#### Climate Vulnerability Assessment Fusarium Factsheet

# *Fusarium*: an increasing biosecurity threat under a changing climate

A warmer climate may increase early infection risks in southern cotton regions, while the northern regions could see fewer late-season infections. These changes present both challenges and opportunities for the NSW cotton industry.

## 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 Climate Vulnerability Assessment, 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 crosscutting biosecurity risks to inform sound planning, risk management and adaptation decisions.



## **Fusarium in NSW**

The fungal pathogen *Fusarium oxysporum* f.sp. *vasinfectum* (hereafter referred to as *Fusarium*) was first detected in NSW in the late 1990s. Fusarium is predominantly detected around the Gwydir and Namoi valleys; however, it has been detected in each cotton-growing valley of NSW (Figure 1)

*Fusarium* survives as chlamydospores or mycelium, capable of persisting for years in the soil. *Fusarium* infects cotton seedlings through roots. Once inside the plant, it restricts water and nutrient flow, leading to wilting and even plant death. Under conducive climatic conditions, the majority of infection occurs early in the season and progresses upwards in the plant through the remaining growing season.

This strain of *Fusarium* is specific to cotton, infecting all stages of crop growth, with the mortality of seedlings frequently greater than 50% and reduced yields, threatening the profitability and sustainability of the cotton industry.



**Figure 1.** Map showing the cotton growing regions within NSW and key towns within each region.



#### **Department of Primary Industries**

## Climate and Fusarium

Overall, the likely impacts of *Fusarium* on cotton are projected to increase in spring and autumn but decrease in summer by 2050. Changes in climate suitability for *Fusarium* are likely to affect all cotton growing valleys except the Murrumbidgee. Climate risks and opportunities that may affect the occurrence and distribution of *Fusarium* include:



Warmer temperatures and changing rainfall will likely alter the timing of infections in cotton plants, potentially increasing the risk early in the season and decreasing the risk later in the growing season.

#### Climate impacts: what to expect

Changes to monthly climate suitability for *Fusarium* are likely to affect the cotton-growing valleys in different ways:

- Increased climate suitability is expected during September and May in the Macquarie and Lachlan cotton valleys under both emission scenarios (moderate to high confidence).



#### FOR MORE INFORMATION

Please get in touch with vulnerability.assessment@dpi.nsw.gov.au This work has been produced by the Climate Vulnerbaility Asessment funded by the State of New South Wales through the Department of Primary Industries and Regional Development.

- **Decreased climate suitability** is expected from November to March for the Gwydir/Namoi and Macquarie cotton valleys under both emission scenarios. These changes are more prominent and wide-spread under the high emissions scenario (*low to high confidence*).
- Historical climate suitability is likely to be maintained in all regions during most of spring and autumn (low to high confidence). During winter, all sites will likely maintain historical levels of very low climate suitability (moderate to high confidence).

#### Impact on key NSW primary industries

Increased climate suitability for *Fusarium* under a warmer climate could impact cotton industries in NSW by 2050. The Macquarie and Lachlan cotton valleys regions may experience higher infection rates in spring and autumn due to rising temperatures, leading to possible earlier infection at planting and improved survival on stubble after harvest.

Decreased suitability during the warmer summer months in Gwydir/ Namoi valleys could result in reduced mid to late-season infection, a potential opportunity for this region in the future. Current strategies fo managing *Fusarium* will likely remain effective but may need adjustments to adapt to these changes. Suggested modifications inclu selecting high *Fusarium* rank varieties, managing stubble by leaving it o the surface for a more extended period after harvest, and placing greater emphasis on controlling host weeds to minimise the risk of infection.

To support these cotton regions, research needs to be undertaken to assess these management approaches and communicate effective management strategies to industry.

## 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 industryor 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.