

## **Traditional Medicinal Plants Used By Tigrigna Ethnic Group In Central Region Of Eritrea**

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**Abstract:** An ethnobotanical study was conducted from October 2015 to April 2016 to investigate the uses of medicinal plants by the Tigrigna people of 15 villages and towns of Central region of Eritrea such as Asmara, Serejaka, Himbirti, Ebardea, Kitmowlie, Tseada-krstian, Nefasit, Embaderho, Embeyto, Adi-Hawesha, Tsazega, AdiTeclay, Adi-guadad, Selae-daero and Ademneger. Information was gathered from 50 people: 19 female and 31 males, using semi-structured questionnaire of which 22 are local healers. The informants, except the healers, were selected randomly and no appointment was made prior to the visits. Informant consensus factor (ICF) for category of ailments of the medicinal plants was determined. 55 medicinal plants used as a cure for 40 ailments were documented and they are distributed across 27 families and 51 genera. Shrubs formed a major component (50.9%) while trees and herbs constitute 27.3% and 21.8% respectively. The study showed that preparation and administration of medicinal plants include several methods. The most frequently used plant parts for the preparations of remedy were leaves (49%), stem (10.9%), bark (9%), fruits (9%), root (7.3%), seed (5.4%), latex (5.4%) and all parts (3.6%). Diseases related to dermatological problems (0.67) had higher ICF values, diseases related to gastro-intestinal with ICF value of (0.59) and problems related to organ diseases (0.57). The medicinal plants that are widely used by the local people or have higher Informant consensus values are *Rutachalepnesis* (60%), *Schinus molle* (50%), *Vernonia amygdalina* (40%), *Terminallia brownii* (38%) and *Sennasingueana* (30%). The main threats to medicinal plants in the study area were fire wood, grazing, agricultural expansion, construction & drought respectively. It is therefore, recommended that the local people have to be encouraged to cultivate medicinal plants in their home garden.

**Key words:** Conservation, Ethnobotany, Tigrigna, Healthcare, IK, Medicinal plant

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### **I. Introduction**

Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs. Right from its beginning, the documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day (Cotton, 1996). According to World Health Organization report more than 80% of the people in Africa depend on traditional medicine for their health care needs (WHO, 2003). With the emergence of new diseases and drug resistance to infections such as HIV/AIDS, malaria, tuberculosis, diarrheal diseases and skin problems; traditional medicine should be given more attention in modern research and development (Mariita, 2006). Because of the unmatched availability of chemical diversity, natural products, either as pure compounds or as standardized plant extracts, provide unlimited opportunities for new drug leads. Now with 78% of the new chemical entities being natural or natural product-derived molecules, there has been a promising alternative treatment of infectious disease using medicinal plants (Mariita, 2006)

Recently, various plants are used as a subject to medical experiment. In particular, herbal plants are recognized as one of the intriguing subjects from which the extracts can be used in health care setting for future purpose. Nevertheless, for the reason that Agricultural expansion, Deforestation, Grazing, Global warming, and Drought in sub Saharan country; many valuable medicinal plants are on the verge of extinction (Cotton, 1996). Therefore, by evaluating their medical values, proper documentation, conservation and usage will be encouraged. Eritrean society has a long history of practicing traditional/ herbal medicine that also has links to cultural values and beliefs. In this context, traditional medicine is concerned with types of medical treatment and practices that are based on customary knowledge. Owing to poor health-care facilities in rural Eritrea, a great majority of the population are still reliant on traditional medicine. Traditional medical practices are quite varied based on cultural diversity. While a majority of traditional healers deal with human diseases, some also specialize in the treatment of animal diseases, disease prevention, and the promotion of spiritual and physical well-being of community members (Senai Weldeab, 2010).

