YELLOW SPOT

FACT SHEET

GRDC Grains Research & Development Corporation

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WESTERN REGION

Management to reduce the risk of yellow spot

A break from wheat-on-wheat, stubble management and growing resistant varieties are important risk-reducing practices for the stubble-borne disease yellow leaf spot.

PHOTO: MANISHA SHANKAR

Yellow spot causes tan-coloured lesions on the leaves that are surrounded by yellow halos. Where these lesions occur near the leaf tip, the end of the leaf rapidly turns yellow (chlorosis) and dies back.

KEY POINTS

- A one-year break from wheat and practices that reduce surface stubble, decrease inoculum levels and provide control.
- If wheat-on-wheat must be grown, avoid sowing susceptible varieties into last year's wheat or barley stubble.
- Temperatures of 15°C to 28°C, with up to 12 hours of leaf wetness, are optimal conditions for infection.
- Typical tan-coloured lesions surrounded with yellow halos on leaves and distinctive black fruiting bodies on stubbles are good diagnostic indicators of yellow spot infection.

What is yellow spot?

Yellow spot, caused by the fungus *Pyrenophora tritici-repentis,* is an important stubble-borne disease of wheat. While the primary infection originates from wheat stubble, the secondary infection occurs in the crop canopy and can be spread by wind.

This fungal infection reduces the photosynthetic area and can result in reduced grain yield. Trials in Western Australia have reported up to a 20 per cent yield reduction in infected very susceptible varieties.

This disease is also known to as yellow leaf spot and tan spot.

Host range

The fungus can infect all bread wheat, durum and triticale varieties, although most triticales have good resistance. As plants mature they become more prone to saprophytic infection, so the stubbles of any variety can host the fungus.

Yellow spot does not affect oats or green barley plants, although barley stubbles can host the pathogen and generate inoculum for the following season.

Risk factors

Farm practices such as minimum tillage, stubble retention, wheat-after-wheat crop sequences and growing susceptible wheat varieties (Table 1) are the main factors that increase the risk of yellow spot.

Table 1 Examples of yellow spot resistance ratings in wheat varieties grown in the western region

Variety	Disease rating
AGT Katana(◊)	MS
AGT Scythe(◊)	MS-S
Annuello(◊)	MS-S
Arrino	MS
Axe(◊)	VS
Binnu(◊)	S
Blade	MS
Bolac(◊)	S-VS
Braewood(◊)	S
Bullaring(◊)	S-VS
Bumper(◊)	MR-MS
Cadoux	S-VS
Calingiri	MS
Camm(◊)	S-VS
Carinya(◊)	S
Carnarmah	MR-MS
Cascades	MS
Catalina(◊)	MS-S
Clearfield JNZ(◊)	MS-S
Clearfield STL(◊)	MS-S
Correll(◊)	S-VS
Datatine	S-VS
Derrimut(◊)	S-VS
EGA 2248(◊)	S-VS
EGA Bonnie Rock(◊)	MR-MS
EGA Bounty(◊)	MR-MS
EGA Eagle Rock(◊)	S
EGA Gregory(◊)	S
EGA Jitarning(◊)	S-VS
EGA Wentworth(◊)	S-VS
Ellison(◊)	MR
Endure(◊)	S-VS
Eradu	S
Espada(◊)	MS-S
Estoc(◊)	Sp
Fang(◊)	MS
Fortune(◊)	MS-S
Frame	S-VS
GBA Ruby(◊)	MR
GBA Sapphire(◊)	S-VS
Gladius(◊)	MS
H45(◊)	MR
H46(◊)	MR
Halberd	S
Jandaroi(◊)	MR-MS
Janz	VS
Kalannie	S-VS
King Rock(◊)	MR-MS
Kunjin(◊)	S-VS
Lincoln(◊)	MS
Mace(◊)	MR-MS
Machete	S
Magenta(◊)	MR
Mitre(◊)	S-VS
Perenjori	MS
Preston(◊)	-
Scout(◊)	Sp
Spear	S-VS
Stiletto	S-VS
Tammarin Rock(◊)	S-VS
Tincurrin	S-VS
Wedin(◊)	S
Westonia	MS-S
Wilgoyne	MS-S
Wyalkatchem(◊)	MR
Yandanooka(◊)	MS
Yitpi(◊)	S-VS
Young(◊)	MS-S
Zippy(◊)	MS-S

MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, Sp = susceptible (provisional assessment)

SOURCE: THE WHEAT VARIETY GUIDE FOR WA 2011

Weather conditions are an important risk factor. Infection by the fungus is much greater where moist conditions extend over longer periods during the growing season. Temperatures of 15°C to 28°C together with six to 12 hours of leaf wetness or dew are optimal for infection. Incidence and severity of the disease increase as moisture periods lengthen.

