KEEP WHAT WORKS WORKING

Septoria resistance: a challenge for New Zealand wheat production

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The resistance problem

Management of *Septoria tritici blotch* (STB), caused by the fungal pathogen *Zymoseptoria tritici* (Zt) remains the most problematic disease for autumn-sown wheat in New Zealand.

Control of STB relies heavily on use single site mode of action fungicide groups, particularly demethylase inhibitors (DMI – Group 3 fungicides) and succinate dehydrogenase inhibitor (SDHI – Group 7 fungicides).

Both SDHI and DMI fungicide groups are considered to have a risk of resistance development and the potential for the pathogen to become insensitive to these fungicides is of concern.

What is Septoria tritici blotch?

STB is caused by the fungal pathogen *Zymoseptoria tritici* (Zt), is a foliar wheat disease, causing major damage in wheat. It is an economically important disease in New Zealand and globally and can cause yield losses of up to 80% if left unmanaged.

In wheat, STB can reach 100% infection on top leaves under favourable conditions, particularly during periods with frequent rainfall, leaf wetness, and high humidity. Elliptical, tan-brown lesions that often have yellowish halos first appear on seedling leaves.

Lesion centres die and dark fruiting bodies are produced, giving the lesion a characteristic speckled appearance. The fungus overwinters on seed, residue, and overwintering cereals. During spring, spores are produced and infect other leaves by rain-splash.



Elliptical tan lesions of STB. Credit: Crop protection network

Industry-led fungicide sensitivity monitoring programme

To understand the extent of the resistance problem in New Zealand, the Foundation for Arable Research (FAR) carried out annual monitoring from 2014 – 2020 to understand how sensitive Zt populations are to these fungicides (FAR 2025, 2025a).

Annual monitoring shows that Zt is showing a gradual reduction in sensitivity to SDHI and DMI fungicides in New Zealand.

This monitoring has indicated a gradual reduction in sensitivity of New Zealand Zt populations to triazole (Group 3) and SDHI (Group 7) fungicides in the laboratory (Warren et al. 2021).

New genetic variants of Zt linked to reduced sensitivity have been detected, and regional differences in fungicide sensitivity are emerging. Triazoles and SDHIs continue to perform in the field at field rates however careful stewardship of these fungicides is needed to protect the long-term efficacy of these fungicide groups

The changing sensitivity in cereal diseases laid the foundation for the current industry initiative, the Fungicide Resistance Industry Initiative (FRII), formed by FAR in 2022 with support from crop protection companies (FAR, 2024b).

The objective of this initiative is to monitor changes in the sensitivity of Zt fungicides and to use this information to provide up-to-date resources on fungicide management. These include good practice guides and decision trees for the optimal timing of fungicide applications.

Management strategies to address Zt resistance

FARs Cereal Disease Management Strategy for wheat is built around an integrated pest management (IPM) approach. This approach relies on the appropriate use of fungicides alongside resistant plant genetics and integration of new crop protection technologies (see Figure 1, below).

The annual monitoring programme for Zt sensitivity to key fungicides is a key component of the management strategy. By tracking changes in sensitivity, FAR can provide the most up-to-date advice to growers on fungicide programmes. This helps growers control STB effectively while slowing the build-up of resistance.

