



## Indigenous knowledge of the community on underutilized and neglected root and tuber crops in Sidama and gedio zones, Snnpr, Ethiopia

Amare Seifu<sup>1\*</sup>, Manaye Misganaw<sup>2</sup>, Girum Faris<sup>3</sup>, Tesfaye Bekele<sup>4</sup>, Ashenafi Ayenew<sup>5</sup>

<sup>1-5</sup> Ethiopian Biodiversity Institute, Genetic Resources Access and Benefit Sharing Directorate, Ethiopia

### Abstract

Indigenous knowledge is passed from generation to generation, usually by word of mouth and cultural rituals, and has been the basis for agriculture, food preparation and conservation, health care, education, and the wide range of other activities that sustain a society and its environment in many parts of the world for many centuries. Tuber and root crops are the third important group of food crops after cereals and pulses, feeding about one fifth of the world population. However, the study on indigenous knowledge of the community on underutilized and neglected root and tuber crops has not been so far investigated. Therefore, indigenous knowledge of the community on underutilized and neglected root and tuber crops was conducted in 120 randomly selected households at 10 different Kebeles (neighborhoods, the smallest administrative units in Ethiopia) within six potential growing districts of Sidama and Gedio Zones, SNNPR, Ethiopia. The result of this research confirmed that underutilized and neglected root and tuber crops used as traditional medicine in the study areas. According to the reports of the respondents the overall uses of underutilized and neglected root and tuber crops were for food, income sources, feed and traditional medicine. Almost all of the respondents use the underutilized and neglected root and tuber crops for food in the study area. Majority of the respondents (74%) were used the underutilized and neglected root and tuber crops for traditional medicinal use. Moreover, some of the respondents in the study reported that the underutilized and neglected root and tuber crops used as income source, food flavoring and for feed. Underutilized root and tuber crops and their wild relatives such as *Ipomoea batatas*, *Colocasia esculenta*, *Dioscorea villosa*, and *Manihot esculenta* have high bioprospecting potential for pharmaceuticals, bio-ethanol and food industries. Therefore, commercializing and bioprospecting those medicinal and food plant, would not only increase the Ethiopia's economic growth, but also contribute to the global stock of pharmaceuticals, food and bio-fuel industries.

**Keywords:** underutilized and neglected root and tuber crops, bio-prospecting, indigenous knowledge

### 1. Introduction

Indigenous knowledge is the unique knowledge confined to a particular culture or society. It is also known as local knowledge, folk knowledge, people's knowledge, traditional wisdom or traditional science. This knowledge is generated and transmitted by communities, over time, in an effort to cope with their own agro-ecological and socio-economic environments (Fernandez, 1994) <sup>[9]</sup>. Indigenous knowledge is passed from generation to generation, usually by word of mouth and cultural rituals, and has been the basis for agriculture, food preparation and conservation, health care, education, and the wide range of other activities that sustain a society and its environment in many parts of the world for many centuries. Indigenous knowledge of the community is mainly on living organisms (plants, animals and microorganisms) and others non living things (Senanayake, 2006) <sup>[19]</sup>.

Plants are invaluable and fundamental to almost all life on earth. They provide wide range of uses to human beings such as medicine, food, shelter, clothing, utensils as well as ritual and religious benefits. Plants are natural factories for the production of chemical compounds, many of which are used to promote health and fight diseases and some of them are marketed as food or herbal medicines. Herbal medicines have long been viewed as a source of curative remedy based on religious and cultural traditions. Only about 30 crop species provide 95% of the world's food energy whereas over 7,000 species have been known to be

used for food and are either partly or fully domesticated. However, with modernization of agricultural practices many have become neglected due to their being held in low esteem and some have been so neglected that genetic erosion of their gene pools has become so severe that they are often regarded as lost crops (Williams and Haq, 2000) <sup>[24]</sup>.