Ethnobotanical knowledge of medicinal plants in the high lands of Eritrea is transferred from the older people to younger generations at household level and this knowledge is not ongoing in written form, so that their losses or distortion at every transfer is inevitable (Shushan, 2002). According to Tecleabet *et al.*, (2006), Ethnobotanical survey was conducted in zoba Maekel and zoba Semenawi Keih Bahri. The survey includes Asmara, Belza, Shegrini, Betgirgish, Areberubu, Adiguadad, Mai-hinzi, and Gihndae. These areas are inhabited

by Tigrigna, Tigre, and Saho ethnic groups. Information was obtained using digital record, free-listing, semi-structured and open-ended interviews with traditional healers, community elders, and mothers. Nine medicinal plants that used to treat diseases associated with bacteria were identified and the study justifies the traditional use of the plants in Eritrean traditional medicine. In spite of the vast role and important ethnobotanical contributions of medicinal plants in the primary health care, limited works have so far been done in the country (Senai, 2010; Thomas *et al.*, 2007; Tecleabet *et al.*, 2006 and Shushan, 2002). This study has therefore been initiated to document the plants used in the traditional medical practices of the Tigrigna people of Central region together with the associated ethnobotanical and ethnomedicinal knowledge and practices.

## II. Study Area

**Central Region**, also known as the **Ma'ekel** or **Maakel Region** is an administrative region (or zoba) in central Eritrea. The region was formed on 15 April 1996, from the historical province of Hamasien. The region is located on the central plateau, and sits at an average of about 2,250 metres (7,380 ft) above sea level. It contains Asmara, the capital and largest city of Eritrea. The region is divided into sub-regions; Berikh, Ghala Nefhi, North Eastern, North Western, Serejaka, South Eastern and South Western, while Asmara forms a separate administrative area. Other settlements within the Central Region include Himbirti, EmbaDerho and Tsazega (CSOM, 2016) It is the smallest region in area, and contains the major city and national capital, Asmara. Maekel is situated inland, and borders Anseba to the north-west, the Northern Red Sea region to the north-east, the Debub (Southern) region to the south, and Gash-Barka to the west (CSOM, 2016)

## III. Methodology

A total of 50 informants including 22 key informants for the local knowledge on traditional medical plants were selected. As pointed by Martin (1995) the selection of the informants, except the healers, were selected randomly and no appointment was made prior to the visits. But in case of the healers the selection was commonly systematic. In other words, it was based on comments and recommendations from the religious leaders, elders, local administrators, teachers, one from the community group and personal observation of the researcher. Thus, key informants were identified, later interviewed, and followed for further detailed discussion. Specimens of medicinally useful plants were collected from various habitats at the spot during guided field work, numbered, pressed, and dried for identification. Identification of specimens was carried out both in the field and in and in Eritrean Institute of Technology, Department of Biology's herbarium. Then after, nomenclature determination was carried out using Flora of Eritrea and Ethiopia and other available taxonomic literatures, the voucher specimens were kept at EIT Herbarium. Preference ranking, direct matrix ranking, ranking of threats to medicinal plants, Informant consensus, Informant consensus factor (ICF) were used to quantify ethnobotanical data (Martin, 1995). Preference ranking was made following Martin (1995) for five most cited medicinal plants that were known for the treatment Hepatomegaly and Splenomegaly. Seven randomly selected traditional healers were given the five most cited medicinal plants to rank based on their efficiency. Ranking was done by giving five to the most efficient plant and one to the least. Ranking of threats to medicinal plants was done by ranking five highly cited threats by taking eight traditional healers randomly. The traditional healers valued five to the most destructive factor (threat) and one to the least. Finally ranking of threats was made by adding the value of each threat. In order to validate the trustworthiness of the ethnobotanical information traditional healers were visited two times (Informant consensus). Informant consensus factor (ICF) was calculated so as to identify the concurrence of the informants on the reported ailments as follows: number of use citations in each category (nur) minus the number of species used (nt), divided by the number of use citations in each category minus one (Martin, 1995). The reported ailments were categorized and then the ICF were calculated using:

$$ICF = \frac{nur - nt}{nur - 1}$$

## IV. Result And Discussion

The age of the informants lie between 45 and 96 years. The highest number is in the age group between 52 and 80. This shows that the elders were more knowledgeable because of the many years accumulated experience. During this study, it has been found that the main sources of Traditional Medicinal Knowledge (TMK) are parents - 52% followed by observation - 24%, trial and error 10% and other acquaintances and knowledgeable persons - 12%. Similar result was also reported by Biniam and Gebrehiwet (2014) in Eritrea and Nigusse, (2010) in Ethiopia. Medicinal plant knowledge, use and transfer of knowledge to the young generation can be affected by religious beliefs, modernization, acculturation, and environmental change (Cunningham, 1996). A total of 55 medicinal plant species belonging to 51 genera and 27 families were used to treat 41 human ailments (Table 1). The family Fabaceae had the highest number of medicinal plant species (16.4%; n = 9)

