Research Projects

Research Project
Information from
CSIRO
Land and Water

Series No. 3
November 1997

Control of Take-all in the Pasture Phase of Rotations

Introduction

The disease, take-all, caused by the fungus *Gaeumannomyces graminis* var. tritici was first referred to in 1852 in South Australia. Reports of losses from wheat crops as a result of "take-all" became common in the 1920's and 1930's, particularly on the lighter soil types typical of the Mallee environments in Australia. In the same period, the first cases of take-all were reported from U.S.A. and the U.K. Since the 1970's, Korea and China have been added to the list of countries that suffer from this disease. Today, take-all is one of the most significant diseases of cereals and is found in all cereal-growing countries of the world.

Across southern Australia, take-all infection of cereals reduces grain yields by approximately $100 million annually. In severe cases (> 50% plant infection) farmers will see the symptoms of this disease as "white heads" appearing in their paddocks, but in many cases, due to lower levels of take-all, farmers will not be aware of the insidious presence of the disease yet crop yields may be significantly reduced.

Research

There are a number of take-all control measures; crop rotation with a non-host (pulses, oil seed, pasture legume or oats), or removal of host grasses from pastures. Work at CSIRO Land and Water has centred on (a) determining the correct timing of herbicide application to pastures, (b) the likely success of various take-all control measures given the rainfall environment, and (c) the relative importance of annual pasture grass species in the build-up and carry-over of take-all.

CSIRO
AUSTRALIA

CSIRO LAND and WATER

(a) Timing of grass removal.

Research has shown that in high rainfall environments (>400 mm annual rainfall), herbicides need to be applied by mid July, and in low rainfall environments (< 400 mm annual rainfall), by the end of June. Soil-bome organisms have the ability to break down take-all infected material, but only if there is sufficient moisture in the soil and adequate time to allow this activity; thus, early grass removal is a critical aspect of successful grass control.

Care needs to be taken with the herbicide used. Selective herbicides are more consistent in their control of grasses but take longer to cause grass death than non-selective herbicides, therefore reducing time for the activities of soil-borne organisms. In addition, some herbicides are unable to remove silver grass, requiring the addition of Simazine to the take-all mix. Farmers should also be aware that non-selective herbicides can damage pasture legumes if application rates are too high. Farmers planning to remove grasses also need to ensure that sufficient pasture legume (clover/medic) exists in the pasture (a minimum of 15% of total pasture composition) to remove the risk of erosion and to provide grazing, nitrogen fixation and seed set for following years.

(b) Importance of rainfall environment.

Rainfall environments with greater than 400 mm annual rainfall have the full range of control options available (all break crops, oats and grass removal with herbicides). This is not the case in lower rainfall environment (<400 mm annual rainfall), where cultivation of grain legumes or oil seeds is made uneconomic or not viable due to low rainfall, necessitating a reliance on oats or diligent use of grass removal techniques. In addition to the rainfall environment, the timing of the opening rains can impact on the likelihood of success of herbicide application, particularly in a season with a late break, where premature reduction in soil moisture reduces time for soil-borne activity on take-all infected material.

(c) Hosting ability of common pasture grasses.

Results of extensive surveys of pasture sites across Victoria and South Australia show that significant variation exists between the various grass species. As a general guide, barley grass is approximately 50% greater than brome or silver grass and 100% greater then rye grass in its ability to host and carry-over take-all. It is therefore critical that densities of barley grass particularly, but also densities of brome and silver grass, are reduced to less than 50 plants per sq. metre following herbicide application.

Recommendations

1. In higher rainfall environments (>400 mm annual rainfall) grasses should be removed by mid July and in lower rainfall environments (<400 mm annual rainfall), grasses should be removed by the end of June.
2. Consider the timing of opening rains and the likelihood of sufficient time for break down of take-all infected material, this assessment may indicate that the application of herbicides may be inappropriate.
3. Following herbicide application, assess pasture paddocks individually for the residual grass species composition to determine the success of grass removal treatments.

For further information contact:

Mr Richard Inwood and Mr David Roget
CSIRO
Land and Water,
PMB No 2,
Glen Osmond, 5064
ph: 08 8303 8564
fax: 08 8303 8560
email: richard.inwood @adl.clw.csiro.au