



International Journal of Herbal Medicine

Available online at www.florajournal.com



E-ISSN: 2321-2187
P-ISSN: 2394-0514
IJHM 2016; 4(3): 15-20
Received: 07-03-2016
Accepted: 08-04-2016

Yakini Arzu
Faculty of Science and
Technology University of Belize
Belize, Central America.

Thippi Thiagarajan
Faculty of Science and
Technology University of Belize
Belize, Central America.

Medicinal plants used by the Rastafarian community in Belize

Yakini Arzu, Thippi Thiagarajan

Abstract

There is an increased focus on the use of medicinal plant products globally due to empirical research carried out on ethnic usage of plants. However some locally used products that are not fully investigated and documented. Documenting local use of medicinal plants by minority socio-ethnic groups is an important first step in advancing the usage of herbal medicine. Rastafarians are a unique cultural group which has strong belief in medicinal herbal usage. Interviews were conducted among several locally known “herbal healers” in the Rastafarian community of Belize. Rastafarians in Belize are a unique community that comprises of members from other ethnic groups including the Garinagu and Creole. Following the interviews, data was collected on the plants they use, for which ailments and what procedures are undertaken for preparation and application. These plants are used to treat a range of diseases from neurological disorders such as epileptic seizures to urinary tract infections and others being used mainly as aphrodisiacs or soothing menstrual cramps in women. Thirty four (34) plants were identified taxonomically fitting into 25 different families and the data was organized with each plant’s locally renowned healing ability and procedures. With many of the small and remote villages in Belize not having complete and unrestricted access to medical facilities, most ailments are tended to by these local “herbal healers” irrespective of religion, ethnicity or creed. A survey conducted among the herbal healers indicated that there is need to educate and protect the important medicinal plants as there is gradual depletion of certain important medicinal plant species.

Keywords: Rastafarians, Medicinal Plants, Cultural Practices

Introduction

The use of plants as a healing agent has been passed from generation to generation throughout tribal cultures of the world. The oldest records of use of medicinal plants can be traced as far back as 2,000 B.C in the ancient Indian medical system known as Ayurveda and Siddha medicine as well as ancient Egyptians. Advancement in ethnomedicine was limited because of the difficulty in communication between greatly distanced tribes and human civilizations. Ethnomedicine is known today as the traditional medicine practiced by various ethnic groups and by the indigenous peoples of the world. These medicinal traditions are only passed down orally from generation to generation and are very rarely documented. This poses a threat for the preservation of some of the traditional practices being lost if not permanently recorded. Belize is a small English speaking country in Central America with a population of about 340,000. Belize as a country hosts several ethnic groups including the Garinagu, Mayans, Creole people and Mestizo (Statistical Institute of Belize 2010) [1]. There is also a small population of Rastafarians living in Belize that has seemed to maintain their own form of culture and ethnicity. The Rastafarians have established themselves worldwide with approximately 1 million dedicated individuals to what they refer to as a movement or a way of life. Although to other nations and religions they are classed as a young religion that started in Jamaica around the 1930’s following the coronation of Haile Selassie I as the king of Ethiopia. They also believe him to be the reincarnation of Jesus Christ and have based their faith around the strength and health of the African Diaspora worldwide for unity and strength. The Rastafari are avid vegetarians (although some make a special exception for fish) and have a great appreciation for plants and herbal use especially their very well-known use for marijuana. However, being that they practice the use and appreciation of herbal use other than that of cannabis, they also rather using herbal medicines rather than modern medicine, which make them one of the prime candidates for the use of ethnomedicine. Notably, marijuana use is not only optional for Rastafari but it is not even completely central to their faith. The Rastafarians will hardly ever enter a hospital because of their belief against the use of western

Correspondence
Thippi Thiagarajan
Faculty of Science and
Technology University of Belize
Belize, Central America.

medicine and believe that it is more a poison than it is for healing. Therefore many of them turn to ethnomedicine for healing of ailments by special preparations, special concoctions or mostly by simply consuming the plant or herb in its most natural form.

