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Indigenous Knowledge of Wild Foods and Medicines among the Tagoi Communities in the Nuba Mountains – Sudan

المعرفة المحلية بالأغذية والأدوية البرية في مجتمعات تَقْوي بجبال النوبة — السودان

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Abstract

The paper at hand aims at compiling and investigating the traditional knowledge of endemic wild plants, animals, birds and insects gathered or hunted by the primarily agriculturalist Tagoi people of South Kordofan (in the savannah summer-rain belt, Sudan), along with their folk culinary and/or medicinal uses, from an anthropological perspective. It is the first attempt at documenting the local bio-cultural heritage of wild species, along with their perceived nutritional and medicinal qualities in this region. In-depth, unstructured and open group interviews with local male and female knowledge holders and journal articles extracted from ethnobotanical research projects carried out in different parts of the world were the main sources of primary and secondary data, respectively.

Introduction

The paper at hand is an outcome of a broader anthropological study conducted over a five-year period (20122017-) in the Tagoi rural communities, which are situated in the north-eastern region of South Kordofan, a remote mountainous area in the south-western part of Sudan. The overarching objective of this paper is to compile and investigate the traditional knowledge of endemic wild species gathered or hunted by the Tagoi, along with their folk culinary and/or medicinal uses.(1) Other specific objectives are: (1) to document the popular wild species that people consume in their daily life. (2) To record the nutritional and medicinal uses of these wild species. (3) To gain insight into the traditional practices, methods and recipes that people utilise while using these wild species. Meeting these objectives makes the current paper the very first attempt at documenting the local bio-cultural heritage of wild species along with their perceived nutritional and medicinal qualities in a region that has never been looked over concerning such resources of food and medicine.

The primary data were generated during in-depth unstructured and open group interviews with local male and female knowledge holders. These interviewees, predominantly mid-age and elderly, were born and brought up in the Tagoi home area. The interviews were carried out in Arabic and in their course data were gathered about the popular wild species, their local names(2) and qualities, the part(s) used, the nutritional and medicinal uses, preparation methods, taste, and availability. They were tape-recorded and then transcribed and analysed. Most of the secondary data were obtained from peer-reviewed articles published in different journals during the period from 2011 to 2021. These articles were outcomes of ethnobotanical research projects carried out in Asian, African, South American and European countries

1-The consumption of wild edible vegetable varieties usually ranges from leaves of annuals, shrubs to trees; but for the purpose of this study, wild animal, bird and insect species are included.

2-The scientific synonyms of these local names were identified later with the help of botanically and zoologically trained staff at the University of Khartoum.

(namely, Pakistan, China, South Africa, Uganda, Ethiopia, Brazil, Italy, Sweden, Spain, Turkey, Russia and Ukraine).

1–Recent Findings of Ethnobotanical Research

Wild edible plants grow on vacant lots, roadsides, homesteads, cultivated lands, the veldt and woodlands. They are "wild, non-altered species, but also include 'feral' cultivars (that grow) without any human intervention, and can include plants that are technically cultivars but were not intentionally planted" (Mollee, Pouliot, & McDonald, 2017). In another definition, they are "plant and fungal resources that grow in natural conditions and which are harvested or collected for the purpose of human consumption and used as food, dietary supplements and medical treatments" (Stryaments, Elbakidze, Ceuterick, Angelstam, & Axelsson, 2015).

Several studies indicated the medicinal and nutritional uses of wild species and an unquestionable strong relationship between food and medicine in this field. Wild species are selected for food application not only because of their pleasant taste, but some pharmacological effects are considered as well. Herbal medicine products have become popular over the past decades and they are widely used for the treatment and prevention of various diseases (Shikov, Tsitsilin, Pozharitskaya, Makarov, & Heinrich, 2017). They are believed to have medicinal, nutraceutical, pharmaceutical, and health benefits. A sizable and growing body of written works from various parts of the world indicates that over seven thousand wild species have been recorded to be edible and for many of these health benefits have been claimed (Abdul Aziz, Ullah, Adnan, Sõukand, & Pieroni, 2021) (Mavengahama, McLachlan, & de Clercq, 2013) (Shikov, Tsitsilin, Pozharitskaya, Makarov, & Heinrich, 2017).

The use of wild species as food or medicine can be difficult to differentiate, and the overlap between these two categories of uses is multidimensional, i.e. they are so interconnected that is difficult to establish when one use ends and the other begins. Several studies addressed this food-medicine continuum by evaluating the overlap between medicinal and edible uses in several social-ecological systems. Pieroni and Quave, for example, synthesized the forms of interactions between food and medicine in three contexts: (1) a given species is used both as medicine and as food but without any further association between the two. (2) A food species is considered healthy but without a specific medicinal target (functional food). (3) A species is consumed to obtain a specific medicinal effect (medicinal food or food medicine). (de Medeiros, et al., 2021) (Shikov, Tsitsilin, Pozharitskaya, Makarov, & Heinrich, 2017) (Xu, Liang, Wang, Wen, & Wang, 2020) (Stryaments, Elbakidze, Ceuterick, Angelstam, & Axelsson, 2015).

A myriad of wild species having cultural and economic significance to local communities have been used over many years as part of human diet and/or medicine throughout the world (Meragiaw, 2016). In many countries, wild species are important dietary components. They can bring adequate amounts of micronutrients, vitamins and minerals, combat 'hidden hunger' and dietary deficiencies, alleviate poverty, maintain and improve health, play a central role in household food security, and contribute to dietary diversity and agro-biodiversity. They are inexpensive yet high quality sources of nutrition, especially for low income and marginalised sectors of the economy. Their hardiness ensures that they thrive in both drought and flood times and, as a result, they are available during harsh environmental conditions when most cultivated crops would have failed (Lewu & Mavengahama, 2011) (van der Hoeven, et al., 2013) (Ntuli, 2019) (Mavengahama, McLachlan, & de Clercq, 2013) (Mokganya & Tshisikhawe, 2019) (Stryaments, Elbakidze, Ceuterick, Angelstam, & Axelsson, 2015).

In traditional societies around the world, several methods for cooking, preservation and storage of wild species are passed on "orally" through generations and the natural course of everyday (van der Hoeven, et al., 2013) (Polat, Güner, Babacan, & Çakılcıoglu, 2017) (Benitez, Molero-Mesa, & Gonzalez-Tejero, 2017). That is, traditional societies hold wealth of indigenous knowledge[1] of wild species and their properties, which has been built up during protracted interactions with nature (de Medeiros, et al., 2021). Studies have helped us understand the ways that such indigenous knowledge is shaped at cultural edges, and how it adapts and changes in the face of new sociocultural and environmental contexts (Mattalia, Quave, & Pieroni, 2012). Knowledge of this kind could play an important role in the collection and use of wild

1-Indigenous knowledge could be defined as: "a cumulative body of knowledge and beliefs handed down through generations by cultural transmission about survival and the relationship of beings (including humans) with one another and their environment" (van der Hoeven, et al., 2013).

species everywhere (Amsalu & Asfaw, 2020).