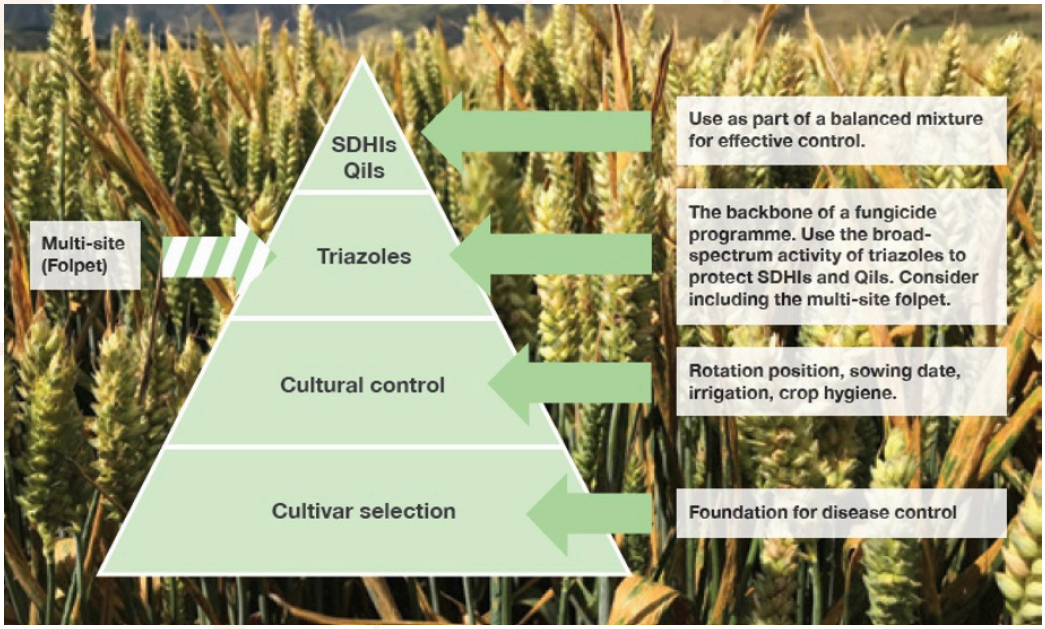

Figure 1. An IPM approach to manage Septoria tritici blotch in wheat (Source: FAR, 2024).

Key parts of an IPM programme for wheat

1. Cultivar selection.

Provide the foundation of the disease management strategy. Disease resistant cultivars provide protection from sub-optimal application timings and allow for reduced pesticide use under various seasonal disease pressures.



2. Investigating new crop protection technologies.

Identifying biofungicides and their role in future cereal disease management programmes to reduce reliance on chemical fungicides and help sustain effectiveness of at-risk active ingredients.

3. Rationalising fungicide programmes.

Development of effective fungicide programmes that maximise disease control, yield, economic returns while supporting IPM adoption and resistance management. FAR has developed fungicide timing priorities, resistance management guidelines and decision trees to guide growers on spray timing, product selection and what to avoid (see figures 2 and 3).

