

The untapped medicinal value of Honeybush in the management of diabetes



GIZ/ABioSA/Brett Eloff



ABioSA STUDENT RESEARCH

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Kyle Le Roux did this research as part of his Master's degree in biochemistry at Stellenbosch University. He presented this research at the African Biotrade Festival in September 2023. Le Roux is now pursuing his PhD at the University of Cape Town, where he is studying the potential use of gold nanoclusters in the treatment of tuberculosis.



**forestry, fisheries
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Department:
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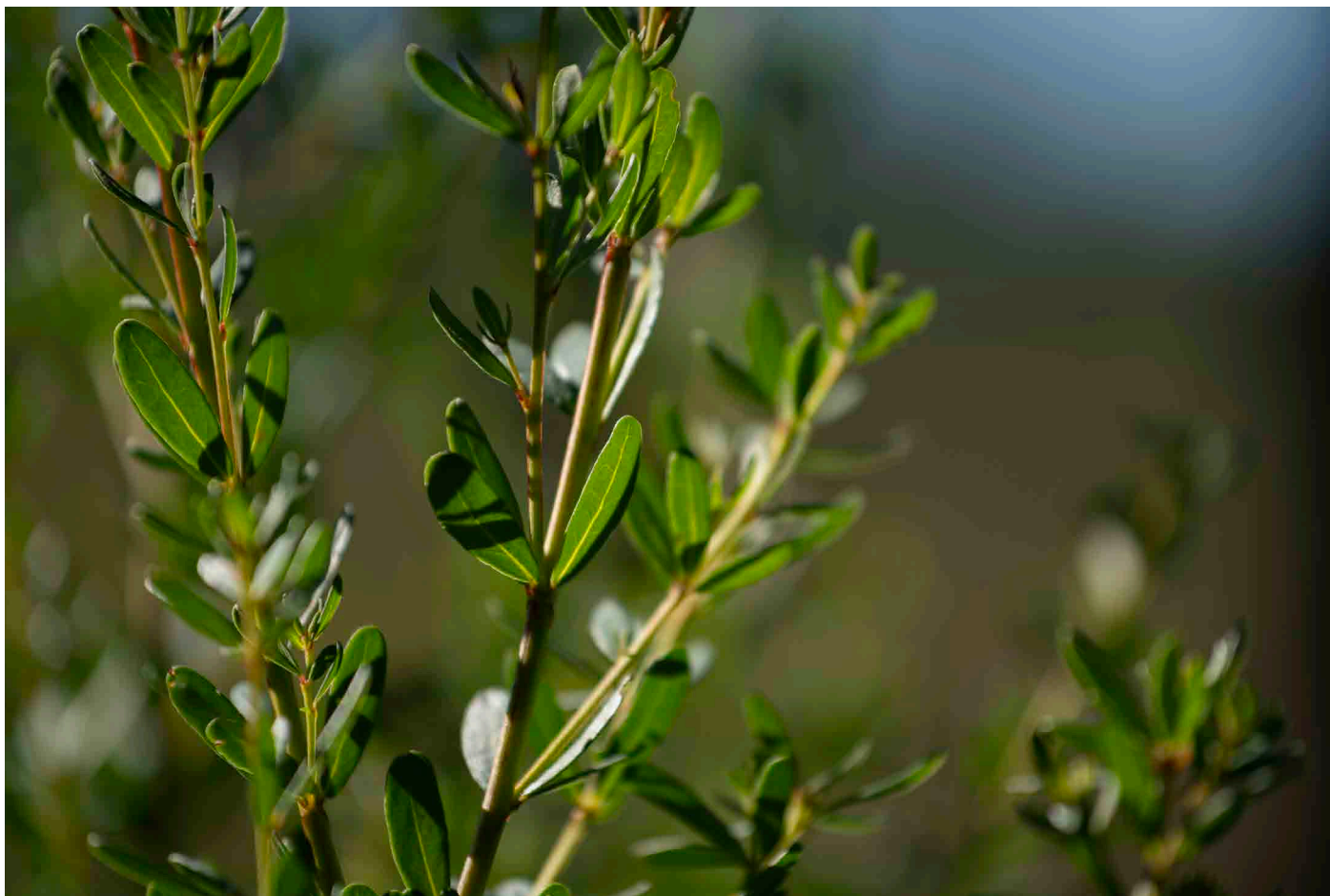
THE ABS
CAPACITY
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Schweizerische Eidgenossenschaft
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About Honeybush

Honeybush (*Cyclopiya species*) is an endemic fynbos shrub growing on sandy coastal plains, mountain slopes and valleys in the Cape Fold mountains across the Western and Eastern Cape provinces of South Africa.