Mankind depends on a very limited number of crops to meet the needs of staple diets and on a very limited number of major non-food crops to meet associated needs. In general, a small number of varieties occupy large areas for these cultivated species. Nevertheless in the past human societies depended on a much wider range of species for food, fiber, health security and other needs. Potato (*Ipomoea batatas* L.), Yams (*Dioscorea* spp), edible aroids (*Colocasia* spp), *Coccinia abyssinica*, *Plectranthus edulis* etc. can play a vital role in subsistence farming and food security of country. Root vegetables are plant roots used as vegetables.

The Root and Tuber crops comprises mainly of Cassava (*Manihot esculenta*, Potato (*Solanum* sp), Sweet Here "root" means any underground part of a plant. Root vegetables are generally storage organs, enlarged to store energy in the form of carbohydrates. Tuber and root crops are the third important group of food crops after cereals and pulses, feeding about one fifth of the world population. They include starchy staple crops that are of

increasing importance for global food security and relief of poverty, important millennium goals for the United Nations (FAO, 2013)<sup>[8]</sup>.

Root and tuber crops are widely cultivated in southern Ethiopia, which are supporting a considerable portion of the country's population as source of food. Prominent among these are: potato (*Solanum tuberosum.*), sweet potato (*Ipomoea batatas*), enset (*Ensete ventricosum*) (Welw.) Cheesman, godere (*Colacasia esculanta*), yams (*Dioscorea* spp.), Ethiopian dinch (*Coleus parviflorus*), koteharrie (*Diaspora bulbiferous*) and anchote (*Coccinia abyssinica*). In Ethiopia less attention is given to the studies of the underutilized and neglected root and tuber crops. Therefore, the present study focused on indigenous Knowledge of the Community on underutilized and neglected root and tuber

crops and their wild relative in Sidama and Gedio Zones, SNNPR, Ethiopia.

## 2. Materials and methods

### 2.1. Description of the study area

The study was conducted in Gedio and Sidama Administration Zone of the Southern Nations, Nationalities, and Peoples' Region (SNNPR) of Ethiopia in a selected six districts, namely, Dilla Zuria, Wonago, Kochere, Bensa, Dara and Aleta Wondo. Sidama is located in the north eastern part of the region and bounded by Oromia in the North, east and south east, with Gedio Zone in the South, and Wolayta Zone in the west (SZFED, 2016)<sup>[21]</sup>. Whereas, Gedio is located in North eastern part of the region and surrounded by Oromia region in the south, southwest, and Abaya wereda in the northwest and east directions, and Sidama zone in north direction (GZFED, 2016)<sup>[21]</sup>.

