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CORPORATION

VETCH

SECTION 4

SEEDING

KEY POINTS | TIME OF SOWING | PRE-SEEDING WEED CONTROL | SEED QUALITY | SEED INOCULATION AND SEED DRESSING | SEEDING SYSTEM – DEPTH AND ROW SPACING | SOWING RATES | SEEDING FERTILISER | ROLLING

FEEDBACK

MORE INFORMATION

GRDC Nitrogen Fixation of Crop Legumes Fact Sheet, www.grdc.com.au/GRDC-FS-NFixation-Legumes

GRDC Rhizobial Inoculants Fact Sheet, www.grdc.com.au/GRDC-FS-RhizobialInoculants

Seeding

Key points

- **Time of sowing is influenced by region, variety maturity and end use.**
- **Early sowing can produce a very bulky canopy that leads to foliar diseases such as Botrytis grey mould (BGM) in a wet season.**
- **Seeding equipment and row spacing can be the same as for other grain crops.**
- **Using quality seed is important for good establishment and early vigour.**
- **Inoculation with rhizobia is generally recommended for low organic matter and acidic soils.**
- **Sowing depth must take into account herbicide use.**
- **Minimal fertiliser is required at sowing.**

FEEDBACK

IN FOCUS

Vigorous crops of vetch can increase soil nitrogen by about 50 kg/ha after a grain crop and up to about 150 kg/ha after a green manure crop. Consequently, vetch requires minimal additional nitrogen at seeding or in-crop. However, to achieve good nitrogen fixation attention must be paid to inoculation with the correct rhizobia group and the use of management that optimises the symbiotic relationship between the rhizobia and vetch plant. More details are in Section 4.4 and Section 4.7.

Vetch is suited to no-till, reduced-tillage, stubble-retention systems. It can be sown using conventional cereal-sowing equipment. Its larger seed size means it does not need to be sown very shallow like canola or other pasture species do.

4.1 Time of sowing

Sowing time is influenced by rainfall region, variety maturity, vetch end use and attitude to foliar disease risk (Table 1).

Early sowing is important for early plant vigour and to maximise forage production. Vetch can be sown dry to promote early seedling establishment and growth. Dry sowing on non-wetting soil is not very successful. Seedling pests such as redlegged earth mite and lucerne flea can be often be avoided when the crop is early sown, to avoid emergence under cold wet conditions.

Sowing early can increase the risk of yield loss through frost damage or leaf disease due to excessive foliage growth. Frost risk can be reduced by sowing early-maturing varieties into good stubble cover to minimise soil moisture loss. Good pre-seeding weed control to conserve moisture also helps mitigate frost damage. Frost-affected grain crops may be more profitable if conserved as forage.

Vetch grown for forage or manure crops is generally sown earlier and at higher seeding rates to produce bulkier crops and optimise forage quality and yield. In trials run by Birchip Cropping Group in Victoria's Wimmera–Mallee to compare choice of forage crops for winter feed. Rasina$^{\Phi}$ and Morava$^{\Phi}$ vetch had similar production levels to the forage cereals, but the peak in production occurred one month later compared with forage cereals, shifting the feed curve for the vetch to later in the season.[1]

Sow vetches for grain production at a similar time to sowing wheat in the same region. Vetch hay crops can also be sown at this time.

Later sowing or grazing of early-sown vetch grain crops runs the risk of lower grain yield if high temperatures and dry conditions are experienced during flowering and pod-fill. It also reduces the risk of foliar diseases, such as Botrytis grey mould (BGM), severely damage vetch crops prior to cutting or harvesting.

1 A Friske (2011) Choice of forage crops for winter feed. BCG http://www.farmtrials.com.au/trial/14067

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Table 1: Vetch time of sowing by rainfall region, end use and variety maturity.

