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JUNE 2018

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SECTION 3

PADDOCK PREPARATION

KEY POINTS | SOIL PREPARATION | STUBBLE | WEED CONTROL | CARRYOVER PESTS | CARRYOVER DISEASES

Paddock preparation

Key points

- **Sowing into paddocks with low broadleaf weed infestations is important, as vetch is a poor early competitor against weeds.**
- **Use integrated pest, disease and weed-management practices.**
- **Control the weed and volunteer 'green bridge' before seeding to minimise disease and pest carryover.**
- **Remediate soil constraints during the summer fallow period.**

FEEDBACK

MORE INFORMATION

Mingenew–Irwin Group Soil acidity management and lime calculator, http://www.mig.org.au/lime-calculator

For details on soil acidity and liming, see the following article by Brett Upjohn, Greg Fenton & Mark Conyers – 'Management of dispersive (sodic) soils experiencning waterlogging', Agfact AC. 19, 3rd edition 2005, https://www.agric.wa.gov.au/water-erosion/management-dispersive-sodic-soils-experiencing-waterlogging

VIDEO

On-farm story variable rate gypsum https://youtu.be/1RWI8KGqPtE

IN FOCUS

The approach to paddock preparation and sowing vetch is essentially the same as for other legume crops. However, as vetch is a poor competitor at emergence it is especially important to pay attention to detail at this stage to help ensure maximum production potential.

Vetch is a poor competitor at emergence so ensuring good paddock preparation maximises crop establishment.

3.1 Soil preparation

Testing for soil limitations and remediation should occur in the summer or autumn prior to sowing vetch.

3.1.1 Soil pH

While vetch is more tolerant of acid soils than most grain legumes it still prefers soil pH ($CaCl_2$) to be >5. Good yields have been grown in paddocks with pH as low as 4.5 ($CaCl_2$), where aluminium and manganese levels were low.

On soils with a pH <5.2 ($CaCl_2$) nodulation and consequently nitrogen fixation will be poor. Root growth may also be reduced in acid soils and soils with subsoil compaction.

Low pH can be remediated with an application of lime during the summer or autumn period, prior to seeding.

3.1.2 Hard setting and compaction

Both of these soil conditions can reduce root growth and free drainage, limiting vetch production.

Hard setting and surface crusting are often linked to sodicity. Exchangeable sodium percentage (ESP) is the measure for sodicity and soils with an ESP greater than six are considered sodic. Sodicity can generally be improved by the addition of gypsum.

Deep tillage and ripping are used to amend soil compaction and may also be used to achieve deeper incorporation of lime, gypsum and organic matter.

Implementing a controlled-traffic system after ripping can help minimise recompaction across a paddock.[1]

1 S Davies, T Overheu (2015), Management of dispersive (sodic) soils experiencing waterlogging Department of Agriculture and Food Western Australia, https://www.agric.wa.gov.au/sites/gateway/files/CU2013%20EOI%205%20-%20Paul%20Blackwell%20CSPB.doc

FEEDBACK

MORE INFORMATION

GroundCover™, 'Seeding non wetting soils', https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-107-novdec-2013/smart-new-way-to-place-seed-over-moisture

GRDC podcast, Sowing sandy soils https://grdc.com.au/~/media/Audio/GRDC-Radio-South/120-south.mp3

MORE INFORMATION

GroundCover™ TV, 'Stubble height and crop emergence' https://grdc.com.au/Media-Centre/GroundCover-TV/2015/01/GCTV15/XDTSbGcZxpM

MORE INFORMATION

Australian Pesticides and Veterinary Medicines Authroity, https://apvma.gov.au/

GRDC Fact sheet – Green bridge www.grdc.com.au/GRDC-FS-GreenBridge

GRDC Web resource Integrated Weed Management Hub https://grdc.com.au/Resources/IWMhub

Web resource or app HerbiGuide chemical labels http://www.herbiguide.com.au/

3.1.3 Non-wetting

In non-wetting soil, crop establishment can be improved with the use of sowing adjacent to last year's stubble row, soil-wetting agents, soil disturbance and the use of press-wheels. If non-wetting soil is severe, addition of clay is worthwhile if a suitable clay source is available.