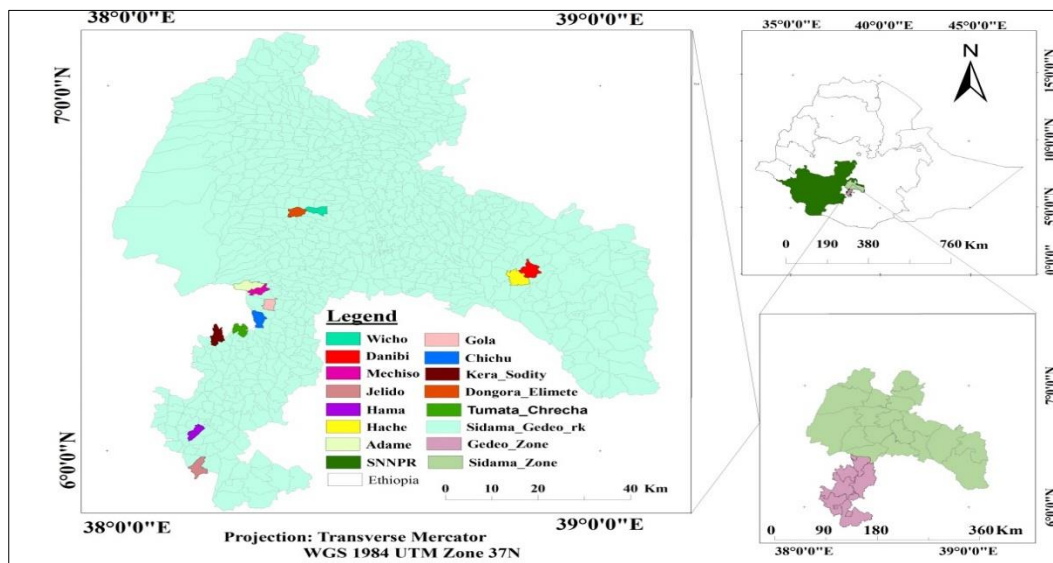


Fig 1: Administrative Map of the study area

### 2.2. Materials

Note books, GPS and photo camera were the materials used in the field study

### 2.3. Sampling design and Methods of data collection

The study areas were selected purposively based on the diversity and abundances of underutilized and neglected root and tuber crops according to the information acquired from agricultural office of the study area. Six potential underutilized root and tuber crops growing districts were selected from Gedio and Sidama zone. Dilla zuria, Wonago, and Kochere were from Gedio zone; and Bensa, Dara and Aleta Wondo were from Sidama zone. A total of 12 sampling sites (kebeles) two from each districts were selected in order to conduct this study.

A total of 120 respondents, 10 from each kebeles were selected purposively to the semi structured interview, and 25 of them are females. Respondents were selected with the help of kebele extension agents and the criteria to select the respondents were knowledge and experience on agricultural activities of underutilized and neglected root and tuber crops and their wild relatives. The interview assured indigenous knowledge related to

underutilized and neglected root and tuber crops and their wild relative. Besides six group discussion one in each district containing five discussants were also conducted to strength the information obtained about the potential use of underutilized root and tuber crops and their wild relatives from the interview.

Generally, data was collected from primary sources. The primary data was collected through Semi-Structured interview, Group Discussion and Field observation. Secondary source of data was obtained from the agricultural office of the Woreda, from different books, journal and research article. The quantitative and qualitative data was collected.

### 2.4. Method of Data Analysis

The survey data were analyzed by using Statistical Package for Social Science (SPSS) software version 21. Descriptive statistics such as frequencies, means, percentages, and others were analyzed to determine the bio-prospecting potential of underutilized and neglected root and tuber crops and their wild relatives and Inferential statistics(Linear Regression Analysis (using SPSS) was used to predict the value of a variable based on the value of another variable).

### 3. Result and Discussion

#### 3.1. Households Characteristics

Concerning to the age of the respondents, a little below half of the heads of the household (49.4%) had age between 36–50 years old, while 31.6% of the heads of the households were aged between 21 and 35 years old, 17.4% of the heads of the households were aged between 51 and 75 years old and 1.6% of the heads of the households were aged greater than 75 years old. The age of respondents were in between 22 years old, the minimum age and (82) maximum age with the mean age of 41 years old. Most of the respondents were males (79.2%) and only a few of them were females (20.8%). All the participants were married. As to the educational level of the respondents 10.8% of the respondents were uneducated, while 2.5% of the participants had informal education, 69.2% of them studied primary (First cycle, grades 1–4 and Second cycle, grades 5–8) and 17.5% of them studied Secondary High School (grades 9–10) education. The educational status of the respondents ranged between uneducated (illiterate) households heads up to Secondary High School. Assessment in the job category of the respondents indicated that all of the respondents were farmers. Most of the respondents (67.5%) had medium income, 6.7% of them had high income and 25.8% of them had low income.

Regarding to the size of land the respondents have, the minimum size was 0.1 hectare and the maximum size was 4 hectares while the mean size of land was 1.3 hectare in the study areas.

