

Ramularia leaf spot in barley



Symptoms and importance

Strong sunlight, prolonged leaf wetness, agrochemical scorch and nutritional stress can all trigger physiological leaf spots associated with infections of the fungus *Ramularia collo-cygni* in barley.

Symptoms comprise small brown rectangular lesions with yellow margins within leaf veins. Lesions occur on green and dead leaves, where brown spots remain visible. Rows of spores can be seen with a hand lens on the undersides of affected leaves.

Ramularia leaf spot poses the greatest threat to spring malting barley crops. While most common in northern Britain, it can occur UK-wide as well as in Ireland, France, Germany, Scandinavia and other northern European countries. Though less common, ramularia on winter barley (feed and malting) can act as a source of inoculum for the spring crop.

Physiological leaf spots can be easily mistaken for net blotch. Diagnostics can help determine the real cause. Ramularia also impairs quality and can increase screenings by up to 4%.

Other leaf spots caused by oxidative stress tend to be superficial browning on upper leaf surfaces, while the undersides are unaffected. Physiological leaf spots cause less yield loss, but trigger the production of ramularia leaf spots.

Varietal resistance

Spring barley varieties show different levels of resistance (Table 1), but no variety is fully resistant. Potential yield losses range from 0.9t/ha in Optic, down to 0.1t/ha in Decanter. The average yield loss in high disease risk sites is 0.4t/ha.

Malting crops are affected more than feed barley. This may be because malting varieties are more susceptible; they are also subjected to greater stress as less nitrogen is applied.

Winter barley varieties are also susceptible, but economic loss is rare since the disease develops late in the season.

Action

Consider treatment need of your current crop in light of losses in recent years due to ramularia on your farm.

If treatment for ramularia is considered necessary, use a preventative spray **before symptoms appear** at boot stage – awns peeping (GS45-49).

For ramularia control, apply a mixture of either prothioconazole or epoxiconazole with chlorothalonil. Consider a strobilurin fungicide as well for broad-spectrum disease control.

Do not apply the mildew fungicide fenpropimorph at GS49 as this may increase spotting.

Always consider your local conditions and consult a professional agronomist if necessary.

Table 1. SAC resistance ratings to ramularia leaf spot in spring barley

Variety	Resistance rating	Variety	Resistance rating	Variety	Resistance rating
Cocktail	4	NFC-Tipple	6	Waggon	7
Doyen	4	Oxbridge	6	Rebecca	7
Troon	5	Wicket	6	Static	7
Cellar	5	Spire	6	Riviera	7
Optic	5	Quench	7	Appalossa	8
Chalice	5	Publican	7	Decanter	8
Kirsty	5	Westminster	7	Power	8

Rating based on 1-9 scale (not given on HGCA Recommended List). High number indicates higher resistance to ramularia.

Life cycle

Infected seed is the main source of ramularia in spring barley. Infection can also result from spores on grasses and winter barley.

The ramularia fungus will spread from infected seed and grow inside barley leaves as they develop, causing no visible symptoms. Dying leaves may show signs of infection throughout the season, but the main damage occurs on the top leaves after flowering.

At flowering, food reserves produced in upper leaves are diverted to the grain. This triggers production of a toxin, which scorches and eventually kills leaves in the presence of light. Symptoms are most common on the most exposed upper leaves.

Typical ramularia leaf spot lesions can now form. Wind spreads spores from lesions to infect other plants, particularly when leaves are wet.

Forecasting

A forecast is being developed based on variety, weather (rainfall and leaf wetness) and presence of spores, and including region. The forecast will help growers assess the risk of crop loss as the disease spreads.

Susceptible varieties are at risk if leaves remain wet for several days before GS49. Prolonged sunshine following wet spells will increase severity.