Symptoms

P. tritici-repentis is a necrotrophic fungus causing death of the host tissues. Although all above-ground plant tissues are susceptible to infection, the fungus initially attacks the leaves. This produces typical tan-coloured lesions surrounded by yellow halos.

When conditions are favourable, lesions expand, coalesce and produce large areas of yellow diseased tissue. Severely diseased leaves wilt and die prematurely. The reduction in photosynthetic area of leaves can affect grain fill, particularly when flag leaves succumb to infection.

In very wet springs severe yellow spot infection can also cause bleaching symptoms on glumes and pink pigmentation on grain, which affects saleability.

In Western Australia, where septoria nodorum blotch (*Stagonospora nodorum*) is common, the symptoms of both pathogens can be easily confused. Correct identification usually requires microscopic observation of spores produced after leaves are placed in a humidity chamber. However, as in-crop management is similar for both diseases laboratory identification is generally not required.

Yellow spot symptoms

PHOTO: HUGH WALLWORK

In summer and autumn, black fruiting bodies on stubble indicate the presence of yellow leaf spot inoculum (above).

PHOTO: DAFWA

In adult stages yellow spot lesions are usually more defined with less chlorosis. In wet springs infection may be seen as pink staining on glumes and seed.

PHOTO: DAFWA

Disease cycle

The fungus *P. tritici-repentis* survives as mycelium in crop stubble and plant debris for up to two years, although relatively poorly after 18 months (Figure 1).

In autumn/winter this mycelium develops sexual fruiting bodies (pseudothecia), which appear as black, pinhead-sized, raised structures with hair-like projections. These fruiting bodies are particularly common around the stem nodes.

Primary infection is mostly initiated by sexual spores (ascospores) that are shot out of the pseudothecia, infecting young plants adjacent to the infected stubble.

Secondary spread within the crop occurs under moist conditions. This is initiated by the production of conidia spores on dead leaf tissue. Conidia travel long distances on the wind and are responsible for developing later infections within the crop canopy, as well as infecting distant crops and stubbles.

Pathogen variability

There is no clear evidence of different strains (pathotypes) of *P. tritici-repentis,* although some slight differences in variety ratings are recorded in different regions. No variety has been shown to lose resistance to new strains within a region.

Management

Crop rotation

Yellow spot survives between crops on cereal stubbles. After a very dry season the fungus may survive more than 18 months and infect second-year crops. In most instances, a one-year rotation out of wheat is highly effective in reducing early disease occurrence.