followed by Lamiaceae (9%, n = 5), Asteraceae (7.3%, n = 4) and Solanaceae (7.3%, n = 4). The genera *Acacia* had the highest number of medicinal plants (7.3%, n = 4) followed by *Senna* (3.6%, n = 2), *Rhus* (3.6%, n = 2) and *Aloe* (3.6%, n = 2). Singhal, (2005) estimated that 90 per cent of plant material for a medicinal purpose is harvested from wild sources and includes a wide range of non-timber forest products (NTFPs) in the form of roots, seeds, skin, bark, flowers, fruits and leaves. In the study area (76.4%, n = 42) of the traditional medicinal plants were collected from the wild, (16.4%, n = 9) and (5.5%, n = 3) are from home garden and both respectively. Analysis of the data revealed that, leaves (49 %, n = 27) and stem (10.9%, n = 6) were the most widely used plant parts in the preparation of remedies followed by others such as root, bulb/tuber, latex, seed, stem/root barks, and fruits. Previous reports in Eritrea have also shown that leaves were the most commonly used parts followed by stem to treat various health problems (Biniam and Gebrehiwet, 2014). The current findings of the study area show that the most widely used medicinal plant habits in the study area are shrubs followed by herbs (figure 2). Results of this finding agreed with the findings of (Bayafers Tamene, 2000; Debela Hunde et al., 2004; Mirutse Giday and Gobena Amenai 2003; Ermias Luleka et al., 2008 and Fisseha Mesfin et al., 2009) and their finding revealed that shrubs are the most commonly used in their respective different study sites of Ethiopia. The usage report of medicinal plants is called informant consensus or respondent consensus. Ten top medicinal important plants were selected by sixteen and above respondents. This indicated that, some medicinal plants are widely used than others. For example, *Rutachalepnensis*, which stood first were cited by (60%) informants, whereas *Schinus molle* and *Vernonia amygdalina* are cited by (50 %) and (40%) informants respectively. The last one from the top selected medicinal plants *Acacia etbaica* accounts for 16 % of the informant consensus (Table 3). As shown in Table-4, the highest informant consensus factor (ICF) 0.67 value was associated with dermatological/skin problems such as wounds, cuts, burns, scabies, dandruff, ringworm, eczema and leishmaniasis followed by ICF 0.59 gastrointestinal problems such as stomachache, gastritis, diarrhea, dysentery, constipation, abdominal helminthes, vomiting, ascariasis and tapeworm, then with diseases associated with organ diseases such as teeth, liver, heart, ear and eye etc. 0.57, and the category of the lowest ICF 0.20 value was associated with diseases related to sun-strike, “weqei”, “gonfii”, etc. The preference ranking for seven medicinal plants to treat Hepatomegaly and Splenomegaly revealed that *Senna alexandrina* was the most preferred one and followed by *Sennasingueana*, *Rhamnus prinoides*, *Terminallia brownii*, *Aloe camperi*, *Withania somnifera*, and *Solanum incanium*. Most informants perceived that fire wood 22.7 % was considered to be the main threat to medicinal plants and relatively drought accounts for the least one 17.3 % (Table 2 & 5).

**Table 1.** List of medicinal plant species used by Tigrigna (n=50) to treat 40 human ailments in central region Eritrea in 2015/2016.

