Project overview

Improving ginger, to future proof the industry against major pest and diseases

December 2020 - July 2024

Background

This research addresses the critical need to better manage ginger for Australian pests and diseases (e.g., Fusarium yellows, Pythium soft rot, and Root-knot nematodes) and increase market opportunities identified in the Ginger Program RD&E Plan 2017-2022. This project aims to reduce risks to the industry, which is reliant on two varieties: 'Queensland' and 'Canton'.

Proper screening of the edible ginger and related species, some of which are edible and potentially have pest and disease resistance, along with breeding will provide the industry with information to cope with these risks. The project also aims to provide knowledge on whether we can increase the narrow genetic base of ginger, so the industry can benefit from a wider pool of ginger accessions for commercialisation.

Research

Introducing genetic diversity of Australian ginger is required for the ginger industry to cope with growing pest and disease pressure, which are increasing due to various forces including climate change. This project will address the critical issues of the extremely narrow genetic base of edible ginger and the associated risks of pests and diseases and climate impacting ginger production.

The genetic base of edible ginger (*Zingiber officinale*) in Australia is restricted to seven cultivars with multiple accessions (e.g. lines in tissue culture and landrace accessions grown on a farmer's property) that have not been adequately screened against the known pests and diseases, even though there is evidence in international literature that resistance or tolerance exists.

In addition, species closely related to edible ginger have been reported, but not confirmed, to have resistance/resistance genes to key pest and diseases of the Australian industry (e.g. *Z. zerumbet*). If resistance in these related species is confirmed, then options for breeding with these species will be investigated. This project will investigate pest and disease resistance in edible and closely related gingers with the aim of increasing the genetic diversity, reducing risks, and facilitating ginger industry expansion.

Objective

The principal objective of the project is to investigate options for the improvement of ginger, to future proof the industry, assuring industry competitiveness by:

- Screening all the accessions of edible ginger (*Z. officinale*) and its close relatives for resistance to key pest and diseases of the Australian ginger industry including Fusarium yellows, Pythium soft rot, and Root-knot nematodes. This will inform the industry if there is resistance to these pest and diseases in Australia that can be utilised in a ginger improvement program.
- Exploring options to increase the genetic diversity of ginger in Australia, through breeding, with the aim of reducing risks from major pest and diseases and facilitating ginger industry expansion.

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Expected outcomes and implications

The 270-ha ginger industry is a moderate size primary industry worth approximately $60-70 million AUD at the farm gate. This research addresses the critical need to better manage ginger and diseases, and increase market opportunities identified in the *Ginger Program RD&E Plan 2017-2022*. It aims to reduce risks to the industry, which is reliant on two varieties: 'Queensland' and 'Canton'.

Proper screening of edible ginger and related species, which are often edible and potentially have pest and disease resistance, along with breeding research will help the industry reduce risks. Thus, this project aims to increase the genetic base of ginger, so the industry has a wider pool of ginger accessions available for commercialisation.

This project will fast track landrace ginger cultivars if found to be resistant to key pests and diseases, providing the industry with opportunities to commercialise new/novel ginger varieties with desirable traits (e.g. adaptability, vigour, and pest and disease resistance). This project will therefore help the industry to sustainably increase production as outlined in the *Australian Ginger Industry 2016-2021 Strategic Plan.*

The expected outcomes of this project will provide the information needed for a more resilient and sustainable ginger industry which is better able to cope with pest and disease incursions.

Specific outcomes include:

- Screening of edible ginger cultivars against key pests and disease, allowing the industry to make informed decisions on the best cultivars to deploy to minimise risk.
- Screening of related ginger species (*Zingiber spp.*) for resistance to key edible ginger pest and diseases to facilitate decisions about the best option to genetically improve ginger.
- Development of a broader genetic base for ginger which may allow the industry to explore new commercialisation opportunities via higher yields, more reliable production, and pest and disease resistance.

Publications

This project builds on the AgriFutures Australia funded scoping study PRJ-011521: Improving ginger to future proof the Australian industry against pests and diseases.

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