

Adaptive strategies for tea plants native to South Africa - prospects of incorporation into cropping systems and industrialisation

Define tomorrow.

UNISA


college of
agriculture and
environmental sciences

150
YEARS

Significance of tea

Tea is ranked the second-most consumed non-alcoholic beverage after water, across the world, confirming its accessibility, popularity, and affordability.

Health benefits to humans and livestock, source of income ([The South African Rooibos Council pays an annual traditional knowledge levy \(1.5%\) per kilogram of harvested rooibos, to harvesters](#)), crucial resource in the food and pharmaceutical industries, enhance soil-ecosystem multifunctionality.

While Africa has several indigenous tea plant species, currently, most are harvested from the wild.

Risks of dependence on wild-tea

Uncontrolled harvesting (illegal and overharvesting); extinction of plant species; competition from invasive-alien plants; overgrazing; climate change; hybridisation; uncontrolled fires

Are we drinking toxic compounds?



Wild teas get contaminated by weeds containing toxic compounds or, the tea can exhibit toxic compounds – all dangerous to humans

(Hardie et al., 2023) - contamination of tea plants co-existing with weed.

Survival strategies adopted by tea plants

Enhanced nutrients - N_2 -fixation, expression of enzymes, formation of cluster roots, decreased rhizospheric pH – acquire, accumulate, and contribute nutrients to soils.

Drought and thermotolerance - formation of thinner roots and higher root:shoot ratio, expression of heat shock proteins.

Addition of N-and P-fertilizers has increased N_2 -fixation, and tea yield – greenhouse gases?

However, the teas are cultivated using organic farming approaches.



Prospects of tea cultivation

Successes achieved on *Camellia sinensis* in Kenya, and Rooibos tea in RSA – shifting from being wholly dependent on wild harvested tea to 0.001% contribution should be replicated on other teas native to Africa.

Multidisciplinary approach - tea cultivation

Breeders, Botanists, Plant Taxonomists, Governments (and other Research Funders), Indigenous people, Scientists,

Lion's share (80%) of Honeybush tea is harvested from the wild, about 20% under commercially cultivation (McGregor, 2017).



Soil and tea quality - plantations

Rooibos and Honeybush teas are cultivated under organic farming practices – little or no addition of inorganic fertilizers.

Decline in quality of soil and shoots (tea), directly associated with declining yield of cultivated Rooibos tea plants (Smith et al., 2018).

Increased accumulation of nutrients in soil and shoots of non-fertilized cultivated Honeybush tea (Maseko and Dakora, 2013).



Depleted nutrients can be sustainably replaced using alternative eco-friendly fertilizers (organic sources - biostimulants?).

Vermicompost tea: increased diversity of bacterial species in Rooibos tea (Van Heerden et al., 2020).

Tea quality – *Athrixia phylicoides* DC

An herbal tea plant native to southern Africa - exhibit great tea quality during winter season (Mudau and Makunga, 2018).

Recommendation rates of N, P, and K-fertilizers, for improved quality under cultivation (horticultural settings) (Mudau et al., 2007).

Presence of parasitic nematodes in the rhizosphere of wild plants (Guga et al., 2023).

Is there depletion of nutrients with continuous cultivation, under field conditions?

What mechanisms does *Athrixia phylicoides* use to improve survive drought events and temperatures, as well as improve the solubility, uptake, and accumulation?

Prospects of commercialisation

Of teas native to Africa, Rooibos is a model on commercialisation – shifting from being wholly dependent on wild harvested tea to 0.001% contribution should be replicated on other teas native to Africa.

Honeybush tea – DSI & ARC have selected and bred seeds and to date, the improved seeds are sold to researchers and farmers, and stakeholders.

Bush tea – currently, there seem to be no evidence of government involvement in promoting commercialisation.

Constraints: over-reliance on produce from CFB, lack of markers to ensure consistent quality product (esp with Honeybush tea) (Rampedi and Olivier, 2008).

Much effort is on the tea native to the Cape Fynbos Biome (challenged by habitat loss – urbanisation; climate change; invasive-alien plants).

ITKU - UNISA

The Policy of the Government of the Republic of South Africa concern recognition, promotion, development, protection, and affirmation of IKS.

The Unit is intended to be transdisciplinary – give an overview on all African Indigenous Knowledge Systems.

To facilitate and be an enabling platform – insist on broad participation and collaboration between stakeholders; as well as capacitate stakeholders that are silent/ignored, to partake on processes.



NGIYABONGA!