



Wheat Disease Management in the Wimmera

Updated: June 2008

AG1276

ISSN 1329-8062

Grant Hollaway, Horsham

Without appropriate management diseases can severely impact on the yield and quality of wheat crops in the Wimmera region of Victoria. Fortunately wheat diseases can be effectively managed with the adoption of an integrated disease management approach.

Introduction

There are over 15 diseases that are known to attack wheat crops in the Wimmera. In most seasons these diseases are effectively controlled because of the use of integrated disease management strategies by wheat growers, but in the absence of appropriate management, and with suitable conditions, these diseases can have serious impacts on grain yield and quality.

This Information Note first discusses the management strategies that are required to protect crops from losses due to disease. The important diseases of wheat in the Wimmera are then discussed in more detail.

Integrated Disease Management

In the Wimmera most of the important wheat diseases can be effectively controlled when an integrated approach to disease management is implemented. For some diseases a single management strategy is effective while for others a number of approaches need to be utilised together to ensure effective management. Many growers don't realise that they are already effectively controlling the important diseases of wheat using an integrated approach.

Effective management of a range of diseases in wheat crops in the Wimmera can be achieved when growers adopt a strategy that incorporates:

- resistant varieties,
- green bridge management,
- seed and fertilizer treatment,
- crop rotation and
- active monitoring of crops with a view to fungicide applications if required.

Resistant Varieties

Many of the important diseases of cereals can be effectively controlled by growing resistant varieties, while for some other diseases avoiding the susceptible and very susceptible varieties may be sufficient. Table 1 provides

suggested minimum resistance levels for wheat varieties to be grown in the Wimmera. If a chosen variety does not meet the minimum recommended level increased emphasis must be placed on the other management strategies.

When choosing a wheat variety it is important to use a current "Cereal disease guide" as variety ratings can change with changes in pathogen populations.

Table 1. Suggested minimum disease ratings for wheat varieties in the Wimmera

Disease	Disease Rating
Stem rust	MS
Stripe rust	MR-MS
Leaf rust	MS
Yellow leaf spot	S
Septoria tritici blotch	MS
Cereal cyst nematode	MR
Crown rot	S
Common root rot	S

R= Resistant; MR = Moderately resistant; MS = Moderately susceptible; S = Susceptible

Green Bridge Control

Self sown volunteer wheat crops growing during summer and autumn can carry over inoculum of some important diseases, particularly rusts. It is therefore important to remove these before sowing. Volunteer wheat can be removed by cultivation, heavy grazing or with herbicides. In seasons where wheat volunteers are widespread during summer and autumn increased emphasis should be placed on the management of rusts using resistant varieties, seed or fertiliser treatments and monitoring for timely applications of fungicides.

Seed and Fertilizer Treatments

Fungicide seed treatments (pickles) should be applied to wheat seed every year to protect the crop from bunt and smut outbreaks. Bunt and smut diseases are economically severe because of their nil tolerance at receival sites. Good coverage of seed is essential for best effect of these chemicals.

Fertiliser and some seed treatments can suppress some important foliar and root diseases of wheat. The most suitable treatment for each situation should be selected. It

should be noted that when using fertiliser treatments, which do not give control of bunts and smuts, a fungicide must also be applied to seed.

Crop Rotation

Many important foliar and root diseases can carry over from one season to the next on either crop residues or in the soil. Crop rotation is important to ensure wheat crops are not sown into paddocks with high levels of either root or foliar disease inoculum. It is also important to control grass weeds during break crops to ensure inoculum levels decrease.

Monitor Crops

Active monitoring of wheat crops during the growing season is advisable to detect any important foliar diseases that may be controlled using a foliar fungicide. There are a number of foliar fungicides available (see Cereal Foliar Fungicides Information Note) and further information on the target disease should be obtained to determine the best strategy for managing it with a foliar fungicide.

For most foliar diseases appropriate timing of the fungicide application is critical with best results generally obtained from fungicide applications early in the disease development. Growers however need to consider the costs of applications, yield potential of the crop and also remember that often low levels of disease late in the season (i.e. grain fill) have limited effects on yield.

Foliar Diseases of Wheat

In general most of the important foliar diseases of wheat in the Wimmera can be controlled by the growing of resistant varieties. However, when adequate resistance within the variety of choice is not available additional protection from other control strategies is important.

Rusts

Leaf, stem and stripe rust of wheat are the most important foliar diseases of wheat in southern Australia. Where favourable conditions occur and susceptible varieties are grown significant yield losses may be incurred. Stripe rust is favoured by cool moist conditions and temperatures of between 8° and 15°C. Stem and leaf rust are favoured by moist conditions and warmer temperatures (15-30°C for stem and 15-22°C for leaf rust).

Life Cycle

These diseases require living plant material to survive and summer volunteer crop plants provide the bridge between one season and the next. In areas where there are long growing seasons and summer rainfall, these green bridges can be significant in determining the severity of the disease in the following season.

