a tolerant line will display disease symptoms but not suffer a significant yield penalty. Morava is an example of this: it was infected by ascochyta this year (rated as MR for ascochyta) but we are not expecting a significant yield penalty from the disease. These results are still being analysed.

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