Biosecurity risks

Climate Vulnerability Assessment
Verticillium dahliae Factsheet

Verticillium dahliae: an increasing biosecurity threat under a changing climate

A warmer climate is likely to increase the occurrence of the pathogen *Verticillium dahliae*. This threatens some of the state's crop industries.

Developing industry-informed climate planning information

Climate change is altering the biosecurity risks for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate, and the risks and opportunities it may bring.

Through its Vulnerability Assessment Project, the NSW Department of Primary Industries is increasing the resilience of our primary industries by providing information and data to help the sector better plan for, and respond to, climate change. The project has determined climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important cross-cutting biosecurity risks to inform sound planning, risk management and adaptation decisions.

Verticillium dahliae in NSW

Verticillium wilt is a disease caused by the pathogen *Verticillium dahliae*. The pathogen lives in the soil and infects over 400 plant species in Australia, including many valuable agricultural crops. The pathogen can survive for more than 10 years in a dormant life stage in the soil. The pathogen infects plants via the roots, causing wilting, dieback, leaf loss (defoliation) and even plant death.

The pathogen has two pathotypes that cause infection – non-defoliating and defoliating pathotype. Each has different temperature preferences, and the distribution of each pathotype is likely to change under future climates.

Verticillium wilt reduces yield, costing the Australian agricultural industry millions annually. In NSW, the pathogen is distributed in a band stretching north-south from the Moree region to Griffith.

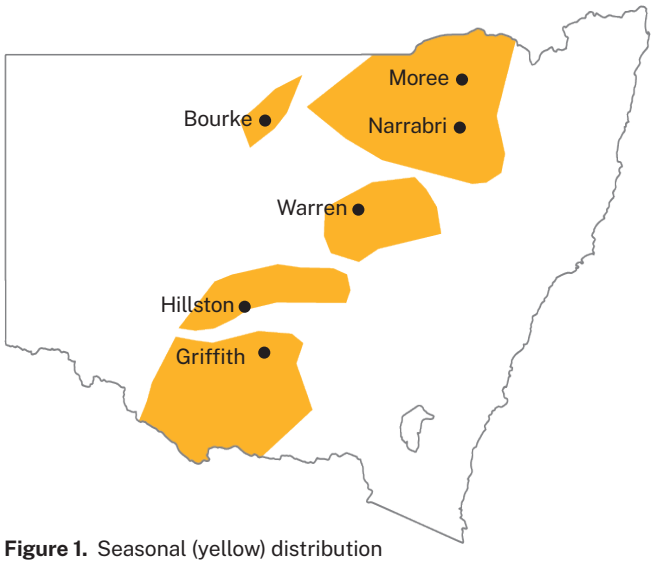

Figure 1. Seasonal (yellow) distribution of *Verticillium dahliae* across NSW. Locations indicate key cotton growing sites across the state.

Department of Primary Industries

NSW GOVERNMENT

Climate and *Verticillium dahliae*

Overall, the likely impacts of *Verticillium dahliae* by 2050 under a changing climate in NSW are projected to decrease for the non-defoliating pathotype and increase for the defoliating pathotype. Changes in climate suitability are likely to occur across all stage of the pathogen's life cycle.

Climate risks and opportunities that may affect the occurrence and distribution of *Verticillium dahliae* include:

Warmer temperatures will likely increase the suitability of Verticillium germination, infection and distribution of the defoliating pathotype, particularly throughout northern NSW.

Climate impacts: what to expect

Parasitic life stage

Non-defoliating pathotype

- **Decreased climate suitability** due to changes in mean temperature and rainfall for all regions from December to February; for Narrabri, Bourke and Warren regions in March; and for Narrabri and Warren regions in November.
- **Maintained historical climate suitability** for all regions from April to October (*low to high confidence*).

Defoliating pathotype

- **Increased climate suitability** for the Narrabri, Warren and Griffith regions in January and February; for Narrabri, Warren, Hillston and Griffith regions in March; for Narrabri, Warren and Hillston regions in April; for Narrabri, Warren, Bourke and Hillston regions in October; for all regions in November; and for Warren, Hillston and Griffith regions in December.
- **Maintained historical climate suitability** for all regions from May to September.

Dormant life stage

- **Increased climate suitability** due to increased mean temperature for the Narrabri, Warren and Griffith regions in April and October; for Narrabri, Warren, Bourke, Hillston and Griffith regions in May; for Narrabri and Bourke regions in June and August; and for Narrabri, Warren, Hillston and Griffith regions in September.
- **Decreased climate suitability** due to increased mean temperature for the Narrabri, Warren, Bourke, Hillston and Griffith regions from December to February; and for Bourke, Narrabri and Warren regions in March and November.
- **Maintained historical climate suitability** (*low to high confidence*) for the Hillston and Griffith regions in March and November; for Bourke and Hillston regions in April and October; for Warren, Hillston and Griffith regions in June and August; for Narrabri, Warren, Bourke, Hillston and Griffith regions in July; and for the Bourke region in September.

Impact on key NSW primary industries

Changing climate suitability for *Verticillium dahliae* infection under a warmer climate may affect key NSW crops. In particular, cotton, wheat (non-symptomatic host), lucerne, walnuts and chickpeas in the north of NSW may be affected due to increased climate suitability to the defoliating pathotype under a warming climate. This may lead to increased economic losses due to disease. Other commodities likely to be affected include almonds, blueberries, cherries and grapes due to increased climate suitability to *Verticillium dahliae* infection at certain times of the year.

There are no chemicals registered for the control of Verticillium wilt. Management practices can help to reduce the risk of losses from the disease, including planting resistant varieties, managing crop residues after harvest, rotating crops with non-susceptible crops, controlling weeds to prevent the green bridge, and good farm hygiene.

Methodology and data

Climate projections were sourced from Climate Change in Australia's 'Application Ready Data'. This dataset is comprised of projections from an ensemble of 8 global climate models, each presenting a plausible future climate. The models differ in their projections, giving rise to uncertainty in our modelling. Low confidence in the projected changes due to differences between the models is noted in the text. Care should be taken when interpreting these results.

The Vulnerability Assessment Project is intended to highlight potential industry-or regional-level changes. Intermediate and high emissions scenarios were used in the assessments (RCP4.5 and RCP8.5), but these are not the only future scenarios possible. The inclusion of climate variables important to each biosecurity risk was based on published research, expert knowledge and data quality and availability.

FOR MORE INFORMATION

Please get in touch with
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This work has been produced by the NSW Primary Industries Climate Change Research Strategy funded by the NSW Climate Change Fund.