Wild species are highly valued in the rural and urban people's livelihoods in the economically less developed countries. In Africa in particular, they are seen as a significant contributor to the socioeconomic well-being of societies (Mollee, Pouliot, & McDonald, 2017) (Mokganya & Tshisikhawe, 2019). However, indigenous knowledge of these species is fragile and is likely to be lost when communities emigrate, undergo cultural changes or through alteration of the local ecology and drought. The fragility of the indigenous knowledge is in the face of growing human and natural pressures. In a rapid phase of globalization, many cultural landscapes and untouched wild vegetation are being modified for the purpose of development. That is, globalisation may undermine the traditional use of wild species and the associated indigenous knowledge (Meragiaw, 2016). During the last few decades, the reliance of local communities on wild species has decreased enormously. Most of the wild species have disappeared from the traditional food and medicinal systems, which may be attributed also to the invasion of food market and the prevalence of conventional medicine (Abdul Aziz, Ullah, Adnan, Sõukand, & Pieroni, 2021) (Lewu & Mavengahama, 2011).

Modernisation has led to people perceiving indigenous knowledge of wild species as inferior or backward. As such, urbanisation could be associated with the loss of knowledge of wild species and their use (van der Hoeven, et al., 2013). It affects local biodiversity, directly through land cover change, or indirectly by changing ecosystem and biogeochemical processes. Along with loss of local biodiversity comes a change in the use of wild resources. This is seen as erosion of traditional knowledge and has been assumed prevalent in the urban environment, where global influences, market availability of exotic species and loss of biodiversity pose a threat to traditional knowledge systems (Mollee, Pouliot, & McDonald, 2017). Other reasons for the drastic decline in utilising wild plants as food and medicine could be the following: (1) the lack of knowledge about nutritional composition, cooking methods and ways of preservation. (2) The environmental and sociocultural changes brought about by migration of labour, economic development, increased urbanization, mass food production, modern synthetically produced medicines, and the promotion of cash crop farming instead of subsistence farming. (3) The excessive cultivation of field crops, which includes chemical elimination of wild vegetables as they are considered as weeds (Stryaments, Elbakidze, Ceuterick, Angelstam, & Axelsson, 2015) (Lewu & Mavengahama, 2011).

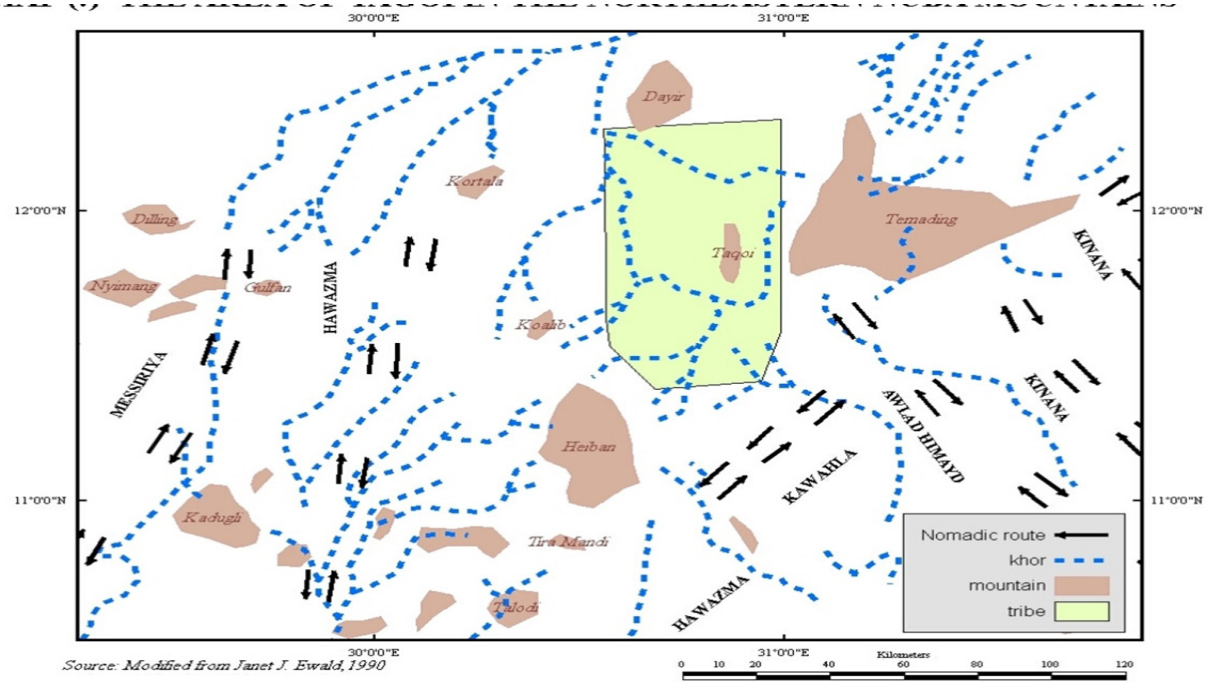
In the developed countries, with high living standards and modern and freely available health care systems, the collection, processing and consumption of wild food and medicine are usually limited and have a mainly recreational character. However, studies show how the uses of wild species as sources of food and medicine have been increasing in these countries over the latest decades (Bulut, Dugan, Senkardes, AVCI, & Tuzlaci, 2019) (Amsalu & Asfaw, 2020) (Mavengahama, McLachlan, & de Clercq, 2013). As the healthcare industry has advanced during the recent decades, alarms about unhealthy added ingredients in produced food have brought about a renewed and growing interest in wild food and medicine, which are regarded as pure, naturally healthy and rich in vitamins and antioxidants. Many wild species used in Africa and other continents have been introduced to regulate the appetite and a new food culture is spreading right through several developed countries (Shikov, Tsitsilin, Pozharitskaya, Makarov, & Heinrich, 2017) (Benitez, Molero-Mesa, & Gonzalez-Tejero, 2017). This growing interest in organic and natural products is a phenomenal trend in Western Europe in particular (Stryaments, Elbakidze, Ceuterick, Angelstam, & Axelsson, 2015).

2–The Study Area and Its Natural Resources

Located in the north-eastern Nuba Mountains, Tagoi territory at present is part of Abu Kershola Locality.(1) It is irregular rectangular-shaped, stretching from north to south, angled in a slightly north-westerly direction dictated by rainwater courses (see Map 1, below). It lies in the savannah summer-rain belt, approximately at the longitudes 3000°-31´60°´E and the latitudes 11-´30° 30°12´N. The average annual rainfall is within the range 750-850 mm, from late April to mid-October. Each of the four months from June to September usually receives more than 100 mm, and there is often a short dry spell between the first rains and the onset of heavy rainfall early in July.(2) However, the rainfall is sufficient for crop raising and cattle grazing.