#### 3.2. Types of Root and Tuber crops in the study areas

All respondents informed the presence of root and tuber crops in the study area. Similarly, large number of respondents, greater than 80%, agreed that *Ipomoea batatas*, *Colocasia esculenta*, *Manihot esculenta*, *Ensete ventricosum* and *Dioscorea spp.* are commonly grow in the studied areas. However, majority of the respondents claimed that plants such as *Dioscorea bulbifera*, *Beta vulgaris*, *Plectranthus edulis*, *Arisaema enneaphyllum*, *Zingiber officinale*, *Allium cepa*, *Solanum tuberosum*, *Daucus carota*, *Curcuma longa*, *Dioscorea villosa* do not grow in their local area.

#### 3.3. Distribution and Abundance of underutilized and neglected root and tuber crops and their wild relatives in the study area

Out of 120 respondents 29.2% were indicated those crops found in their home garden, farmland, and in the wild, 28.3% reported that underutilized and neglected root and tuber crops found both in their home garden and farmland, 26.7% responds those crops were found only on their farm land but not elsewhere and the rest 15.8% reported that only found in their home garden. In terms of wild relative of underutilized and neglected root and tuber crops reports that out of 120 respondents 40.8% were identified the wild relative of those crops, while 54.2% the respondents reported that there were no wild relative of underutilized and neglected root and tuber crops and 5% were not recognized about the presence of wild relative of underutilized and neglected root and tuber crops.

In addition to this, the respondents were reported the different between cultivated and wild relative of underutilized and neglected root and tuber crops. Based on this, 34.2% of the respondents distinguished their different, 6.6% were reported as if there had no differences and the majority (59.2%) were reported

no wild relative of those crops. The communities were differentiating the wild relative from the cultivated one based on different factors such as their products, taste, growth rate, size and the like.

The most abundance underutilized and neglected root and tuber crop in the study area was *Ipomea batatas* followed by *Discorea spp.* and *Colocasia esculenta* respectively. As to the frequency of these plants, *Discorea spp.* was the most frequent followed by *Colocasia esculenta* and *Ipomea batatas* respectively. Concerning to the dominance, *Ipomea batatas* was the most dominance followed by *Discorea spp.* and *Colocasia esculenta* respectively. This might be due to better productivity, suitability of the crop for food, suitability of agro ecology for the production of root crops, high market demand, better price, and it requires little follow up. On the other hand *Manihot esculenta* was the least abundance this might be due to lack of awareness about the use of the plant in the study area.

Respondents (40% and 41.7%) also reported that *Discorea spp.* and *Ipomea batatas* were the most dominant among underutilized and neglected root and tuber crops respectively. However *Manihot esculenta* was the least dominant underutilized and neglected root and tuber crops in the surrounding area.

#### 3.4. Cultivation Methods of underutilized and neglected root and tuber crops

The respondents of the study area were reported that almost all of them cultivating and cropping underutilized and neglected root and tuber crops. Of these, 56.7% monoculture, 32.5% polyculture/intercropping and 10.8% were used both monoculture and polyculture cultivation.

Associated species that grew with underutilized and neglected root and tuber crops were *Coffea arabica* and *Ensete ventricosum* (26.7%), *Coffea Arabica* (11.7%), *Coffea arabica*, *Ensete ventricosum*, *Persea americana*, *Annona senegalensis*, and *Mangifera indica* (3.3%). Beside this, 23.3% of the respondents were reported that cultivation of those root and tuber crops with other crop species have an advantage. Based on the respondents' reports, the benefits of intercropping of underutilized and neglected root and tuber crops were to increase soil fertility, to save time for management and to increase productivity in small area etc.

#### 3.5. The potential use of underutilized and neglected root and tuber crops and their wild relatives

According to the reports of the respondents the overall uses of underutilized and neglected root and tuber crops were for food, sale, animals' feed, traditional medicinal use and traditional food preparation. Almost all of the respondents use the underutilized and neglected root and tuber crops for food in the study area. Majority of the respondents (74%) were used the underutilized and neglected root and tuber crops for traditional medicinal use. Moreover, some of the respondents in the study reported that the underutilized and neglected root and tuber crops used as income source, food flavoring and for feed.

