



Figure 1. Impending rainfall over windrowed oaten hay plots near Hyden. Rainfall during curing can increase the risk of saprophyte staining. Image: DPIRD.

Protecting WA Crops

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Insights into saprophyte staining in oaten hay

At a glance

- Saprophytic staining develops when rainfall wets curing hay in windrows between cutting and baling, reducing visual hay quality.
- The risk of staining increases with rainfall events greater than 10 mm, multiple rainfall events and extended periods of hay wetness.
- Research has found no varietal resistance to saprophytic staining in the oat varieties tested.
- While no fungicides are registered specifically for saprophytic staining, some fungicides applied for oat disease management may provide incidental reductions in staining severity.

Weather induced fungal staining, also known as saprophyte damage, results from the growth of saprophytic organisms, mostly fungi, on curing hay following rainfall. Saprophytic fungi commonly found on hay include species of *Alternaria* and *Cladisporium spp*, which colonise senescing or dead plant tissue. Under favourable conditions, particularly when rain wets exposed hay in the windrow, these fungi can grow on the top, bleached portion of the curing hay. This saprophytic growth causes dark discoloration or spotting on leaves, stems and panicles, reducing the overall visual quality of the hay.



Figure 2. Saprophyte damage on oaten hay. Image: DPIRD.

Since 2019, the Department of Primary Industries and Regional Development (DPIRD) Western Australia (WA), in collaboration with AgriFutures Australia and Agriculture Victoria, has been researching saprophytic fungal staining to improve understanding of the factors that increase the risk of it occurring, the impact on hay quality, and potential management strategies to minimise its occurrence.

Saprophytic staining occurs between cutting and baling while hay is curing in windrows. The level of saprophyte damage is dependent on the amount and timing of rainfall and how long the curing hay remains wet. Rainfall events greater than 10 mm or multiple rainfall events increase saprophyte staining risk, with the greatest impacts observed when rainfall events occurred closer to baling.

Management

Varieties

Variety trials at Muresk in 2023 and 2025 found no difference in the level of saprophyte damage between oat varieties tested, suggesting that the varieties were equally susceptible, and no genetic resistance was observed. However, variety maturity can still influence saprophyte staining risk through optimal cutting time and the likelihood of rainfall occurring during curing. In environments where panicle (branched spikelet of flowers and grain) emergence may be delayed, selecting varieties less likely to have un-emerged panicles at the time of cutting can reduce staining risk by reducing curing time and thereby shortening the time hay remains in the windrow before baling.

Off target fungicide applications

There are currently no fungicides registered for saprophyte fungi management, however, research has found that registered fungicides used in-season for the control of oat diseases, such as rusts (oat stem rust and oat leaf rust) or septoria, may also reduce saprophyte damage.

Fungicide trials conducted in WA and Victoria have shown that saprophyte damage could be reduced by as much as 78%, depending on the fungicide mode of action, amount of rainfall and saprophyte severity. However, in seasons where no rainfall occurred during curing, fungicides provided zero benefit, as there was no saprophytic growth or staining. A reduction in saprophyte damage is not indicated by any product label and not guaranteed in any season, regardless of use patterns. While fungicides were found to be able to reduce (but not eliminate) saprophyte damage, the application of fungicide, including those containing Group 11 (QoI/strobilurin) and Group 7 (SDHI) active ingredients, did not improve hay colour (greenness) or nutritional quality beyond the benefits associated with controlling oat diseases. Fungicide choice, application rate and application timing should always be based on the diseases present in the crop and the product's label recommendations.

In trials with high levels of saprophyte damage, registered products containing Group 11 active ingredients, and the Group 7 fungicide containing propiconazole and benzovindiflupyr, generally provided greater incidental reduction in saprophytic staining than standalone Group 3 (DMI) fungicides. Currently there are multiple Group 11 and Group 3 fungicides registered for disease management in oats; however, the concentration of azoxystrobin (Group 11) active ingredient applied per hectare (g a.i./ha) varies drastically between products. In general products with a higher recommended azoxystrobin g a.i./ha rate tended to provide greater protection than those with a significantly lower azoxystrobin g a.i./ha rates.