1-Source: warrant of the establishment of Abu Kershola Locality, South Kordofan State, 2014.

2-Information collected from the Sudan Meteorological Authority in Khartoum, 2015.



Map (1) The Area of Tagoi in South Kordofan

The area is studded with rugged granite hills that rise sharply from the wide clay plains, scatter all over the area, and vary in size and extent, from small isolated outcrops of boulders to quite large ranges or massifs, the highest peaks of which rise to nearly 5000 feet above the sea level. Small outliers from these raised areas of land obtrude through the lowlands. A great number of small stream channels break the whole area, extending out from around the hills and rocky outcrops, often for several kilometres. Reddish-brown gritty loams cover some areas. There are extensive stretches of black cracking clay lands (cotton soils) in all the lower areas and along the major rainwater courses. There is no permanently running water in the area.

The Tagoi are primarily agriculturalists. Lands, other than the building sites and the lots cleaned for cultivation, are held in common by the local communities that manage their respective territories by themselves, through their respective native leaders. A male member in the tribe could apply to his direct leader to clean a piece of land for cultivation, and having obtained permission and cleaned it, the land then belongs to his family and heirs forever. No land owned could be sold or alienated. It could be loaned to a friend or guest for cultivation or building, but still remains the property of the family. Usually, clay lands are used for cultivation of grain, sesame and cotton. Rainwater courses are for orchards (planted with mango, lemon and guava trees) and for cultivation of beans, vegetables, cotton and chili. Stony lands are for cultivating grain, beans, *tibish* (cucumis melo var agrestis) and sesame. As filled with grass, sandy and dune lands are used as pastures for animals or growing some crops such as peanuts, groundnuts, grain, beans, millet and sesame.

3–Gifts of Nature and Their Uses

Spread all over the Tagoi areas are various forest and bush land trees, with which and in whose respective habitats exist thickly growing sundry wild shrubs and grass species. There are diverse uses of these wild tree, shrub and grass species in the different rural Tagoi communities, including building materials, fuel-wood, fodder, gum production, food and medicine. This article deals with this aspect of Tagoi social life: the uses of these local trees, shrubs and grass, beside a wide variety of wild insects, birds and animals. It makes a special focus on wild food and the associated folk medicine-related beliefs and practices.

It could be argued that the economy in the area is based entirely on the gifts of nature, part of which have successfully been domesticated, whilst the others are still wild. A point to emphasize here is that many wild species, which are found in the surrounding natural environment, have multiple uses in Tagoi communities. They are abundant during summer and there is a decrease, even no-availability off-season, leaving most people in a state of food deficit and shortage. When the agricultural season fails or in times of drought and famine, people rely entirely on wild plants, insects, animals and birds in making their foods.[1] Some of these wild stuffs are given in exchange for money in the local markets. Some are not used as basic

1-In normal life, people rely on both cultivated and wild stuffs, which they store in what they call "*wentefrang*," which is built in the form of a huge

diet foods, but as stuffs for entertainment at leisure times (when drinking coffee, for instance), to supplement inadequate staple food, to entertain guests, to feed livestock, or as medicines for organic diseases. Until recently, as many informants stated, Tagoi families d to rely on wild stuffs for about 60-70% of their food and medicinal needs. This dependency, however, has decreased at the present.

The list of wild species that the Tagoi utilise is a long one and only a few of the principal ones are mentioned in Table (1) below, which shows the names of wild plants, animals, birds and insects that Tagoi use in preparing food and in medical treatments. The table and the following sections of the paper show the local and scientific names, qualities, part(s) used, nutritional and medicinal uses, preparation methods, taste, and availability of all these wild species.

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sugar bowl or water jar (2-3 meters in length, but with no specified diameter). There are three types of "*wentefrang*" in the Tagoi communities. The first type is built of tightly stacked stone columns, which are all fixed upon a ground of four large stones used as substrates. These stone columns are then tiled from inside with mud mixed with white soft straw called "*sharganiya*" or "*abu jagwa*." The second type is built of woven canes, which are also tiled from inside with mud mixed with "*sharganiya*" straw. The third type is built of thin wood sticks woven together. Tagoi usually use the second and third types of "*wentefrang*" in cases of urgency. The first type, which is built of stone and mud, is the oldest, original and basic.

Table (1): A List of Wild Stuffs (in Tagoi, Sudanese Arabic and scientific terms)

Plants

Fruits	**Roots**	Fleshy Fungi	Leaves/Seeds of Grass and Trees
Ngamjae (*dabkar*: crateva adansinii dc.) *Ngabal* (*kirkir*: randia genipaeflora) *Nigmo* (*um togolgol*: baulinia rufescens) *Ngaj gar* (*nakhjar*: azanza garckeana) *Kobong bon* (*fittar/tartar*: sterculia setigera) *Naffal/ wad dag/ yaf nij* (*jomayz*: ficus sycamorus) *Nogor* (*tabaldi/gongolayz*: adansonia digitata) *Kon jan* (*aradayb*: tamarindus indica l) *Wol win* (*guddeim*: grewia tenax) *Ko winj* (*gar'a mor*: bitter gourd) *Naban* (*sidir/nabag*: ziziphus spina-christi) *Nada lung* (*kramdodah*: nauclea latifolia) *Nogo rom* (*jawghan*: diasporys messpiliforis) *Nogo ra* (*laloob*: balanites aegptiaca l) *Nod go* (*gimbeel/zaan*: cordia abyssinica) *Ni gil* (*himmaydh*: sclerocarya birrea or marula) *Mog lij* (*andhirab*: cordia africana) *Naff* (*daleib*: borassus aethiopium) *Wadadao* (*kharob*: bauhinia retiulatum)	*Hirray* (*hirray*: cassia arereh) *Taff* (*taff*: borassus aethiopium) *Fangallalai* (*gafal*: commifora africana) *Naban* (*sidir*: ziziphus spina-christi) *Nagmat ro* (*kortala*: maerua pseudopetalosa) *Irig kayl* (*irig kayl*: cissampelos pareira) *Alalay* (*alalay*: carrisa edulis) *Jib bayn* (*jib bayn*: salanum coagulans) *Shingil* (*shingil*: dioscorea trifida) *Kuff* (*fayo*: raphanus raphanistrum) *Agash* (*agash*: solanum bulbocastanum) *Jibbayn* (*jibbayn*: solanum dubium)	*Kabag* (*um tartoos*: *hydnora abyssinica* A) *Kolanj* (*ush ghuraab abyadh*: brown agaricus bisporus) *Kalak* (*kalak*: calvatia cyathiformis)	*Yimri* (*ab assabie*: dactyloctenium aegyptium) *Ho riyo* (*safag tabaldi*: adansonia digitata) *Ho do* (*safag hijlij*: balanites aegpti-aca l) *Kabbad* (*khudra bariyah*: *corchorus trilocularis* **l**) *Hadang ho ban* (*safag sidir*: ziziphus spina-christi) *Wahnjat* (*arat*: albizia amara) *Ubuglaylaih* (*um shutoor*: kigelia africana) *Ywarwar* (*sala'la*: cissus quadrangug laris) *Wuraih* (*shajarat el-sim*: jatropha glauca) *Walalao* (*liyon*: lannea humilis) *Wuhwuh* (*suksuk al-girid*: …)
Animals/Birds *Ko ro* (*ngalat*: alcelaphus-buselaphus) *Tcharo* (*taytal*: connochaetes) *Haranj* (*abu urof*: *chrysocyon brachyurus*) *Kalambar* (*zaraf*: giraffe) *Wih ranj* (*ghazal*: gazella dorcas) *Tchi woi keikao*: hyracoidea)	*Wal maogad* (*um digdig*: cephalophinae) *Ko wayr* (*abun-dilaf*: aardvark orycteropus afer lc) *Wor* (*abu shoak*: *hystrix cristata*) *Tchiin* (*arnab*: oryctolagus cuniculus) *Wiid* (*jadad alwadi*: *numida meleagris*) *Warat* (*ghit khalawi*: felis silvestris)	Insects *Ruwi* (*sari al-layl*: anacridium melanorhodon melanorhodon) *Nomae* (*nahal*: apis) *Ngomman* (*basboos/ nahal ab zanbur*: apis florea) *Ngew* (*al bug*: nezara viridula)	