The maximum estimated amount of money sold per year from underutilized and neglected root and tuber crops was 50,000 Ethiopian birr while the minimum estimated amount was 0 birr, 95% of the respondents sold underutilized and neglected root and tuber crops and the average (mean) estimated amount of money sold per year from underutilized and neglected root and tuber

crops was 4472.89 Ethiopian birr. A little below half of the respondents (44.9%) sold between 2000 and 5000 Ethiopian birr.

**3.5.1. Ethno-medicinal significance of underutilized and neglected root and tuber crops and their wild relatives**

Based on the result of this research, underutilized and neglected root and tuber crops used as traditional medicine in the study areas. Most of the respondents (74.2%) replied that underutilized and neglected root and tuber crops used as traditional medicine while 25.8% the respondents replied that they had no traditional medicine use

According to the information obtained from the respondents, the diseases treated by underutilized and neglected root and tuber crops and their wild relatives are Stomach ache occur after delivery (stomach bloating, Kidney infection, common cold, arthritis, Gastritis, wound caused by accident, ringworm, Malaria, abscess, itch, cattle bloating, Earache, Fungal diseases, broken bone, Hypertension, Brain tumor, Dermatomycosis, to get ride off Leech from the mouth of cattle and ulcer.

Most of the respondents (74.2%) aware of about the diseases treated by underutilized and neglected root and tuber crops and their wild relatives. Of these 25.8% of the respondents replied that underutilized and neglected root and tuber crops and their wild relatives used to treat stomach ache occur after delivery and ringworm (*Dioscorea spp*), 15.8% Stomach ache occur after delivery and Ringworm(*Dioscorea spp*), 9% for hypertension, stomachache occur after delivery (*Dioscorea spp*), Malaria, Wound, Earache, Abscess, Brain tumors and Derma to-mycosis (*Colocasia esculenta*),3.5% for Stomach ache occur after delivery, for ringworm (*Dioscorea spp.*) and wound caused by accident(*Colocasia esculenta*) and insignificant number of the respondents reported to get ride off Leech from the mouth of cattle, Malaria, stomach bloating, Kidney infection, arthritis, itch and ulcer(*Colocasia esculenta, Arisaema enneaphyllum Ipomoea batatas, and Manihot esculenta* ) (Fig.2). Almost similar result had been reported by, Krochmal *et al.*, (1973)<sup>[16]</sup>, Foster & Duke, (1990)<sup>[5, 10]</sup>, Howell, (2006)<sup>[13]</sup>, Crellin & Philpott, (1990)<sup>[5]</sup>, Afiukwa (2013)<sup>[11]</sup> and Sheikh (2013)<sup>[20]</sup>.