Management

Rusts of wheat can be managed by using an integrated strategy that encompasses:

- Green bridge management to minimize inoculum carry over,
- Variety selection to avoid the more susceptible varieties,

- Seed or fertiliser treatment to suppress early infections of leaf and stripe rust, and
- Active monitoring with a view to a timely fungicide application if necessary.

Consult the following Information Notes for more information:

- Cereal Disease Guide (Agriculture note 1160)
- Information Notes on specific rusts

Yellow Leaf Spot

Yellow leaf spot is a stubble borne disease that can be important when susceptible varieties are sown into infected wheat stubble. Yield loss from this disease has typically been minimal, but given suitable conditions is a potentially important disease in the Wimmera.

Life Cycle

Yellow leaf spot survives from one season to the next mainly on stubble. Rain early in the season releases spores that infect nearby wheat seedlings. Damage from this disease is worse in wet seasons. If wet weather occurs throughout spring, the infected seedling leaves produce more spores that infect leaves higher up the plant, resulting in significant yield loss.

Management

Not sowing wheat into wheat stubble and avoiding very susceptible varieties will help manage this disease. Foliar fungicides are available, but their use is not economic unless disease pressure is high. In many cases plants will grow out of seedling infections, unless the season is continually wet favoring more disease development.

Consult the following Information Notes for more information:

- Yellow Leaf Spot of Wheat (Agriculture note 1160)
- Cereal Disease Guide (Agriculture note 1160)

Septoria

During the 1970's Septoria tritici blotch was the most important foliar disease of wheat in the Wimmera. With the adoption of partially resistant varieties since the 1980's this has become a minor disease in the region. It is important to note that a return to susceptible varieties will again see Septoria tritici blotch as an important disease in the Wimmera.

Life Cycle

Septoria is predominantly a trash-borne disease. Rains in early autumn release airborne spores which infect susceptible wheat varieties. These infections produce fruiting bodies which release spores during warm wet weather causing secondary infection higher up the plant. Severe damage can occur after heavy and frequent rain which can be experienced in some springs.

Management

Growing varieties with partial resistance to septoria should continue to effectively manage this disease. If susceptible varieties are adopted in the future growers will need to remove infected stubble, avoid continuous cropping with

wheat, delay sowing to avoid early spore release and use foliar fungicides as required.

Consult the following Information Notes for more information:

- Cereal Disease Guide (Agriculture note 1160)

Other Foliar Diseases of Wheat

Minor diseases of wheat such as Halo spot and Wirrega blotch are known to occur, but their impacts are usually minimal.

When identifying diseases of wheat it is necessary to note that not all disorders are caused by a disease. Nutritional disorders are often confused with foliar diseases and this should be considered when identifying diseases of wheat.

Root Diseases of Wheat

In general most root diseases can be effectively controlled with the use of crop rotation. Resistant varieties are only available for cereal cyst nematodes and chemicals are only available to assist with the management of take-all, Rhizoctonia and Pythium root rot.

To effectively prevent yield losses from root diseases it is important for growers to identify those paddocks at risk. If a grower is uncertain of the root disease risk because of the presence of symptoms within the paddock a soil test should be conducted prior to sowing (consult your local agronomist).

Cereal Cyst Nematode (CCN)

Cereal cyst nematode (CCN), also known as eel worm, is historically the most important root disease of wheat in the Wimmera. In recent times this disease has been well controlled with the use of pulse and oilseed crops in rotation and the use of CCN resistant cereals. CCN decreases root function as they feed and reproduce within the roots causing the characteristic knotting of the roots.

Life Cycle

CCN survives from one season to the next as eggs in cysts. The eggs hatch in response to soil moisture when soil temperature drops below 15°C. These nematodes then invade the host plant's roots. After about eight weeks these nematodes produce eggs. There is only one cycle per season. Each year, about 85% of eggs hatch (lower in dry seasons); therefore a two year break from susceptible hosts is required to effectively reduce inoculum.

Management

In paddocks with medium to high CCN levels susceptible cereals should not be grown for two years. Grass weeds in break crops, particularly wild oats, should be controlled within 10 weeks of crop emergence. Paddocks at risk of CCN can be identified by taking a soil test or monitoring cereal crops for the presence of symptoms of CCN.

Consult the following Information Notes for more information:

- Cereal Root Diseases (Agriculture note 0562)
- Cereal Disease Guide (Agriculture note 1160)

Take-all

Take-all is a sporadic disease in Wimmera wheat crops, more common in seasons following wet springs. Take-all causes dead heads, and blackening of the sub-crown internodes and roots is a characteristic symptom.

Life Cycle

The take-all fungus can only survive between susceptible crops in the root and tiller bases of previously infected plants. Following the autumn rains the take-all fungus grows out of this material and attacks the roots of susceptible plants. In the absence of hosts (cereals and grasses), the take-all fungus is unlikely to survive for more than one year.

Management

To effectively control take-all grasses must be removed prior to the end of July the year before a cereal crop is to be grown. Delayed sowing can help reduce the level of disease pressure to a crop. In paddocks at the risk of take-all infection there are some seed and fungicide treatments available that give some disease suppression.

