

The Project

The Cooperative Research Centre for Developing Northern Australia, AgriVentis Technologies and CQUniversity co-fund a project to determine opportunities for growing new spice lines in northern Australia. Six trial locations (Figure 1) were spread across northern Australia, from Biloela in the south to Darwin in the north. The trials have been running since 2019, with small plot trials in the first year to determine the suitability of five spices to the climate and soils of northern Australia. Black sesame and fennel were trialled as summer crops, kalonji, cumin and kalijiri were trialled in the winter. Black sesame performed well in summer at all locations and kalonji performed well in winter in the southern sites. The black sesame was trialled under farmer managed conditions in the summer of 2020/2021 at all sites and in the Ord, WA. Kalonji is currently being trialled under farmer managed conditions at all QLD locations. In addition to kalonji during winter, small farmer managed trials of black sesame and fennel were grown in the Ord, WA and in the two northern sites in QLD, Ayr and Tully. The coming summer of 2021/2022 will see black sesame grown on a larger commercial scale across QLD, the NT and WA. Depending on the results of this current winter trial, kalonji, black sesame and fennel could be grown across QLD and the NT on a commercial scale in winter 2022.

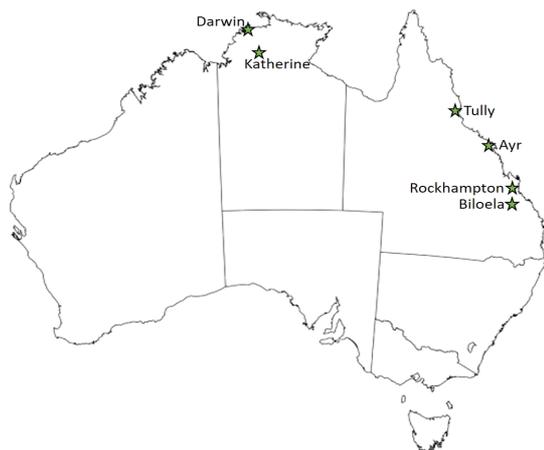


Figure 1. Trial locations across northern Australia

Black Sesame



Black sesame has shown promise as a summer crop across northern Australia with some lines achieving hand harvest yields of over 3 t/ha in the summer of 2019/2020 small plot trials. As a summer crop it grows to maturity in about 120 days, plant height can be up to 1.8 m tall, producing a prolific number of capsules which can shatter. Harvesting a shattering crop poses challenges and more work is required to refine mechanical harvest to reduce losses.

There is potential for black sesame as a winter crop in northern Australia, where nighttime temperatures do not drop below 8°C. In winter, the crop is shorter, typically around 1.2 m tall, which could improve harvest outcomes, particularly when using a harvester with a reel on the front. The reel can knock the tall plants causing

seed to shake out of the open pods.

Machine harvest yields from the farmer managed verification trials in summer 2020/2021 were typically less than 1 t/ha, although the significant losses during harvest suggest the crop yielded well during this season.

Black sesame is drought tolerant and can be grown in a rainfed system assuming adequate soil moisture upon planting. Weed management is important to ensure crop losses are minimized.

A high value crop, black sesame is used for whole seed and oil and studies are currently being undertaken to understand the composition of the seeds for potential uses in pharmaceutical and cosmetic industries.



Fennel

Fennel was trialled as a summer crop in the small plot trials in 2019/2020. Northern Australia proved to be too hot and humid to support productive growth of this crop and small plot trials were conducted over winter in 2020. Fennel is a 200 to 250 day crop and during the first summer yielded between 300 kg/ha and 1.5 t/ha hand harvested from a small plot trial. The winter fennel small plot trials showed greater promise with better plant establishment. Fennel is being grown again over the 2021 winter as a small-scale farmer managed trial. This will help to determine whether fennel has potential for commercialization in winter of 2022 and will provide the opportunity to test mechanical harvesting of the seed.

Fennel is an aromatic spice producing aniseed scented seeds which are consumed whole or ground. An oil can be extracted from the seed and biomass which is high value and can be used for medicinal purposes.

Kalonji



Kalonji, also known as Nigella was trialled as a winter crop in the small plot trials in 2020. The crops in the central QLD performed well with yields up to 3 t/ha from hand harvested trials in Biloela. The black seed remains in the capsule upon maturity and the capsules are quite uniform in height on the plant. The plant structure suggests mechanical harvesting should be possible with minimal losses.

Kalonji is used as a whole seed for human consumption and can be pressed for oil which is known as Black Seed Oil and is used for pharmaceutical purposes.

Current Trial Crops

This winter season we are trialling crops in the following areas:

Location	Crop
Biloela, QLD	Kalonji
Rockhampton, QLD	Kalonji
Ayr, QLD	Black sesame, fennel, kalonji
Tully, QLD	Black sesame, fennel, kalonji
Ord, WA	Black sesame

If you are interested in getting involved, we are looking for producers who would like to grow the following crops on a land size greater than 1 ha:

Crop	Planting Date	Crop Duration	Location
Black sesame	Nov 2021 to Jan 2022	120 days	All northern Australia
Black sesame	May 2022	140 days	QLD north of Ayr, NT and Ord, WA
Kalonji	May 2022	140 days	Central QLD
Fennel	May 2022	250 days	All northern Australia

For more information on this project visit: <https://www.crcna.com.au/research/projects/spicing-northern-australia-high-value-condiment-crops>

Contact

Tieneke Trotter
e. t.trotter@cqu.edu.au
m. 0402 406 385

Surya Bhattarai
e. s.bhattarai@cqu.edu.au
m. 0422 800 518