| Scientific name               | Family        | Local name    | Habit  | Preparation, application and dosage  | Pp     | Disease treated               |
|-------------------------------|---------------|---------------|--------|--|--------|-------------------------------|
| <i>Acacia etbaica</i>         | Fabaceae      | Seraw         | Trees  | Dried, crushed & consumed  | Leaf   | Abdominal - Helminthes        |
| <i>Acacia oregana</i>         | Fabaceae      | Alae          | Trees  | The fresh leaves of the plant was consumed   | Bark   | Constipation                  |
| <i>Acacia senegalensis</i>    | Fabaceae      | Tseada-qenteb | Trees  | The gum was chewed taking 1/7 days   | Bark   | Diabetes                      |
| <i>Acacia gyal</i>            | Fabaceae      | Chea          | Trees  | The leaf spounding and covers the infected area with it.                             | Root   | Snake and Scorpion bites      |
| <i>Achyranthes aspera</i>     | Amaranthaceae | Mechelo       | Shrubs | Fresh leaves are crushed mixed with water & creamed infected area.                   | Leaf   | Anti-inflammation             |
| <i>Acothanthus schimperii</i> | Apocynaceae   | Mehtee        | Trees  | Pounding leaf together with dried leaf <i>Schinus molle</i> and cover the wound area | Fruit  | Skin inflammation             |
| <i>Aervalanata</i>            | Amaranthaceae | Hamli-gobo    | Herbs  | Crushed and put it in the charcoal fire & inhale it                                  | Leaf   | Gereffa                       |
| <i>Aloe camperi</i>           | Aloaceae      | Sanday-Eere   | Shrubs | The latex in its fresh stage mixed with water & Honey & consumed                     | Latex  | Hepatomegaly and Splenomegaly |
| <i>Aloe elegance</i>          | Aloaceae      | Eere          | Shrubs | The latex in its fresh stage mixed with water & Honey & consumed                     | Latex  | Diabetes and Antibiotic       |
| <i>Azadirachtaindica</i>      | Meliaceae     | Neem          | Trees  | Crushed fruits, boiled, decanted & drunk 1/7 days                                    | Fruit  | Hemorrhoids                   |
| <i>Barleria anthemoides</i>   | Acanthaceae   | Eshok-ziebie  | Shrubs | Crushed, boiled in water, decanted & took 1 drop / 10 days.                          | Leaf   | Eye infection                 |
| <i>Becium grandiflorum</i>    | Lamiaceae     | Tahebeb       | Shrubs | Crushed, mixed with water, filtered & drunk a cup 3 / 10 days.                       | Leaf   | Malaria                       |
| <i>Bidens pilosa</i>          | Asteraceae    | Tsegogot      | Herbs  | Crushed, mixes with water, boiled & inhale the water vapour for 7 days.              | Stem   | Gereffa and Gonfii            |
| <i>Boscia angustifolia</i>    | Capparidaceae | Kemed         | Shrubs | Crushed, mixed with water, creamed for day x 7 days.                                 | Bark   | Gastritis                     |
| <i>Buddleiaphys tachya</i>    | Loganiaceae   | Metere        | Shrubs | burn in charcoal in closed house for 10 min.   | Leaf   | Insecticides                  |
| <i>Carica papaya</i>          | Caricaceae    | Papayio       | Trees  | Boiled in water decanted & drunk 1 beaker in the morning till it gets down.          | Fruits | Diabetes and Amoeba           |
| <i>Carissa spinarum</i>       | Apocynaceae   | Aggam         | Shrubs | Crushed, mixed with water, decanted & drunk 1 glass x 2 x 7 days.                    | Stem   | Constipation                  |
| <i>Chitoba ysinica</i>        | Euphorbiaceae | Etanbelaito   | Shrubs | Crushed, boiled in water, decanted and drunk 1 glass x 3 per 7 days.                 | Leaf   | Malaria and Hepatomegaly      |
| <i>Croton macrostichus</i>    | Euphorbiaceae | Tambuk        | Trees  | Crushed, mixed with water and, drunk 1 glass before food.                            | Leaf   | Anti biotics                  |
| <i>Cucumis dipsaceus</i>      | Cucurbitaceae | Hafallo       | Herbs  | Crushed, mix with water decanted & drunk 1 beaker x 2 per 10 days                    | Root   | Abdominal-Helminthes          |

Traditional Medicinal Plants Used By Tigrigna Ethnic Group In Central Region Of Eritrea