In non-wetting soil, delaying sowing until the soil has become wet may be the best option. Dry sowing with seed furrows left to trap water may not work as furrows may become filled with soil before germinating rains occur.

3.2 Stubble

The surface retention of cereal stubble does not affect vetch germination or growth and may improve establishment on hard-setting, surface-crusting soils. It is important to keep adequate plant residues on the surface to protect the soil from moisture loss and erosion during establishment, growth and after harvest.

Standing stubble of the previous crop can also help create a trellis for vetch. However, in hay crops, this standing stubble can be included in the baled material and can reduce hay quality.

Infected stubble of host crops can be an important source of the diseases Aschochyta blight, Botrytis grey mould, chocolate spot and rust (see Section 2.3.1 Disease).

3.3 Weed control

Controlling weeds and volunteers as early as possible will help conserve soil moisture, reduce potential disease carryover and minimise blockages at seeding. Removal of weeds is important as vetch is a poor competitor at emergence and in-crop herbicide options are extremely limited.

3.3.1 Summer weed control

As a result of an increase in the use of no-till cropping and the incidence of summer weeds many growers have adopted a spray-fallow system, which predominantly uses glyphosate over summer to remove weeds and conserve moisture for the next crop.

To reduce the risk of glyphosate resistance developing in fallow weeds some growers are using weed-detecting technology (WeedSeeker®, WEEDit) to detect individual weeds that have survived the glyphosate application and spraying these with an alternative knockdown herbicide.

Weed-detecting technology uses optical sensors to turn on spray nozzles only when green weeds are detected, greatly reducing total herbicide use per hectare. The units have their own light source so can be used day or night. Moving from a blanket to a targeted application enables a higher herbicide rate per plant to be applied but, generally, much less herbicide per hectare.

The new technology also has the potential to map troublesome weed patches so that these areas can be targeted with a pre-emergent herbicide before sowing.

The use of selective grass herbicides and higher rates of paraquat and diquat (bipyridyl herbicides, Group L) are covered by a permit (PER11163), which is in force until 28 February 2019 and is for all Australian states.

This permit allows the use of about 30 different herbicides from seven different mode-of-action groups. Additional modes of action are likely to be added to the permit over time.

Some herbicide rates have been increased to enable control of larger or stressed weeds. For example, glyphosate (450 grams of glyphosate per litre) rates range from 3–4 L/ha (using a set water rate of 100 L/ha), which far exceeds the label blanket rates of 0.4–2.4 L/ha. Similar increases in rate have also been permitted for paraquat (e.g, Gramoxone®).

FEEDBACK

3.3.2 Removing the 'green bridge'

Vetch should be sown into a clean seedbed, with weeds and volunteers controlled with cultivation and/or herbicides prior to planting. If not achieved earlier, paddocks should be free of weeds for 2–3 weeks prior to seeding to prevent pest and disease carryover.[2]

Left uncontrolled, volunteers (see Section 2, Table 2) and weeds can result in the carryover of pests and diseases to the vetch crop.

A wide range of products are registered for controlling weeds in fallows. These including mixtures of paraquat (Group L) and diquat (Group L) and 2,4-D (Group I) and glyphosate (Group M).

Check plant-back periods before sowing vetch. For example, there is a 7–10 day plant-back period constraint before planting vetch following an application of 2,4-D (Group I).

There are no pre-planting residual herbicides registered for use with vetch crops in New South Wales or Queensland. Some formulations of trifluralin (Group D) are registered for pre-planting use in vetch crops in SA and WA, but not in NSW or Queensland.[3]

Self-sown vetch can itself become a 'green bridge' for pests and disease in the following season. Volunteer vetch seedlings need to be controlled early to minimise the effects of aphids, viruses and diseases in other pulse crops.

