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Ethnobotanical study on the utilization of wild edible indigenous fruits in miombo woodland of Tabora region in western Tanzania

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Abstract

The wild edible fruits provide the diets of rural inhabitants living in underdeveloped nations with essential nutrients and vitamins. However, due to changes in rural ecosystems and landscape values related to conserving biodiversity, certain fruit species are becoming less common and others may be in danger of going extinct. The purpose of this study was to provide evidence of the use and value of wild fruits in western Tanzania's Tabora region. A total of 244 local inhabitants were surveyed and interviewed to gather ethnobotanical information on the utilization of wild fruits. The findings indicated that most fruit species had a variety of applications, food, medical, and cultural events. The majority 51% of the inhabitants consumes wild fruits daily, 19% use them up to four times per week, 6% consumed them once every week and 15% do not. 51% consumed fresh fruits as a dietary supplement, 36.1 % cooked them into traditional dishes like oatmeal, 12.7% used them during cultural gatherings, 5.3% used them when grazing, and 1.2% used them medicinally. In addition, fruit species, such as *Strychnos cocculoides* are used to treat stomach problems, *Friesodielsia obovata* and *Parinari curatellifolia*, are used to treat reproductive issues, *Vitex mombassae*, used to treat cough and respiratory infections, *Vitex doniana* and *Phyllanthus engleri*, are used to treat diabetes and high blood pressure, and *Tamarindus indica* is used to treat urinary tract infections. Moreover, significant levels of mineral elements like potassium, magnesium, and calcium were also found in the sampled fruits. The largest concentrations of Fe, Ca, Na, Mg and K were found in *Vitex doniana*, *Strychnos cocculoides*, and *Parinari curatellifolia*. Vitamin B9, A, and C were found in *Phyllanthus engleri*, *Grewia conocarpa*, *Strychnos cocculoides*, *Vitex doniana*, and *Parinari curatellifolia*. Apart from their multifunction use, wild fruits are becoming less diverse due to overgrazing, charcoal extraction, increased farming activity, and selective plant harvesting for building. Therefore, the benefits of wild fruits for ecological health, cultural preservation, economic development, and biodiversity protection must thus be made known to the local inhabitants in order to achieve the United Nations Sustainable Development Goals 2, 12 and 15 by 2030 and 2063 African Development Agenda.

Keywords: use type, pharmacological uses, nutritional benefits, and conservation

Introduction

The miombo woodland is a home to a wide variety of native wild fruit species that can be eaten (Degreef et al., 2020). Studies (Omotayo and Aremu 2020, Mapunda and Mligo 2019, Sardeshpande and Shackleton 2019; Omotayo and Aremu 2020) indicates that the diversity of wild edible fruits in diverse ecological zones is crucial to rural people's capacity to maintain their income and nutrition security. Besides the potential of wild fruits, they are subjected to inadequate advancement in consumption and conservation. This tendency is caused by changes in societal and environmental systems that disrupt rural systems' ability to conserve biodiversity (Zareen and Jules, 2010). Since rural systems of biodiversity conservation are weakening and plant richness is diminishing, wild fruits are being neglected (Ojelel et al., 2019). Wild fruit species, particularly in western Tanzania, are in threat due to habitat degradation and biodiversity loss brought on by increased cultivation expansion, livestock grazing, charcoal extraction and unsustainable plant wood harvesting for different uses. The supply of wild indigenous fruits has been drastically reduced as a result of these dynamics, and several species are now in danger of going extinct. In many rural communities, the majority of people lack varieties of nutrients in their diets to meet their daily needs, as a result, rural people continue to be undernourished and many more are deficient in one or more micronutrients (FAO, 2003). As of recent, due to increased human activity, the habitats for wild fruits are deteriorating, hence threatening food systems, biodiversity, and land productivity. Undertaking research on the use and importance of wild edible fruit diversity, especially in western Tanzania, is crucial to help realize the United Nations Sustainable Development Goal 2 by 2030 and to preserve this information for future generations. Western Tanzania's Tabora region is home to a large coverage of miombo woodlands that are interspersed with a variety of diversity of wild fruit species. However, the region has had varying degrees of forest loss, and not much has been done to protect wild fruit species. Therefore, the purpose of this study was to document ethnobotanical information on the use and value of wild edible fruits to the rural populations in the Tabora rural, Uyui and Sikonge districts under the contemporary societal and environmental change.

Material and Methods

Tabora region is located at latitude 3° 00' – 7° 00' South and longitude 32° 00 – 34° 00' East. According to Njana et al. (2013), the region experiences a warm climate with annual average temperatures of 23°C and temperature ranges between 15°C and 30°C. Rain falls from November to May and the dry season begins from June to October. The main sources of income for the local inhabitants are crop farming, livestock rearing, beekeeping, and charcoal extraction and sales. Among the native ethnic groups include; the Sukuma, Waha, and Nyamwezi. Ethnobotanical information on the utilization of wild edible fruits was collected through conducting field surveys and interviews with the local people. Descriptive statistics was used to analyse ethnobotanical information while minerals and vitamin contents were tested for five fruits (Fig. 1).