Control

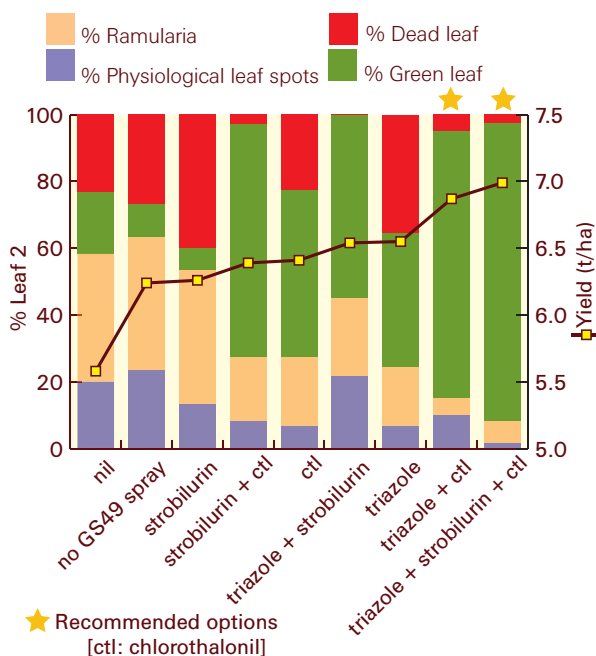
Current data indicates that ramularia is not controlled by seed treatments or fungicides applied at tillering.

Trials were carried out in Perthshire to determine effects of various fungicides and combinations on disease and yield. Figure 1 shows the effects on percent disease and distinguishes spots caused by ramularia and stress effects (physiological spots).

Prevention with fungicides can be effective (Table 2) but correct timing is critical. Fungicides should be applied before symptoms are likely to develop, preferably at the boot to awns peeping stage (GS45-49). For information on fungicide doses see www.sac.ac.uk/crops and open the 'Fungicide Dose Curves' window.

Prevention with fungicides can be effective (Table 2) but correct timing is critical. Fungicides should be applied before symptoms are likely to develop, preferably at the boot to awns peeping stage (GS45-49). For information on fungicide doses see www.sac.ac.uk/crops and open the 'Fungicide Dose Curves' window.

Figure 1. Example of effects of various fungicide options on percent disease and yield



★ Recommended options [ctl: chlorothalonil]
Sprays were applied at GS49 to spring barley variety Optic in Perthshire in 2005. Triazoles used were epoxiconazole and prothioconazole; strobilurins were azoxystrobin and fluoxastrobin. A standard GS25 fungicide spray was applied to all, except the 'Nil,' treatment.

Overview

An increased incidence of leaf spotting in barley in recent years has reduced yields for some farmers, especially of malting crops in northern Britain. HGCA-funded projects have shown how a fungus, ramularia, and stress conditions interact to cause spotting. A current project is investigating disease prediction and control.

Highlights

Variety choice is important to minimise disease risk. Control measures – usually a triazole: chlorothalonil mixture spray at GS45-49 - need to be applied before symptoms appear.

Further information

Dr Simon Oxley,
Scottish Agricultural College
simon.oxley@sac.ac.uk

TN568: Barley Disease Control
(available on SAC and HGCA websites)

Topic Sheet 57

Project Report 282

Ongoing project 3024

The Home-Grown Cereals Authority (HGCA) has provided funding for this project but has not conducted the research or written this report. While authors have worked on the best information available to them, neither the HGCA nor the authors shall in any event be liable for any loss, damage or injury howsoever directly or indirectly in relation to the report or the research on which it is based.

Reference herein to trade names and proprietary products without stating that they are protected does not imply they may be regarded as unprotected and thus free for general use. No endorsement of named products is intended, nor is any criticism implied of other alternative, but unnamed products.

Table 2. Fungicide options at GS45-49 for ramularia leaf spot control

Partner 1	Partner 2
prothioconazole	chlorothalonil
fluoxastrobin + prothioconazole*	chlorothalonil
boscalid + epoxiconazole*	chlorothalonil
prothioconazole	azoxystrobin + chlorothalonil*
epoxiconazole	azoxystrobin + chlorothalonil*

*Formulated mixtures