

Arable Update



Herbage: Issue 81

Managing small broomrape in clover

Introduction

Small broomrape (*Orobanche minor*) is a parasitic weed that is becoming an increasing problem in clover seed crops in New Zealand. It is considered a notifiable weed in some countries, and is causing difficulties for seed companies in producing crops that pass field inspections, particularly for markets such as South America where crops must be free of the weed at inspection.

This Arable Update describes the biology of small broomrape and initial data on control options including herbicides and their application timing.



Small broomrape emerging in a clover seed crop.

Biology and Lifecycle

Small broomrape spends most of its lifecycle below ground, undergoing germination, penetration of the host, vascular connection, and nutrient acquisition. Seeds will not germinate without the presence of a host or certain “false host” plants. Attachment to the clover root system by the haustorium (the rootlike structure that penetrates the host plant tissue to take up nutrients) occurs during the winter months. Some false hosts commonly found in arable rotations, including wheat, ryegrass (annual and perennial), barley, oat, and tall fescue, can trigger germination, but the small broomrape’s haustorium is unable to attach to their roots. False hosts alone do not provide adequate control to pass field inspection, but can reduce soil seed loads though time.

A single *Orobanche minor* plant can produce up to 500,000 seeds, which may remain viable in soil for up to 50 years. Emergence of the weed generally occurs from late October or early November through at least January, with the first seeds typically maturing in mid to late December. Mature flower stalks are typically 10 to 50 cm tall and lack chlorophyll. Literature indicates that once flowering has started, removal of flower stalks does not prevent seed maturation. Second-year clover crops appear to have higher levels of broomrape and earlier emergence.

There are currently no comprehensive data on clover crop losses due to infection; however, losses are believed to be minimal in healthy, irrigated crops, while stressed crops, such as those under dryland conditions, may experience more substantial impacts.

Key points

- Small broomrape (*Orobanche minor*) is a parasitic weed that is becoming an increasing problem in clover seed crops.
- Each plant can produce up to 500,000 seeds, which may remain viable in the soil for as long as 50 years.
- Herbicide options for control are limited, and precise timing of application is essential to target weed emergence.
- A 2023–24 trial indicated that a spring application of imazethapyr (mode of action group 2) applied after the predicted emergence of small broomrape shows potential for effective control.

Control options

Chemical control options for small broomrape are limited. Herbicides that do not readily translocate through the host plant have little effect because the weed relies entirely on the host for nutrients and water. Herbicides targeting photosynthetic pathways are also ineffective since the weed does not photosynthesize. Effective control requires the herbicide to be absorbed by the clover and translocated to the attached broomrape.

Field observations in Canterbury

Observations over the last two springs indicate that the first small broomrape plants usually emerge in early November. In first-year clover crops, small broomrape is likely to emerge in late November or December. Second-year clover crops exhibit higher infestation levels and earlier emergence. The first mature seeds appear in mid to late December, with the emergence period extending from late October or early November through to at least January.

FAR herbicide trial results from the 2023-24 and 2024-25 seasons

A trial at the FAR Chertsey Arable site in 2023-24 showed promising results for spring applications of imazethapyr (Mode of Action Group 2) as a chemical control. Seed was collected and spread over the trial area in the previous two autumns. Herbicide treatments of imazethapyr (Equate® etc.) and flumetsulam (Preside™) (both MOA Group 2) were then applied in the spring of 2023-24 as the most likely herbicides to control small broomrape.

Overseas literature suggested that herbicides must be applied before emergence to be effective. A growing degree day model was produced by Oregon State University to predict life stage, which was adjusted to New Zealand and predicted emergence well. Timings of herbicide applications in the trial were used to coincide with when the model predicted emergence.

In the trial, all plots in which Imazethapyr was applied had no small broomrape emerge whereas 82% of plots without Imazethapyr had at least some small broomrape, regardless of timing of herbicide application.

A second trial was conducted during the 2024–25 season; however, small broomrape infestation levels were too low to determine which herbicide treatment was most effective. Future evaluations of herbicide options for small broomrape control will be incorporated into broader clover weed management trials.

Table 1. Mean small broomrape (SBR) stems per plot following treatment with different herbicides in a clover seed crop trial conducted at the FAR Research site in Chertsey, Canterbury during the 2023–2024 season. Small broomrape stem data represent counts on 14 December 2023.

Herbicide product and date of application				Mean number SBR stems
Tmt. No.	25/09/2023	13/10/2023	16/11/2023	14/12/23
1	Negative Control			20.6
2	Imazethapyr (G2)			0
3	Imazethapyr (G2)	Imazethapyr (G2)		0
4	Imazethapyr (G2)		Imazethapyr (G2)	0
5	Flumetsulam (G2)			23

Treatments included: Equate® (240 g/L imazethapyr) at 400 mL/ha with Hasten™ (704 g/L ethyl and methyl esters of canola oil fatty acids with 196 g/L non-ionic surfactants) at 500 mL/ha, and Preside™ (800 g/kg flumetsulam) with Uptake™ Oil at 1 L/ha. G2 indicates Mode of Action Group 2.

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