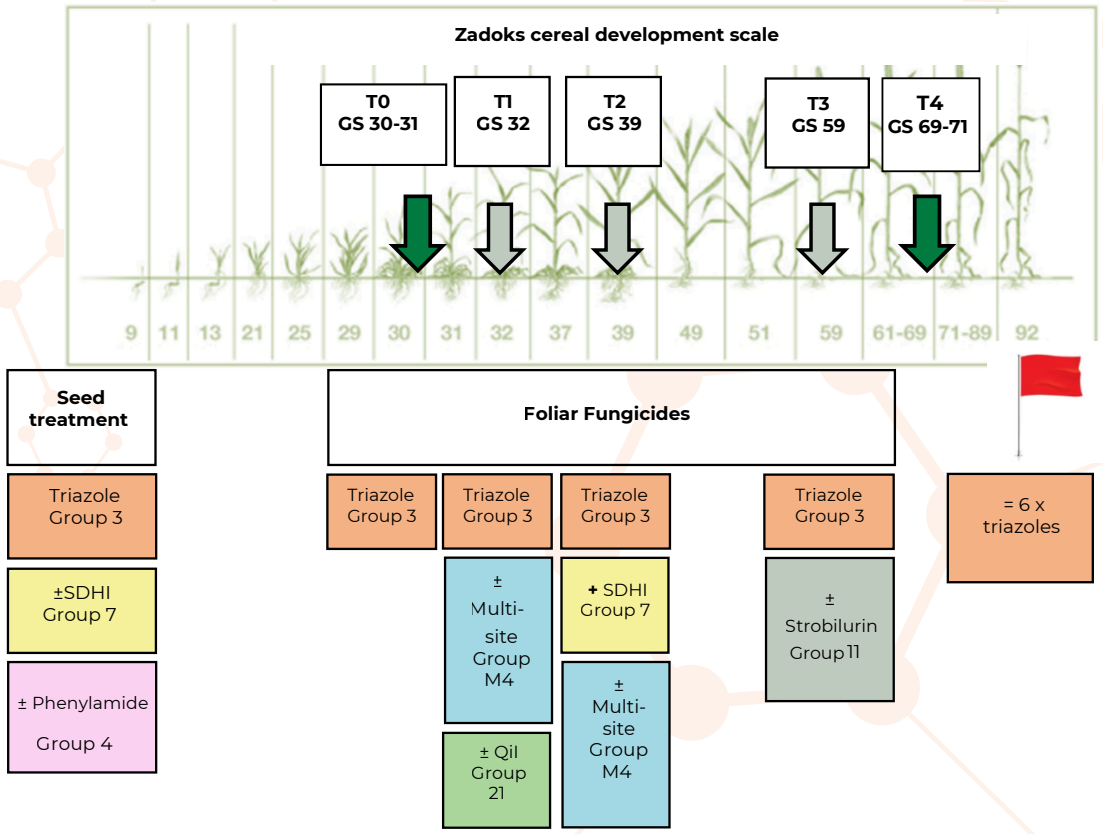

Figure 2. An example of a high input seed treatment and foliar fungicide timings and the fungicide mode of action groups used at each timing. T0 and T4 (green arrows) are considered optional.

Alignment with A Lighter Touch

FAR's cereal disease management programme is aligned with A Lighter Touch, a seven-year, cross sector and MPI supported programme.

A key goal of the FAR-ALT initiative is to help extend the effectiveness of both crop protection products and cultivars by integrating new biological products into arable production systems and disease management programmes.

Since 2020 FAR has been investigating how biopesticides could fit into an IPM programme in wheat by critically looking at the timing of biopesticide applications in the season.

FAR trials in 2022-23 and 2023-24 found that disease management programmes which included both biopesticides and conventional products did not compromise disease control or yield.



The challenge of adopting a disease management strategy

Resistance management and stewardship of chemical control tools are important drivers of disease management strategies.

However, they represent only one of several factors that growers consider when deciding to apply a spray. The decisions growers make on farm are also challenged by volatile market prices, increasing production costs and extreme weather events.

FAR supports arable growers to make good decisions by providing growers with the latest information and recommendations for the effective management of STB.

These recommendations have been developed from numerous years of monitoring and validated in research trials. The IPM programme is designed to balance disease control and corresponding yield with economic returns and pesticide stewardship (FAR, 2024).

The Fungicide Resistance Industry Initiative has supported the development of fungicide application decision trees for very early (Growth Stage (GS) 30-31, T0), and very late (GS 69-71, T4) fungicides applications.

The decision tree for Growth Stage (GS) 30-31, T0 is shown in Figure 3 (next page).

Alongside these decision trees FAR has published fungicide resistance guidelines for the use of triazole (Group 3), SDHI (Group 7), and strobilurin (Group 11) fungicides to control STB and leaf rust (FAR, 2024a).