|                               |                |                |        |   |       |                                 |
|-------------------------------|----------------|----------------|--------|---|-------|---------------------------------|
| <i>Daturastramonium</i>       | Solanaceae     | Mezerbae       | Shrubs | Crushed, boiled & creamed the hair<br>1x7 days  | Leaf  | Dandruff                        |
| <i>Dichrostachys cinerea</i>  | Fabaceae       | Ghonoq         | Shrubs | Crushed mixed with butter, stained<br>the whole part of penis and heated it<br>with fire for continuous days. | Leaf  | Impotency                       |
| <i>Dodonaea angustifolia</i>  | Fabaceae       | Taheses        | Shrubs | Crushed, mixed with water, boiled,<br>decanted & drunk 1 cup/day x 7 days.                                    | Leaf  | Abdominal-Helminthes            |
| <i>Eucalyptus globulus</i>    | Myrtaceae      | Ts-Kelamitoes  | Trees  | Crushed, boiled in water, decanted<br>drunk 1 cup/day until it get down                                       | Bark  | Diabetes and Rheumatism         |
| <i>Foeniculum vulgare</i>     | Apiaceae       | Shelan         | Herbs  | Crushed, mix with water, filtered<br>& drunk 3 cup/day x 7 days   | Leaf  | Abdominal pain and Obesity      |
| <i>Hypoestes forskalii</i>    | Acanthaceae    | Debe-awald     | Herbs  | Crushed, boiled in water, decanted &<br>drunk 1 glass x 7 days.   | Leaf  | Gastritis and Diabetes          |
| <i>Jasminum grandiflorum</i>  | Oleaceae       | Habi-tselim    | Shrubs | Mixed with water, boiled and drunk a<br>beaker 2 times a day for 5 days for<br>10 days Anti-Helminthes        | Leaf  | Eye problem and Anti-Helminthes |
| <i>Leucas martinensis</i>     | Lamiaceae      | Tektater       | Herbs  | Crushed, mixed with water, boiled,<br>decanted and drunk 1 cup x 2 x 7  | All   | Cough and Cold                  |
| <i>Linum usitatissimum</i>    | Linaceae       | Entatie        | Herbs  | Dried roasted, mix with water<br>& creamed the injured part.  | Seed  | Limb-Inflammation               |
| <i>Martynia senegalensis</i>  | Celesteraceae  | Argudi         | Shrubs | Crushed, mixed with water, boiled,<br>decanted & drunk 1 cup of the<br>solution for 3x12 days.                | Stem  | Arthritis                       |
| <i>Meriania dianthera</i>     | Lamiaceae      | Nehba          | Shrubs | Dried, crushed, boiled, decanted<br>& drunk 1 cup per day in the morning<br>Until it reduced down             | Leaf  | Hypertension and Diabetes       |
| <i>Nicotiana glauca</i>       | Solanaceae     | Ashea-gereb    | Shrubs | The leaves are boiled in water<br>& inhaled for 10 minutes for 7 days.  | Latex | Antibiotic and Gerefita         |
| <i>Ocimum basilicum</i>       | Lamiaceae      | Seseg          | Shrubs | Crushed, boiled in water, decanted &<br>drunk: Asthma; 1 glass x 7 days.                                      | Leaf  | Asthma and Hypertension         |
| <i>Otostegia integrifolia</i> | Lamiaceae      | Chendog        | Shrubs | Crushed, mix with water, filtered and<br>drunk 1x14 days (1cup).  | Bark  | Hypertension and Tonsillitis    |
| <i>Phytolaccadodecandra</i>   | Phytolaccaceae | Shibitti       | Shrubs | Crushed, mixed with water<br>and decanted drunk 1 cup for 3 days  | Stem  | TB and Gastritis                |
| <i>Plumbago zeylanica</i>     | Plumbaginaceae | Aftuh          | Herbs  | Crushed, make the patient to smell<br>and for snake bite<br>Chewing spit the crud and took<br>the solution.   | Root  | Evil eye & Snake venom          |
| <i>Rhamnus prinosides</i>     | Rhamnaceae     | Geso           | Trees  | Drunk in the form of filtered<br>swallowing taking 1 liter/day.   | Leaf  | Hepatomegaly & Splenomegaly     |
| <i>Rhus glutinosa</i>         | Anacardiaceae  | Amoss          | Shrubs | Roasted, fine powder is mixed<br>with honey & stained the Part of body<br>for 3 days                          | Leaf  | Ectoparasites & Scabies         |
| <i>Rhus retinorrhoea</i>      | Anacardiaceae  | Tateale        | Trees  | The powder, mixed with honey<br>& creamed the injured part.   | Leaf  | Scabies                         |
| <i>Ricinus communis</i>       | Euphorbiaceae  | Guulei         | Shrubs | Crushed, mixed with hot water<br>and creamed the infected part  | Leaf  | Anti-(insect fungal)            |
| <i>Rumex nervosus</i>         | Polygonaceae   | Hihhot         | Shrubs | Roasted fine powder is mixed<br>with honey & stained the Part of body<br>for 3 days.                          | Leaf  | Itching and Eczema              |
| <i>Rutachalepnesis</i>        | Rutaceae       | Chena adam     | Shrubs | Crushed, mix with water, boiled and<br>inhaled the water vapour for 10 min.                                   | All   | Cough and Cold                  |
| <i>Schinus molle</i>          | Anacardiaceae  | Berberet selim | Trees  | Crushed, mix with water and<br>cream at the skin.   | Leaf  | Cough and Cold                  |
| <i>Senna alexandrina</i>      | Fabaceae       | Senno          | Herbs  | Crushed, boiled, decanted drunk<br>1 glass of the solution in the morning<br>before food.                     | Stem  | Hepatomegaly & Splenomegaly     |
| <i>Senna ingueana</i>         | Fabaceae       | Hambo-hambo    | Shrubs | Crushed, boiled, decanted drunk<br>1 glass of the solution in the morning<br>before food.                     | Stem  | Hepatomegaly & Splenomegaly     |
| <i>Solanum incanum</i>        | Solanaceae     | Uengule        | Shrubs | Crushed, boiled, decanted & drunk 1<br>beaker per day for 14 days.  | Fruit | Hepatomegaly & Splenomegaly     |
| <i>Tagetes minuta</i>         | Asteraceae     | Chena amharay  | Herbs  | Crushed put in charcoal fire & burn<br>for 15 seconds in the house.   | Leaf  | Insecticide                     |
| <i>Tamarindus indica</i>      | Fabaceae       | Homer          | Trees  | The raw fruit eaten as it is for 7 days<br>one per day.   | Fruit | Cough and Cold                  |
| <i>Terminalia brownii</i>     | Combretaceae   | Weiba          | Trees  | Crushed, boiled, decanted and<br>drunk one glass before food.   | Bark  | Hepatomegaly & Splenomegaly     |
| <i>Vernonia amygdalina</i>    | Asteraceae     | Grawa          | Shrubs | The leaves crushed, mix with<br>water and creamed the part of the<br>body.                                    | Leaf  | Gerefita and Goufii             |
| <i>Withania omnifera</i>      | Solanaceae     | Agol           | Shrubs | Crushed, boiled, decanted drunk 1<br>glass of the solution in the morning<br>before food.                     | Leaf  | Hepatomegaly & Splenomegaly     |
| <i>Xanthium strumarium</i>    | Asteraceae     | Bano           | Herbs  | Crushed, mixed with water and<br>drunk 1/ day for 7 days (1 beaker).  | Leaf  | Abdominal-Helmentes             |
| <i>Zingiber officinale</i>    | Zingiberaceae  | Jenjebel       | Herbs  | Put the powder, 3 tea spoons take<br>in the form of soup or tea until you<br>get relieve.                     | Seed  | Rheumatism and Diabetes         |
| <i>Ziziphusspina-christi</i>  | Rhamnaceae     | Gaba           | Shrubs | The leaves crushed, mix with<br>water and creamed the part of the<br>body for 5 days                          | Leaf  | Anti-fungal                     |