In a study conducted by D'Avigdor, *et al.* (2014)^[2] found that a majority of Ethiopians rely on traditional medicine for healthcare. The participants of this study were fully aware that their practices and plants were becoming endangered because of lack of recorded practices and the general lack of conservation of species. It was concluded that there was an urgent need to fully document the medicinal knowledge of herbs in these communities and it should be available to the community for them to be able to pass down this knowledge.

In northwest Ethiopia, Chekole *et al.*, (2015)^[3] investigated the medicinal plants of Tara-Gedam and Amba remnant forests of the Libo Kemkem district. Remnant forests are found in areas that have long been converted to agricultural landscapes and have become a refuge for wild plants. A total of 163 medicinal plant species were analyzed and while 71% of these were used for human ailments only, 21% was for both human and livestock and 8% for livestock only. The diversity of medicinal plants and the associated knowledge are more attributed to the elders and healers of the community and although they are important for the healthcare of the villagers the knowledge pool is under threat. There is, therefore, a recommendation for the conservation of vegetation along with the preservation of the indigenous knowledge.

In South American Argentine Patagonia there was a research conducted by Molares and Ladio (2014)^[4] to determine the medicinal plants in the cultural landscape of a Mapuche-Tehuelche community. The study reported 121 medicinal species from wild and non-wild environments, most of which have a present aroma and/or taste. These plants were used for ailments from digestive to genital-urinary complaints. The local herbal specialists also used plants that come from even more distant environments such as the Andean forest and the Patagonian Monte. The herbal landscape was concluded to not only be used for medicinal purposes but also for recreational advantages. The indigenous uses of these plants play a role as immediate fixes to simple ailments despite the new and available resources.

In San Juan Argentina, research conducted by Hernandez *et al.*, (2014)^[5] to record the medicinal use of wild fauna by Mestizo communities. They conducted interviews with 171 inhabitants between the ages of 15 to 93 years old. The medicinal use of animals was reported by only 57% of the surveyed people and mentioned seven species whereas the body parts used included the fat, legs, stomach, feathers, meat, blood etc. A low number of animal species was mentioned and it was concluded that this could be related to the strong control the legislation has on banning hunting which contributes to the erosion of traditional knowledge. A management strategy was recommended to balance conservation and ancestral usage. Similar study on medicinal use of animal products in Cameroon was reported by Bobo *et al.* (2015)^[6].

In their paper Balick and O'Brien, (2004)^[7] reported that in Belize there is a total of 3,408 native and cultivated flora species. The flora were assessed for their traditional local uses for medicine. The objective of that study was to collect and preserve cultural and traditional knowledge of natural products. In that study the authors attempted to identify where these plants occur and made recommendations for the establishment of a forest reserve of a total 50,000 acres of land to be set aside for conservation of medicinal plants (Balick and

O'Brien, 2004)^[7]. Another study conducted in Southern Belize by Amiguet *et al.*, (2005)^[8] led to a collection of 169 medicinal plant species from 67 different plant families. The data shows the use of the majority of these plants were from the rainforests of Southern Belize. The species were grouped into 17 medicinal usage categories. It also noted the usage by different healers of each plant which shows the well-defined medicinal traditions. That study showed that there has been an increased interest in the maintenance of the traditional culture, including the medicinal knowledge. A similar study was also carried out by Arnason *et al.*, (1980)^[9] in the western Belize on the Maya use of medicinal plants.

The current study attempts to document the ethnic use of medicinal plants by the Rastafarians, a small but unique minority group in Belize.

Methodology

The data for this study was collected by conducting personal interviews with locally known Rastafarian herbal healers. A total of 7 individual herbal healers were interviewed along with a questionnaire containing 18 questions from a total of 4 villages/towns in 2 different districts (Belize and Toledo districts respectively). The information about the locally known medicinal plants was first recorded in compliance with the data collected from the surveys. During the interview process plant specimens were collected and pictures were taken for scientific identification and classification. Each plant was identified by using available literature and verified with type specimens. The plants were categorized by family and were characterized by the ailment treated, parts used and general description of preparation of plant. The information gathered from the questionnaires were summarized and presented appropriately.