3–1–Fruits

Tagoi utilise the fruits of many wild trees as functional food, i.e. as healthy food but without a specific medicinal target. The fruit of *ngamjae* tree is similar to the normal orange in size, colour, exterior shape and internal structure; but it tastes like pomegranate. Its seeds are bigger than the orange ones, varying in colour between red and orange, and flat-shaped just like the lupine beans. The *ngabal* trees produce fruits identical with those of the balanites aegptiaca l, but they taste bitterer. The fruits of *nigmo* trees are almost sweetish and looking like the olives, but their peels and seeds are black. Flour is extracted out of these three types of fruits (*ngamjae*, *ngabal* and *nigmo*). The trees of *ngaj gar* yield fruits comparable to the cotton bolls and have four inner sections holding small sugary seeds, which are eaten just for amusement.

There are four types of ficus sycamorus tree fruits, which are eaten fresh as functional food in Tagoi areas. *Naffal* is the largest of these types and much the same as figs in shape and size; followed in size by *wad dag* fruit that is almost identical with olive. Then comes the *wor ya* fruit, which is brown and of neem-fruit shape. The smallest *naffal* fruit is *yaf nij*, which resembles the raisin (i.e., the partially dried grape). Similar to olives also are the fruits of *nogo rom* trees, but they contain multiple seeds in the same structure of sweetsop. The *nod go* and *ni gil* trees also produce fruits that are eaten fresh. A *ni gil* fruit contains a liquid called "korat kinil" in Tagoi language. The *mog lij* fruits are yellow, comparable to the neem fruits, and between their crusts and interior seeds there is a sticky and sweet substance that both children and shepherds in the wastelands suck out as entertaining stuff, much the same as the *naban*. Usually a person could not suck up a large amount of *mog lij* fruits, because usually they are appetite-clogging stuffs. The *kobong bon* is one of the many trees, which become a focus during their blooming stage in the various Tagoi communities, as its blooms are dried up and then used in making a type of sauce.

The tree fruits, which are consumed as food medicine or in the treatment of ailments, degraded health conditions or hygiene, include *wol win*, *nod go*, *nogor*, *kon jan*, *nogo ra*, *ko winj*, *nada lung* and *naff*. A specified amount of each of *wol win*, *nod go*, *nogor*, *kon jan*, *nogo ra*, *ko winj*, and *nada lung* fruits is poured into a bowl filled with water and then left for a long period to soak. The resulting juice is mixed with grits to make a light porridge that patients drink in repeated doses. Both *wol win* and *nod go* are used in treating anaemia, as they are believed to quickly improve the haemoglobin levels. The *nogor* fruit powder is used in treating cases of dysentery and all other types of acute diarrhoea as well. The use of *kon jan* fruits and the juice extracted from the brown substance directly lying under the peels of *nogo ra* fruits is intended for cleaning the human digestive system of worms, viruses, bacteria and parasites and as laxatives for the treatment of constipation.

The kernels of the *nogo ra* fruits are dried up and then smashed to get their pulps. These pulps are eaten fresh as snacks (nuts) or pressed to draw out the called "*bura* oil", which Tagoi describe as having a flavour much sweeter than the flavour of sesame oil or ghee. Tagoi also feel sure that the pulps of *nogo ra* fruits are of health benefit associated with abdominal diseases, rheumatism and malaria.[1] People with rheumatism or malaria smear their bodies with such pulps, which are conceived to remove both pain and symptoms. Usually, the *bura* oil is added to some bee honey and millet as food for women in childbed. Tagoi believe that the *bura* oil, when mixed with millet, increases the generation of breast milk, as it also gives energy to the confined women and makes them look healthy when the puerperal period ends. Besides, when the *bura* oil is added to bee honey then both would help to get out the rest of childbirth blood and to clean the body of it. People with high blood pressure soak the peels of *nogo ra* fruits in water and then drink it, as they are believed to reduce hypertension. Similarly, the fruits of *nada lung* and *ubuglaylaih* are used to treat high blood pressure: soaked in some water, together with some kind of wild herbs (locally known as "*um gilaylah*") that are used as condiment in tea, and then the resultant juice is drunk. In addition, the internal fibre remaining from the kernels of the used *nogo ra* fruits are deemed as effective insecticides when placed on fire to smoke out and hence expel mosquitoes and midges.[2] It is worth noting that the ash from the seeds of *ubuglaylaih* is smeared on tumour, as it is believed to reduce it.

Frequently observed, some Tagoi use the pulp of bitter gourd (*ko winj*) in rituals aimed at protecting properties. They take amounts of such a pulp to local Muslim religious leaders (known as "*fugara*"; singular "*faki*") to

1-The pulps of *nogo ra* fruits are exposed to a fermentation process, as they are placed in a container filled with water. The water is continuously renewed, for four consecutive days. This fermentation is meant to remove the bitter taste in the pulps that a normal human could not tolerate.