Six of the 23 *Cyclopiya* sub-species are wild harvested or cultivated to produce Honeybush tea and extracts. The plant material is finely chopped and placed in fermentation tanks for oxidation at high temperatures, allowing for the development of its unique flavour and rich reddish-brown colour.

The plant is dried, sieved, graded for quality and packaged. Production of green Honeybush skips the fermentation process to retain high levels of antioxidants, making it suitable for nutraceutical extracts.

Low in tannins and caffeine-free, Honeybush boasts a long history of therapeutic use. Research shows it may provide an alternative treatment for several conditions. It has anti-inflammatory effects, anti-cancer potential, and a positive effect on individuals living with Type 2 diabetes.

With further research and development, Honeybush has significant potential to be promoted as a niche indigenous product in tea markets and as an alternative health treatment.

Availability and sustainability

Honeybush is mainly an export product, with 75% of the tea produced in South Africa being sold to Europe, Japan and the United States.

It is both cultivated and harvested in the wild, and in some areas is threatened by overharvesting and invasion by alien plants.

The sector is undergoing significant development to ensure reliable quality supply from sustainable harvesting of Honeybush for its use as a commercially viable nutraceutical extract.

Research summary

Le Roux investigated the potential effects of Honeybush extracts in the treatment of disease induced by oxidative stress and hyperglycaemia (high blood sugar).

His research aimed to fill a knowledge gap around the use of Honeybush as part of a potential intervention strategy for oxidative stress-related diseases such as diabetes.

His goal was to prove that Honeybush could become an affordable and accessible natural alternative to existing treatments.

Research process

Le Roux studied how Honeybush extract affects HepG2 cells, which are commonly found in the human liver, to assess its impact on the mitochondrial function under conditions that mimic high blood sugar.

The cells were exposed to both a hyperglycaemic environment and varying concentrations of Honeybush to see whether the extract could reduce the damage caused by high glucose levels. After seeing a positive effect, the most effective concentrations were selected for further testing to evaluate Honeybush's potential to improve mitochondrial function.

The underlying biological processes were then investigated to determine whether Honeybush altered the levels of certain cellular components that protect mitochondria – components that are typically harmed by hyperglycaemia.

A combination of biochemical and molecular analyses confirmed that Honeybush helps prevent damage caused by high glucose, primarily by protecting and enhancing mitochondrial function.