Results and Discussions

Thirty four (34) plants were identified taxonomically fitting into 25 different families. Some of the important plant specimens are displayed in Plate 1 and Plate 2. Table 1 summarizes the data including the common name, family, scientific name, healing properties and procedures or preparations for usage. These plants are used to treat a range of diseases from neurological disorders such as epileptic seizures to urinary tract infections and others being used mainly as aphrodisiacs or soothing menstrual cramps in women. In total 28 plants were identified and described. Of these 28 plants, there are a total of 22 different plant families with Fabaceae containing 4 plants, Malvaceae accounting for 3 and each other family only containing one (recorded) species in this list. The majority of these plants were angiosperms with only one plant falling under the gymnosperms and most of which the leaves are used for treating ailments. Considering that Rastafari believe in using all things herbal and do not associate themselves with animal products as much, the making of teas of each medicinal plant is essential. For most woody plants, the bark is used to make teas or drinks and the leaves are usually used in combinations. Common combinations include "Bitters" which is a locally made infusion of several different pieces of bark from different species of trees along with other sticks and the inclusion of either water (which is usually left to sit out in the sun) or alcohol (which is normally set to draw from bark for several days or weeks before consumption). Herbal formulas are very common among the Rastafarians for detoxifying and gall bladder flushes. Similar uses of formulas are also seen in the other traditional medicines (Balick and Cox 1996)^[10].

Table 1: Characteristics of herbal plants used by Rastafarians in Belize

Common Name	Family Name	scientific name	ailments treated	plant parts used
Mango tree	Anacardiaceae	<i>Mangifera Indica</i>	<ul style="list-style-type: none"> • Diabetes • Diarrhea • Vomiting 	Leaves Fruit (skin)
Saw palmetto	Arecaceae	<i>Serenoa repens</i>	<ul style="list-style-type: none"> • Prostate enlargement • Impotence 	Seed
Contribo	Aristolochiaceae	<i>Aristolachia trilobata</i>	<ul style="list-style-type: none"> • Fatigue • Immune system boost 	Whole plant
Jackass bitters	Asteraceae	<i>Neorolaena lobata L.</i>	<ul style="list-style-type: none"> • Antibacterial • Parasites • Sores 	Leaves
Gumbo limbo	Burseraceae	<i>Bursera simaruba</i>	<ul style="list-style-type: none"> • Urinary tract infection • Headache • Colds • Poison antidote • Sores/rashes 	Bark
Scoggineal	Cactaceae	<i>Opuntia cochenillefera</i>	<ul style="list-style-type: none"> • Fevers • Headaches 	Leaves
Papaya tree	Caricaceae	<i>Carica papa</i>	<ul style="list-style-type: none"> • Parasites • Malaria 	Seeds Leaves
Almond (hammond) tree	Combretaceae	<i>Terminalia catappa</i>	<ul style="list-style-type: none"> • High blood pressure 	Leaves
Tree of life	Crassulaceae	<i>Kalanchoe pinnata</i>	<ul style="list-style-type: none"> • Athletes foot • Asthma • Headaches 	Leaves
Sorosi	Cucurbitaceae	<i>Momordica charantia</i>	<ul style="list-style-type: none"> • Blood cleanse • Fatigue • Parasites 	Whole plant
Physic nut	Euphorbiaceae	<i>Jatropha curcas</i>	<ul style="list-style-type: none"> • Cooling • Constipation 	Leaves
Billy webb tree	Fabaceae	<i>Acosmium panamensis</i>	<ul style="list-style-type: none"> • Malaria 	Bark
Stinking toe (bukut) tree	Fabaceae	<i>Cassia grandis</i>	<ul style="list-style-type: none"> • Blood builder • Mild laxative 	Fruit
Strong back	Fabaceae	<i>Desmodium adscendens</i>	<ul style="list-style-type: none"> • Back pain • Impotency 	Whole plant
Madre de cacao	Fabaceae	<i>Gliricidia sepium</i>	<ul style="list-style-type: none"> • Eye infection 	Bark
Piss-a-bed	Fabaceae	<i>Senna alata</i>	<ul style="list-style-type: none"> • Parasites • Mild purge • Constipation • Cooling 	Leaves
Avocado tree	Lauraceae	<i>Persea</i>	<ul style="list-style-type: none"> • High blood pressure • Fever diarrhea 	Leaves
Provision tree	Malvaceae	<i>Pachira aqua</i>	<ul style="list-style-type: none"> • Blood cleanse • Blood builder 	Bark
Cola nut (from bissicola tree)	Malvaceae	<i>Cola acuminata</i>	<ul style="list-style-type: none"> • Vomiting • Nausea • Food poisoning 	Seed
Hibiscus	Malvaceae	<i>Hibiscus rosa-sinensis</i>	<ul style="list-style-type: none"> • Miscarriages • Menstrual cramps • Epilepsy/Seizures 	Leaves Flowers
Cedar tree	Meliaceae	<i>Cedrela odulata</i>	<ul style="list-style-type: none"> • Reduce blood clots • Bruising • Blood cleanse 	Bark
Moringa	Moringaceae	<i>Moringa oleifera</i>	<ul style="list-style-type: none"> • Anti-ageing • Antioxidant 	Leaves
Eucalyptus	Myrtaceae	<i>Eucalyptus quadrangulata</i>	<ul style="list-style-type: none"> • Colds • Enhance lung activity • Encourage normal digestion 	Leaves
Pine tree	Pinaceae	<i>Pinus caribea</i>	<ul style="list-style-type: none"> • Urinary tract infection 	Sap
Fever (lemon) grass	Poaceae	<i>Cymbopogon vitratus</i>	<ul style="list-style-type: none"> • Immune system build • Fevers • Coughs • Colds 	Whole plant
Gengwheo	Polygalaceae	<i>Securidaca lanceolata</i>	<ul style="list-style-type: none"> • Aphrodisiac 	Whole plant
Polly red head	Rubiaceae	<i>Hamelia patens</i>	<ul style="list-style-type: none"> • Skin rashes and sores • Menstrual cramps 	Whole plant