2-More and above, the *bura* trees are used in the traditional ritual practices in the different Tagoi communities: A new king cuts a branch of *bura* tree by a sword during his investiture, and the groom does the same during his wedding ceremonies. For Tagoi, the *bura* trees have a spiritual value, as

do specific prayers or supplications upon them. Then, they spread that pulp around properties to be saved from theft or infringements. Tagoi believe that anyone who takes a property, which is kept safeguard with the pulp of bitter gourd, has to suffer from swellings on his limbs that may disappear only after the affected limbs are stabbed with a piece of heated iron to remove the gathered pus. The pulp of bitter gourd is also used in treating children infected with measles. The whole bodies of children infected with measles are smeared with crushed pulps of bitter gourds. More and above, a piece of bitter gourd, on which a *faki* has written some religious texts, is hung as cure on the neck of a child infected with cough or pertussis. Therefore, a person could be infected with or recover from a disease using bitter gourds, i.e. Tagoi use bitter gourds as a double-edged weapon in certain fields of spiritual and organic therapies.

A *naff* fruit, usually composed of more than one cotyledon, is a lump to the size of sweet melon. It is used both as food and as medicine, both as fruit and as laxative for abdomen in cases of constipation, but without any further association between the two uses. It is covered with a hard outer layer, between which and the internal seed there is a soft fibre filled with thick mango-like juice. This fleshy part is eaten raw.

3–2–Roots and Fleshy Fungi

The *hirray*, *shangil*, *fangallalai* and *taff* are wild plant roots, which plentifully grow in the Tagoi wildland areas during the rainy season. They are used as "functional" foods in times of drought, famine and grain shortage.(1) They contain toxic liquids and therefore require a special handling for a few days before they get edible. To use *hirray*, which are underground runners similar to the potato tubers, they are cut into slices, put in a container filled with water, and then subjected to a fermentation process for three or four days. The water used in the fermentation is changed several times to get rid of the poisonous liquid. The fermented slices are dried up and grinded. The *hirray* flour is viscous and clean, just like the milled wheat. It is used in making *kisra* bread or porridge. The *shangil*, likewise, have a similar appearance to potato tubers, but they have rough irregular outer shells that must be removed first before the remaining substances are boiled on fire and then fermented for three or four days, just like what happens in the case of *hirray*, also with the aim of weeding out the toxic liquid. The fermented *shangil* is dried up and grinded to be used as flour in making porridge. Both *hirray* and *shangil* also could be fermented, boiled and eaten without being dried or ground. The *fangallalai* roots conglobate to form mass kernels analogous to the cassava tubers and then expand repeatedly to conglobate somewhere else under the ground. People use dried and grinded *fangallalai* kernels in making *kisra* bread. The *taff* roots stem out of *naff* fruits and infiltrate into the ground. They are brown and their bases under the ground are broader than their heads at the top. They are cut into slices, dried up and then milled to make *kisra* bread. Sometimes they are boiled or grilled, just like the sweet corn husks. Other times the *taff* roots are smashed to get their pulps, which are soft, sweet and satiating to the full. These pulps are eaten fresh, without being cooked or subjected to any other treatment.

The *kuff* is a plant that grows in push lands during summer. It has roots that are usually full of water. Herdsmen and hunters use these roots during their stay in the push lands as food that could provide them with what satiates and quenches. As to this quality, it is comparable to the *agash*, which is an edible water-rich root. The *agash*, which grows in abundance in the wild lands, is a green straw with only one or two leaves. Its roots are small white oval-shaped, similar to potatoes, but of lemon size. They have shells that must be removed before they are eaten. The *nagmat ro* roots are dried up in the sun, then grinded after removing their outer layers. The resulting flour is added to the amount of grain available with the family. The mixture is used in making *kisra* bread or porridge. The *nagmat ro* plants also have beans, which are fermented, hard-boiled, mixed with sesame or groundnuts grist, and then eaten as a full meal. Tagoi in areas where water is salty, chew and then spit small amounts of *nagmat ro* roots to taste sweetness in that water. The *nagmat ro* roots also are considered as an effective cure for both diabetes and hypertension. That is, a *nagmat ro* plant is used as medicine, food and water sweetener, but without any further association between these uses. The soft roots of the newly grown *naban* trees are crushed, boiled in water, and then used as pain reliever and for treating digestive disorders (e.g., abdominal distension). It is worth mentioning here that Tagoi use the

they are also the only spiny trees that demons or jinn do not inhabit.

1-To collect the above varieties of wild roots, Tagoi women walk in groups out of their villages into the surrounding wildernesses. Every woman normally brings about one *raykah* refill (about 30 *malwas*; *malwa* is a local Sudanese measure for cereals, flour and the like [one *malwa* = 4.125 litres]), an amount that could suffice her family for several days in times of famine. Occasionally, some grain, if available, is added to such a *raykah* refill in order to increase the amount of flour extracted from the wild roots, and thus increase their sufficiency duration for the family. If there is no grain with the family, they shall rely entirely on the flour extracted from the wild roots.

jibbayn roots in making the white pickled soft cheese that they conventionally make from cow milk in their rural communities.

Tagoi make use of certain types of fleshy fungal growth as functional food. They call them "*ngifi nga kabar*" (literally "meat of the ground"). Some of these fungi are what Tagoi call "*kalak*", "*kolanj*" and "*kabag*". The *kalak* is a brown mushroom, both small- and large-sized, and grows in *ganatiir*[1] during the rainy seasons. In the *ganatiir* also grows the white *kolanj* and the yellowish brown *kabag*. Sometimes *kalak* and *kolanj* are eaten fresh (mixed with sesame seeds as a salad) without being cooked; but other times, they are cut into slices, dried in the sun, and then cooked as sauce. The *kabag* is cut into slices, dried up, and grinded to be used as an alternate flour (to grain) in making porridge in times of drought and famine.

3–3–Leaves/Seeds of Grass and Trees

Tagoi make use of leaves and seeds of some wild grass and trees, which exist in abundance in all wastelands nearby their villages, in making *kisra* bread, sauces and salads. *Yimri* is a grass that has small seeds in the size of sugar crystals, contained in elongated ears. The ears are dried, rubbed with hands, and then winnowed in a current of air to separate the seeds from chaff. After that, the seeds are grinded in order to use their flour in making *kisra* bread. Tagoi usually resort to *yimri* in times of drought and famine as an alternate to grain.

Tagoi make sauce from the seeds and leaves of *walalao*, *nogor*, *bura*, and *kabbad*. The *walalao* is one of the weak-stemmed ramblers, which commonly climb and straggle over trunks of other vegetation during the rainy season. The green fresh *walalao* seeds and leaves are used in making a certain type of sauce. Sometimes the seeds and leaves are dried up in the sun and then used to cook another type *walalao* sauce.[2] Tagoi also cook a sauce with in-the-bud baobab or *bura* leaves. The in-the-bud baobab leaves also are utilised, together with sesame, in making salad. In the wild lands in Tagoi areas, there is *kabbad*, which is identical to the *mulukhia*,[3] which they grow on their farms and classify into green-stalked *mulukhia* (*wanj*) and red-stalked *mulukhia* (*wanj ahmar*). The wild *mulukhia* has a green stalk just like the *wanj*. Its fresh leaves (or sometimes its leaves that are dried up in the sun) are used to cook a certain type of sauce. Tagoi cook the *bura* leaves as *balilah*[4] in times of famine; occasionally added to the sorghum bicolour to increase the quantity of grain to be cooked. The *bura* leaves are also used in making a local lotion for the eyes in cases of conjunctivitis.

