Social-Cultural Uses of Wild Wood Ear Mushrooms of Western Kenya
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Abstract
Wild edible mushrooms are an important food resource in Western Kenya. Harvesting and marketing wild mushrooms is a serious income generating business in Kakamega, Western Kenya. The mushrooms are often collected mainly from the forests and terrestrially, during fructifying seasons. For decades, they have been utilized for social and cultural purposes. In Western Kenya, they are commonly used as a source of food for nutritional purposes, medicinal, fetish protection articles/objects and for life-span longevity. A study was conducted to determine various aspects of mushroom as a resource. The study was conducted through oral interviews. Mushroom pickers and elderly persons in the community around Kakamega forest were identified and interviewed. Information was gathered on the social cultural issues of mushroom typologies, occurrence, gender role in collection, consumption and preparation, host tree species in relation to mushroom quality and the comparative differences between the traditional and contemporary culinary methods of preparation. The study revealed that indigenous knowledge with regard to mushrooms passed from generation to generation helped conserve and preserve the forest resources sustainably. Mushrooms were not only a restricted food source to man but also to forest animals especially the monkeys. Mostly men are the forest mushroom pickers and children pick terrestrially. The quality of specific wild mushroom species correlated to the kind of tree host species. Only a few species of forest mushrooms were edible.

Key words: Indigenous-knowledge; Gender; Culture; Wood ear mushroom

INTRODUCTION
The utilization of mushrooms by man predates recorded history. Historical data indicates mushroom cultivation and utilization occurred in ancient civilizations of China, Rome, Greece, Egypt and Central America (Ivors, 2003). Asian civilizations particularly China, have cultivated edible mushrooms for almost 1400 years since the first mushroom Auricularia auricula (wood ear) was first cultivated in China around 600 A.D. Enokitake (Flammulina velutipes) was cultivated around 800-900 A.D., shiitake (Lentinula edodes) around 1000-1100, button (Agaricus bisporus) around 1600, Paddy straw (Volvariella volvacea) around 1700 and white jelly (Tremella fuciformis) around 1800 and oyster (Pleurotus ostreatus) around 1900. Of the leading mushrooms that were cultivated before 1900, only button was not first grown in China. Commercial cultivation of mushrooms began in the 17th century in France (Chang and Miles, 1987).

Wild mushrooms including wood ears (Auricularia spp.) are important natural resources. The highly prized wild, particularly the symbiotic mushrooms that also include African indigenous species of Termitomyces microcarpus and T. gigantes, have drastically fallen in harvest numbers, due to poor management of the environment. Pollution especially fertilizer application and plant diseases have damaged their natural habitats. Therefore, efforts are needed to protect the environment in which these mushrooms grow. This includes researching to better understand the relationship between the mushrooms, ethnobotany and their growing environment and in particular, researching into the symbiotic mushroom relationships with their hosts.

The most common wood ear mushrooms comprise Auricularia auricula and A. polytricha. These are two of the most popular edible species. Species of Auricularia are found worldwide and A. polytricha occurs in both tropical and subtropical regions (Cheng and Tu 1978). A. polytricha is prevalent in the tropics and A. auricula in temperate regions of the world. Wood ear mushrooms are the fruiting bodies of a fungus that invades and lives in the wood of fallen logs of several tree types. They resemble ears in shape and are gelatinous (with unusual jelly-like texture), elastic, rubber to leathery in texture and brownish-purple in colour. Most are more solid than jelly. They can be found very soon after a rainfall. Most of them have the uncanny ability to dry out then re-hydrate. The fungi are spread by airborne spores produced on the basidiocarps. Spores landing on suitable substrate germinate, penetrate the wood and produce mycelium that grows throughout the wood. When the fungus sporulates, basidiocarps or wood ears are produced on the log surface and they have been collected in the wild in Kenya for many years.
The wood ears are of great economic importance globally. Auricularia polytricha was one of the edible fungi in ancient China. The precise time when the mushrooms were cultivated remain uncertain. Cheng and Tu (1978) proposed at least as early as 300 BC while others proposed 600 AD. The mushroom is prized in Chinese cuisine and is commonly used to give texture to soups. They became an export product to the Chinese in China and San Francisco during the late 1800s (Anon. 1914). They were also exported from New Zealand during the same period (Stamets 1993). The earliest record of this species was recorded in about 200-300 BC. The commercial cultivation of this mushroom species is concentrated throughout the South Pacific and Asia. The cultivation and exportation of Auricularia polytricha, in Hawaii was substantial in the 19th century and probably was its first effort at cultivation of mushrooms. Regardless of where it is utilized, it has a common name which makes reference to the ear-shaped structure of the fruiting body, Matere (lobed) in Kenya (Isukha’s dialect), Mu-Erh (wood ear) in China, and Pepiao (ear) in Hawaii, just to name a few. The fruiting bodies are usually brownish to reddish brown and have a consistency of jelly. In nature, the two species are saprobes that grow on tree logs. Thus, the cultivation of these species is the same as that of the Shiitake and the Oyster Mushroom.