			<ul style="list-style-type: none"> • High blood pressure 	
Sink and bible	Xanthorrhoeaceae	<i>Aloe vera</i>	<ul style="list-style-type: none"> • High blood pressure • Cooling • Purging • Sores • Slow healing wounds 	Leaves

Common Name: Contribo (Plate 1A)

Scientific Name: *Aristolachia trilobatas*

Family Name: *Aristolochiaceae*

Description: Vine plant that grows up to 3 meters long (tall). Vine has a rough bark that peels off easily and exhibits a characteristically strong odor. The leaves are dark green with three lobes.

Traditional Use: Used for energy or fighting fatigue, increasing appetite and increasing immune system health.

Preparation: The Contribo is soaked initially in warm water for at least for 24 hours at room temperature. Half a glass of the resulting tea can be drunk once a week for increasing functionality of immune system. For fighting fatigue, a half cup can be consumed when necessary. Note: "Contribo bitters are not recommended to drink everyday as it could be causing more harm than good."

Common Name: Jackass Bitters (Plate 1B)

Scientific Name: *Neorolaena lobata L.*

Family Name: *Asteraceae*

Description: Herb growing from 1 to 4 meters tall with few stems and numerous branching on each stem. Leaves often have 3 distinctive points and flowers are small and yellow. This plant often grows near recently cleared land or on roadsides.

Traditional Use: Used for fighting bad internal bacteria and parasites such as ringworm and beef worm. Also used to treat sores and slow healing wounds.

Preparation: One leaf per cup of water is to be boiled to form a tea and 1 to 3 cups recommended daily. For external ailments, a handful of leaves could be boiled in a gallon of water and individual is bathed with this mixture while it is warm (not hot). The liquid from the leaves themselves can be used directly by squeezing and rubbing the leaves on sores.

Common Name: Piss-a-bed (Plate 1C)

Scientific Name: *Senna alata*

Family Name: *Fabaceae*

Description: Shrub growing up to 2 meters tall with many branches and leaves having up to 12 leaflets. It grows in yards and disturbed or disturbed forests. Its distinct flowers are yellow in color and each petal is rolled giving it a bulbous shape.

Traditional Use: Cleansing of parasites and mild purge. Also used to relieve constipation and "cooling of blood" (purging the lymph/gland system in the body)

Preparation: An entire leaf (all leaflets included) should be boiled in 3 to 5 cups of water and a half cup is to be taken twice a day while drinking plenty of water to relieve constipation as well as purging and removal of parasites.