Rainfall zone (mm)	Optimum sowing date			
	For grain		For forage	
	Early varieties	Late varieties	Early varieties	Late varieties
<250	Mid-late April	Mid–late April	Mid–late April	Mid–late April
251–300	1st–2nd week May	1st week May	1st–2nd week May	Mid April–1st week May
301–375	3rd week May	2nd week May	2nd week May	1st week May
376–450	1st week May–1st week June	3rd–4th week May	2nd–3rd week May	1st–2nd week May
>450	1st–4th week June	4th week May	2nd–4th week May	1st–3rd week May

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

4.2 Pre-seeding weed control

There are only limited herbicides registered for use in vetch for grass control. For broadleaf weeds post-sowing pre-emergent (PSPE) herbicide is the only option. Achieving good weed control pre-sowing is crucial. (See Section 3.3 Weed control.)

The importance of cleaning and decontaminating spray equipment before the application of herbicides cannot be over-stressed. Traces of sulfonylurea herbicides (such as chlorsulfuron, metsulfuron or triasulfuron) in spray equipment can cause severe damage to vetch and other legumes.[2]

Pulse crops can be severely damaged by some hormone herbicide sprays, such as 2,4-D ester, drifting into the crop. This can happen when these sprays are applied nearby in very windy or still conditions, especially where there is an inversion layer of air on a cool morning.[3] Vetch is not tolerant to the phenoxy-based herbicides (e.g. MCPA).

Taking some general precautions can help to reduce the likelihood of crop damage with residual herbicides that are registered for used in vetch at planting:

- Do not apply residual herbicides if heavy rain is imminent.
- Maintain at least 7.5–10 cm soil coverage over the seed.
- Avoid leaving a furrow or depression above the seed that could allow water (and chemical) to concentrate around the seed or seedling.
- Avoid leaving an exposed, open slot over the seed with disc-openers and avoid a cloddy, rough tilth with tyned-openers.

MORE INFORMATION

Inoculating pulses, http://www.pulseaus.com.au/growing-pulses/publications/pulse-inoculation

2 Best Management Guide (2016) Faba Bean Production Southern and Western region. Pulse Australia http://pulseaus.com.au/growing-pulses/bmp/faba-and-broad-bean/southern-guide

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

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MORE INFORMATION

Information on disease-testing services around Australia https://extensionhub.com.au/web/field-crop-diseases/-/disease-testing-services-around-australia

Fact sheet, Germination testing and seed rate calculation, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/157442/pulse-point-20.pdf

4.3 Seed quality

Quality seed is vital for crop establishment and ultimate production. Good seedling vigour is also important as it helps improve establishment.

Weathering of crops after ripening and poor storage can substantially reduce viability of seed (see Section 11 Late season management).

Germination and vigour may deteriorate in storage if seed is more than one year old, frosted or weather damaged (see Section 12.2 Grain storage).

Check germination percentage and purity before purchasing seed and ask for the test certificate. Ideally, the germination percentage should be more than 90%. Experience from the Australian National Vetch Breeding Program (ANVBP) found that a germination percentage of more than 95% is required for Common vetch and more than 92% for Woolly pod vetch.

If it is low (<80%) increase seeding rate or obtain new seed with a higher percentage germination.

Home-saved seed should be cleaned and graded to ensure it is free from weed and crop seed contamination.

Retain seed from the healthiest crop where Ascochyta blight, Botrytis grey mould and chocolate spot levels are the lowest. Seed disease testing services are available and, ideally, sow seed with nil infection.

Seed-borne inoculum is usually less important for vetch diseases than stubble-borne inoculum (Section 3, Table 2).