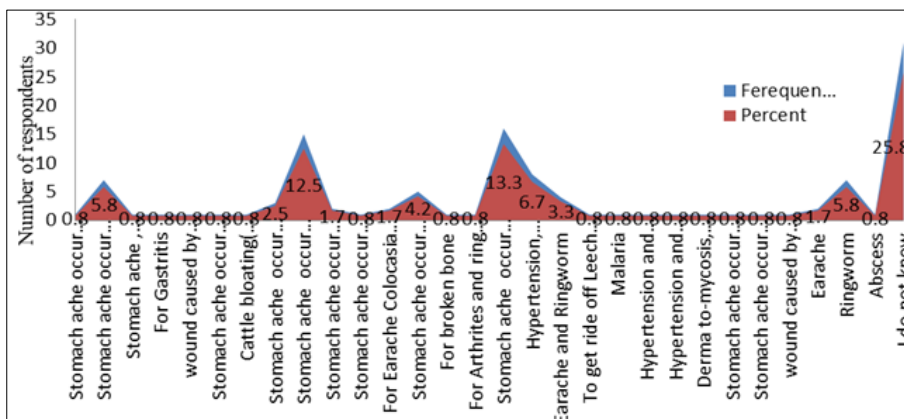


Fig 2: Diseases treated by underutilized and neglected root and tuber crops

According to the response of the respondents from underutilized and neglected root and tuber crops/wild relative that used as traditional medicine were:- *Dioscorea spp*, *Colocasia esculenta*, *Ipomoea batatas*, *Manihot esculenta* and *Arisaema enneaphyllum*. Most of the respondents (34.2%) replied that *Dioscorea spp* (*Dioscorea bulbifera*, *Dioscorea villosa* and *Dioscorea abyssinica*) were used as traditional medicine while 15% of the respondents used *Dioscorea spp.* and *Colocasia esculenta* as traditional medicine. On the other hand 6.7% of the

respondents used *Dioscorea spp.*, *Colocasia esculenta* and *Arisaema enneaphyllum* as traditional medicine. In addition only 5% used *Colocasia esculenta* as traditional medicine. Moreover, insignificant number of the respondents used *Manihot esculenta* and *Ipomoea batatas* for traditional medicine. Furthermore, people in the study area used root and tuber crops such as *Zingiber officinale*, *Allium sativum* and *Allium cepa* (5%) as traditional medicine (Fig 3).

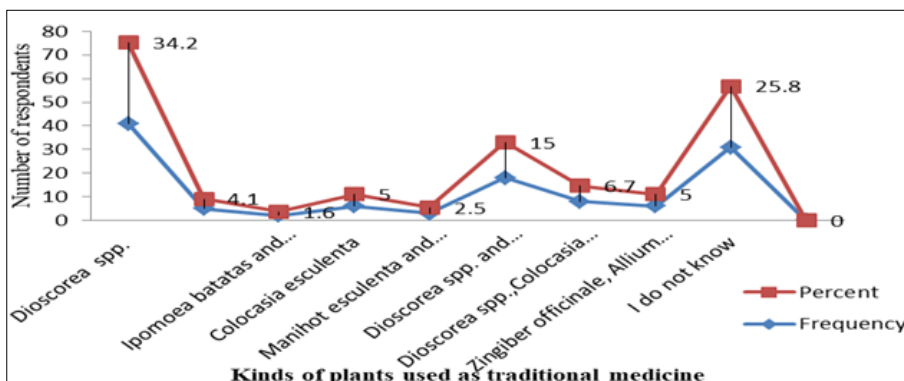


Fig 3: underutilized and neglected root and tuber crops/wild relative used as traditional medicine in the study areas

### 3.5.2. The traditional medicinal use of *Dioscorea* spp in the study areas

Based on the respondents report, the traditional medicinal use of *Dioscorea* spp. were;- stomach ache occur during delivery, itch, abscess, ringworm/fungal diseases, brain tumor, hypertension, stomach bloating and kidney infection. The leaves and roots of these plants were predominantly used for traditional medicinal purpose. Afiukwa (2013)<sup>[1]</sup> and Sheikh (2013)<sup>[20]</sup> reported that Diosgenin an aglycone is a chemical substance found in *Dioscorea* spp. Which are used commercially in pharmaceutical industry. Sheikh (2013)<sup>[20]</sup>, Atsukwei *et al.*, (2015)<sup>[3]</sup> and Dutta (2015)<sup>[7]</sup> also reported that Species of *Dioscorea* has been also used as sources of saponins for the preparation of steroids in the pharmaceutical industry. Other similar study by Atsukwei *et al.*, (2015)<sup>[3]</sup> also confirmed that *Dioscorea* spp is a popular herbal remedy for pains associated with rheumatism and arthritis, colic and intestinal cramps, proving itself a reliable antispasmodic and anti-inflammatory