**Table 2.** Preference ranking of plants used for treating Hepatomegaly and Splenomegaly, by taking seven healers to rank five potential medicinal plants by Tigrigna ethnic group, central region Eritrea in 2015/2016

| Scientific name           | R1 | R2 | R3 | R4 | R5 | R6 | R7 | Total | Rank |
|---------------------------|----|----|----|----|----|----|----|-------|------|
| <i>Aloe camperi</i>       | 4  | 2  | 3  | 4  | 3  | 2  | 5  | 23    | 5    |
| <i>Rhamnusprnoides</i>    | 3  | 5  | 4  | 5  | 4  | 3  | 2  | 26    | 3    |
| <i>Sennaalexandrina</i>   | 4  | 3  | 5  | 5  | 4  | 3  | 5  | 29    | 1    |
| <i>Sennasingueana</i>     | 4  | 4  | 3  | 4  | 4  | 5  | 3  | 27    | 2    |
| <i>Solanumincanium</i>    | 2  | 3  | 2  | 3  | 3  | 3  | 4  | 20    | 7    |
| <i>Terminalliabrownii</i> | 4  | 3  | 5  | 3  | 4  | 4  | 4  | 25    | 4    |
| <i>Withaniasomnifera</i>  | 5  | 2  | 3  | 3  | 3  | 4  | 2  | 22    | 6    |