The genus Auricularia spp. is classified in the order Auriculariales in the basidiomycete group of fungi and contains a number of species (Alexopoulos et al. 1996). Auriculariales is the largest order of jelly fungi and the fruiting bodies are basidiocarps. Many of the species are produced on wood. The brown, rubbery, earlike structures may reach 4 to 6 inches in diameter and are produced on dead stumps, logs and branches of hardwood trees. Auricularia spp. has a high content of indigestible polysaccharides and dietary fiber. The protein, vitamin and carbohydrate content are reported to be higher than that of many vegetables and fruits and the caloric content is relatively low (Cheng and Tu, 1978). As a result, they make a nutritious ingredient of soups or other dishes. Dried mushrooms need no further processing or refrigeration and could be sold to local markets, hotels or restaurants.

Besides its culinary value, wood ear mushroom has been used in China as medicine. Chinese herbalists have used them medicinally for more than four thousand years. It is particularly useful for stopping pain and bleeding, and is regularly prescribed in traditional Chinese medicine to treat hemorrhoids and excessive uterine bleeding (Ying et al., 1987). Pharmacologically, the polysaccharides have been used as immune toxins, anticoagulants and to lower cholesterol. It is reported that extracts of Auricularia spp. prevent egg implantation in animals terminating early and mid-pregnancy (He and Chen, 1991). Owing to this possible teratogenicity, it is recommended that Auricularia spp. extracts should not be taken by pregnant or lactating women and those planning to conceive.

There is paucity in information on East Africa and especially Kenya with regard to the traditional value of indigenous mushrooms amongst the communities that consume mushrooms. Despite the large scale utility of wood ear mushrooms for food and medicine by residents of the larger Kakamega region, hardly any literature is available on the ethnobotany. There has been no deliberate effort to record the cultural importance of the mushroom. The social and cultural uses of mushrooms in Kenya remain undocumented. However, indigenous edible mushrooms remain a priced relish amongst consumers. It is well known that the people of Western Kenya especially those that reside near the Kakamega forest, have a cultural attachment to their collection and consumption. However due to forest destruction and changing lifestyles, besides the old, less young people are cognizant of the cultural vale of most of the traditional mushrooms. There is therefore need to document the indigenous knowledge associated with cultural and social importance of wood ear mushrooms in Western Kenya.

This study was therefore conceived to study the socio-cultural aspects related to the uses of wood ear mushrooms among the communities residing around the Kakamega forest. The basic question the study attempted to answer was; what are the cultural and social roles of wood ear mushrooms in Kakamega? Information was therefore gathered on the social-cultural aspects of mushroom typologies, occurrence, gender role in collection and preparation, host tree species in relation to mushroom quality. 

**Approach**
The study was conducted around the Isecheno reserve of Kakamega forest. A stratified sample of informants drawn was used to collect social and cultural information associated with wood ear mushrooms. The informants were sampled on the basis of either old age (75 years and above), medicine men or custodians of the Isukha community culture. All the informants were elderly, spoke the Isukha language and were residents of around Isecheno forest reserve. Generally, data pertaining to wood ear mushroom utilization, methods of preparation and reasons for such practices were investigated by conducting participant observations, oral interviews and focus group discussions. Generally, data pertaining to wood ear mushroom utilization, methods of preparation and reasons for such practices were investigated by conducting participant observations, oral interviews and focus group discussions using the above described informants.

To identify ear wood mushroom host trees, mushroom forays were conducted to collect ear wood mushrooms in Kakamega forest. On these trips and with the aid of forest guides, information on ear wood mushroom types and host tree species was collected. Identification of tree species was conducted using botanical and taxonomic characteristics. Data collected included the texture and colour of the mushroom, local and scientific names of the host trees. A critical analysis of the cultural perceptions of the mushrooms was derived by correlating qualitatively the traditional uses of the mushroom host trees and uses of the ear wood mushrooms in communities residing around the forest.

