

Study explores the bitter taste of honeybush tea

What makes some cups of honeybush tea taste bitter and others not?

This is the topic explored by Lara Alexander as part of her PhD study. Alexander is a student at Stellenbosch University's Faculty of Agrisciences in the Department of Food Science. She will be receiving her doctoral degree in December.



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Fermentation and bitterness

Alexander investigated phenolic compounds in both "unfermented" (green) and fermented honeybush tea as potential indicators of bitterness. These (natural) plant compounds are responsible for the colour of honeybush and other herbal teas, contribute to the health benefits associated with drinking it and are also involved in its flavour properties.

This is also the first study to investigate the reduction of bitter intensity of tea infusions due to the honeybush fermentation processes.

"Bitterness is not acceptable in honeybush tea, known and marketed for its characteristic and pleasant sweet taste," Alexander points out in her thesis. Some batches of *Cyclopia genistoides* (traditionally known as "coastal tea") have a bitter taste profile. This species is one of the *Cyclopia* species currently cultivated for the production of honeybush tea.

"Bitterness is even more prominent in the unfermented herbal tea," she writes. "Yet, there is great variation in the bitterness of honeybush infusions, and the compounds responsible for this taste deviation have not yet been identified."

A professional research environment

Alexander has been working on honeybush tea under the mentorship of Prof Lizette Joubert (her supervisor) since 2013 when she started in a temporary research assistant position. Joubert is a specialist researcher working on bioactive compounds and indigenous tea at the Agricultural Research Council (ARC). "It was an ideal position as I was working in a

professional environment with absolute experts in the field. The topic of honeybush tea and the interdisciplinary nature of the work intrigued me and I continued to complete both my MSc and PhD in her (Joubert's) laboratory."

The study employed different research methods, including a descriptive sensory analysis of hot water extracts and fractions enriched in phenolic compounds such as benzophenones, xanthenes and flavanones. Alexander also developed a statistical model that can be used to help screen plant material used for tea production in future.

She considered the effect of fermentation on bitter intensity and the content of hot-water infusions. These infusions were prepared from genotypes of two of the 23 known honeybush species. Both species studied (*C. genistoides* and *C. longifolia*) contain high levels of xanthone and benzophenone and have been found to produce bitter infusions, she points out.

Taste and content differences

The two species differed in terms of bitter taste, phenolic content and response to fermentation. Different genotypes of the same species also produced infusions varying in phenolic composition and bitter intensity. *C. genistoides* produced bitter-tasting infusions even after fermentation, whereas the bitter taste of *C. longifolia* infusions was adequately reduced by fermentation.

"The results indicated that the benzophenone-rich tea fraction was not bitter, the flavanone-rich fraction was somewhat bitter, and the xanthone-rich fraction was distinctly bitter," Alexander points out in her study. "Bitter taste reduction through fermentation was more effective for *C. longifolia* than for *C. genistoides*, highlighting the problem the industry often faces with inconsistent production batches."

Selection of plant material

As several phenolic changes that affect compound concentrations take place during fermentation, care should be taken when plant material is chosen for propagation and cultivation, notes Alexander.

Currently, demand for honeybush tea far outstrips supply. Most of the honeybush (about 80%) is wild harvested and the rest is cultivated. Growing the industry not only requires the expansion of commercial cultivation, but also the cultivation of plant material delivering higher yields and consistent quality. The ARC's honeybush breeding programme is evaluating honeybush genotypes for improved product yield and quality, among others.

"Honeybush is indigenous to South Africa and we hope that it will achieve the same popularity of the wider known rooibos industry," says Alexander. "By supporting a local South African industry, we hope to achieve a socio-economic impact in support of the local economy," concludes Alexander.

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