The *naban* leaves boiled in water are used to disinfect and treat wounds. When dried and ground, the resultant *naban* powder is used to nourish women's head hair and to treat hair and scalp conditions (e.g., head lice and nits, dandruff, cysts and itchiness). The *naban* leaves are utilised also in the practice of doing "*ruqyah*,"[5] which is intended as a means of treating cases of possession by demons or jinn. In cases of death, the *naban* leaves are put into some amount of water until it foams, then the body of the deceased is anointed with this foaming water after it had been washed and before it is shrouded. This is done following the example of the Prophet Muhammad (i.e. the Sunnah), as it happens in many other Muslim societies as well. Sometimes, such foaming water is drunk and/ or smeared on the body as cure for black magic.

The Tagoi shepherds use other wild plants for therapeutic purposes while they are in the wilderness. They extract an analgesic substance for treating pain from *wuraih* trees and an oily white antiseptic substance[6] for cleaning wounds from *wuhwuh* shrubs. To help the embryonic membranes get out after birth, the Tagoi shepherds grind some leaves from *ywarwar* plants and then enter the resultant particles into the womb of animal that gives birth. In addition, they use the leaves of *ubuglaylaih*, *wahnjat* trees as feeds for their animals.

A person who is infected with a running cold or sinusitis and hence suffers a constant headache is taken to the nearest *bura* tree, where he is jabbed at his upper nose cavities with one of its greenish thorns until he bleeds a lot. This is one of the therapeutic practices for this type of disease. The greenish *bura* thorn is used also to treat persons with health problems including difficulty in tolerating exposure to bright light due to infection with albinism. In such case, the lachrymal glands under the upper eyelids are cauterised with a hot greenish *bura* thorn. The greenish *bura* thorn is used in the operation

1- "*Ganatiir*" (plural of "*gantoor*"): nests of termites, which are almost elaborate structures made in the form of mini-hills using a combination of soil, mud, chewed wood/cellulose, saliva and faeces.

2- This second type of *walalao* sauce is tenacious to the point that if a person takes a bit of it with his hand without being aware of how exactly to eat it, all the sauce in the dish will stick and then trail with the bit taken by the hand. Tagoi follow a certain way of eating this *walalao* sauce, as they normally cut bits with their thumbs.

3- *ulukhia* is a leafy summer vegetable that is popular throughout the Middle East. Only the leaves are edible.

4- *Balilah* is seasoned and boiled grain, served as a hot mezze dish.

5- *Ruqyah* is the recitation of Qur'an, seeking of refuge, remembrance and supplications. It is practiced in many Muslim societies.

6- Such oily white substance turns into yellow when removed from a shrub.

of "darkening women's lips" ("*kajar tubrak*" in Tagoi language) too, for being unstained. Moreover, the eyes of a person with conjunctivitis are washed with water, in which some *bura* leaves have already been soaked, in the early morning for several consecutive days as treatment. As is the custom in Tagoi communities, a woman in-childbed is frequently given some water boiled with a small bark piece from *nogor* and a bit of sugar to drink. This is believed to relieve abdominal pain during the postnatal period.(1) In addition, there is a powdery layer at the trunk of every *nogor* tree, lying directly under the outer bark. It is called "*saman galdi*" in Tagoi language. People ordinarily chew some of this powdery layer, because it contains a sweet-tasting liquid. It is taken as delicious entertainment food.

3–4–Insects, Animals and Birds

Tagoi tell about two main types of bees in their areas: *nomae* and *ngomman*, in line with their own observations and inferences. Some informants say that *nomae* bees, which live in groups like humans, perch inside the large openings on big tree trunks or amid rock piles on the mountains, and occasionally in the *ganattiir*. Perching inside such places could protect bees from rainwater and winds. Some *nomae* bees may gather in a hive hanging off a tree branch, a hive that Tagoi call "*abu al-dalu*". Bees like these often change their living locations in winter times, looking for shelters against cold winds.(2) Collecting honey from hives hanging off tree branches or inside tree trunks or *ganattiir* is easy and carried out during the daytime. As to a hive hanging off or in tree trunk, huntsmen commonly cut down the tree and then kindle fire to produce a thick smoke for bee removal. In summer, bees get thirst frequently; therefore, they are most of the daytime away from their hives, making it easy for huntsmen to dig into *ganattiir* looking for honey. The collection of honey from amid rock piles is extremely difficult during the daytime; therefore, it is done at night. *Nomae* bee honey in some mountain areas may stay ripened amid the rock piles for two or more years. Usually, an experienced huntsman takes honey from one part of the hive, leaving the other parts and a slit for *nomae* bees to enter. Such huntsman does so, so that bees do not abandon the hive he has discovered.(3)

Accordingly, Tagoi talk about different types of *nomae* bee honey. There is honey, which stays ripened in the hives for two or more years. It is thick and highly concentrated, and, in many cases, it looks brown. The new-made honey is usually light and "white". The honey collected from hives amid the rock piles is more in quantity than that collected from hives inside tree trunks. The honey taken from *ganattiir* is mostly "white" in colour and considered the best, for being concentrated and free of water, because the surrounding soil uptakes the water droplets.

Besides using it as food, Tagoi accept as true that *nomae* bee honey has multiple health and nutritional benefits. When smeared on a wound, it helps speed the healing process. A person sick with diarrhoea, cough, malaria, or any of the other fevers is advised to drink some *nomae* bee honey, particularly the one collected from *ganattiir*, early in the morning and then not to drink water, except in the form of a cup of tea, up to the evening. Tagoi also use *nomae* beehives for building immunity to malaria. They think that eating a *nomae* honey-free hive or being exposed to a certain number of bee stings may provide a lifelong resistance to malaria. In addition, a porridge made of grain sometimes is mixed with *nomae* bee honey and *bura* oil as food provided to women in childbed. This mixture is believed to help clean the body of postpartum discharge. In times of lack of sugar in Tagoi areas *nomae* honey is used instead.(4)

1-The bark of *nogor* is used also in producing binding ropes for building huts or fences in Tagoi areas.