Photo 1: *Quality seed is vital for crop establishment and ultimate production. Avoid sowing seed that is shrivelled or contains too many cracked seeds or seeds without seedcoat. Seeding rates should be modified for germination percentage.*

Photo: Emma Leonard, AgriKnowHow

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MORE INFORMATION

Inoculating legumes: a practical guide
https://grdc.com.au/GRDC-Booklet-InoculatingLegumes

GRDC Nitrogen fixation Fact Sheet
https://grdc.com.au/GRDC-FS-NFixation-Legumes

GRDC Rhizobial inoulants Fact Sheet
www.grdc.com.au/GRDC-FS-RhizobialInoculants

4.4 Seed inoculation and seed dressing

To achieve nitrogen fixation the correct strain of rhizobia must be present to form a symbiotic relationship with the vetch. The same species of rhizobia can nodulate legumes in inoculant groups E and F. Group E is recommended for vetch, especially in acid soils. Rhizobia are moderately sensitive to soil acidity, which means **they sometimes occur at levels below that needed for optimal nodulation**.

Inoculants can be applied either on the seed, in-furrow by water injection, or in a granular form.

Vetch requires the same strain of rhizobia as pea, lentil and faba bean. If these crops have been grown during the past 5 years the correct rhizobia may be present. This is especially true for alkaline, self-mulching grey clays where high numbers of rhizobia may be found.

On acidic soils (pH $CaCl_2$ <5.2) vetches often nodulate poorly. **Lupin rhizobia (Group G) is acid-tolerant** but not suited for vetch. Use of granular inoculums and application of lime may make some acidic soils suitable for growing vetches.[4]

Inoculation is generally recommended. It is especially important on acidic soils prone to waterlogging and poorly structured soils with low organic matter where survival of rhizobia is poor.

Use of fungal seed dressing is seldom beneficial. Thiram plus thiabendazole is registered for use on vetches to provide protection against seedling root rots (*Fusarium* spp. and *Pythium* spp.). Use of fungal seed dressing can minimise the risk of introducing disease into new vetch-growing areas.

Insecticide seed dressings (dimethoate) or an in-crop spray of omethoate can be used as part of an integrated approach to the control of redlegged earth mite.

If the seed dressing is compatible with inoculum, apply the seed dressing first and then inoculate immediately before seeding. Do not mix inoculants and seed dressing together unless the inoculant label specifies compatibility. Do not use fungicide seed dressings with a seed-applied inoculant in acid soils as this can reduce rhizobia numbers.

A granular inoculant may assist in rhizobia survival, particularly in acidic soils, when sown dry or fungicide seed treatments are used.

4.5 Seeding system – depth and row spacing

Vetch as a pure stand or vetch mixes for forage or manure crops can be sown together using an air seeder. Mixes can be sown with the other seed or in alternate rows using a combine seeder.

4.5.1 Sowing depth

Seed should be sown at a depth of 2–4 cm, as for wheat in a similar rainfall district.

Sowing can be deeper on lighter soils. Vetch can be broadcast onto dry soil and buried by trampling by sheep or harrowing, so sowing depth can vary from very shallow to deep. Shallow-sown vetch is more prone to damage by soil-active herbicides.

When dry sowing, sow at 4–8 cm deep to ensure good moisture conditions before germination and to protect applied inoculum from high temperatures near the soil surface. If the opening rains are delayed some weeks, deep-sown crops can be slower to establish and grow when soil temperatures fall.

Deeper sowing is also required to minimise damage from residual herbicides used for vetch.

Vetch cotyledons remain below the soil surface and only the shoot pushes through, so re-shooting is possible if the initial shoots are damaged by insects or vermin.

4 Pulse Australia (2016) Southern/western field pea best management practices training course, module 2-2016. Pulse Australia.

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4.5.2 Row spacing

Vetch is generally sown on the same row spacing as used for cereal production. It can also be broadcast and incorporated by sheep or harrows, so there is no specific row spacing.

Some growers use a medium to wide row spacing (25–36 cm) to suit trash clearance, inter-row weed control or to have a more open canopy to reduce the development of disease, such as Botrytis grey mould.

Wider-spaced crops risk lower forage production and are less competitive with weeds. Weed control can be more difficult with wider row spacing unless sown with adequate stubble cover, or a shielded sprayer is used for inter-row weed control.

