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An integrated industry

Managing resistance development in Stemphylium leaf blight in onions

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The resistance problem

Foliar applications of fungicides have been the mainstay of the control programme for Stemphylium leaf blight (SLB). The problem is that SLB is very prone to developing resistance to certain modern synthetic fungicides when they are used repeatedly in spray programmes.

New Zealand growers were expressing concern that fungicides currently used for SLB control were losing their effectiveness.

Field trials in North America have demonstrated that many fungicides in several fungicide groups (FRAC 3, 7, 9 and 11) used to control SLB no longer provide effective suppression of the disease. New Zealand growers were also expressing concern that fungicides currently used for SLB control were losing their effectiveness (Beresford and Wright, 2023).

What is Stemphylium leaf blight (SLB)?

Stemphylium leaf blight or SLB, caused by the fungal pathogen *Stemphylium vesicarium*, is a major, aggressive fungal disease occurring in most onion growing regions in the world. The disease causes premature leaf dieback, reducing bulb size and yield by up to 30-60%.

Historically SLB has been a minor disease of onion crops in New Zealand, however during the 2017-18 growing season, significant outbreaks of SLB occurred in commercial onion fields (Wright et al 2018). From this season onwards SLB has been one of the main onion diseases and caused serious production losses.



Stemphylium leaf blight symptoms in onions (on left) and SLB lesion (on right). Source: Wright et al. (2018).

Understanding the scope of the resistance problem in NZ

The concern that fungicides currently used for SLB control were losing effectiveness prompted the industry to commission Bioeconomy Science Institute (Plant & Food Research) to carry out a preliminary investigation to determine if field-collected SLB isolates were sensitive to eight fungicides that were used to control SLB in New Zealand. From this survey a concerning degree of resistance was found to three fungicide mode of action (MOA) groups – DMIs (Group 3), SDHIs (Group 7), QoIs (Group 11) (Beresford & Wright, 2023).

A more extensive national survey was carried out in 2024 to define the extent of the resistance problem. A total of 360 *Stemphylium vesicarium* isolates were screened against 13 fungicides from seven MOA groups (Beresford & Wright, 2024).

These surveys have confirmed that resistance has developed to three of the seven fungicide mode of action groups available for SLB control.

Importantly, this study found that all the Group 3 DMI, Group 7 SDHI and Group 11 QoI fungicides tested were severely affected by resistance in *Stemphylium vesicarium*. The Group 2 DCA (Trade name: Sumisclex®, Ippon®) and Group 9 AP fungicides (Trade names: Chorus®, Diva®) demonstrated good efficacy, but these MOA groups are vulnerable to resistance. The Group 12 PP (fludioxonil, Trade name: Geoxe®) and Group 29 (fluazinam, Trade name: Pinnacle®) fungicides did not appear to be affected by resistance.

Resistance status of fungicide MOA groups for SLB control

(from Beresford & Wright, 2024)

FRAC code	MOA group	Active ingredient	Trade name	Resistance status
2	Dicarboximide (DCA)	procymidone	Sumisclex®	Good efficacy, vulnerable to resistance
		iprodione	Ippon®	High resistance risk
3	Demethylation inhibitor (DMI)	difenconazole	Score®	High resistance, do not use for SLB control
		propiconazole	Condor®	
		tebuconazole	Hornet® 430 SC	
		prothioconazole	Vitalis®	
7	Succinate dehydrogenase inhibitor (SDHI)	fluopyram	Luna® Privilege	High resistance, do not use for SLB control
		fluxapyroxad	Sercadis®	
9	Anilinopyrimidine (AP)	cyprodinil	Active in Switch®	Good efficacy, vulnerable to resistance
		peremethanil	Active in Apex®	
11	Quinone outside inhibitor (QoI)	azoxystrobin	Amistar®	High resistance, do not use for SLB control
12	Phenylpyrroles (PP)	fludioxonil	Active in Switch®	Good efficacy, low resistance risk
29	Uncouplers of oxidative phosphorylation	fluazinam	Active in Apex®	Good efficacy, low resistance risk

High resistance Medium resistance Low resistance

The solution: A collaborative all of industry initiative to develop guidelines for SLB management

This high resistance risk prompted Onions NZ to convene a workshop of researchers, technical experts and growers to develop a set of guidelines for SLB management.

The guidelines provide concise recommendations to growers as to the effective MOAs and their appropriate use for SLB management.

Alongside these recommendations the guidelines emphasise the importance of integrated disease management for SLB management in onions.