To document the traditional uses of wood ear mushrooms, interview respondents were drawn from a diverse background of informants (as described above) and included perennial commercial mushroom pickers, forest guides and traditional medicine men. The questions asked were structured to collect information concerning uses of wood ear mushrooms. To determine the medicinal purposes as practiced in the past and at present, medicine men residing around the Kakamega forest were interviewed on the medicinal values of wood ear mushrooms. The information gathered included: illnesses cured or prevented; methods of preparing medicine for administration, that is, whether the medicine was administered as powder or after boiling and the correlation between mushroom host trees and their medicinal values.

The role of gender in wood ear mushroom collection, processing, preparation and consumption was investigated. Reasons for these practices were examined to provide in depth understanding of the perception of the activities in the community. The procedures for cooking wood ear mushrooms were investigated and documented.

**Results & Discussion**

Ear wood mushrooms collected from Kakamega forest were predominantly of one type, Auricularia spp. Variations were observed in the characteristics investigated. These characteristics included; colour, texture, and size. The mushrooms occurred in two distinct colours, dark brown, light brown and off white with the majority being dark (Figure 1). The light brown mushrooms (figure 2) were rare and limited in distribution. The relative abundance of the dark mushrooms was very higher than light brown mushrooms. In fact, the population of the dark wood ear mushrooms was very high and occurred in groups or clusters. The number of wood ear mushrooms on a given log or tree stump was high. Mushroom texture was variable and depending upon several factors including mushroom colour and host tree species. As a result, most of the light brown mushrooms were slimmer than the dark mushrooms which tended to be more firm. In addition, it was observed that dark or brown mushrooms were found growing on specific trees although occasionally both species could be found growing on the same host tree (Table 1). The size of the dark mushrooms generally large and highly variable whereas the light mushrooms attained a relatively small size.

Culturally, the mushrooms are mainly used as sources of food and medicine. Dark coloured mushrooms are preferred over the brown type for eating purposes. Those interviewed sited firmness as a preferred attribute when selecting wood ear mushrooms for consumption. The lighter ones are more delicate while the darker ones have a more concentrated taste. For instance the, Diospiros abyssinica tree in comparison to other tree hosts is famous for the production of very large sized, dark coloured and tasty wood ear mushrooms.

The role of gender in mushroom collection, preparation and consumption in this community is diverse. Unlike other food types, the task of collecting wood ear mushrooms as was in the olden days, is reserved for the men. Women would often not be directly charged with this responsibility since the collection entailed access to the forest which is often infested with snakes and other scary wild animals. This explains why men foray for forest mushrooms. The forest was sacred to women who had reached childbearing age.
A forest was a shrine and therefore a sacred place where cultural rituals including cleansing, cursing and blessing occurred. Only the elderly members including women who were beyond child bearing age were allowed access to the forest. However, in the process of gathering wood for fuel, women have picked mushrooms.

![Mushrooms on a fallen tree trunk](image1.jpg)

Figure 1. Dark coloured wood ear mushrooms growing on fallen tree trunk

Today men in communities surrounding the Kakamega forest regard picking of wood ear mushrooms as a source of food and income. However, collection of non-forest mushrooms is solely done by women and children. Reasons attributed to this practice include; cultural beliefs on women and forest access, avoiding competition from other pickers, unsustainable harvesting and identification of edible species, collection times, risks from wild animals in forests; vulnerability of women and children to abuses, beliefs and practices associated with collection and transportation of the mushrooms from the forest. Often, picking is undertaken very early in the morning and extreme care is exercised in preventing over-harvesting and transportation of the otherwise very fragile mushrooms. Mushroom picking sites remain highly guarded secrets by pickers in order to minimise competition. Harbingers of luck have to be observed early in the morning before getting into the forest and they include placing a dried sample of a wood ear mushroom on your body.

![Mushrooms on a stump](image2.jpg)

Figure 2. Light brown coloured wood ear mushrooms growing on a tree stump.

Table 1: Wood ear host tree species and mushroom characteristics.

