

Introduction

A.1 Crop overview

Vetch (*Vicia* spp.) is a legume offering significant benefits to grain growers, despite being only a minor crop (Photo 1). Vetches are classified broadly as either grain or forage legumes. Vetch is more commonly grown for forage and hay than for use as a grain crop.¹

Vetch has been adopted by Australian farmers as a legume rotation crop where drought is the major environmental stress. Vetch is better adapted to these regions than field peas, chickpeas, lentils, faba beans or lupins.²



Photo 1: Common vetch (*Morava*(l)).

Photo: Stuart Nagel

Vetch is not grown for human consumption, however, it is a very versatile crop, allowing decisions about its end-use to be made during the year. While providing stock feed over winter, it then has a number of end-use options - as a grain, hay, silage and pasture or as green or brown manure.

As a legume, it can fit well into cereal and canola rotations, providing nitrogen to the soil, and can potentially reduce the incidence of diseases in succeeding crops. Vetch can also be used as a management tool against resistant weed development, though it is important to note that there are few herbicides registered for in-crop control.³

Vetch can be a valuable addition to continuous cropping systems. The income from vetch hay combined with highly effective non-chemical weed control and water conservation, especially preceding higher value such as canola, can make the legume hay crop a good option. However, soil cover is reduced for vetch hay

1 R Matic (2010) Vetch summary 2010. SARDI. Online Farm Trials. <http://www.farmtrials.com.au/trial/14055>

2 R Matic (2015) GRDC Final Reports: DAS00013 – Vetch variety improvement for Australian field crop farming systems. <https://grdc.com.au/research/reports/report?id=268>

3 K Penfold (2006) Vetch interest puts pressure on supply. Groundcover GRDC. <https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-60/vetch-interest-puts-pressure-on-supply>

compared with brown manure and this low cover can be an issue with low-biomass grain legumes on erosion-prone areas.⁴

In mixed farm operations, vetch is a viable winter grazing crop which can be eaten down and then locked up and either made into hay or stripped for grain. Vetch is often grown solely for grazing and is sprayed out in the spring when the bulk of the crop has been removed. This also offers an opportunity to control spring weeds when a knockdown spray such as glyphosate is used

Vetch is grown in a wide range of soil types from light sands to heavier clay soils.

In higher rainfall areas (>400 mm/year), most farmers prefer to produce grain; in drier areas (350–400 mm/year) farmers like to use vetch crops for hay or silage. In lower rainfall regions vetch is commonly grown for grazing and green manuring.⁵

In 2005/06, 142 introductions passed quarantine and were tested for the targeted traits in comparison with advanced lines and present varieties. Eleven *Vicia* species/subspecies were tested for use as hay crops.

The Australian National Vetch Breeding Program found that the common vetch (*V. sativa*) and hairy/fodder/winter vetch (*V. villosa*) species/subspecies are useful in Australia for hay/silage production. The plants of these two species have most targeting traits.

The other species are smaller plants and most of them are prone to shattering. Palestine vetch (*V. Palestine*) is the most drought tolerant, but the lowest in dry matter production. Purple vetch (*V. benghalensis*) has hard seeds and is not reliable in the crop rotations. Bitter vetch (*V. ervilia*) is a better vetch. It is a small plant with a better test as a green manure and grain is not recommended to use for any stock feed. All Hungarian vetch (*V. pannonica*) tested introductions are prone to shattering.⁶

A.1.1 Types of vetch

Common vetch varieties are mainly relatively short season, early maturing types which are more suited to grain or dual purpose situations.

Purple vetch are long season, late maturing annuals suitable for fodder production in cropping country. This variety regenerates poorly and not suitable for permanent pastures.

Woolly pod vetch can be used as a pasture plant, hay/silage and green manuring crop. Plant establishment is much slower than common vetches (in 10–12 weeks reaching 10–15 cm high). These varieties in Australian conditions grow rapidly during the second part of vegetation and generally are higher in dry matter production than common vetches.⁷ This species is medium-late maturing cultivars with very high levels of 'hard' seed. It is more suited to permanent pastures. Woolly pod vetch is not recommended in cropping country where regeneration could be a problem in cereal crops.⁸

A.1.2 Vetch for feed grain

Vetch is a very good source of crude protein. It has high digestibility of dry matter and is high in metabolisable energy.⁹

Grain or common vetch (*Vicia sativa*) varieties Morava(), Rasina(), Blanchefleur and Languedoc are grown for forage, hay, grain, green manure or grazing (Photo 2). Grain vetch for ruminants is considered similar to field peas, but much smaller in size.