Fig 1. Five wild fruits species analysed for minerals and vitamin contents.

Results and Discussion

Life form and fruits

A total of 51 wild edible fruit species were recorded, 64% were shrubs, 21% were small trees, and 15% were deciduous trees. Fewer species of fruit were collected prior to the rainy season

however, diverse fruits harvested during and after rainy season (Fig. 2). According to the locals across the study areas, every resident takes part in picking wild fruits.

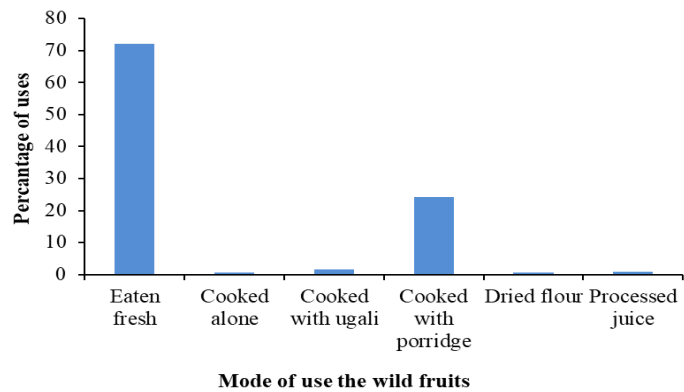
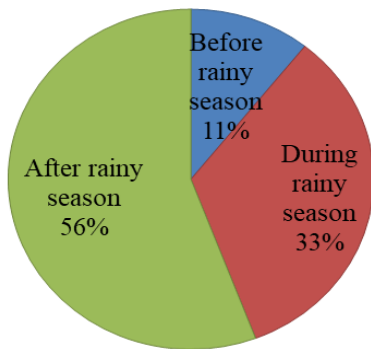


Fig 2. Seasonal collection of wild fruits. **Fig 3.** Mode of use the wild fruits.

Utilization extent

The majority 68.3%, of fruit species were used for food, 19.7% used for medicine and 12.0% used specifically to obtain vitamin supplements. The majority of the local inhabitants, 60%, reported using wild fruits more than five times per week, few used once per week and fewer do not use them at all. The majority 72% consumed mostly fresh wild fruits, while 24% prepared them into regular diets like oatmeal and the remaining dried some fruits to flour and boiled them with ugali or processed them into juice. In the research areas, eating wild fruits is crucial for emergency food and as a complement to staple foods. In most rural areas of Tanzania the majority of people cannot afford to buy sugar in their day to day meals; instead, wild fruits like *Tamarindus indica* and *Phyllanthus engleri* mostly used to supplement taste in their oatmeal, the popular food. It has lately been recognized that eating wild edible fruits plays a significant role in maintaining global food security, especially in agricultural civilizations (Owolodun and Merten, 2023). As a result, the majority of inhabitants in the study areas depend on wild fruits for both food and medicinal uses.

Mineral contents

Five fruit species were analysed, and the levels of the mineral elements such as potassium, magnesium, and calcium, ranged from 487 to 1650.2 mg/100g. The highest concentrations of the minerals Fe, Ca, Na, Mg, and K were found in *Vitex doniana*, *Strychnos cocculoides*, and *Parinari curatellifolia* species whilst vitamin B9, A, and C were found in *Phyllanthus engleri*, *Grewia conocarpa*, *Strychnos cocculoides*, *Vitex doniana*, and *Parinari curatellifolia*. According to the locals, the vitamin and mineral contents in wild fruits are particularly important for nutritive constituents. Similar findings were shown by Sardeshpande and Shackleton (2019), who revealed that a wild fruit species with multifunction is an important indicator of its cultural value. Besides food category, the pharmacological use of wild fruits is crucial. Specifically, fruit species like *Strychnos cocculoides*, is used to treat digestive issues, *Friesodielsia obovata*, and *Parinari curatellifolia* are used to treat reproductive issues, *Vitex mombassae* is used to treat cough and respiratory infection, *Vitex doniana*, and *Phyllanthus engleri* are used to treat diabetes and high blood pressure, and *Tamarindus indica* is used to treat urinary tract infections.

Conclusions and Outlook

The wild fruit species investigated have a variety of use, including food and medicine. They are used by the locals as dietary supplements for vitamins and minerals as well as for medicinal and cultural purposes. In addition to their importance for household diets, these plant species were found under threats in their natural habitats because of different human activities. Agricultural

expansion, the harvesting of fuel wood, charcoal extraction, overgrazing, and the selective cutting of trees for building materials are the main activities that are threatening the diversity of wild edible fruits. In order to maintain their sustainability, improving value on wild edible fruits can be an important source of cash especially for low-income and cash-strapped households in rural areas. Sensitizing the public about the nutritional, cultural, economic, and ecosystem benefits of wild fruits will help to increase their cultural value, encourage species protection, and ultimately aid in biodiversity conservation. This study advises policymakers to enact sustainable policies that involve species conservation and planting some species for future generations in order to maximize the advantages of biodiversity conservation.

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