<table>
<thead>
<tr>
<th>Host tree</th>
<th>Common name host</th>
<th>Local name of tree *</th>
<th>Characteristics (Colour of basidio and host tree characteristics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ficus thorningu</td>
<td>-</td>
<td>Mukumu</td>
<td>Dark, light, host tree treats chest infections</td>
</tr>
<tr>
<td>Olea capensia</td>
<td>Elgon teak</td>
<td>Mutukuyu</td>
<td>Dark, light</td>
</tr>
<tr>
<td>Markhamia lutea</td>
<td>-</td>
<td>Lusiola</td>
<td>Light</td>
</tr>
<tr>
<td>Puntumia africana</td>
<td>-</td>
<td>Mutondo</td>
<td>Light</td>
</tr>
<tr>
<td>Diospiros abyssinica</td>
<td>-</td>
<td>Lusui</td>
<td>Dark, big sized and tasty</td>
</tr>
<tr>
<td>Polycius fulva</td>
<td>-</td>
<td>Mwaanzu</td>
<td>Light, host tree protects against lightening</td>
</tr>
<tr>
<td>Croton megalocarpus</td>
<td>-</td>
<td>Musine</td>
<td>Dark, light</td>
</tr>
<tr>
<td>Albizia grandprateta</td>
<td>-</td>
<td>Mukunzulu</td>
<td>Light, host tree treats stomach ailments</td>
</tr>
<tr>
<td>Ficus lutea</td>
<td>-</td>
<td>Mukavakava</td>
<td>Dark</td>
</tr>
<tr>
<td>Croton silvaticus</td>
<td>Forest croton</td>
<td>Musutsu munamuli</td>
<td>Light</td>
</tr>
<tr>
<td>Malinigara butangi</td>
<td>-</td>
<td>Lutolia</td>
<td>Dark, Very tough</td>
</tr>
<tr>
<td>Albizia spp.</td>
<td>-</td>
<td>Mukangu</td>
<td>Dark, host tree treats stomach infections boosts immunity</td>
</tr>
<tr>
<td>Ficus exasperata</td>
<td>-</td>
<td>Museno</td>
<td>Dark, host tree Treats chest infections</td>
</tr>
</tbody>
</table>
* The local names used are of the Isukha community dialect

Indigenous knowledge pertaining to sites of collections and cleansing practices prior to conducting mushroom collection trips were passed over from fathers to young male children. This way, the male children were equipped with knowledge that enabled them to; collect the most delicious ear wood mushrooms, determine collection seasons, protect themselves against evil while in the forest, and even when to water drying logs to enhance sprouting and growth and thereby ensuring a steady supply of mushrooms all year round. Unfortunately, those still practicing log watering for continued supply of the mushrooms in the forest do not relate the practice to mushroom cultivation under forest storey.

Processing and preparation of wood ear mushrooms is done by women. The wood ear mushrooms in the olden days was an alternative to meat. Today, upon collection, freshly picked mushrooms are processed by sun-drying to a crispy state for storage (Figure 3). For cooking purposes, the dried mushrooms are re-hydrated to a thick fleshy state by soaking in water for several hours. The reconstituted mushrooms are then prepared in various ways. They can be cooked fresh or dried. The mushrooms can also be cooked by boiling or frying. They can be served singly or alongside other dishes such as “ugali” (baked maize flour porridge), banana, meat, beans, “thripes” (animal intestines). Traditionally, the mushrooms were cooked with a derivative of bicarbonate of soda but hardly fried. Presently, the mushrooms are both boiled in bicarbonate of soda and fried with fat.

Wood ear mushrooms are traditionally used as medicine to cure diseases and for protection. As such, they were used as fetish objects for protection against ailments and misfortunes. Dried pieces of the mushroom would be crushed into powder and administered to children to protect them from witchcraft and psychotic ailments. To date, mushroom pickers use dried wood ears (figure 3) to protect themselves against wild animals and snakes in the forest and also used as a harbingers of luck for locating mushroom sites. In men the wood ear is believed to enhance sexual potency. In addition, it is used as a treatment against, stomach ailments, heart related problems, epilepsy and general body pains like headache. The light brown types are believed to be memory boosters. The dark wood ear types are believed to be anti-hallucinogenic. Wood ears from the Diospiros abyssinica trees were solely used for medicinal purposes. The mushroom is also used as an immune booster to the body and particularly when consumed in small quantities. It is not surprising that, wood ears were recommended for eating twice of thrice a month to avoid overdose which was regarded to have adverse effects on the body such as aggravating illnesses. Consequently, consumption of wood ear mushrooms is believed to enhance immunity against many ailments when consumed in small quantities regularly. Conversely, over consumption compromises body immunity predisposing consumers to diarrhoea and general weaknesses of the body. Overall, edibility of wood ears was associated with life longevity by the old.

There is a correlation between the medicinal values between wood ear mushrooms and their host trees. Most host trees of wood ears have medicinal values. For instance, Polycus fulva protects against lightening which is considered a mysterious problem. Albizia grandprateta treats stomach ailments while Albizia spp. is used to treat stomach infections and to boost immunity. Ficus exasperata is used to treat chest infections.

Figure 3. Dried wood ear mushrooms for sale.

