Our essential oil and its essential friend

The relationship between Buchu and its mycorrhizal symbiont

Buchu is a term that was primarily used by the Khoisan people in the western region of South Africa for fragrant plants that could be dried and powdered, and included a wide variety of aromatic plants. In recent times, buchu generally refers to species of Agathosma of which A. betulina and A. crenulata have the highest commercial value.

Both A. betulina and A. crenulata have been extensively used as medicinal plants due to their several proven therapeutic properties and pharmacological uses. They are valued both locally and as export items especially for their extractable essential oils. Buchu oil has been approved by the US Food and Drug Administration (FDA) [registration number 172.510 with a Generally Recognized as Safe [GRAS] status 2169] as well as the European Union for use in foodstuffs. Of the two species, A. betulina is better accepted, used and commercialized since its essential oil has minimal pulegone content. Pulegone was thought to be hepatoxic but has recently been approved by the US FDA for use in the food industry at low concentrations.

A. betulina produces essential oils from which several important compounds such as isomenthone, diosphenol, limonene and menthone have been extracted. Buchu is said to be the only plant in the world that genetically produces diosphenol, which is responsible for the characteristic blackcurrant scent and flavour of the plant.

> It is imperative to conserve the buchu plant and enhance its sustainable ex-situ cultivation

Essential oils from buchu have been used extensively as effective antiseptics to prevent infections of the urinary tract, bladder and urethra as well as to prevent wounds from becoming septic. The essential oils have also been credited with the ability to soothe and ease muscle pains by reducing the level of pain and inflammation. The oils were also found to be active against selected pathogens such as Staphylococcus aureus (causative organism for a range of mild and some life-threatening diseases such as pneumonia and meningitis), Bacillus cereus (one of the most common causes of food poisoning), Klebsiella pneumonia (causative organism for infections such as pneumonia, meningitis and cellulitis) and Candida albicans (most common cause of genital yeast infections). In addition, buchu belongs to non-timber forest produce, which is globally important for rural livelihoods.

Buchu is a natural endowment that must not be allowed to go into extinction. To ensure its sustainability, there is a need to develop enabling strategies that would promote sustainable cultivation and harvesting, as well as enhance production of the plant since demand exceeds supply.

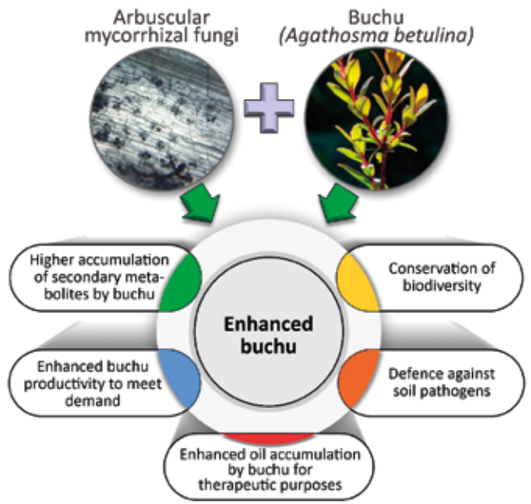
It thus becomes imperative to conserve the plant and enhance its sustainable ex-situ cultivation. Buchu has been over-harvested due to its demand and strategies such as ex-situ cultivation have been implemented to make up for the difference between supply and demand.

These strategies are helpful in making buchu more abundant; however, none of them conserves the mycorrhizal partner of the plant.

Mycorrhizal partners of plants are their fungal mutualistic symbionts, and they are essential for ecosystem functions such as nutrient mobilization and biocontrol of soil-borne plant pathogens.

Interactions between plants and mycorrhizal fungi are critical for the growth and survival of both partners (plant and fungus). Mycorrhizal fungi colonize plant roots and aid in the defence of the plant against soil-borne pathogens.

Such defence against plant pathogens may be particularly relevant for buchu because of its susceptibility to soil-borne fungi of the genus Phytopthera. These mycorrhizal fungi, particularly arbuscular mycorrhizal fungi, are also known to increase productivity of medicinal and aromatic plants by enhancing accumulation of valuable secondary metabolites, which would then be utilized to benefit human health. It is therefore posited that enhancing ex-situ cultivation of buchu would require conservation of the mycorrhizal partners that are associated with wild buchu. Conserving the plant's mycorrhizal partners is envisaged to confer several advantages, enhancing its sustainable ex-situ cultivation and boosting the accumulation of essential oils.



Furthermore, concerns are being expressed that the quality of oil extracted from buchu cultivated ex-situ is not as good as that from wild buchu. The association of mycorrhizal fungi with ex-situ cultivated plants has the potential to enhance the quality of oil to a semblance of that of wild-growing plants. Mycorrhizal as well as rhizobacterial inocula have been shown to enhance buchu productivity. It is therefore important to investigate the mycorrhizal symbionts of the wild plants and use such information to formulate mycorrhizal inocula that will enhance the quantity and quality of buchu cultivated ex-situ.

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