

Case Study: GM Crop

Would you like to know what the distribution pattern might be for any given species in the future as a result of climate changes? Or, what the distribution potential is for genetically modified plants in a given region? Or, what the distribution potential is for a foreign insect in a given agricultural region? Leading scientists from around the world use CLIMEX and DYMEX to help them determine the answers to these types of questions.

To date, more than 150 scientific papers citing the use of CLIMEX and/or DYMEX have been published. This latest paper is titled: **Prediction of the naturalisation potential and weediness risk of transgenic cotton in Australia**, *Agriculture, Ecosystems & Environment*, John Rogers, Robert E. Reid, Janet J. Rogers and Stewart J. Addison. Full Text: [doi:10.1016/j.agee.2006.07.007](https://doi.org/10.1016/j.agee.2006.07.007)

This is the first time CLIMEX inferential modelling has been used to evaluate the naturalisation and distribution potential of a genetically modified crop.

Dr Rogers, the principal author of this paper, is a long time user of CLIMEX and a respected Australian agricultural consultant. "I was an occasional user of the first Windows version of Climex and was excited to see the recent enhancements in Version 2", said Dr John Rogers, Principal Consultant, Research Connections and Consulting. "The inclusion of grided meteorological data sets was especially useful for our transgenic cotton modelling, allowing us to produce detailed suitability maps using the 0.1 degree data sets. We were able to use the output from Climex to produce detailed continent-scale maps in a GIS mapping package, combining the Climex suitability predictions with soil fertility data."

Dr Rogers became aware of the use of CLIMEX for weed risk assessment from his involvement with the CLIMEX development team and weed scientist colleagues in the Cooperative Research Centre for Tropical Pest Management.

"When Research Connections and Consulting was asked to do the transgenic cotton weediness risk study, I immediately saw the parallels between some of these previous uses of CLIMEX and this project. The important advantage we had working with cotton, compared to the challenges faced by the weed scientists, was the availability of detailed data on the responses of cotton to temperature and moisture, and good data on the original distribution of the primitive *Gossypium hirsutum* cottons in Central America. This allowed us to make rapid progress with the modelling and validation processes," said Dr. Rogers.

He went on to say, "Our CLIMEX predictions for cotton in northern Australia are in agreement with recent experimental work. Dr Rowena Eastick from the Northern Territory Government studied the naturalisation potential of Bt cotton in bush sites in the Northern Territory and the Kimberleys over five years. In a paper that will appear shortly in the journal *Weed Science*, she reports that in the absence of supplementary water, all of her experimentally established populations died out. As well, cotton did not persist in the Ord River and Burdekin areas after commercial and experimental plantings ceased. Our CLIMEX predictions for all of these areas was that cotton would experience fatal levels of Dry Stress".

"I also found the Irrigation Scenarios in CLIMEX very useful during the cotton modelling project. In the Northern Territory, there are approximately 60 sites with naturalised cotton populations, some on beach strands on the northern coast and others on river banks and floodplain margins further inland. All occur in locations where plants have access to extra water during the Dry Season. We were able to use CLIMEX Irrigation Scenarios to gain an understanding of how much Dry Season water was needed for plants to be able to naturalise at these locations. This assisted us with some subsequent work that examined cotton's naturalisation potential at roadside creek crossings in north-east Australia".