4.5.3 Wheel tracking

Consider 'tramlining' and controlled-traffic farming set-ups to avoid physical damage to the crop from machinery. This damage can provide 'hotspots' for disease.

Photo 2: *Vetch can be sown with the same equipment as cereals and pulse crops. Row spacing is generally the same as for other crops in the rotation but seeding depth needs to vary in relation to access to soil moisture and the use of residual herbicides.*

Photo: Emma Leonard, AgriKnowHow

MORE INFORMATION

Fact sheet, Controlled Traffic farming set-up http://www.spaa.com.au/pdf/253_SPAA_fact_sheet_(controlled_traffic).pdf

http://www.naturalresources.sa.gov.au/files/15e99f33-a569-4fcd-b8c5-a38700a74fe3/inter-row-in-fodder-shrubs-gen.pdf

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4.6 Sowing rates

Seeding rates are determined by the end use and vetch subspecies (Table 2). Rates also depend on the expected rainfall and time of sowing and should be adjusted for germination percentage (see Section 4.3 Seed quality).

Aim for a lower plant density in regions averaging <350 mm of annual rainfall and higher in areas with >500 mm annual rainfall.

Seeding rates can be increased by 10–15% for manure crops and if sowing is delayed beyond the optimum time (Table 1).

For mixtures of vetch cereal hay use a 1:1 or 1:2 cereal:vetch mix at a total seeding rate of:

- 40 kg/ha in areas with <400 m annual rainfall
- 60 kg/ha in areas with 400–550mm annual rainfall
- 60–100 kg/ha in areas with >550 mm annual rainfall.[5]

A lower plant population results in less bulky crop, reducing the potential grain or forage yield but lowering the risk of foliar disease.

Seed yield to seeding rate was examined in nine field experiments across two years in south-western Australia. In high-yielding situations in this region a target plant population of 40 plants/m² gave optimum grain yield. Sowing overlaps (e.g. headlands) can exacerbate disease development due to more bulky crop growth. The use of precision agricultural tools, including guidance, autosteer and section control, and controlled-traffic farming systems, can help minimise sowing overlaps.

4.6.1 Calculating seed rate

The number of seeds that emerge is often less than the number of seeds sown due to non-viable seed, seedlings with poor vigour, disease, herbicide damage or poor soil structure.

Target plant density for vetch by subspecies and end use are in Table 2.

Seeding rate (kg/ha) = plant density (plants/square metre) x 1000 seed weight (g) ÷ emergence percentage (from germination test).

Table 2: Target plant density and common seeding rates for vetch by end use and subspecies.

End use	Common vetch varieties		Purple vetch varieties		Woolly pod	
	Plant density (plants/m²)	Sowing rate (kg/ha)	Plant density (plants/m²)	Sowing rate (kg/ha)	Plant density (plants/m²)	Sowing rate (kg/ha)
Grain/seed	40–60	40–50*	60	20–40	50	20–40
Green manure	60–70	50–60	65	25–40	50	25–40
Hay	50–70	50–60	60	25–35	50	25–35
Grazing	50–70	50–60	65	25–40	50	25–40
Regenerating pasture	40–60	40–60	–	20–40	40	20–40

* WA target a plant population up to 50 kg/ha unless high grain yields expected.

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

5 B Bull, A Mayfield (1992) Growing Vetch – out of print

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4.7 Seeding fertiliser

The nutrient requirements of vetches are similar to other legumes. Generally, Common vetches are grown in rotation with cereals; this provides enough residual nutrients to maintain soil fertility for vetch growth. Generally minimal fertiliser is applied.