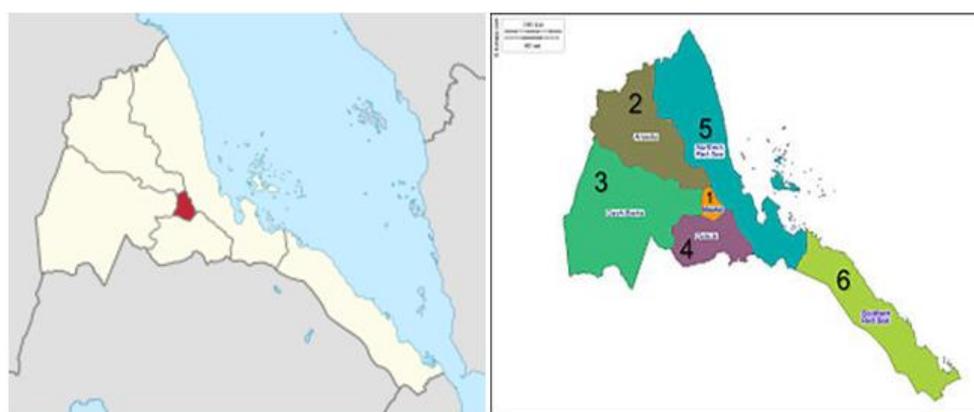
R refers to the key Respondents (R1-R7)

**Table 3.** Informant consensus of medicinal plants by Tigrigna ethnic group in central region Eritrea in 2015/2016. (Plants mentioned by more than 16 respondents).

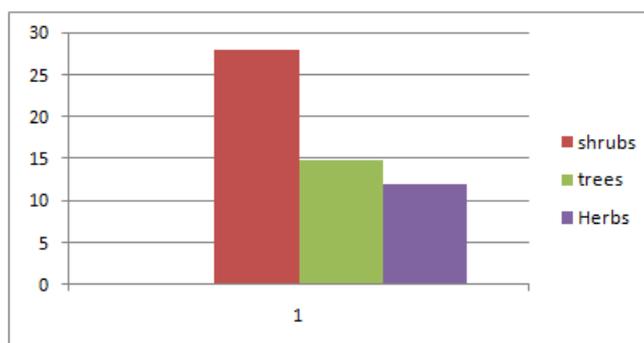
| Scientific name           | No. of respondents | Percentage | Rank             |
|---------------------------|--------------------|------------|------------------|
| <i>Rutachalepnis</i>      | 30                 | 60         | 1 <sup>st</sup>  |
| <i>Schinusmolle</i>       | 25                 | 50         | 2 <sup>nd</sup>  |
| <i>Vernoniaamygdalina</i> | 21                 | 40         | 3 <sup>rd</sup>  |
| <i>Terminalliabrownii</i> | 19                 | 38         | 4 <sup>th</sup>  |
| <i>Sennasingueana</i>     | 15                 | 30         | 5 <sup>th</sup>  |
| <i>Zingiberofficinale</i> | 13                 | 26         | 6 <sup>th</sup>  |
| <i>Linumstatissimum</i>   | 11                 | 22         | 7 <sup>th</sup>  |
| <i>Meriandradianthera</i> | 10                 | 20         | 8 <sup>th</sup>  |
| <i>Aloe elegance</i>      | 9                  | 18         | 9 <sup>th</sup>  |
| <i>Acacia etbaica</i>     | 8                  | 16         | 10 <sup>th</sup> |

**Table 4.** Informant consensus factor of most cited disease by Tigrigna ethnic group in central region Eritrea in 2015/2016.

| Diseases  | Ns | Nuc | ICF  |
|---|----|-----|------|
| Diseases related to dermatological problems                           | 14 | 41  | 0.67 |
| Diseases related to gastrointestinal problems                         | 12 | 23  | 0.59 |
| Organ diseases such as: liver, heart, kidney ,teeth, ear, eye etc.    | 10 | 22  | 0.57 |
| Diseases related to malaria, hepatitis, hepatomegaly and megalomegaly | 09 | 15  | 0.43 |
| Diseases related to respiratory problems: cough, common cold, TB etc. | 05 | 07  | 0.33 |
| Diseases related to sun-strike, "weqeii", "gonfii", etc.              | 05 | 06  | 0.20 |