Common Name: Bissicola (Cola nut) (Plate 1D)

Scientific Name: *Cola acuminata*

Family Name: *Malvaceae*

Description: Tree growing up to 25 meters in height with dark green glossy leaves. Characteristic rough green seed pods contain the oval shaped nut in multiples of 3. Nut can be red to reddish brown/brown and is easily separated in halves by an uneven margin in the middle.

Traditional Use: Relieving food poisoning symptoms and hangovers; essentially treating vomiting and nausea.

Preparation: Half of the cola nut is grated and boiled in one

cup of water. Half cup of this is taken 3 times a day while symptoms last.



Contribo
Aristolachia trilobata

Jackass Bitters
Neorolaena lobata L.



Piss-A-Bed
Senna alata



Cola Nut
Cola acuminata

Plate 1

Common Name: Polly Red Head (Plate 2A)

Scientific Name: *Hamelia patens*

Family Name: *Rubiaceae*

Description: Semi-woody shrub that grows up to 3 meters tall. The leaves have a reddish tint with deep veins and the flowers are bright orange-red that produce a red berry which turns black when ripe. This shrub grows in old fields and on roadsides mainly.

Traditional Use: Mainly for epidermal problems like skin rashes and sores but can also be used to treat menstrual cramps and high blood pressure.

Preparation: The entire plant is boiled in 3 to 6 cups of water (depending on the size of the plant) and taken as a tea with 3 cups daily to treat menstrual cramps and high blood pressure. The same tea can be used as a bath to treat sores and other rashes on the skin but the leaves of the plant can be grinded and applied to the sores directly.

Common Name: Gengwheo (Plate 2B)

Scientific Name: *Securidaca lanceolata*

Family Name: *Polygalaceae*

Description: A woody vine with rounded/oval shaped leaves. Flowers are normally purple with 3 to 5 petals. This vine grows in savannahs and lowlands but can also be found in forests and near rivers.

Traditional Use: Used as an aphrodisiac and fighting male

impotence.

Preparation: Leaves of the vine (and sometimes with the vine) is left in hot water to draw for 10 to 15 minutes. At least 3 leaves and 4 inches of vine to 3 cups of water is recommended. This is taken once a day in the morning for fighting impotence and can be combined with other herbs to form a natural aphrodisiac concoction.

Common Name: Strong back (Plate 2C)

Scientific Name: *Desmodium adscendens*

Family Name: *Fabaceae*

Description: Herb that grows on roadsides or in yards that is usually low lying but can sometimes stand up straight. Its leaves are rounded and wide and its fruit is a legume that has small hairs which allows it to easily attach onto fur or other fur-like material like clothing.

Traditional Use: For lower back pains and impotency.

Preparation: The entire plant is boiled in water for 10 minutes and consumed as a tea. One cup of tea is taken before every meal for 3 to 5 days to relieve backaches and impotency as well.

Common Name: Pine tree (Plate 2D)

Scientific Name: *Pinus caribea*

Family Name: *Pinaceae*

Description: Hard pine that inhabits tropical and subtropical forests. It grows up to 20 meters tall and has a brown, rough woody bark. Its leaves are characteristically needle shaped and rather than fruit its pinecones are used for reproduction.

Traditional Use: Reducing urinary tract infections.

Preparation: The sap is drained from the tree by slicing a part of the bark and collecting at least a cup of the sap. Two tablespoons of sap to one cup of water is enough to boil and make a tea to treat urinary tract infections. This tea should be taken once in the morning and once in the night. It is recommended that a lot of water be consumed as well.

Most of the plant species are known for using leaves while few are known to have (medicinally) useful flowers, fruits and seeds (Figure 1). As well, about 36% of these plant species are medicinally known for their gastrointestinal uses including diarrhea, constipation, stomach cramps and others. 41% is used for building blood or treatments having to deal directly with blood and 17% each to epidermal uses and parasite expulsion respectively (Figure 2). Other uses include treatments for eye irritation, urinary tract infections, (libido) sexual drive increase, breathing disorders (asthma) and headaches/fevers. The local concern among the Rastafari is that people tend to over consume certain medicinally important concoctions which could cause adverse effects. Majority of individuals believe that sharing the knowledge is good, but abuse of knowledge is becoming a growing concern. From information collected within interviews, an estimated 30% to 40% of individuals that seek help from these Rastafari herbal healers are of Creole decent, while the other 60% can vary depending on area but is mostly comprised of the Garinagu and other Rastafari. Traditional medicine is being used commonly among individuals that cannot afford or reach modern medicinal centers easily. This trend is universal across the developing world as reported in many studies [11, 12, 13].