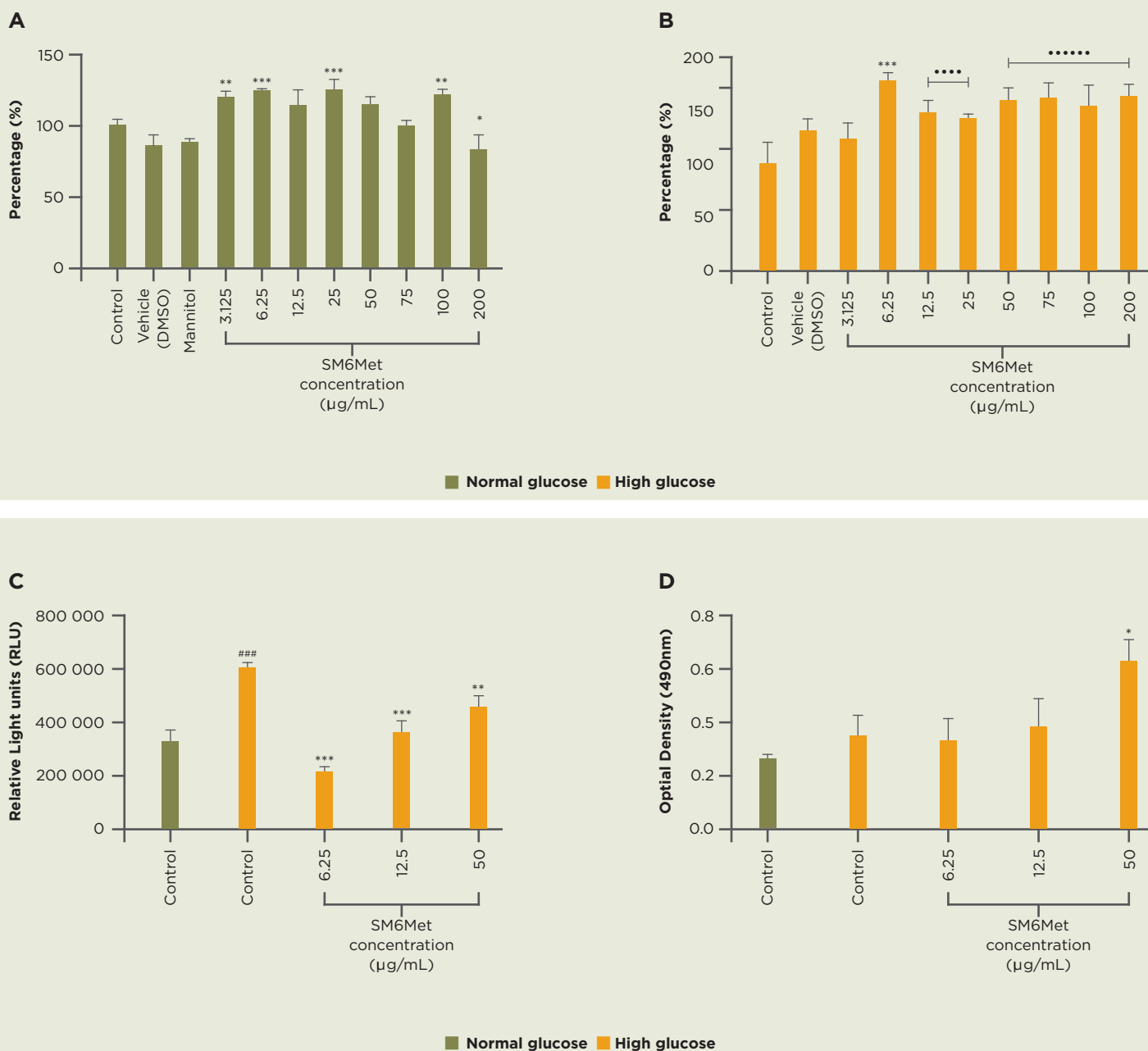
Results

Le Roux's research showed that Honeybush can reduce or prevent harm caused by hyperglycaemia – a symptom of Type 2 diabetes – by protecting mitochondria and preventing mitochondrial dysfunction.

Based on these findings, the development of new nutraceutical extract markets could encourage producers to prioritise the chemical content and quality of Honeybush rather than its taste profile.

If Honeybush is proven to be beneficial in managing diabetes, previously under-utilised sub-species of Honeybush could also enjoy market growth. This could boost interest in other indigenous plants and their conservation, while strengthening the case for greater investment in the biotrade sector.

Le Roux's work adds to the growing body of research supporting the health benefits of Honeybush, and further studies are currently underway by the Sheik Abdul group at Stellenbosch University.



The effect of SM6Met (Honeybush extract) on metabolic activity and cell death. SM6Met improved metabolic activity (MTT assay) under both A) normal glucose and B) high glucose conditions. Selected SM6Met concentrations showed C) significant decreases in apoptotic execution (Caspase-Glo® 3/7 Assay) under high glucose conditions, whereas D) a significant increase in necrosis (LDH assay) was detected at the highest selected SM6Met concentration.

represents HG vs NG, * represents HG vs SM6 treatment. ###p<0.0001; *p<0.05; **p<0.01; ***p<0.0001.