Majority of the respondents (60.8%) aware of about the medicinal use of *Dioscorea* spp. Of these,17.5% of the respondents replied that root of *Dioscorea* spp. were used for the treatment of stomach ache occur during delivery, 15.8% of them replied root and leaves *Dioscorea* spp. used for the treatment stomachache occur after delivery & ringworm/fungal diseases, 15% of them replied leaves of *Dioscorea* spp. used for the treatment of ringworm/fungal diseases,5.8% of them replied root for stomachache occur during delivery, leaves for fungal diseases and brain tumor and Root for hypertension and insignificant number of the respondents replied root and leaves used for the treatment of itch, abscess, stomach bloating and kidney infection while the remaining (39.2%) respondents were not aware of about the medicinal use of *Dioscorea* spp. Ahmed *et al.*, (2009)<sup>[2]</sup> and Crellin and Philpott (1990)<sup>[5]</sup> also reported almost similar result. In addition, Krochmal *et al.*, (1973)<sup>[16]</sup> and Foster and Duke (1990)<sup>[5, 10]</sup> also reported that in herbal medicine the root is used for intestinal colic (and indigestion), to soothe diverticulitis, relieve dysmenorrhoea, as well as allay uterine and ovarian pain. The most significant use is in the treatment of rheumatoid arthritis to relieve the intense inflammation in the acute phase. It is also used for muscular rheumatism and spasmodic asthma. Furthermore, Fisher and Painter (1996) reported that the components of wild yam are chemically manufactured into the hormones progesterone or estrogen since the body is unable to use wild yam in the same way.

Extracts of Wild Yam also help to women with menopausal and PMS (premenstrual syndrome) symptoms (Sheikh, 2013, Atsukwei *et al.*, 2015)<sup>[3]</sup>. It is also used to be good for labor pains and the prevention of early miscarriage. The American Indians use a root decoction to relieve the pain of childbirth (Krochmal *et al.*, 1973)<sup>[16]</sup> other sources say that it is good for the nausea that can be experienced during pregnancy (Sheikh, 2013)<sup>[20]</sup>.

### 3.5.3. The traditional medicinal use of *Colocasia esculenta* in the study areas

Based on the response of the respondents the traditional medicinal use of *Colocasia esculenta* in the study areas were for Malaria, Ulcer, Earache, Abscess, to get ride off leech from the mouth of cattle, brain tumor and gastritis. Considerable numbers

of the respondents (34.2%) were familiar with the medicinal use of *Colocasia esculenta*. Of these, 10% of the respondents replied that leaves and stem of *Colocasia esculenta* used to treat earache, 8.3% of them used stem to treat ulcer caused by accidents,5% of them used leaves to treat malaria, ulcer, earache, brain tumor and abscess,3.3% of them used leaves to treat abscess and the remaining used root, stem and leaves to treat Malaria, to get ride off leech from the mouth of cattle and gastritis.

Almost similar result by Awasthi and Singh (2000)<sup>[4]</sup> and Devarkar *et al.*, (2011)<sup>[6]</sup> reported that leaf juice of *Colocasia esculenta* is applied over scorpion sting or in snake bite. It is also given in food poisoning of plant origin, constipation, stomatitis, alopecia, hemorrhoids and general weakness. Taro (*Colocasia esculenta*) has, purse, arrowroot and canna. These tubers have a lot of the preeminent, not containing gluten, containing angiotensin and antioxidative.

### 3.5.4. The traditional medicinal uses of *Ipomoea batatas* in the study area

Insignificant number of the respondents reported concerning to the traditional medicinal use of *Ipomoea batatas* (5% used to treat Arthritis and 6% for cattle bloating). However, other experimental study by Fukumoto and Mazza, (2000)<sup>[11]</sup> confirmed that in addition to the nutritional values of *Ipomoea batatas*, it has been rediscovered as a functional food containing high levels of various phytochemical which might have various health beneficial effects. Beside this, most studies on phytochemical in roots or leaves of *Ipomoea batatas* indicated that their health promoting and/or disease preventing benefits were interrelated to the high level of polyphenols.