Consult the following Information Note for more information:

- Cereal Root Diseases (Agriculture note 0562)

Crown Rot

Crown rot is a sporadic problem, depending on the season. It often shows up in seasons with a dry finish. After flowering, white heads occur scattered throughout the crop. The disease is often observed near trees where there is moisture stress.

Life Cycle

The fungus survives for up to two years on infected stubble from previous cereal plants and grass weeds. Survival is enhanced by dry summers and stubble management is important. The disease is favoured by moist humid conditions, with temperatures between 15° and 20°C.

Management

Grow varieties less susceptible to this disease. Where this disease has occurred grow non host crops for 2 years. Non-host crops are grass-free pulses, oilseeds, oats, pasture and fallow.

Burn or burry stubble to speed up the breakdown of stubble which carries the disease.

Consult the following Notes for more information:

- Cereal Root Diseases (Agricultural note 0562)
- Cereal Disease Guide (Agriculture note 1160)

Root lesion nematodes

Yield losses caused by root lesion nematodes are correlated with the population of these nematodes present in the soil at sowing, the tolerance of the wheat variety and the date of sowing. As the symptoms caused by root lesion nematodes are not as distinct as for the other cereal root diseases it is advisable to have soil tested to determine the likely impact of this disease.

Life Cycle

Root lesion nematodes survive in soil from one season to the next either as eggs or in a dormant state. During the growing season they multiply and feed within the roots of the host. They have a number of generations per season.

Management

In paddocks with high levels of root lesion nematodes resistant crops should be grown to reduce nematode levels. If wheat is to be sown into an at risk paddock avoid late sowing, and select a more tolerant wheat variety.

Consult the following Information Notes for more information:

- Root lesion nematodes
- Cereal Disease Guide (Agriculture note 1160)

Rhizoctonia

Rhizoctonia is favoured when weed growth is not controlled before sowing, there is no soil disturbance before sowing and soil fertility is low, especially phosphorus, nitrogen and zinc.

Rhizoctonia becomes evident as bare patches in the crop, appearing at an early growth stage and forming sharply defined areas of stunted plants. Bare patches may vary in size from a few centimetres to several metres. Diseased plants are usually stunted and sometimes appear purple in colour. If plants are severely infected, the root systems will be small, discoloured and have characteristic brown 'spear points'.

Life Cycle

The Rhizoctonia fungus survives between crops in particles of plant residue in the soil. The fungus grows out of this material after the autumn rains and spreads rapidly through the soil, infecting roots of germinating plants. The fungus is most active between of 10° and 15°C.

Rhizoctonia has a wide host range and all crop, pasture and weed species grown in rotations are susceptible. There are no resistant cereal varieties and crop rotations cannot be used to control this disease.

Management

Rhizoctonia multiplies on weed roots so it is imperative to control weeds from the first autumn flush. If weeds are established, a three to four week chemical fallow, prior to sowing, will reduce disease damage. Weeds must be dead for two to three weeks before sowing, but it is inadvisable to delay sowing past the optimum date merely to ensure chemical control of weeds.

Soil disturbance has, in some instances, proved effective in controlling rhizoctonia. However, multiple cultivations before sowing are not necessary, provided weeds are controlled and there is a single deep cultivation (50 mm under the seedbed) in the fortnight prior to sowing.

For direct drilling, a depth-modified combine that disturbs the soil 50 mm under the seedbed while sowing at the correct depth will provide enough soil disturbance to reduce disease damage.

A seed treatment has recently become available that gives suppression of Rhizoctonia.

Consult the following Information Note for more information:

- Cereal Root Diseases (Agricultural note 0562)

Smuts and Bunts

Due to the nil tolerance for bunt and smut in wheat at receival centres these diseases are economically very important. Fortunately these diseases can be effectively controlled with the application of fungicides to seed every year.

Life Cycle

These diseases carry over from one season to the next predominantly on seed and to a lesser extent in soil. During the growing season infected plants are apparently healthy, with no symptoms appearing until ear emergence.

Management

Annual seed treatments are very effective, provided good seed coverage is ensured. .

In the advent of an outbreak of bunt, all machinery that handled the infected grain must be thoroughly cleaned. The affected paddock should be kept wheat-free for several years, prior to sowing with a clean source of seed.

Consult the following Information Note for more information

- Smuts and Bunts of Cereals (Agricultural note 1257)

Further Information

Agnotes: www.dpi.vic.gov.au/notes

(click on Crops and pastures, then Cereals)

www.dpi.vic.gov.au (click on Agriculture and Food, then Crops, pastures and weeds, then Grain crops)

Victorian Winter Crop Summary

Wallwork, H (2000) Cereal Leaf and Stem Diseases

Wallwork, H (2000) Cereal Root and Crown Diseases

Wurst M, Wilhelm N, Brennan R (2001) *Winter Cereal Nutrition: The Ute Guide*.



This Information Note was previously published in January 2007

The advice provided in this publication is intended as a source of information only. Always read the label before using any of the products mentioned. The State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.