PART OF PLANT USED

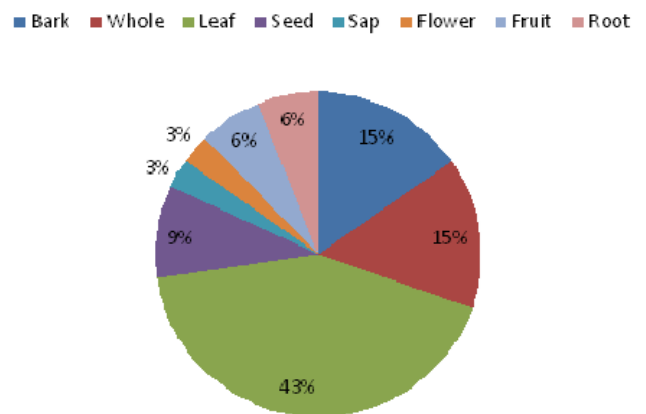


Fig 1: Distribution of Plant Parts Used by Rastafarian Community

Overview of Plant treatments

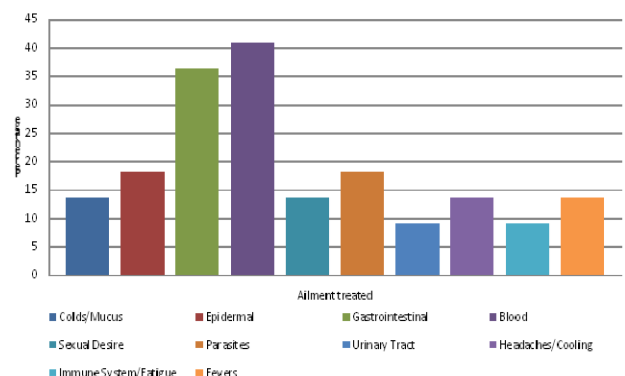


Fig 2: Plants Used for Treating Different Ailments by Rastafarian Community



Polly Red Head
Hamelia patens

Gengwheo
Securidaca lanceolata



Strong Back
Desmodium adscendens

Pine Tree
Pinus caribea

Plate 2

A survey conducted among the Rastafarian healers to obtain information about the plants used, the people who use these products, whether they products are sold or shared for free, how the knowledge is passed on to younger generations. The survey revealed that some of the Rastafarian families have been known as healers for generations, and the information is

passed down from mother or grandmother preferably to younger females in the family. The study conducted by D'Avigdor *et al.* (2014)^[2] in Ethiopia also noted this practice of learning from elders as an apprentice. Male practitioners gained knowledge by working as apprentice under experienced elders. One interviewee stated that it took him 22 years to fully perfect the art of healing through plants and prayers. One interviewee expressed his concern that the information was not being passed to other generations or even other individuals because the Rastafarian community in Belize is not a cohesive group. The medicinal knowledge they possess and the awareness they are attempting to spread is communicated from individual to individual. Although it doesn't take much formal schooling to be well versed in ethnomedicine (at least from a local perspective) the Rastafari believe that one must be chosen to follow this particular path. Most of the practitioners surveyed stated that "all medicinal herbs used should be done with prayer". The Rastafarian community strongly believes that spiritual faith plays a critical role in the healing process. The prayer is equally important as the medicinal plant. The healers had special reverence to the plants they used and the environment from where they obtain their plants. Most plants were available within their immediate neighborhood; some require hiking into the mountains and forests. Some healers stated that there is a general depletion of available medicinal plants and certain plant species such as "Contribo" are getting scarce due to habitat destruction. It was stressed that many of the plants that are used mainly as aphrodisiacs are being overused while others which are considered to be more medically beneficial are very seldom talked about. Plants that are used in treating sexual dysfunction or disorders are also reported elsewhere from India by Marandi *et al* (2015)^[14] and Rana *et al* (2012)^[11]. Some other plants that are not easily available include the "Gengwheo" and the "Chiney root". According to Balick and O'Brien (2004)^[7] the "Contribo" is not the only medicinally valuable plant that has been affected by deforestation. Other plants of medicinal significance include "Provision Bark" and "Billy Webb" has also been victims of the riparian deforestation and over exploitation of natural resources. Due to the dependency of the poor and vulnerable population for the herbal medicine to cure many of the ailments, there is a critical need to conserve the biodiversity^[15, 16].