**Figure 1.** The red color and number 1 indicates the study area Photo from Google



**Figure2** plant growth forms

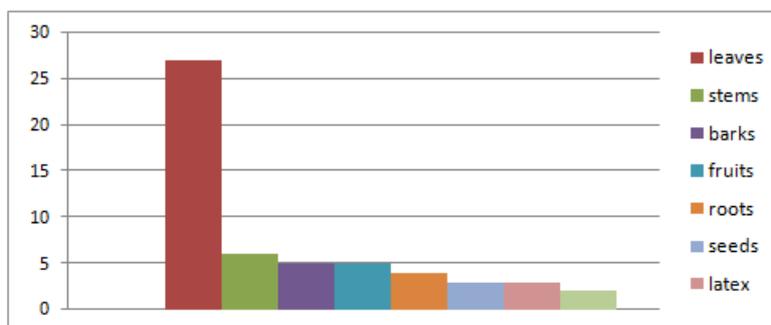


Figure 3 plant parts use

Table-5 treats of medicinal plants in the study area

| Major threats  | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | Total | %     | Rank |
|----------------|----|----|----|----|----|----|----|----|-------|-------|------|
| Agri-expansion | 4  | 5  | 4  | 3  | 3  | 2  | 4  | 5  | 30    | 20%   | 3    |
| Fire wood      | 5  | 4  | 3  | 5  | 3  | 5  | 4  | 5  | 34    | 22.7% | 1    |
| Construction   | 4  | 3  | 2  | 4  | 4  | 5  | 3  | 3  | 28    | 18.7% | 4    |
| Grazing        | 3  | 4  | 5  | 3  | 5  | 4  | 5  | 3  | 32    | 21.3% | 2    |
| Drought        | 2  | 4  | 3  | 3  | 5  | 3  | 4  | 2  | 26    | 17.3% | 5    |

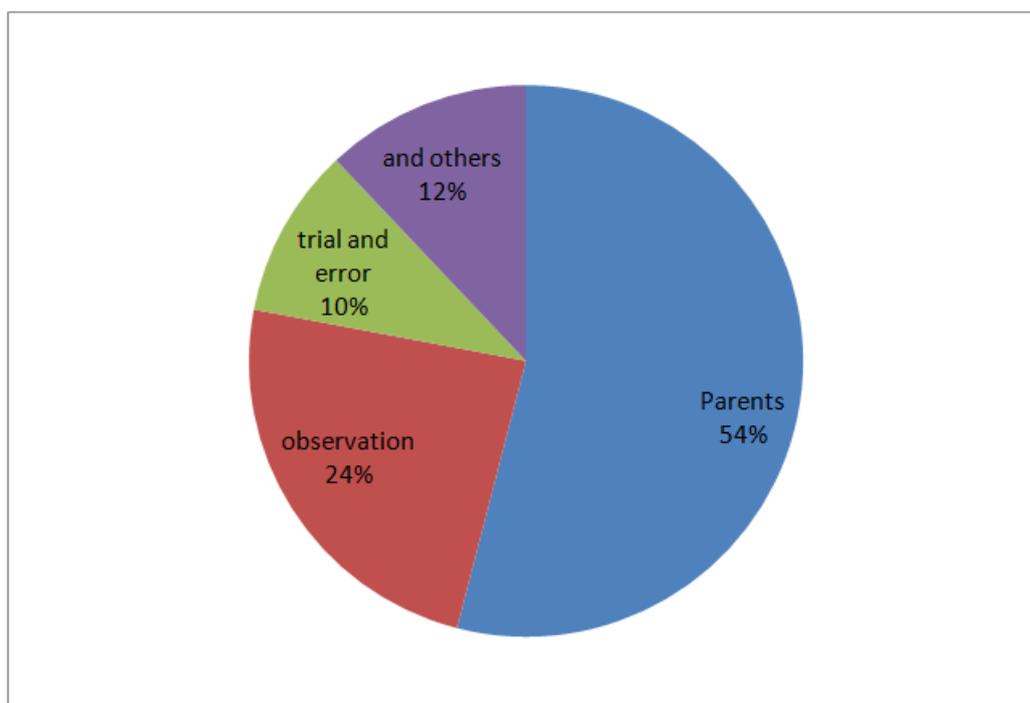


Fig -4 transferring of traditional medicinal knowledge in the study area

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