Photo 1: *Vetch is a poor competitor at emergence and in-crop herbicide options are limited, especially for broadleaf weeds. Controlling summer weeds and the 'green bridge' to minimise pest and disease carryover are essential tools in the successful production of vetch.*

Photo: Emma Leonard, AgriKnowHow

2 GRDC (2012) Green Bridge Fact Sheet. GRDC www.grdc.com.au/GRDC-FS-GreenBridge

3 G Charles (2006) Managing weeds in vetch rotation crops. WEEDpak NSW Department of Primary Industries http://www.insidecotton.com/xmlui/bitstream/handle/1/995/WeP%20I3%20Vetch%20management.pdf?sequence=30&isAllowed=y

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MORE INFORMATION

Timerite
www.timerite.com.au

3.4 Carryover pests

Carryover pests to considerer are mites, including balaustium and redlegged earth mite, aphids and lucerne flea. Removal of the green bridge will reduce the infestations of establishment pests in vetch and is an important part of integrated pest management (IPM) (Table 1).

Table 1: Best-bet IPM strategy, establishment to maturity.

	Post harvest	Pre-sowing
Earth mites and lucerne flea	**Assess risk.** **High risk when:** • history of high mite pressure • pasture rotating into crop • susceptible crop being planted (e.g. canola, pasture, lucerne, vetch) • seasonal forecast is for dry or cool, wet conditions that slow crop growth **If risk is high:** • ensure accurate identification • use Timerite® (redlegged earth mites only) • heavily graze pastures in early-mid spring	**If high risk:** • use an insecticide seed dressing which is compatible with rhizobia inoculum on susceptible crops (See Section 4.4) • monitor more frequently until crop establishment • use higher sowing rate to compensate for seedling loss • consider scheduling a post-emergent insecticide treatment. • earlier sowing into warm soil to give quick emergence and more vigorous seedlings **If low risk:** • avoid insecticide seed dressings • monitor until crop establishment
Slugs and snails	**Assess risk.** **High risk when:** • high stubble load • annual average rainfall >450 mm • history of slug infestations • canola being planted • summer rainfall • heavy clay soils	**If high risk:** • burn stubbles • cultivate worst areas • remove weeds in paddocks/along fencelines, at least eight weeks prior to sowing • deploy shelter traps prior to sowing • sow early to get crop established prior to cold conditions • use soil compaction at sowing (e.g. press wheels) • bait at or after sowing prior to emergence
Aphids – virus transmission	Control green bridge (in fallows) Sow virus-free seed Sowing into standing stubble may reduce aphid landing.	**Assess risk of aphid outbreak.** **High risk when:** • warm, mild conditions • abundant weed hosts • nearby food sources e.g. clover/medic Aim to close canopy and minimise gaps to outcompete infected plants.
Aphids – direct damage	Remove green bridge (aphid hosts) to minimise build up during autumn and spring. Sowing into standing stubble may reduce aphid landing and delay aphid build up in crops.	• Control in-crop weeds to minimise sources of aphids • Beneficial insects suppress low populations and reduce the chance of outbreaks. • High nitrogen may make the crop more attractive to aphids.

Source: IPM Guidelines for Grains (2013) http://ipmguidelinesforgrains.com.au/workshops/resources

FEEDBACK

MORE INFORMATION

GRDC Tips and tactics – Rhizoctonia
http://www.grdc.com.au/TT-Rhizoctonia

PestFax Map
https://www.agric.wa.gov.au/diseases/pestfax-map

3.5 Carryover diseases

Carryover diseases on vetch volunteers include rust and viruses. Other diseases are carried over on stubble and in the soil and these will not be controlled by green bridge management (see Table 2 and Section 2, Table 3). More detail on disease control is in Section 7 In-crop management – disease.

Table 2: Infection sources for major vetch disease.

Disease	Stubble	Seed	Soil	Aphids	Volunteer seedlings
Ascochyta blight	***	**	–	–	**
Botrytis grey mould	**	–	–	–	**
Chocolate spot	***	*	***	–	**
Rust	**	–	*	–	***
Seed-borne viruses	–	**	–	***	***
Non-seed-borne viruses	–	–	–	***	***

– Nil * Minor ** Moderate ••• Major
Source: PIRSA/GRDC (2010) Vetch: The Ute Guide – https://grdc.com.au/vetch-the-ute-guide