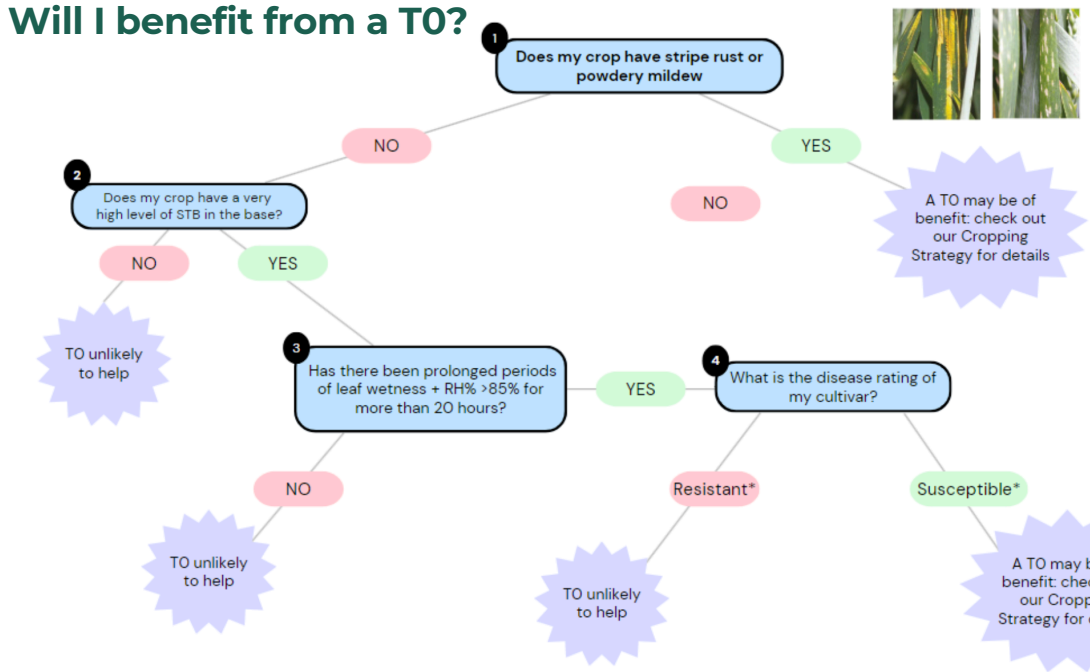

Figure 3. GS 30-31 (T0) Decision Tree (Source: FAR 2024a)

Outcomes of the Fungicide Resistance Industry Initiative

Through the industry monitoring programme FAR collects fungicide use patterns for the Zt monitor programme samples.

Fungicide programmes are also collected from FAR's cultivar performance trials in Manawatu/Rangitikei, Canterbury and Southland. These trials are conducted under grower management.

The data has shown that over time control programmes have become more complex as growers have incorporated resistance management guidance into their own management practices.

The data shows that growers are mixing MOA groups, using mixing partners that have different cross-resistance profiles, using only one Group 7 fungicide per season instead of two, and alternating active ingredients at the different application timings.

FAR's monitoring of fungicide use patterns shows that control programmes have become more complex, indicating that growers are incorporating resistance management guidance into their programmes.

While the cost of these more complex fungicide programmes remains a concern for arable growers, these programmes are generally viewed as an insurance against yield loss.

FAR has observed that growers will use the resistance management guidance as insurance to retain access to these key fungicide control tools. Growers are also using the guidance to aid decisions on where to strategically place products for the greatest effect.

Key learnings

- Growers respond well to clear, consistent messaging that is backed by industry.
- Cultivar selection is a key foundation of disease management programmes and an important component of the IPM approach for managing STB.
- Growers consider selecting the right cultivar as a foundation for a disease management programme as a core component of the IPM approach to manage STB.
- Industry monitoring shows that growers are applying resistance management practices, such as mixing modes of action, reducing the number of applications, rotating chemistry across and between seasons.

Reports and resources

FAR (2024) Cereal Disease Management PART 1 (Revised 2024). Disease control in wheat and barley. Issue 11. 2024. 56p. https://assets.far.org.nz/431296-FAR-cropping-strategy-issue-11-cereal-disease-PART1.pdf, accessed February 2026.

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FAR (2025). Arable Update. Cereals 232. Managing Septoria: Latest results on triazole performance. October 2025. https://assets.far.org.nz/C232-Managing-Septoria-latest-results-on-triazole-performance.pdf, accessed February 2026.

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Warren, R, Joshi, M, Thompson, S, Marroni, V, Drummond, J (2021). A survey of *Zymoseptoria tritci* sensitivity to fungicides in New Zealand in 2019-20. Project code C17-30. FAR Research Results 2020/21 pp 6. Sourced via FAR AI.

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