SOUTHERN
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GRDC GROWNOTES™

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

VETCH

SECTION 8

WEEDS

KEY POINTS | WEED MANAGEMENT IN-CROP | EFFECTIVE WEED CONTROL | TOLERANCE OF VETCH SPECIES TO A RANGE OF HERBICIDES | HERBICIDE MODE OF ACTION | AVOIDING HERBICIDE DAMAGE | HERBICIDE DAMAGE EFFECTS IN VETCH

In-crop management – weeds

Key points

- Use integrated approaches to pest, disease and weed management
- Controlling broadleaf weeds prior to emergence is vital as there are no in-crop options available
- Most grasses can be controlled with selective grass herbicides, unless resistance has developed

FEEDBACK

8.1.1 Weed management in-crop

Vetches provide a valuable opportunity to use alternative weed control practices to those used in cereal and oilseed phases. The opportunity to use grass herbicides, alternative herbicides and herbicide groups, as well as making hay, a green or brown manure crop and crop-topping, assists in reducing the soil seedbank and controlling some weeds.

However, there are only limited herbicides registered for use in vetch for grass control and for broadleaf weeds post-sowing pre-emergent (PSPE) herbicide is the only option.

Herbicides that require incorporation by sowing (IBS) are only registered for use with knifepoint, press-wheel seeding systems. Residues from unregistered chemicals can be detected in forage, seed and, if these are fed to livestock, these can also be detected in products (milk, meat or offal).

Even registered herbicides can cause some crop damage (Section 8.4 Herbicide damage effects in vetch) and registrations vary between states. Vetch species can differ in their tolerance to the same herbicide application in different seasons or conditions

Most grass weeds can be controlled either pre or post-emergence. For example, diuron can be used IBS or PSPE and metribuzin PSPE. Take care to apply the herbicide at the right growth stage of both vetch and weed. Always consult the label.

Weeds such as bedstraw and biofora once limited the planting of vetch but can be controlled with products containing mixes of paraquat and diquat (e.g. Revolver®).

Flumetulam (Broadstrike®) is only registered for use on in Popany vetch, for control of weeds such as bedstraw.

Poor early crop competition can also result in ryegrass infested crops, but crop topping, harvesting as forage or green/brown manuring helps make vetch a more robust part of a rotation.

Crop-topping or desiccation may reduce vetch yield, depending on the crop stage at application, but reduces the seed set of weeds, allowing minimal or no movement of the weed population towards herbicide resistance (Section 11.3.2).

Always check and abide by herbicide product labels consult the Australian Pesticides and Veterinary Medicines Authority website (https://portal.apvma.gov.au/pubcris).

Photo 1: *Unregistered herbicides are being used by farmers to successfully control grass weeds in vetch crops but these can have a negative impact on vetch production depending on the season, environment and wetter used. Further research is required on these products, so registered herbicide options remain limited and registrations vary between states.*

Photo: Emma Leonard, AgriKnowHow

MORE INFORMATION

CropLife Austrlaia, Herbicide Resistance Management Strategies – https://www.croplife.org.au/resistance-strategy/2017-herbicide-resistance-management-strategies/

GRDC Cropping with herbicide resistance Fact Sheet – https://grdc.com.au/resources-and-publications/all-publications/factsheets/2012/05/herbicide-resistance

GRDC Integrated Weed Management Hub – https://grdc.com.au/resources-and-publications/iwmhub

GRDC Integrated Weed Management Hub – Common weeds of cropping – https://grdc.com.au/resources-and-publications/iwmhub/common-weeds-of-cropping

FEEDBACK

IN FOCUS

8.1.2 Effective weed control

- Prevent weed seedset to ensure a low weed seedbank.
- Control weeds as early as possible.
- Control when weeds and crops are at the correct growth stage.
- Apply post-emergent grass herbicides while canopies still allow adequate spray coverage of weeds.
- Do not spray when weeds or the crop are under stress.
- Check the 'rainfast' period prior to rain.
- Do not spray in windy conditions over 15 km/h.
- Use the right nozzle output and droplet size to ensure adequate coverage.
- Ensure the spray rig is properly cleansed of damaging residual chemicals.
- Check the withholding period for grazing and harvest.

8.1 Tolerance of vetch species to a range of herbicides

Although there is a range of grass herbicides that are able to be applied to vetch, only flumetsulam is registered for post emergent application for broadleaf weeds and only in Popany.

The vetch groups vary in their tolerance to various herbicides, with the purple vetch variety, Popany often being most tolerant and of late enough maturity to be able to recover from any herbicide effects (Table 1).

Table 1: Tolerance of vetch species to herbicides used at different growth stages.