4 J Kirkegaard (2017) Careful management required to sustain continuous cropping. GRDC E-Newsletter.

5 R Matic, S McColl (2013) Which vetch is my farming system? Online Farm trials. <http://www.farmtrials.com.au/trial/16634>

6 R Matic (2007) [Improved vetch varieties for fodder production](#). Rural Industries Research and Development Corporation.

7 R Matic, S Nagel, G Kirby (2008) Woolly pod Vetch. Pastures Australia. http://keys.lucidcentral.org/keys/v3/pastures/Html/Woolly_pod_vetch.htm

8 DAF (2011) Vetches in southern Queensland. DAF QLD. <https://www.daf.qld.gov.au/plants/field-crops-and-pastures/pastures/vetches>

9 K Penfold (2006) Vetch interest puts pressure on supply. Groundcover GRDC. <https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-60/vetch-interest-puts-pressure-on-supply>

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[Pulses nutritional value and their role in the field industry](#)

[Vetch interest puts pressure on supply](#)



Photo 2: Vetch grain.

Source: [Pulse Australia](#)

Grain vetches are not generally recommended for monogastrics. There is evidence that bitter vetch is a suitable grain for ruminants, but use in monogastrics should be treated with caution. Grain supply of bitter vetch is very limited.¹⁰

Common vetch grain is rich in the following main characteristics: crude protein 28–32%; digestibility 71–89% and metabolisable energy 9.8–13.7MJ/kg DM. Grain from common vetches can be used without limit in rations together with cereals to feed ruminants, or in cereal grain mix up to 25% for pigs.¹¹

For more information about Vetch feed quality, see Section 2: Pre-planting, section Vetch for feed grain.

A.1.3 Vetch for forage

Information gathered from district agronomists, farmer advisors, seed distributors and field days indicate that over 65% of vetch production is used for hay/silage.¹² Vetch hay and silage are highly palatable for all ruminants. Cutting vetch for hay and silage at the flowering-early podding stage means that many weeds are also cut before they begin setting seed, which reduces weed populations in the following crop, saves herbicide applications and decreases the risk of herbicide resistance development.

Vetch hay is a very rich source of protein and metabolisable energy and is highly digestible for all ruminants (Table 1). Australian dairy farmers are increasingly adopting vetch hay as one of the main forage sources to increase milk production. Vetch hay or silage has been reported to have increased milk production per cow by more than 12% compared with meadow/grass or cereal hay.¹³

Table 1: Hay samples measurements of quality. Data from DPI Hamilton Pastoral and Veterinary Institute (1999–2005) and Agrifood Technology (2007–2011).

Hay	No. of samples		Crude Protein (%)	Metab. Energy (MJ/kg DM)	Dry matter digestibility (%)
Oaten	870	Mean	7.2	9.1	63.0
		Range	1.7–17.9	5.6–11.4	41.3–78.0
Lucerne	273	Mean	19.6	9.4	65.4
		Range	9.6–26.3	5.3–11.1	39.2–75.7
Clover	40	Mean	17.5	9.1	66.9
		Range	10.6–24.0	7.7–10.5	57.5–79.4
Medic	67	Mean	19.3	9.5	65.6
		Range	13.7–23.9	7.5–11.2	53.4–76.2
Vetch	229	Mean	20.2	9.0	62.9
		Range	15.6–26.2	7.2–11.0	51.2–74.9

Source: [Online Farm Trials](#)

¹⁰ W Hawthorne (2006) Pulses nutritional value and their role in the feed industry. Pulse Australia Pty Ltd. http://www.pulseaus.com.au/storage/app/media/using_pulses/2006_Pulses-Feed-value-livestock.pdf

¹¹ R Matic, S McColl (2013) Which vetch is my farming system? Online Farm trials. <http://www.farmtrials.com.au/trial/16634>

¹² R Matic (2007) [Improved vetch varieties for fodder production](#). Rural Industries Research and Development Corporation.