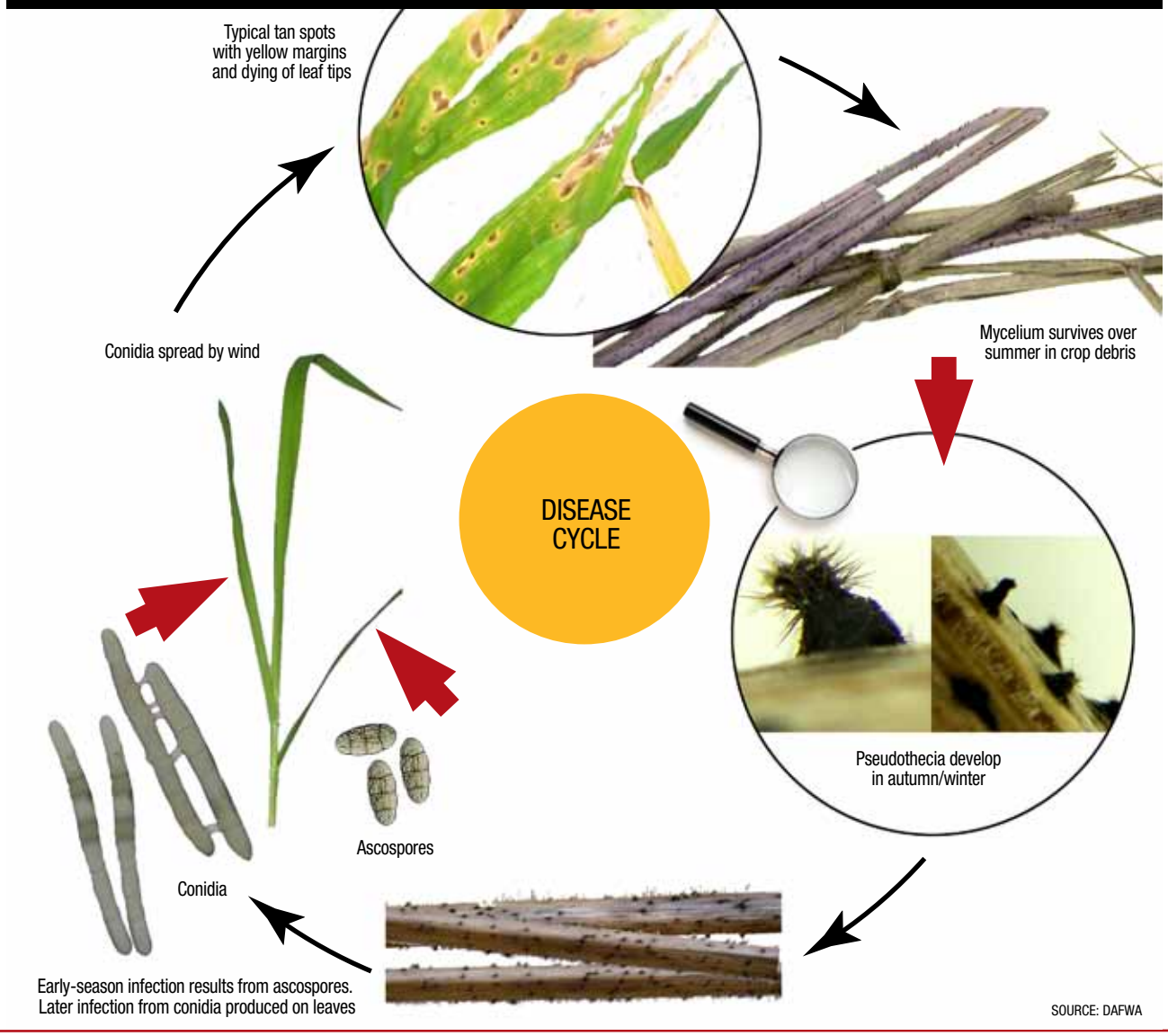
Stubble management

Any practice that reduces stubble density on the surface will reduce the level of inoculum. Surface stubbles may be reduced by tillage, burning or grazing. Stubble reduction must be balanced against the increased risk of soil erosion by wind or water, especially in light soils. Stubble management will not reduce disease caused by spores blown in from other fields later in the growing season.

Resistance in varieties

Variety choice has a major influence on yellow spot development in crops.

Figure 1 The disease cycle of yellow leaf spot *Pyrenophora tritici-repentis*



Expression of resistance ranges from moderately resistant (MR) to very susceptible (VS) (Table 1). Where wheat is to be sown into wheat stubbles it is best to avoid varieties that are rated susceptible (S), S-VS or VS.

Fungicides

When considering fungicide use it is important to ensure that symptoms observed are due to the disease and not to other factors (for example, nutritional disorders or environmental stresses).

In Western Australia, yellow spot frequently occurs together with septoria nodorum blotch and application of fungicides is an option for controlling both these diseases.

Prosaro®, Amistar Xtra® and products incorporating propiconazole and tebuconazole are all registered for the control of yellow spot. They are likely to deliver yield benefits provided the symptoms have been correctly diagnosed, moist conditions persist and they are applied at appropriate times. Time of application is dependent on disease severity and seasonal conditions.

PHOTO: MANISHA SHANKAR

Fungicides can provide up to three weeks of protection against yellow spot but the economics of fungicide control will depend on the timing of disease development and if moist conditions persist in spring.

When there is high disease pressure early in the season (for example, where a susceptible wheat variety is sown into the previous year's wheat stubble), a fungicide spray between early tillering and stem elongation may be required to reduce the disease pressure and provide yield benefits. This may be followed by a second spray after flag leaf emergence, especially during wet spring conditions.

When disease appears mid/late season the most profitable use of fungicide is to apply a single, well-timed spray between flag leaf emergence and early head emergence. Spraying will be most effective if done before the upper two or three leaves (flag, flag-1 and flag-2) become diseased. However, fungicide applied later than flag-leaf emergence in the season is unlikely to provide economic returns in environments with minimal spring rainfall.

Frequently asked questions

How much yield loss is likely to be caused by yellow spot?

Providing that the spring is not exceptionally wet, it is unlikely for yield losses to exceed 15 per cent, even if a particularly susceptible variety is grown. Yield losses may be higher when exceptional weather conditions occur in areas predominantly growing wheat-on-wheat.

A young wheat crop has severe yellow spot. Should a fungicide be applied?

If the late winter/early spring weather forecasts suggest that prolonged leaf wetting either from dews or rainfall will occur, then a fungicide may provide useful protection for up to three weeks. If conditions are warm and dry it is likely that the crop will grow away from the problem with little benefit from a spray.

How is yellow spot identified in a crop?

In autumn and winter, look at the stubbles around the plants and determine whether there are any of the distinctive fruiting bodies of the fungus. They tend to be more common around the old nodes of the stems.

Useful resources

Project codes: DAW00206; DAW00210; DAS00099

- **Cereal Leaf and Stem Diseases** — http://www.sardi.sa.gov.au/crops/wheat__and__barley/publications
- **Wheat variety guide for WA 2011** — http://www.agric.wa.gov.au/objtwr/imported_assets/content/fcp/cer/wh/bn_wheat_variety_guide_2011.pdf
- **National Variety Trials** — www.nvtonline.com.au
- **GRDC Disease Links** — www.grdc.com.au/diseaselinks

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