Conclusions

The Rastafari community in Belize is very small and hence the medicinal knowledge they possess as well as the principles and practices could be lost over time. This study made an effort to document the herbal knowledge of this unique community in Belize. Further studies can be conducted to understand the cross cultural knowledge dissemination among various culture groups in Belize.

References

1. Statistical Institute of Belize, Population and Housing Censes, Report, 2010.
2. D'Avigdor E, Wohlmuth H, Asfaw Z, Awas T. The current status of knowledge of herbal medicine and medicinal plants in Fiche, Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. 2014; 10(38).
3. Chekole G, Asfaw Z, Kelbessa E. Ethnobotanical study of medicinal plants in the environs of Tara-gedam and Amba remnant forests of Libo Kemkem District, northwest Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. 2015; 11(4).
4. Molares S, Ladio, A. Medicinal plants in the cultural landscape of a Mapuche-Tehuelche community in arid Argentine Patagonia: An eco-sensorial approach. *Journal of Ethnobiology and Ethnomedicine*. 2014; 10(61).
5. Hernandez J, Campos C, Borghi C. Medicinal use of wild fauna by mestizo communities living near San Guillermo Biosphere Reserve (San Juan, Argentina). *Journal of Ethnobiology and Ethnomedicine*. 2014; 11(15).
6. Bobo K, Aghomo F, Ntumwei B. Wildlife use and the role of taboos in the conservation of wildlife around the Nkwende Hills Forest Reserve; South-west Cameroon. *Journal of Ethnobiology and Ethnomedicine*. 2015; 11(2).
7. Balick MJ, O'Brien H. Ethnobotanical and floristic research in Belize: accomplishments, challenges and lessons learned. *Ethnobot Res Appl*. 2004; 2:77-88.
8. Amiguet V, Arnason J, Maquin P, Cal V, Vindas P, Poveda L. A consensus ethnobotany of the Q'eqchi' Maya of Southern Belize. *Economic Botany*. 2005; 59(1):29-42.
9. Arnason JT, Uck F, Lambert J, Hebda R. Maya medicinal plants of San Jose Succotz, Belize. *Journal of Ethnopharmacology*. 1980; 2:345-364.
10. Balick MJ, Cox PA. Plants, people and culture. *The Science of Ethnobotany*. Scientific American Library, New York, USA, 1996, 219.
11. Rana CS, Tiwari JK, Dangwal LR, Sundriyal RC. Herbal remedies for sexual capability. *Indian J Traditional Knowledge*. 2012; 11(4):646-51.
12. Bussmann RW, Sharon D. Traditional medicinal plant use in Northern Peru: tracking two thousand years of healing culture. *Journal of Ethnobiology and Ethnomedicine*. 2006; 2:47.
13. Setshogo MP, Mbereki CM. Floristic diversity and uses of the medicinal plants sold by street vendor in Gaborone, Botswana. *The African Journal of Plant Science and Biotechnology*. 2010; 5(1):69-74.
14. Marandi RR, Britto SJ, Kindo I. Herbal Therapy of Sexual Disorders and Debilities Practiced by Oraon Tribals of Palamu Division, Jharkhand, India *International Journal of Herbal Medicine*. 2015; 3(3):26-32.
15. Kasagana VN, Karumuri SS. Conservation of medicinal plants (Past, Present and future trends). *Journal of Pharmaceutical Science and research*. 2011; 3(8):1378-1386.
16. Byers BA, Cunliffe RN, Hudak AT. Linking the conservation of culture and nature: a case study of sacred forests in Zimbabwe. *Human Ecology*. 2001; 29:187-218.