

Yellow leaf spot – Is it worth spraying?

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Take home messages

- **Control inoculum levels and you can control this disease**
- **Return on fungicide inputs for this disease are inconsistent**
- **Rotation is your friend, use it!**

Introduction

If you only read this one sentence you will know a great deal of what there is to know in avoiding yellow leaf spot (YLS) epidemics in the majority of seasons in SNSW; don't sow susceptible varieties into stubbles containing moderate to high levels of inoculum. It's really that simple. If you still want to learn more about this disease then read on for information about the pathogen and how to reduce the impact it can have on your crops.

Know your enemy

Yellow leaf spot or Tan spot is caused by the pathogen *Pyrenophora tritici-repentis*. This is a necrotrophic fungus which means it spends part of its life on dead plant material. In this case the leaves and stems of wheat and many other species such as barley. Yellow leaf spot produces inoculum in two different forms, firstly ascospores which are mainly produced on the stubble and are important for the early season infection of the young crop. The second form is called conidia which grow mainly on the infected dead leaf tissue (lesions). These spores are important for the movement of the pathogen up the plant through the season. These spores require the presence of free moisture on the leaf surface for at least 6 hours for infection to be optimal.

This pathogen is favoured by the practice of stubble retention because it increases its survival between seasons. This is an important feature to remember as it also gives us the knowledge to manage the disease so that the risk of significant yield loss can be reduced to a point where frequent application of in season fungicide is not required.

How to decide whether it is worth spraying for YLS?

Is that really YLS?

First be sure it is actually YLS. The symptoms of YLS can be confused with other causes. Chlorosis and necrosis (yellowing and dead leaf tissue) can have many causes such as nutrient disorders, genetics (eg necrosis associated with Lr34/Yr18), herbicide damage, stresses (moisture) or other diseases. To diagnose this pathogen confidently an examination of the symptoms by a pathologist is required. However in the field a number of observations can assist in correctly identifying the

disease and these are outlined in the “Cereal Disease Ute Guide” or the “Cereal Leaf and Stem Diseases” publications written by Hugh Wallwork and available from GRDC.

Where is it coming from?

Where is the inoculum coming from? Is it the stubble in the paddock, or the neighbouring ones? This may influence your decision of a spray program. What is the likelihood of more infection events occurring? Stubble carrying high inoculum loads within the same paddock has a greater risk of causing repeated infection events than stubbles further away. The spores of YLS are not as aerodynamic as for example, stripe rust spores and tend not to travel great distances from their source.

Will I get a return on my fungicide application?

Once the disease is identified and the source of inoculum is determined, the next important consideration is crop growth stage coupled with the season forecast. We can sum up a number of principals that numerous fungicide trials have illustrated in the management of this disease.

Early season infection of crops

It is common in SNSW where wheat on wheat is sown, to see YLS develop during May to August, particularly where a moderately susceptible – susceptible variety is sown. However, SNSW trials indicate that despite high levels of infection occurring in early growth stages (pre GS31) there is no significant loss of yield in most seasons. This is mainly due to a lack of conditions suitable for infection and re-infection to occur frequently during stem elongation and later growth stages. In Queensland trials with heavy early infections (pre GS31) yield losses of up to 13% were experienced (Rees and Platz, 1983). However this level of response to early infection has not been repeated in trials from central and southern NSW.

The situation is different for wet years or high rainfall regions of SNSW where this early infection establishes the platform for disease to cause yield losses. In these cases trials such as those described in Street and Brill (2012) in central NSW or Beard and Smith in Western Australia (2012) have demonstrated that a program of early and repeated spraying is required to minimise the potential losses of the disease in susceptible varieties. Under conditions of frequent rainfall events, the ability to completely control the disease for an entire season is difficult due to continued spore production from the stubble and infected lower leaves combined with the fact that fungicides only protect those parts of the plant it comes in contact with. The practical implication of this is that newly emerged or emerging leaves are vulnerable to infection between fungicide applications resulting in some leaf area lost despite in trials up to 4 or 5 fungicide applications being used.

Mid season infections

Epidemics commencing in growth stages 31-55 (August – September) are likely to be associated with weather event(s) particularly suitable for mass spore release and infection. Once again the outlook for rainfall during spring is going to determine if spraying will be economical. However, if significant infection has occurred on the flag and flag -1 leaves then taking action to protect what green leaf remains may reduce further yield loss. As with the previous early epidemic example, if it is a susceptible variety sown into infected stubble the risk of epidemic development is increased

because two of the three main ingredients for an epidemic are already in place. That is, a susceptible variety and high levels of inoculum. Evidence from research trials show that attempts to control YLS from GS31 and GS39 sprays can provide benefit when the conditions are conducive for continued disease development. However this strategy suffers also from the fact that it will only provide protection of the green leaf area for 3-4 weeks depending on the product used. While GS39 sprays give protection to the emerged flag leaf, any infection that has already occurred remains active with the potential to provide spores for new infection events once the fungicide activity becomes ineffective.

Late season infections

There is little work available looking at the effect of controlling YLS at these later growth stages (Growth stages 55-85 (October – November)) in Australia. The general principal of foliar disease management is that in our low yielding environment there is little benefit of applying fungicides at growth stages after GS55. This is in contrast to high yielding environments of for example the UK, New Zealand, irrigation production or Australia during high rainfall years such as 2010. The main reason is that the onset of moisture stress to crops is so rapid that the plants have little time to realise differences in green leaf retention at these later growth stages. The evidence for this comes from comparing the yield differences between full control treatments and the various fungicide treatments. There is often large difference between the amounts of diseased leaf area but very little or no significant difference in yield when spring conditions turn dry.

Which fungicides work?

The good news is there are relatively cheap options that are effective against YLS. From the trials conducted around Australia, fungicides containing the active ingredient of propiconazole or tebuconazole have been demonstrated to be effective. With YLS it is important to remember that the fungicides do not kill the fungus living on dead leaf or stem tissue, so the stubble and lesions already present at the time of application can continue to produce spores. Consequently, when the fungicide wears off, re-infection can occur rapidly, if weather conditions are suitable.

The evidence from trials using seed or fertiliser fungicide treatments indicates no control of the disease in epidemic situations. One reason for this is that they do not control the source of inoculum being produced by the stubble.

What about next year – What can I do if I want to reduce my YLS risk

Preparation is the key to avoiding problems with this type of disease;

1. Choose varieties with higher levels of resistance
2. If using a susceptible variety make sure you know if YLS is present at significant levels so that the stubble left in the paddock can be managed
3. Reduce the need to spray by reducing loads. The key is to reduce stubble the stubble that carries the fungus. This can be achieved by
 - a. Burning stubble

- b. Stubble incorporation
 - c. Grazing stubble
4. Rotation with non-host species has been shown to reduce inoculum loads by up to 95% in a single year where stubble breakdown occurs. YLS is only a major pathogen of wheat so any other crop species is a non-host species.

References

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