Applying fungicides earlier in the season, up to 14 days before the withholding period (WHP), dependent on product, can provide multiple benefits. These include reducing the risk of chemical residues in hay, potentially being a more suitable disease management timing, increasing flexibility around cutting dates, and maintaining the same level of incidental protection against saprophyte damage. The WHP is the minimum length of time growers need to wait before cutting hay after applying a chemical. The WHP varies between products. Currently registered Group 11 fungicides are subject to either a 21 or 28-day WHP (with application also required before Zadoks growth stage Z59) but showed the same level of incidental protection against saprophytic staining when applied 21-35 days or 28-35 days before cutting, respectively. The Group 7 (SDHI) fungicide propiconazole + benzovindiflupyr has a 10-day WHP, although it was found in trials that they provided similar incidental protection against saprophytic staining when applied 10-21 days before cutting. Some Group 3 products have WHPs of as little as 7 days before cutting. Products with shorter WHPs can be useful for managing late-season outbreaks of oat leaf rust and/or oat stem rust while still providing some off-target protection against saprophyte damage.

When using fungicides, always check the latest registration details via the APVMA database, follow the latest directions and observe withholding periods (WHPs) for grazing and cutting to minimise the risk of chemical residues in hay.

Growers should be aware that compliance with Australian label requirements does not guarantee compliance with maximum residue limits (MRLs) for export markets, which may have stricter standards. Growers should consult their fodder exporter regarding residue requirements for intended export markets.

Further information

For more information on saprophyte management refer to:

- AgriFutures factsheet Managing weather induced fungal staining (saprophyte damage) in oaten hay windrows

Could Annual Ryegrass Toxicity (ARGT) be affecting your farm?



Help build a clearer picture of ARGT across Western Australia (WA) by taking part in a new research project to modernise ARGT detection, risk prediction and management.

The Department of Primary Industries and Regional Development is combining surveillance, climate modelling and improved diagnostic tools to identify where ARGT occurs and develop practical solutions to support the livestock, grain and export fodder industries. This proactive research aims to strengthen existing management practices and export assurance systems, helping protect livestock welfare, farm productivity and market access.

WA livestock owners and broadacre farmers are encouraged to complete the survey and register for a free testing kit. Every response provides valuable information about ARGT across WA, whether you have experienced ARGT or not.

Visit dpird.wa.gov.au/ARGT to complete the survey and share your experience.

Meet the Crop protection team - The voices behind the Grains Convo podcast



You may have read the Grains Convo newsletter or tuned in to the Grains Convo podcast, but have you ever wondered who is behind the microphone? Meet the three DPIRD researchers who bring the latest grains research, industry insights and grower stories to life.

Cindy Webster joined DPIRD as a Research Scientist in 2006 and is based in Narrogin. Raised on her family's farm near Pingelly, Cindy went on to complete an Honours degree in Natural Resource Management at the University of Western Australia. Today, she leads the highly regarded PestFacts WA service and the crop protection communications team. She is also the editor of the PestFacts WA newsletter. Whether she is producing a Grains Convo podcast, hosting a webinar or working on new extension initiatives, Cindy is passionate about connecting growers with practical and timely information.

Tim Scanlon has spent the past 20 years as a DPIRD Research Scientist, bringing a wealth of experience across sheep nutrition, plant nutrition, crop agronomy, modelling and climate science. From a mixed farm in Wagin, he completed a Bachelor of Science (Honours) in plant nutrition and a Masters of Science in plant science at the University of Western Australia before joining DPIRD. Many growers will know Tim from his extension work in Merredin and Northam, where he shared agronomic and seasonal insights and

supported grower group research trials. Today, he manages the Building Grains R&D program and continues to share his knowledge as one of the familiar voices of Grains Convo.

Janette Pratt, based in Moora, has also been with DPIRD for more than two decades. Growing up on a mixed farm and station along the Murchison River north of Northampton sparked her lifelong interest in agriculture before she completed a Bachelor of Science at Murdoch University. Alongside co-hosting Grains Convo podcast episodes with Cindy and Tim, Janette is the author and editor of the Protecting WA Crops newsletter and serves as Communications Officer for the Disease Epidemiology and Management Tools project, helping deliver research and disease management information to WA growers.

Together, Cindy, Tim and Janette bring decades of research, extension and communications experience to the Grains Convo podcast, combining science, practical insights and a genuine passion for agriculture in every episode.

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