



Wheat Streak Mosaic Virus (WSMV)

Following the discovery of Wheat Streak Mosaic Virus (WSMV) infections in wheat plants grown out of season at several locations around Australia, Federal and State governments have been working closely to identify the full extent of the disease.

Surveys have now confirmed WSMV is established and widespread in south-eastern Australia. All evidence suggests it has been here for many years without causing notable production losses.

WSMV is a relatively common disease worldwide. It is found in parts of North America, Russia, eastern Europe, Mexico and the Middle East. Accurate identification of the virus requires sensitive diagnostic techniques. The availability and expense of these techniques means that the global distribution is probably under estimated. Unconfirmed reports of the disease have been made in several other countries including China, India and New Zealand.

In the countries in which WSMV is known to occur, serious crop damage is rare, as the mite responsible for spreading the virus requires favourable conditions to survive over summer. Heavy subsequent infection of early sown crops is required before significant yield reduction occurs.

With the current range of management practices available to growers, average crop losses in North America are around 4 per cent. Losses in other countries are believed to be small.

Areas that may be at risk in Australia are those that experience mild, wet summers that enable volunteer cereals and grasses to form a 'green bridge' between the old crop and the new crop. The dry summer and



Wheat streak mosaic symptoms in a young wheat plant. © CSIRO 2003

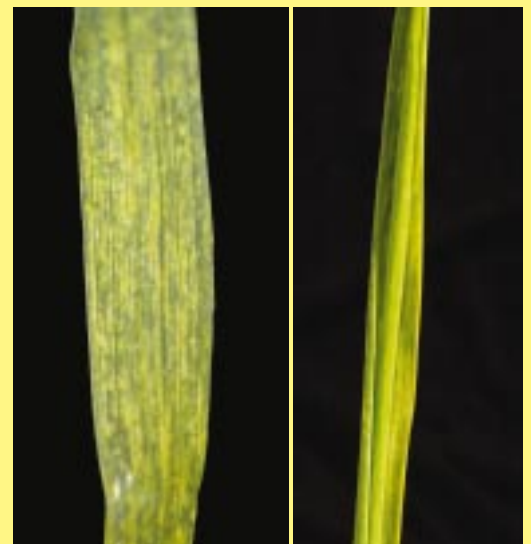
late sowing break in many parts suggest the virus will have little or no impact on yield or quality in 2003.

Since the disease is already established in Australia, wheat crops are assumed to be at no greater risk of infection this year than in any recent season. The presence of the disease will have no effect on grain deliveries nor on export markets.

Industry and government representatives have developed interim national protocols for winter cereal field trials this season.

Disease symptoms

Plants infected with WSMV initially have light green streaks in the leaves which later develop into yellow stripes running parallel to the leaf veins. These symptoms are often difficult to diagnose as they can be easily confused with nutritional disorders, environmental effects and chemical damage.



(L) Close-up of a wheat leaf with WSMV symptoms.

(R) Curling of the leaf caused by large numbers of mites feeding on the young plant. © CSIRO 2003

Heads on infected plants can be sterile and contain no seed, or only small and shrivelled grain. Infected plants usually appear first along paddock edges or in patches near volunteers. Small 'islands' of plants showing symptoms may then occur throughout the field as the growing season progresses. Symptoms develop at temperatures above 10°C, so may fail to appear in infected plants during the winter months, especially in later sown crops.

The evidence of mite feeding can sometimes be seen on young leaf blades which may curl tightly, trapping new leaves and resulting in rolled, twisted seedlings. Heads may also be trapped in the boot.

Transmission

WSMV is spread by a tiny (0.3mm) white, cigar-shaped mite called the wheat curl mite (*Aceria tosichella*). This mite has no wings but has two pairs of legs near its head, and a fleshy body. It is not visible to the naked eye. The mites do not walk far, but like many small insects, they can be randomly distributed by wind. They can also hitch a ride on other insects and animals, including humans. These mites are believed to be very widespread across the cereal belt.



(Picture courtesy of Electron Microscopy Laboratory, NDSU, Fargo, North Dakota)

Wheat curl mites are short-lived and need to continue feeding on live, green plants to survive. As such their disease cycle is dependent upon a 'green bridge' of live volunteer cereals and/or host grasses between seasons.

Once the mite has fed on an infected plant, it transmits the virus as it feeds but does not pass the virus through the egg to its offspring. The optimum temperatures for mite activity and virus transmission are 24-27°C.

Seed transmission of the virus is possible but has not been reliably confirmed in wheat. If it does occur, it is expected to be extremely rare.

Management

In countries where WSMV is known to cause damage, control relies on reducing both the mite population and the numbers of infected host plants that survive.

Control strategies for managing the virus include:

- breaking the disease cycle by controlling summer cereal volunteers (the 'green bridge') to reduce the number of mites that can invade the following autumn sown crop, and
- controlling grasses and grassy weeds around the borders of recently sown crops.

Spraying with pesticides is not effective in controlling the mites.

WSMV hosts

Both the wheat curl mite and WSMV can survive on a range of live cereals, grasses and grassy weeds. In Australia these include:

CROPS

Wheat
Barley
Oats
Maize
Sorghum
Millet
Cereal rye

GRASSES

Brome (*Bromus diandrus*)
 Setaria (*Setaria verticillata*)
 Blackgrass (*Eragrostis cilianensis*)
 Crowsfoot Grass (*Eleusine indica*)
 Wild Oats (*Avena fatua* and *A. sterilis*)
 Annual Ryegrass (*Lolium rigidum*)
 Couch (*Cynodon dactylon*)
 Phalaris (*Phalaris aquatica*)

Contact

Growers are encouraged to assist in developing a better understanding of the distribution of the disease in Australia this season. If you suspect you have wheat streak mosaic virus, collect infected plants and place them in a sealed bag to prevent the spread of the virus.

Take the samples to your local Department of Agriculture for identification and advice. Any sightings of WSMV, whether on crops or grass weeds, or even on the roadside, should be reported to the nearest office of your State Department of Agriculture.



South Australia:

Chris Wilmshurst
 SARDI Seed & Plant Pathology Services
 Ph: 08 8303 9360



Victoria:

Contact your local Department of Primary Industries agronomist



New South Wales:

Contact your local NSW Agriculture agronomist



Tasmania:

Department of Primary Industry, Water and Environment
 Freecall: 1300 368 550



Queensland:

Queensland Department of Primary Industries
 DPI Call Centre 132523



Western Australia:

Contact your local Department of Agriculture WA agronomist



Grains Research & Development Corporation

DISCLAIMER

This publication has been prepared in good faith on the basis of information available at the date of publication without any independent verification. The Grains Research and Development Corporation does not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this publication nor its usefulness in achieving any purpose.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. The Grains Research and Development Corporation will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication. Products may be identified by proprietary or trade names to help readers identify particular types of products but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to.