Africa appears to be generally mycophilic. There are some some regions, such as Nigeria, where mushrooms are a part of everyday life. Communities in Western Kenya are also mycophilic. In this region and particularly in communities residing around the Kakamega forest, mushrooms are a part of everyday life as food, charms and remedies in traditional medicine. The most preferred mushrooms are the symbiotic species.
Termitomyces microcarpus and T. giganticus, which are associated with termite nests. There are also myths concerning mushrooms that are unique. All edible mushrooms contain substantial amounts of protein and trace minerals, and many also have medicinal properties. These medicinal effects are probably the result of complex molecules present in the mushroom and mycelia called polysaccharides that the fungi produce to inhibit the growth of molds and bacteria in a mushroom. Mushrooms generally contain many substances which support good health. Species contain alkaloids, nucleotides, proteins, triterpenes, polysaccharides and unsaturated fatty acids which have positive health effects. The surprisingly rich blend of polysaccharides contained in specific mushrooms has received a lot of scientific attention in the past few years (Ikekawa, 2002). The ability of polysaccharides to stimulate the human immune system has been established beyond question (Ikekawa, 1995; Xia, 1978). Different polysaccharides appear to support different elements of the immune response. Once in the body, a few medicinal mushrooms seem to be able to transmute metabolic waste and neutralize toxic accumulations without provoking eliminative catharsis as a consequence (Li et al., 2001). They are a safe and effective medicament that has been valued over thousands of years of human civilization. The result is that mushrooms, especially in combinations, can have broad and impressive effect on human health.

The culinary value of wood ear mushrooms in Western Kenya as is the case in South East Asia and Hawaii cannot be overemphasized. Chinese mushrooms refer to them as “meat without bone” (as is tofu in Japanese). They are believed to be healthy and have considerable incomplete protein in form of amino acids in their composition. It has been postulated that 100g of dried tree ears contain 11g of protein, almost no fat, and 65g of carbohydrate, about 400 mg of calcium, 200 mg of phosphorus, 400 mg of iron, and various polysaccharides.

Auricularia spp. also has significant medicinal properties and has been used for many centuries in traditional herbal remedies all over the world. Owing to its resemblance to the folds of the throat, in Europe in the 1800’s, Auricularia spp. was boiled in beer, milk, or vinegar and was used to treat throat ailments. Because its gelatinous consistency could bind eye medicine, it was also often used as a salve to treat eye ailments. A. auricula-judae and A. polytricha were used in China to cure hemorrhoids and strengthen the body, maybe by stimulating the immune system. It was also sometimes used to treat hemoptysis, angina, diarrhea, and warding against gastrointestinal upset. They are also widely used to treat debility caused by childbirth, relieve pains and muscle spasms, to stimulate bowel activity, and to even build intelligence quotient.

In modern medicine, Auricularia spp. has been reported to contain pharmacologically active agents. It has been shown to block blood clotting by obstructing the platelets. There is some evidence that regular ingestion of Auricularia spp. in small doses can be therapeutic in preventing strokes and heart attacks. However, cases of internal bleeding from sensitive people who accidentally ate too much sweet and sour soup combined with stir-fry containing this fungus may occur.

Other therapeutic uses of Auricularia spp. from modern medicine include; lowering blood cholesterol and triglycerides. There is even some evidence it can play a role in treating diabetes and cancer, and some studies claim it can reverse ageing by increasing SOD activity for DNA repair. However, due to the possibility of anti-fertility effects, this fungus is not recommended for pregnant or lactating women, as well as those intending to conceive. There is also a report of a man who consumed over 250 grams of this fungus who developed a severe "solar dermatitis," making his skin very sensitive to sunlight. Although there is anecdotal information such as this, general side effects are not well documented or expected.

Ancient and modern Chinese believe wood ear mushrooms are good for infections of the lungs since they clear irritations and smooth its surface. They also recommend them for hemorrhoids and as cleansing agents for both stomach and intestines. They are also used to quicken blood and to stop bleeding. Western science now agrees that tree ears play a role in blood coagulation due to their possession of anti-coagulants. Above all like in communities of Western Kenya, the Chinese believe wood ear to be a longevity tonic.

Conclusions

Wood ear mushrooms are an important natural resource amongst communities residing around the Kakamega forest. Besides being a source of food and medicine, they are a source of income for pickers. The mushrooms medicinal values are used traditionally in disease prevention, curing and protection. Amongst the Isukha community, gender determines the picking, preparation and consumption of wood ear mushrooms. However, there is need for more studies to document the social economic importance of the mushrooms in rural