Collection, Identification and Characterization of Indigenous Mushrooms from Coastal Kenya

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Background

- Kenya lies across the equator on the East Coast of Africa.
- It borders Indian Ocean to the South East and Lake Victoria to the west.
Background cont...

- It has a pleasant warm climate with a hot and humid climate at the coastal areas and mild in the plateaus.
- Highest $T_0$ range from 22-27°C and lowest between 10-14°C.
- However at the site of study, mean $T_0$ go as high as 31°C.
Background cont…

- Kenya covers about 587,000 Km$^2$ and has an estimated population of 40 million people (2010 census)
- The country enjoys ethnic diversity, with 42 tribes of which 38 are known to consume mushrooms
Introduction

- Mushrooms are consumed all over the world as part of the regular diet.
- While some are cultivated, others are just collected from the wild.
- To date, wild mushrooms are collected and sold in over 80 countries.
- Collections amount to several million t with a minimum value of USD 2 billion (FAO, 2007).
In Kenya, cultivated species include A. bisporous, Pleurotus spp, L. edodes and G. lucidum (Farn Concern Int./MOA/GTZ, 2005)

However, majority of Kenyans depend on wild sources because these cultivated species are very expensive.

Collection of mushrooms forms an integral part of a long standing cultural and traditional practice (Munyanzinza, 2003)
Introduction cont...

But wild mushrooms have two major problems

- Extensive consumption is hampered by
  1) Cultural bias
  2) Lack of adequate Knowledge on edible and poisonous species

- Risk of extinction due to climate change, wanton destruction of their natural habitat and overexploitation
Cultivated mushrooms are therefore the only safe and sustainable source.

But there exists scarce knowledge on these wild sources in Kenya.

Although well known by the communities, they are completely unknown to science.

This study was undertaken to collect, identify and characterize important species.
Materials and Methods

Sites

- Field surveys for indigenous mushrooms were carried out in Coastal Kenya
- Sites included Arabuko Sokoke forest in North Coast and Kaya Teleza forest shrines in South Coast
- Arabuko Sokoke forest comprises of Brachystegia woodlands which are a perfect habitat for mycorrhizal fungi
- Kaya Teleza forest shrines is a naturally rich biodiversity, barley disturbed for many years
Materials and Methods cont…

Survey and Sampling

- Key informants advised on suitable collection sites
- Criteria for selection was knowledge and utilization of mushrooms by locals
- Fruit body surveys were limited to soil and wood inhabiting fungi that were of appreciable size
- Sampling was done along the forest line 1000 x 100m
Materials and Methods cont…

Fruit body identification and description

- Collected fruit bodies were identified on the basis of occupational habitat, morphological features and any other phenotypic features visible
- Specimens were matched with descriptions in books to facilitate classification
Fruit body identification and description

- Features such as size, shape odour, texture, ornamentation on the pelius and stipe, reproductive features and presence of a ring or volva were used.
- Where possible, color of the spore print was also taken to confirm tazon.
- Tazons listed were according to Kirk *et al.*, 2008.
Materials and Methods cont...

Field drier
Materials and Methods cont...

In the forest with the key informants
Several mushrooms were collected and classified as:

- For food security
- For medicinal purpose
- For industrial Application
- For Ornamental purpose
Results and Discussion

Ganoderma spp- lignicolous
Pelius is large 6-10cm, it is flat, shiny, kidney shaped with a reduced stipe.
Creamy white margin, yellow and orange-red at the center
Spore print brown

Edible - Medicinal
Results and Discussion cont…

*Cantharellus spp*- Foliculous
Small Cap (3-5 cm), yellow or orange, funnel shaped and depressed at the center.
Gills forked and decurrent
Mildly peppery taste
Spore print white

A popular food source
Results and Discussion cont...

Auricularia spp-Lignicolous
Caps ear shaped and smooth
Fresh Jelly like, elastic
Stalk very short or absent
Dark brown with a purplish tint
A food source
**Results and Discussion cont...**

*Russula* spp - Foliculous

- Cap pinkish to purplish
- Cap Convex to flat (5cm)
- Stipe long, white in colour
- Gills Cream, forked near the margin
- Spore print white

**A favourite food source**
Results and Discussion cont...

*Termitomyces* spp-
- Coprophilous
  - Cap very large (15cm) and white in colour
  - Stipe long with a subterranean elongation
  - Presence of Umbo

A favourite food source
Results and Discussion cont...

**Pleurotus spp**- Lignicolous
- Caps funnel shaped, white
- And growing in clusters
- Stipe reduced, off the centre
- Gills decurrent, white
- Spore print white

A food source
Results and Discussion cont...

**Microporous** spp – Lignicolous

- Cap hard and corky with beautiful concentric rings which assume various colours
- Margin sharp
- Stipe centrally placed

Unpalatable - ornamental
Results and Discussion cont…

*Trametes* spp – Lignicolous

- Caps flat, thin but tough
- Show concentric zones of different colours
- Has one conspicuous brown zone
- Stipe highly reduced, absent
- Mushrooms grow in tiled layers

Unpalatable - Medicinal
Results and Discussion cont…

*Amanita* spp – Hemicolous
- Cap thick and conical
- Covered by grey pyramid like warts
- Stalk well visible with a ring and Volva at the base

Poisonous - Industrial
Results and Discussion cont…

*Lactarius* spp – Hemicolous
- Caps white and small (5cm)
- Gills white, decurrent
- Stalk white and long
- Cap exudes a milky substance with a peppery taste
- Spore print white

Poisonous - industrial
Results and Discussion cont…

Stinkhorn (*Phallacea*) spp-
- Hemicolous
  - Cap pink and spherical
  - Stalk white with Volva at the base
  - Covered in a foul smelling slime

Poisonous- Industrial
Conclusion

- Arabuko Sokoke and Kaya Teleza forests provide a habitat for diverse macrofungal species.
- Some are used as food by locals, some are poisonous and therefore can find industrial application, others are medicinal and some have ornamental value.
- Most form mycorrhizal associations with trees and only a few can be domesticated.
- Information obtained can be used as a baseline for future studies – diversity and pop., climate change trends and management strategy for sust. utilization.
Recommendations

- Further characterization using molecular tools should be done.
- Studies on genetic diversity and populations should also be done.
- Further research to map out mycorrhizal partners of edible species important.
- Investigation on culturing, nutrition and pharmaceutical studies should be done.
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THE END

Thank you