On-farm practice is often to apply 50–75 kg/ha triple superphosphate (0N:20.6P:0N:1S) or 100 kg of single superphosphate (0N:9P:0K:11S) at sowing to provide a good start and growth. However, many growers choose to sow without any fertiliser with good results.[6]

4.7.1 Phosphorus (P)

If soil levels are low then 10–30 kg P/ha may be required to gain good forage and seed yields. Where levels are high, maintenance levels to meet removal (Table 3) are all that is required (5–15 kg P/ha).

4.7.2 Nitrogen (N)

Vetch should be self-sufficient for nitrogen (N) if well nodulated. Rates of 5–15 kg N/ha at seeding to aid establishment may be useful on lighter and slightly acid soils.[7] Hay crops of cereal and vetch can benefit from up to 30 kg N/ha at seeding particularly if early grazing is also required.

4.7.3 Potassium (K)

In higher-rainfall areas where hay is often cut, rates of 15–30 kg K/ha at seeding may be required if soils are low in potassium.

4.7.4 Sulfur (S)

If soils in the region generally respond to sulfur then apply 5–2 kg S/ha at sowing. Soils that leach or have grown canola are more likely to require sulfur.

4.7.5 Zinc (Zn)

Zinc is required for vetch on alkaline soils but use of zinc in other parts of the rotation may be sufficient, and so zinc generally does not need to be applied to vetch.[8]

4.7.6 Copper (Cu)

Responses to copper on legumes may occur on sandy soils.

4.7.7 Manganese (Mn)

A response to manganese may be seen in high pH soils (>8 $CaCl_2$). This is usually applied in-crop as a foliar application.

6 R Matic, S Nagel, G Kirby (2008) Common Vetch Fact Sheet. Pastures Australia http://keys.lucidcentral.org/keys/v3/pastures/Html/Common_vetch.htm

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

8 Better Soils (1998) Advisory Board of Agriculture http://soilwater.com.au/bettersoils/module2/2_7.htm

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4.7.8 Molybdenum (Mo)

This may be required on acidic soils where molybdenum becomes unavailable. Rates of 50–60 g Mo/ha should be applied if no applications in the past five years.[9]

Table 3: Guide to nutrient removal by one tonne of vetch grain.

Major nutrients	Kg removed in grain	Minor nutrients	Kg removed in grain
Nitrogen	44	Copper	8*
Phosphorus	3.8	Zinc	26*
Potassium	10*	Manganese	12*
Sulfur	1.5*		
Calcium	0.8		
Magnesium	1.2		

* Value for field pea, estimated to be same for vetch.

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

4.8 Rolling

Surface rolling or prickle chaining flattens clods and ridges caused by sowing or press-wheels, and presses rocks and sticks into the soil, leaving a flat surface to allow the harvester comb or forage harvester to cut close to ground level. Rolling helps to reduce harvest losses, machinery wear and contamination in the seed or forage sample.

Rolling should be carried out post-sowing, pre-emergence and is best done with a rubber-tyred roller, when the soil is moist.

It may have to be delayed until the crop has emerged if the soil is prone to hard setting, crusting or eroding on sandy or sloping country. Emerging shoots can be broken off if rolling when plants are just at emergence.

If rolling is carried out post-emergence, it should be done later in the day in warm weather so plants are limp and not brittle from cold or frosty conditions.

Avoid rolling two weeks before or after applying a post-emergent herbicide.

Rolling vetches post-emergence could increase the possibility of early leaf diseases, aiding the early spread of disease later within the crop.

Both rubber-tyred and steel rollers can be used successfully, although a lighter roller is preferred when rolling post-emergence. However, the choice of roller is largely dictated by soil conditions and the type of material being rolled. The heavier the roller, the better the job of levelling heavy. This is especially true on heavier soil types and when pushing rocks and sticks below the soil surface. Lighter rollers work well on sandier soils.[10]

9 B Bull, A Mayfield (1992) Growing Vetch – out of print

10 J Lamb, A Poddar (2008) Grain Legume Handbook for the Pulse Industry. Grain Legume Hand Book Committee, https://grdc.com.au/grainlegumehandbook