This includes controlling other common foliar diseases in onions such as downy mildew and botrytis leaf blight, managing onion thrips, reducing herbicide damage, reducing water stress with effective irrigation, and ensuring plant nutrition is optimised.

Integrated disease management:

- Inoculum management – burying residues, removing volunteer plants
- Maintain good field hygiene (clean equipment)
- Regular crop monitoring for disease pressure
- Consider disease models and weather-based risk forecasts
- Reduce water stress
- Optimise plant nutrition
- Control foliar diseases



Outreach and education campaign

Onions NZ has led significant outreach to industry about the guidelines embedding practice change with growers and crop advisors. To demonstrate the effectiveness of the guidelines they were validated in field trials by comparing their recommendations against a grower standard approach. The guideline recommendations gave better SLB control than the grower standard.

Outcomes

The onion industry has lost three MOA groups for SLB management. Through the collaborative efforts of growers, agrichemical companies, scientists and industry partners the onion sector has established SLB resistance management guidelines. Onions NZ will continue to monitor resistance risks via surveys to gauge whether the resistance status of SLB resistance has improved or worsened.

Key lessons learnt

- Management of SLB resistance has required a **whole of industry approach**, from growers, crop advisors and agronomists, crop protection companies.
- **Monitoring for resistance is important**. The onion industry confirmed resistance risks to three MOAs, and have used this information to develop an effective SLB management strategy.
- The SLB guidelines remain under **constant review** to ensure they remain fit-for-purpose, and resistance risks are being managed.


Stemphylium Resistance Management
Version 2, October 2025
onions NEW ZEALAND INC
Summary:
Stemphylium leaf blight is a significant disease of onion crops. To maintain the effectiveness of agrichemical control options, Resistance management strategies must be followed. Resistance has already developed for key fungicide groups, without the adoption of strategies to slow down resistance development, further loss of fungicide effectiveness is inevitable. Updated disease management guidelines aim to assist growers in decision-making.
Stemphylium leaf blight
Stemphylium leaf blight (Stemphylium vesicarium) is a foliar disease in allium crops, that can result in complete defoliation of the plant, compromise bulb quality, and make the plant more susceptible to other diseases that affect bulb quality.
Since the 2017-2018 growing season, onion growers have had varying levels of Stemphylium outbreaks in crops across the country. Previously considered a minor issue in onions, Stemphylium symptoms are now seen more often across the country in most seasons.
Infection starts as small yellow-tan water-soaked spots, which elongate into light brown lesions, finally turning dark brown or black as the pathogen produces a dense mass of spores. Eventually, the entire leaf becomes completely blighted, with rapid necrosis occurring, defoliation, and early death of the crop.
Resistance development
Resistance is when a crop protection product that previously controlled a population (insects, weeds or pathogenic organisms), while still being used correctly, no longer controls the population.
A laboratory analysis is required to determine if resistance is present in an insect or pathogen population.
Resistance is genetic (heritable), and by the incorrect use of crop protection products, becomes more widespread.
To combat resistance, we need to:
- Utilise alternative methods of pest control.
- Monitor crops to make informed decisions around control.
- Apply crop protection products as per label instructions so good coverage is achieved.
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Onions NZ resistance management guidelines for SLB.

Reports and resources

Beresford RM, Wright PF. August 2024. Sensitivity of *Stemphylium vesicarium* to fungicides used for onion stemphylium leaf blight control, 2023–24. A Plant & Food Research report prepared for: Onions New Zealand Incorporated. Milestone No. 100802. Contract No. 42167 var. Job code: P/391015/01. PFR SPTS No. 26006.

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Wright P, Tyson J, Fullerton R. 2018. Stemphylium leaf blight of onion. A Plant & Food Research report prepared for: Onions NZ. Milestone No. 76204. Contract No. 35374. Job code: P/340501/01. SPTS No. 16075.

Piñeros-Guerrero, N, Pethybridge, S, Hay, F, and Heck, D. 2023. Stemphylium leaf blight of onion.Cornell College of Agriculture and Life Sciences. 4p. https://www.vegetables.cornell.edu/pest-management/disease-factsheets/stemphylium-leaf-blight-of-onion/, accessed February 2026.

Searle B, Wright P. 2018. Climate conditions and Stemphylium leaf blight development. A Plant & Food Research report prepared for: Onions New Zealand Inc. Milestone No. 76204. Contract No. 35374. Job code: P/340501/01. SPTS No. 16069.

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