	Herbicides						
Vetch species	**Timing**	**Before sowing**	**Incorporated by sowing (IBS) or post-sowing pre-emergence (PSPE)**	**Post-sowing pre-emergence (PSPE)**		**Post-emergence**	
	Herbicide	Trifluralin	Diuron	Metribuzin	Cyanazine SA only	Grass herbicide e.g. fluazifop	Flumetsulam
	Herbicide Group	Group D	Group C			Group A	Group B
Common	High	High	High	High	High	High	Not registered
Woolly pod	High	High	Not registered	High	High	High	Not registered
Purple	High	High	Not registered	High	High	High	High

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

FEEDBACK

8.2 Herbicide mode of action

The main reason for the development of herbicide resistance is because of the repeated and often uninterrupted use of herbicides with the same mode of action.

Selection of resistant weed strains can occur in as little as 3–4 years if no attention is paid to resistance management.

All herbicides sold in Australia are grouped by mode of action. The mode of action is indicated by a letter code on the product label. The mode of action labelling is based on the resistance risk of each group of herbicides.

Groupings of herbicides have changed over the years to improve the accuracy and completeness of the modes of action. Ultimately, this enables informed decisions to be made about herbicide rotation and resistance management.

All herbicide labels now carry the mode of action group clearly displayed. This enables users to better understand the mode of action grouping and resistance risk by reference to the mode of action chart.

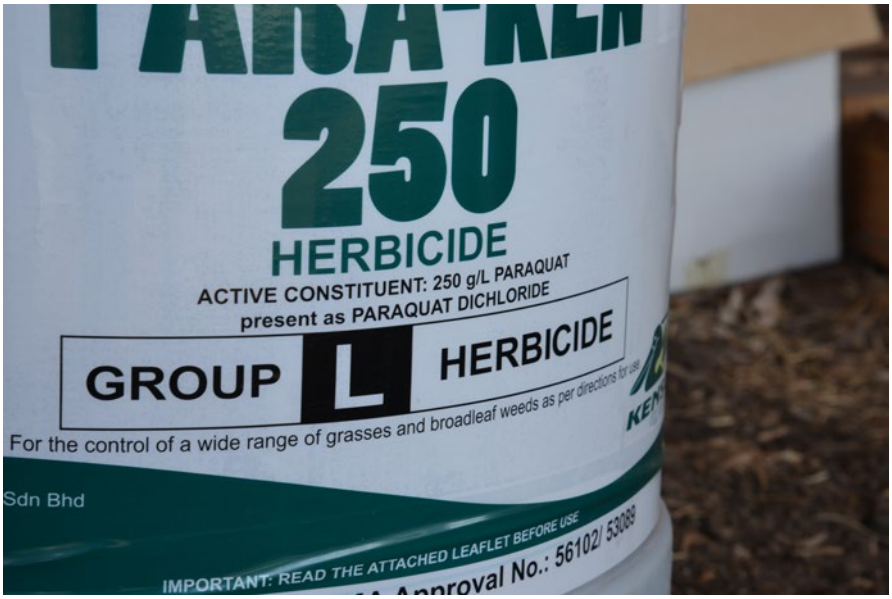

Photo 2: *All herbicides sold in Australia are grouped by mode of action. The mode of action is indicated by a letter code on the product label. The mode of action labelling is based on the resistance risk of each group of herbicides.*

Photo: Emma Leonard, AgriKnowHow

FEEDBACK

8.3 Avoiding herbicide damage

Most IBS and PSPE herbicides can cause damage in vetch. In most cases this is due to:

- product solubility and sowing too shallow
- accumulation of herbicide into furrows from press-wheels
- run-off from non-wetting inter-rows
- an uneven soil surface.

Damage can be worst in lighter-textured soils (especially sands) and soils with low organic matter. Herbicide applied to dry soil followed by heavy rainfall can wash into the root zone, causing serious damage to the emerging crop.

Herbicide crop injury symptoms can be confused with symptoms produced by other causes, such as from frost, disease, nutrient deficiencies or toxicities (See Section 10, Table 1). Checking affected crops for missed strips and for differences in damage due to changes in soil type can help identify the cause of the damage. Symptoms of crop damage from herbicides do not always mean there will be a lower yield.

To reduce the risks of herbicide damage when using soil-active products PSPE:

- Sow at 5 cm or deeper – vetch can readily emerge from at least this depth, especially in lighter soils.
- Apply the herbicide to a level soil surface (such as after prickle chaining, rolling).
- Ensure rolling after press wheels levels the ridges (see Section 4.8).
- Avoid applying herbicide post-sowing to dry soils before heavy rainfall.
- Choose the right rate for your soil type (lower rates for lighter soils).
- Split the application between IBS and PSPE.

A collaborative project in the GRDC Crop Sequencing Initiative used three herbicides: clethodim (not registered for use in vetch), haloxyfop and glyphosate for grass removal or spray-topping in Morava$^{\Phi}$ vetch. Trials assessed the herbicides' impact on biomass production and nitrogen fixation.