¹³ R Matic, S McColl (2013) Which vetch is my farming system? Online Farm trials. <http://www.farmtrials.com.au/trial/16634>

All common vetch varieties are similar in palatability for green grazing. Common vetches can be grazed from 10–15 cm high to the end of pod maturity.¹⁴

For more information on grazing vetch, see Section 2: Pre-planting, sections 2.1.2 Vetch for forage and 2.1.4 Grazing/cutting of vetch.

A.1.4 Vetch for manuring

In subtropics in northern New South Wales and southern Queensland, vetch is used mainly as a green manure in cotton production, orchards and vineyards.¹⁵

Vetch has the ability to offer substantial benefits to soil fertility and can contribute to improvements in soil structure and organic matter. It also provides a weed and disease break for cereals in a crop rotation. The Australian National Vetch Breeding Program (ANVBP) results across five sites in southern Australia over three years have shown after a vetch grain crop, total nitrogen in the soil increased by 56 kg/ha. After vetch hay production 94 kg/ha of nitrogen was returned to the soil, and after green manuring there was an increase of 154 kg/ha of soil nitrogen. Cereal yields following vetch are usually at least 30–50% higher than continuous cropping cereals.^{16 17}

A green crop of vetch can be worked into the soil with cultivation equipment to boost organic matter content. More commonly the vetch crop is brown manured by desiccating using a knockdown herbicide to kill both the vetch and weeds, and allowed to decompose over the fallow period before being worked into the soil at sowing.

Producing large volumes of biomass makes vetch a good green or brown manure crop. This is because vetch returns large amounts of organic matter to the soil, which, in turn, boosts biological activity. Add to this its ability to fix nitrogen and it provides the ideal manure crop. There are three key reasons for manuring legumes:

- management of weeds, particularly if they are herbicide-resistant;
- boost soil nitrogen; and
- conserve soil moisture for subsequent crops.

The main disadvantage of a manure crop compared to a non-cropped fallow is the cost of establishment (seed plus sowing) and herbicides. Despite the manure phase being cash-flow negative in the first season, a crop production system involving a manure crop can be more economic than continuous cropping.

To gauge the true value of legumes in a crop sequence, the input costs and crop returns need to be considered over the whole crop sequence in terms of net income per hectare per year.¹⁸

A.2 Growing region

The Northern growing region stretches from southern NSW to northern Queensland. Common vetch is more commonly grown in the winter cropping regions while woolly pod vetch is more common in the sub-tropical areas of the Northern region.

Vetch is a minor crop in the Northern region, with a small amount grown for grain in southern NSW and mainly grown for hay/silage, grazing and green or brown manuring elsewhere in the region.

The north has a relatively high seasonal rainfall and production variability compared with the other two regions. Both summer and winter crops are important for profit.

¹⁴ R Matic, S McColl (2013) Which vetch is my farming system? Online Farm trials. <http://www.farmtrials.com.au/trial/16634>

¹⁵ R Matic, S Nagel, G Kirby (2008) Woolly pod Vetch. Pastures Australia. http://keys.lucidcentral.org/keys/v3/pastures/Html/Woolly_pod_vetch.htm

¹⁶ I Rochester (2004) Rotational vetch lifts cotton yields and profit. *Farming Ahead* 150, pp. 54–55.

¹⁷ M Unkovich, J Pate, P Sanford (1997) Nitrogen fixation by annual legumes in Australian Mediterranean agriculture. *Australian Journal of Agricultural Research* 48, pp. 267–293.

