

Adaptive pest management for horticulture under climate change - pilot pest scoping.

VG13029



National Vegetable
Extension Network
SOUTHERN QUEENSLAND

SUMMARY

The potential impacts of climate change and climate variability on pest management have attracted attention from within the Australian horticultural industry. The media and scientific literature about the potential impacts that climate change can have on pest, diseases and weeds are alarming. Taken collectively, it can be confusing. This project focuses on exploring a method to use scenario modelling to identify adaptive pest management options for horticultural regions.

Many previous studies have attempted to use climate change scenario data to forecast future risks and impacts. These studies have typically mistreated the climate scenario data as if it were a set of observations of future climate conditions, giving readers an unrealistic picture of substantial uncertainties.

Fortunately, adaptive pest management strategies at the region or enterprise level do not require accurate or precise predictions of the climate for periods of decades into the future. Hence, the fundamental premise of this project is that the Australian horticultural industry is likely to be best served by approaching anthropogenic climate change within an adaptive management framework, using scenario analyses (Moore et al. 2013; O'Neill et al. 2008) to cast ahead in a prospective manner to identify:

1. Potential pest management issues of concern.
2. Potential cost-effective solutions to the significant pest management issues, and the necessary lead time for implementation.
3. Lead indicators signalling that the pest management issue is likely to arise.
4. A system to monitor the lead indicators at a suitable frequency.

Firstly, modelling the potential changes in pest populations of horticulture industries under future climate scenarios, including the identification of current locations around the world, which are climatically similar to the two case study locations under the future climate scenarios (i.e., future climate analogues). Secondly, exploring with growers the adaptation options and strategies that could be employed to respond to potential changes in the case study pest management issues.

There appears to be substantial issues related to some management practices and their adoption. It is important that strategies and processes be put in place now that will prepare and forewarn growers into the future of the impacts of climate change.

RESULTS

The results for this project have been split into two components, one focusing on the modeling of the pest within the two region surveyed under the project and the second being the engagement of growers within the regions and the adoption of science or lack thereof.

Pest Modeling

The modeling system, CLIMEX (Sutherst & Maywald 1985; Sutherst et al. 2007) was utilized in this project predict the trends of the pest for this report. The model depicted the following for the Bundaberg region. This prediction indicated a potential increase in the number of generations of

B. tabaci (Silverleaf whitefly) from 9.4 generations to 13.8 generations under the future climate scenario. The reason for this can be seen in the weekly growth index model.



Bemisia tabaci

The above process was repeated for the Werribee region and the pest modeled was *P. xylostellata* (Diamondback moth). The study indicated that there was the potential to have an increase of 51% in the number of generations across the same modeling period. This equates to an increase from 10.1 generations to 15.3 generations.



Plutella xylostella

Grower Workshops

The growers across both regions were approached to participate in a workshop specifically focused on the outcomes of this project. The Bundaberg region held, however a workshop and the Werribee region was resistant to a workshop and referred the team to two consultants that are active in the region.

CONCLUSION

It appears that scepticism exists about present management practices and their adoption, or lack thereof, by growers in both regions. It is important that strategies and processes be put in place now that will prepare and forewarn growers into the future of the impacts of climate change.

In the management and control of these pests across the regions, it will be necessary for industry and the growers to collect relevant data to monitor pest occurrence data within each growing region, noting changes in

abundance and phenology of pests.

Once the regions have a suitable regional monitoring / management system in place and the growers build confidence with the data, industry can push and pursue further investigations. Research can then occur along a gradient of environmental conditions and our temporal analyses can track changes in pest management over time and across regions.

RECOMMENDATIONS

There were number of recommendations under this project and these were presented under the following headings.

Climate change adaptation.

- Undertake a project to identify the feasibility of undertaking periodic analyses of changes in the spatio-temporal abundance of pests of concern to the horticultural industries. This study should identify the sources and qualities of pest abundance data, the types of questions that it is capable of supporting, and a suitable business model to support the ongoing analyses. To the extent that existing data sources are unable to support the spatio-temporal analyses, the study should investigate the feasibility of enhancing the pest monitoring activities to a standard capable of supporting the required analyses.
- Improve grower understanding of the nature of projected climate changes and the need for climate adaptation within the context of a more general global change framework.

Extension of pest management information.

- Investigate the reasons for the poor adoption of existing pest management recommendations, and identify options for closing the adaptation gap through better extension of existing pest management knowledge.