2-Inside every beehive, as Tagoi informants say, there is a queen bee amidst a large number of worker bees. All the worker bees wait on the queen bee. While some of them build the hive in the shape of curtains, others collect flowers, soak up fruit buds, and then transport both into the hive. A third group of worker bees make wax and fill the hive at both sides with flowers and nectar of fruit buds. After the hive is filled with flowers and nectar, a great number of what Tagoi call "*abu al-dageeg*" (cabbage butterfly; *pieris brassicae*) and believe to be the product of flower-nectar mixture then appears inside. Sooner after, bees add a specific substance to *abu al-dageeg*, causing its colour to change to yellow and then red. With the passing of time, the reddish *abu al-dageeg* converts to a thick porridge-like liquid, which afterwards develops into honey. According to informants, there is a second type of *abu al-dageeg*, which converts into honey directly without passing through the porridge-like-liquid stage. A third type of *abu al-dageeg* grows up into worm and then bee. In the latter case, the newly grown bees leave to another location, leaving the old hive for the originally existing bees.

3-For Tagoi informants, bees start make honey during autumn (July-October) and honey ripens in early summer (March-April). Huntsmen collect honey in late summer and early next autumn, mostly benefiting from the behaviour of a dark ashen wax-bee-eater, slightly smaller than starlings and known as "*chadu*" in Tagoi language. According to informants, *chadu* lures huntsmen to beehives, by making a recurring voice and moving from one tree to another, and gets a chance to eat as much of the worms inside the hives after the huntsmen finish collecting the honey. Noteworthy, there is a tenure system regarding the collection of bee honey in the Tagoi communities. The locations of discovered beehives are allotted to huntsmen. No huntsman is to approach a beehive formerly discovered by another one.

4-Tagoi families usually keep well-closed small earthenware jars, cooking vessels or gallons full of bee honey in their stockrooms for use as cure. It

The *ngomman*, the second local type of bees in the Tagoi areas, is smaller than the housefly. For the Tagoi informants, the *ngomman* produces honey, which tastes sweeter than the *nomae* bee honey, and one who eats such honey does not feel satisfied quickly or feel any postprandial heartburn or acid reflux. It has the same pre-mentioned uses of *nomae* bee honey, but, in addition, it stimulates the generation of mother's breast milk.

The "*ngew*" is a green or grey hard-backed and sidelong-thorn bug. It is bigger than the housefly in size. It usually lays eggs in dead animal bones. The *ngew* larvae grow quickly in such bones and then fly to the nearest mountain to settle in nests inside the rock piles. In the afternoons in late summer and early autumn, people from Tagoi areas take empty sacks, leafy tree branches, and big utensils and go to the *ngew* nesting locations. There they throw the branches on the nest slots. When the *ngew* bugs intend to come out of their nests after sunset, they knock against the dense branches and find no way out. At that moment, people start gleaning and putting into their sacks what bugs they can catch, until they make sure that the nests have become empty.(1) Often, the collection of *ngew* bugs extends beyond the time of "*ṣalat al-ʿiša'*" (night prayer). The collected bugs are taken home to be fried or grilled alive, as they may also be mixed with *balilah*. The produced food is hot exactly like chilli and of mint-like flavour. A lot of such food, which Tagoi consider as containing a considerable amount of protein (i.e. as healthy food, but without a specific medicinal target), is sold in the local markets. Some Tagoi families extract oil from the cooked *ngew* bugs and sell it in the local markets as well.

Tagoi use as food a type of locusts, which they call "*ruwi*" (*anacridium melanorhodon melanorhodon*) and which feed on the blossoms growing on orchard trees like mangoes. They grill such locusts. For the informants, the important edible part is the belly, where the eggs, which give a distinctive taste, exist. A person normally begins to eat the legs, then the wings, and finally the belly and the chest. The *ruwi* locusts are also utilised as cure for jaundice and hypertension, i.e. they are used both as medicine and as food. In addition, Tagoi hunt many types of wild animals and birds to eat their meats just as functional food, including *ngalat*, *tcharo*, *haranj*, *kalambar*, *wih ranj*, *tchi woi*, *wal maogad*, *kor wayr*, *wor*, *tchiin*, *wiid*, and *warat*.

4–Concluding Remarks

The copious amount of multipurpose edible wild species (i.e. those used as staple food, seasonings, sweeteners of drinking water, insecticides, snacks, amusement stuffs, medicines, spiritual protectors, etc.) reveals sturdily built traditions of hunting wild animals and gathering wild plants in the study area. It mirrors a strong association of Tagoi with their natural environment and a related extensive indigenous knowledge that has been an outcome of experiences, observations and inferences. In total, forty-five wild plants were recorded, with local taxonomy and naming, including nineteen types of fruits, twelve types of roots, three types of fleshy fungi, and eleven types of leaves and seeds. This is in addition to twelve types of wild animals and birds and four types of insects. The remoteness of Tagoi rural areas from the urban markets in the Nuba Mountains region until the recent past and the lack of modern means of transportation and paved routes were key factors that made Tagoi dependent on wild species in food, medical treatment and hygienic practices. In line with findings of the above-reviewed ethnobotanical research papers, the current study addressed the overlap between three categories of using wild species in the Tagoi communities: as food and/or medicine. Notably, Tagoi collect functional foodstuffs more often than the medicinally utilized ones. 26.2% of the recorded species are collected only for medication purposes (i.e., as medicinal food), 65.6% as functional food with no medicinal target, and 8.2% as both medicine and food. The medicinal uses are restricted to plants and insects; whilst fruits and leaves are the most plant parts reported to have medicinal properties. The medicinally utilized stuffs are chewed; drunk as juice, light porridge or boiled in hot water; eaten fresh as snacks (nuts); used as pressed cooking oil; placed on fire to smoke; hung or smeared on the body; or used in jabbing, cauterising or washing certain parts of the body.

Fourteen categories of curative and preventive effects of the medicinally utilized wild stuffs could be identified: (1) Dermatologic conditions: measles and wounds. (2) Obstetric and gynaecologic problems: stimulating the generation of mother's breast milk, giving energy to confined women and making them look healthy, relieving abdominal pain during the postnatal period, and cleaning the body of postpartum discharge (i.e. childbirth blood,

is considered truthful that the longer bee honey stays in a stockroom the greater will be the probability that the wax in it turns into a more concentrated honey and hence a more effective cure.