In a trial at Boree Creek, NSW, glyphosate was the only chemical to suppress both dry matter and nitrogen fixation, slashing peak biomass production from 6.1 t/ha for the untreated control to 3 t/ha when glyphosate was used to crop-top in August.[1]

8.4 Herbicide damage effects in vetch

The following damage symptoms may arise from herbicide application, misapplication/drift or residual herbicide in the soil. Chemicals should only be applied in accordance to the label.[2]

8.4.1 Group A

Description

Grey or brown spots on leaves which do not necessarily show through both sides. Herbicide (e.g. Group A) applied at high temperature with oils or surfactants added. Leaf burning from trace element foliar applications. Damage is increased by frost or high temperatures soon after spraying.

Management

Be alert to label restrictions for temperature, frost, water rates, droplet size, additives and adjuvants.

MORE INFORMATION

Herbicide modes of action, Croplife: http://www.croplife.org.au/industry-stewardship/resistance-management

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

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

FEEDBACK

8.4.2 Group B

Description

Visual symptoms appear 5–8 days after spray application or where there are residues in the soil. Seedlings may emerge and grow for several weeks before plants become stunted with shortened internodes. New foliage is yellow to red to purplish, progressing throughout the plant. Leaf curl may be apparent. Growth of lateral roots may be reduced.

Management

Follow plant-back periods as indicated on label. Group B herbicide can result in more crop damage when applied where Group B residues exist.

Cold, wet conditions, conditions that stress and prevent plants from recovering, zinc deficiency and compacted soil (such as wheel tracks) can be contributing factors. Grass herbicides can strip Group B residues from the spray boom and tank – ensure correct decontamination procedure.

8.4.3 Group C

Description

Visual symptoms appear as weeds emerge (where soil-applied) or 4–6 days after spray application to emerged weeds. Rapid yellowing and necrosis beginning at the edge of leaves leads to their desiccation and burnt appearance. Interveinal chlorosis or veinal chlorosis can occur. Tolerant plants (crops) usually recover.

Management

Follow plant-back periods as indicated on the label where soils are alkaline and calcareous, leachable with low organic matter, or of lighter texture. Duplex soils with shallow sand over heavy clay also present a risk of damage. Damage is most likely from herbicide leaching into seed furrows after heavy rainfall in ridged soils, where there is water harvesting off non-wetting inter-rows and in shallow-sown crops.

8.4.4 Group D

Description

Visual symptoms appear as the crop emerges with intermittent emergence along drill rows as a result of shortening and thickening of the hypocotyl.

Seeds germinate, but shoots are unable to emerge.

Emerging leaves in affected plants may be twisted and distorted.

Roots can be shortened and thickened.

Management

Avoid sowing seed into the layer of herbicide-treated soil. This results from the seeder set-up causing variable depth of sowing, or sowing too fast, throwing herbicide-treated soil on to adjacent furrows.

Symptoms are often worse where wet, cold conditions slow germination and emergence.

FEEDBACK

8.4.5 Group F

Description

White/yellow spots/bands may develop within 3–4 days after application (2 days in bright, sunny weather). Plants turn light green and whole leaves turn yellow to cream colour for 4–6 weeks.

Effects may disappear as new growth develops with no long-term effects.

Management

Effects are worse in lighter soils and when applied to crops suffering stress such as frost, cold, wet conditions or high temperatures soon after spraying.

8.4.6 Group G

Description

Numerous white spots on the leaves from the droplets of herbicide contact within 1–2 days of application.

May lead to desiccation and death in vetch although grasses and cereals generally recover.

Management

Ensure that herbicide drift does not occur on vetch crops, especially where fine droplets are targeted for the use of products as indicated by the label.

8.4.7 Group J

Description

Visual symptoms appear underground or as the crop emerges, with reduced or poor seedling emergence.

Shoots, if emerged, are often swollen and bright green.

Roots are often pruned, leaving stubby root knobs.

Management

Ensure seed is not sown into the band of herbicide in the soil. Effects are worse when wet, cold conditions slow germination and emergence.

8.4.8 Group K

Description

Visual symptoms appear as the crop emerges, with reduced or poor seedling emergence.

Seedlings are malformed and twisted, with transitory crop yellowing. In most cases weeds do not appear.

Management

Ensure seed is not sown into the band of herbicide in the soil.

Effects are more severe in light-textured soils with low organic matter, in waterlogged conditions, where crops are stressed from lack of moisture or lack of nutrients, and when frost occurs within 10 days of application.

FEEDBACK

8.4.9 Group L

Description

Visual symptoms appear within hours of application, with spots of dead tissue on otherwise healthy leaves. There may also be wilting and interveinal yellowing followed by browning and blackening of the leaf edges.

Plants shrivel up within 4 days of application if damage is severe.

Signs are often worse on one side of the plant or stem.

Effects disappear as new growth develops.

Management

Ensure that herbicide drift does not occur on to vetch crops.

8.4.10 Group M

Description

Symptoms are most obvious at growing points within 5–7 days of application.

Plants are stunted (growth stopped until recovery or death) with leaves turning yellow to red, followed by browning.

There may be some twisting of plants.

Plants look flaccid and tend to lie on the soil surface.

Management

Ensure that herbicide drift does not occur onto vetch crops.