¹⁸ GRDC (2013) Manuring of Pulses. GRDC Fact Sheet <https://grdc.com.au/Resources/Factsheets/2013/09/Manuring-of-Pulse-Crops>

Yield depends, to a significant degree, on conservation of soil moisture from summer-dominant rainfall. The Northern Region has the highest diversity of crop production, including maize, sorghum and tropical pulses as well as wheat, barley, winter-growing pulses and oilseeds

Key characteristics of the Northern growing region include:

- Tropical and subtropical climate
- Yield depends upon conservation of soil moisture from subtropical rainfall
- Substantial enterprise size
- Diversity in crop choice, need for new crops e.g. pulses
- Premium on high-protein wheats for export and domestic markets
- High-potential yields
- Competition with cotton

Winter crops grown in the Northern region include; wheat, barley, oats, chickpeas, triticale, faba beans, lupins, field peas, canola, safflower and linseed.

Summer crops grown in the Northern region include; sorghum, sunflowers, maize, mungbeans, soybeans, cotton and peanuts.

A.3 Brief history

In the early 1990s, vetch production in Australia collapsed due to a lack of information regarding toxicity, and the emergence of rust and ascochyta as a disease problem. Another limiting factor was the weediness of vetches (hard seededness). However, this was overcome by the release of Morava(b) with 100% soft seed and the availability of herbicides to control volunteer vetches in cereal crops. In the 1990s, Australian vetch production dropped to under 20,000ha/annum. After the release of soft seeded varieties, vetch production increased dramatically and has remained high. The area sown to vetch increased from 35,000ha in 1998 to over 250,000ha per year in 2015, due to the promotion of the versatility of the crop and its variety of end use options.¹⁹

Since it began in 1992, the National Vetch Breeding Program (NVBP) funded by the Grains Research and Development Corporation (GRDC) has focused on breeding common vetch (*Vicia sativa*) varieties for Australian farmers for use as hay/silage, grazing, grain and green manuring. In 2005, the program also included the breeding/selection of woolly pod vetches (*Vicia villosa*) for grazing, hay/silage and green manuring.

A South Australian Grains Industry Trust Fund (SAGIT) project was added to the program in 2008, investigating the potential of new vetch species/varieties for very low rainfall areas in southern Australia. This program is investigating *Vicia palaestina* (leaf dense vetch – LDV), *V. macrocarpa* (big leaf vetch – BLV), *V. articulate* (Bard vetch) and *V. obicularis* (small erect vetch). From this SAGIT project Leaf dense vetch (*V. palaestina*) has shown the best results in areas with less than 300 mm average annual rainfall and the program will concentrate on this species to deliver varieties to farmers for grazing, hay/silage, green manuring and further investigate its potential for grain use.²⁰

Vetch has become an increasingly important crop for the less productive areas in southern Australian cropping regions.

A.3.1 Breeding objectives

The Vetch Breeding Program has adopted the most appropriate breeding, selecting and testing methods to provide farmers with improved vetch varieties that possess higher grain and dry matter yields, wider adaptability in Australian cropping

¹⁹ R Matic (2015) GRDC Final Reports: DAS00013 – Vetch variety improvement for Australian field crop farming systems. <https://grdc.com.au/research/reports/report?id=268>

²⁰ S Nagel, R Matic, G Kirby (2011) Vetch in Australia farming systems. SARDI. <http://eparf.com.au/wp-content/uploads/2014/12/2011-26-Vetch-in-Australian-farming-systems.pdf>

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environments, resistance to major diseases to avoid chemical cost/use, fit into crop rotations and increase farm productivity.

Vetch for grain production means it must be high yielding, disease-resistant, particularly to rust, with low toxins, large seeds, soft seeds, non-shattering and high-protein.

Vetch for pasture, hay or green manure must have high winter yield, palatability, adaptability to grazing, compatibility with sown cereals, high herbage, disease resistance and low alkaloid content in foliage.²¹

The Australia National Vetch Breeding Program (ANVBP) focuses on breeding varieties with:

- high yields of grain and dry matter
- resistance to rust, ascochyta and botrytis
- soft seed to avoid weed problems in following crops
- lower toxins in the grain for inclusion as a stock feed
- varieties adapted to lower rainfall areas where other crops are performing poorly
- non-shattering pods.²²

21 K Penfold (2006) Vetch interest puts pressure on supply. Groundcover GRDC. <https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-60/vetch-interest-puts-pressure-on-supply>

22 R Matic, S McColl (2013) Which vetch is my farming system? Online Farm trials. <http://www.farmtrials.com.au/trial/16634>