1-An alternative way for catching the *ngew* bugs is to put big utensils upon the slots of nests, shove long sticks between the stacked stones, and then move these sticks in violent and disturbing way so that the bugs move into the utensils.

embryonic membranes, etc.). (3) Hematologic disorders: anaemia, hypertension, and jaundice. (4) Eye problems: conjunctivitis and difficulty in tolerating exposure to bright light due to infection with albinism. (5) Abdominal problems: abdominal distension, all types of acute diarrhoea (e.g. dysentery), cleaning the digestive system of worms, viruses, bacteria and parasites, and laxatives in cases of constipation. (6) Respiratory conditions: running cold, sinusitis, cough and pertussis. (7) Arthropathy (e.g. rheumatoid). (8) Endocrine diseases (e.g. diabetes). (9) Analgesic substances. (10) All types of fever (e.g. malaria). (11) Reducing tumours. (12) Insecticides (for mosquitoes and midges). (13) Cosmetic treatments (e.g. darkening women's lips). (14) Hair and scalp conditions (e.g., head lice and nits, dandruff, cysts and itchiness). We could add to these effects the use of some wild materials in ritual practices, which aim at treating mental disorders attributed to spirit possession (or sometimes at protecting properties from theft or infringement).

As stated above, about two-thirds of the recorded wild stuffs are used as "functional" foods, particularly in times of drought and life-threatening food shortages. They are normally abundant during summer; but there is always a decrease, even no-availability off-season, leaving most people in a state of food deficit. They are consumed fresh (with or without cooking, fermentation, boiling, frying, grilling, drying up in the sun, grinding, rubbing with hands or any other treatment) in salad, soup, sauce, porridge, *kisra* bread, *balilah* and juice; as meat, extracted oil, entertaining sweet substances or drinking-water sources or sweeteners; or in making milk cheese. Wild raw snacks and seasoning stuffs make up sizeable categories. They are commonly eaten or sucked by people in leisure times or added to food to enhance its flavour. Some of the foodstuffs are sold in the local markets as a source of income. Other types of wild plants are given as feeds to domesticated animals.

In the Tagoi areas, which are almost devoid of modern medical facilities, simple traditional food and medical knowledge is transferred through generations of the ordinary people. However, in cases of diagnosing and treating diseases and symptoms that are difficult for them, the ordinary people turn to traditional medicinal practitioners known as "*yidbonin*" (singular "*wodbon*") in Tagoi language. Such practitioners, both males and females, are famed in the different communities for their exceptional skills and awareness of more indigenous knowledge details. That being the case, one could describe every Tagoi community as a "large-scale hospital of people, by people and for people". This description could be generalised for all societies or communities, where folk medical knowledge, practices and practitioners dominate.

In support of some findings of ethnobotanical research reviewed above and carried out in South Africa, Sweden, Ukraine and NW Russia, the hardness of wild species in the Tagoi areas ensures that they thrive in both drought and flood times and, as a result, they are available during harsh environmental conditions when most cultivated crops fail. That is mainly why many wild species appear as famine "functional" food in the Tagoi areas. As also noted, in line with findings of research conducted in South Africa, Ethiopia, Uganda, Pakistan, Turkey, Spain and Brazil, the Tagoi have built up an indigenous knowledge of wild species, their properties, and methods of collection and use during a protracted interaction with their natural environment. They pass this traditional knowledge "orally" through generations and everyday natural course; but it is likely to be lost due to their recent mass migration to urban centres in other parts of Sudan,[1] where a range of factors pose a threat to their traditional knowledge systems in general. Their reliance on wild foods and medicines has decreased enormously in these new urban environments.

As de Medeiros and others (de Medeiros, et al., 2021) emphasized, the cultural significance of certain wild species in the intersection between food and medicine follows a logic of maximum return, so that species with better returns in terms of ease of acquisition and nutritional value are appropriated and rooted culturally. In the Tagoi case, this also seems to hold true, as the most culturally salient of the wild species is the *bura* tree (balanites aegptiaca l), followed by the two pre-mentioned types of bees (*nomae* and *ngomman*). The *bura* tree, for the Tagoi informants, is a king of nature. It is believed to be an expeller of spirits. It is the symbol of generosity and protection. Due to its spiritual and symbolic status and other various nutritional and health benefits, the *bura* tree is not cut down in all Tagoi areas. The queen bee, for the Tagoi informants, is another king of nature. It is also a symbol of generosity and protection and of great nutritional and health benefits. As could be remarked from the previous descriptions, the *bura* tree and the *nomae* and *ngomman* bees are the wild species with the maximum returns to the Tagoi people in their rural communities.

1-Lately, there has been mass migration from the Tagoi homeland, due to civil war in their immediate region, to different areas in Sudan.

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المعرفة المحلية بالأغذية والأدوية البرية في مجتمعات تَقْوي بجبال النوبة — السودان

ملخص

تهدف هذه الورقة إلى جمع ودراسة المعارف التقليدية المتعلقة بالنباتات والحيوانات والطيور والحشرات البرية المحلية، التي يجمعها أو يصطادها أفراد قبيلة تقوي الزراعية بمنطقة جنوب كردفان (في حزام السافانا الممطر صيفًا بالسودان)، إلى جانب استخداماتها في الطبخ أو الطب الشعبي أو كلاهما، من منظور أنثروبولوجي. إنها المحاولة الأولى لتوثيق التراث البيولوجي والثقافي المحلي لأصناف المواد البرية، بالإضافة إلى صفاتها الغذائية والطبية، التي يتصورها الناس في هذه المنطقة. المقابلات الجماعية المتعمقة، وغير المنظمة، والمفتوحة مع أصحاب المعرفة المحليين من الذكور والإناث، ومقالات المجلات العلمية المستخرجة من مشاريع البحوث الاثنوجرافية والنباتية، التي نُفِّذت في أجزاء مختلفة من العالم، كانت المصادر الرئيسية للبيانات الأولية والثانوية، على التوالي.

الكلمات المفتاحية
أصناف المواد البرية
دواء/دوائي
غذاء
معرفة
استخدام (استخدامات)
نبات (نباتات)

Connaissances autochtones sur les aliments et les médicaments sauvages parmi les communautés Tagoi des monts Nouba – Soudan

Résumé

Cet article vise à collecter et étudier les connaissances traditionnelles sur les plantes, les animaux, les oiseaux et les insectes sauvages locaux, que les membres de la tribu agricole de Tagoi dans la région du Sud Kordofan (dans la ceinture de savane pluvieuse estivale au Soudan) rassemblent ou chassent. Il aborde également leurs utilisations en cuisine et/ou en médecine populaire, d'un point de vue anthropologique. C'est la première tentative de documenter le patrimoine biologique et culturel local des variétés de ressources sauvages, ainsi que leurs propriétés nutritives et médicinales perçues par les gens de cette région. Les entretiens de groupe approfondis, non structurés et ouverts avec des détenteurs de savoirs locaux masculins et féminins, ainsi que les articles de revues scientifiques issus de projets de recherche ethnographique et botanique menés dans différentes parties du monde, ont été respectivement les principales sources de données primaires et secondaires.

Mots clés
variétés de ressources sauvages, médicament/ médicinal
nourriture
connaissance
usage(s)
plante(s)

تضارب المصالح

يعلن المؤلف (المؤلفون) لا تضارب في المصالح

Competing interests

The author(s) declare no competing interests