Final Report Summary

Improving ginger to futureproof the industry against pests and diseases

Objectives

To investigate options for the ginger genetic improvement and other strategies to protect ginger plants against pests, diseases and climate change.

Background

The commercial ginger industry in Australia is based on only two edible Zingiber officinale cultivars, Queensland and Canton, which are both susceptible to soil borne fungal pathogens Fusarium wilt and Pythium. There are considerable risks for the industry from pests and diseases, and changes to growing conditions, which will likely increase due to various forces including climate change.

Preliminary floral biology and pollination studies indicated all varieties of ginger in Australia produced flowers and the pollen of the varieties tested was viable.

Research

A literature review was undertaken to investigate whether ginger could be bred using traditional technologies, options to increase the genetic diversity of ginger in Australia and explore if resistance to key pests and diseases of the Australian ginger industry had been found overseas. Options to use biocontrol agents (e.g. beneficial bacteria) to protect ginger were also explored. In addition, preliminary flowering and pollination viability studies of the ginger varieties in Australia were commenced.

The literature indicates that breeding of ginger using traditional pollination technologies may be possible and that ginger pollen viability is impacted by nutrition, temperature and humidity.

Resistance to key pests and diseases for the Australian ginger industry is documented in several papers. There is only one reference of resistance to Fusarium and more on Pythium, mainly in publications originating in India. Confirmation of resistance to the Australian forms of these pathogens is required.

This scoping study found there are only 13 edible cultivars of ginger currently captured in the ginger germplasm collection in Australia. Many ornamental gingers that belong to different species and genera that are not edible also occur in Australia. The literature indicates that countries including India, China, Malaysia and the United States of America have varieties not currently available in Australia and these varieties, if they can be accessed, would increase the genetic diversity available to the ginger industry.

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Outcomes

This project indicated that there were options to increase the genetic diversity and future proof the Australian ginger industry against pests and diseases. The range of options includes traditional breeding to develop new varieties, importation of potentially resistant varieties from overseas, biocontrols, mutation breeding and polyploids. These options need to be further explored.

Implications

Introducing genetic diversity to the edible Australian ginger markets will help the industry cope with increasing pest and disease pressure, and changes to growing conditions, which will likely increase due to various forces including climate change. This study has set the groundwork needed to achieve the goal of increasing the genetic diversity, improving pest and disease resistance and reducing the impact of pests and diseases using biocontrols, for the Australian ginger industry.

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Contact

Associate Professor David Lee
University of the Sunshine Coast
Sippy Downs Drive, Sippy Downs, Queensland 4556

dlee@usc.edu.au

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