Predominantly, cancer-preventive effects of polyphenols in *Ipomoea batatas* have been widely investigated. For example, Rabah *et al.*, (2004) demonstrated that *Ipomoea batatas* extract offered the activity of cancer prevention which was correlated with its level of phenolic content Mazza *et al.*, (2002)<sup>[17]</sup> has proved their (leaves and root of *Ipomoea batatas*) excellent bioactivities such as antimutagenic, radical scavenging (Tsoyi *et al.*, 2008), antihyperglycemic (Youdim *et al.*, 2002), hepatoprotective (Wang and Mazza, 2002)<sup>[17]</sup>, anticancer (Hagiwara *et al.*, 2002), antioxidant activities and chemo preventive activities (Kano *et al.*, 2005)<sup>[15]</sup>. Moreover, *Ipomoea batatas* tubers (sweet potato) contain ample amounts of antioxidants. It has been proven already by many scientific studies that antioxidants have ulcer healing properties (Panda and Sonkamble, 2012)<sup>[18]</sup>.

### 3.5.5. The traditional medicinal uses of *Manihot esculenta* in the study area

The traditional medicinal uses of *Manihot esculenta* in the study area were leaves used for stomach ache occur after delivery and root for broken bone. Insignificant number of the respondents were report about the medicinal use of *Manihot esculenta* (only 17.8% of the respondents). Other study Jansz and Uluwaduge (1997)<sup>[14]</sup> indicated that the bitter variety of *Manihot esculenta* root is used to treat diarrhea and malaria. The leaves are used to treat hypertension, headache, and pain. Cubans commonly use cassava to treat irritable bowel syndrome; the paste is eaten in excess during treatment.

### 3.6. The parts of root and tuber plant used for the preparation of traditional medicine

Based on the respondent reports leaves, roots and stem of *Dioscorea spp.*, *Colocasia esculenta*, *Ipomoea batatas*, *Zingiber officinale*, *Allium sativum*, *Allium cepa* and *Arisaema enneaphyllum* were the parts of the plant used for the preparation of traditional medicine in the study area. Most of the respondents (74.2%) used the leaves, roots and stem these species but the remaining (25.8%) were not used these medicinal plants in the study area. Most of the respondents (23.3%) used Leaves and Root of *Dioscorea spp* as traditional medicine followed by Root of *Dioscorea spp* (9.2%), Stem and leaves of *Colocasia esculenta*(5.8%), Stem, leaves and root of *Dioscorea spp.*and *Colocasia esculenta*(5.8%),5% of them used Leaves and root of *Dioscorea spp.*, Stem and leaves of *Colocasia esculenta*, stem and leaves of *Arisaema enneaphyllum* and Leaves of *Ipomoea batatas*.

### 3.7. The preparation methods of traditional medicine from underutilized and neglected Root and tuber crops/wild relative

The preparation methods of traditional medicine from underutilized and neglected root and tuber crops/wild relative were:- Squeezing the leaves of *Dioscorea Spp* within the palm for fungal diseases(ringworm), boiled root of *Dioscorea spp* for stomach ache and squeeze leaves of *Colocasia esculenta* and smearing for itch, squeezing the leaves of *Dioscorea spp.* within the palm and add oil for cattle bloating, squeezing the leaves of *Colocasia esculenta* and *Dioscorea Spp* and add on the wound, heating the stem of *Colocasia esculenta*, make it cool, squeezing the stem and add the juice to the infected ear, and boiling the leaves of *Ipomoea batatas* for Arthritis and cattle bloating, juice/ latex of stem and leaves of *Colocasia esculenta* and *Arisaema enneaphyllum* to treat malaria, ulcer, earache, brain tumor and abscess, Most of the respondents aware of about the preparation methods of traditional medicine from underutilized and neglected root and tuber crops and their wild relatives (fig.4).

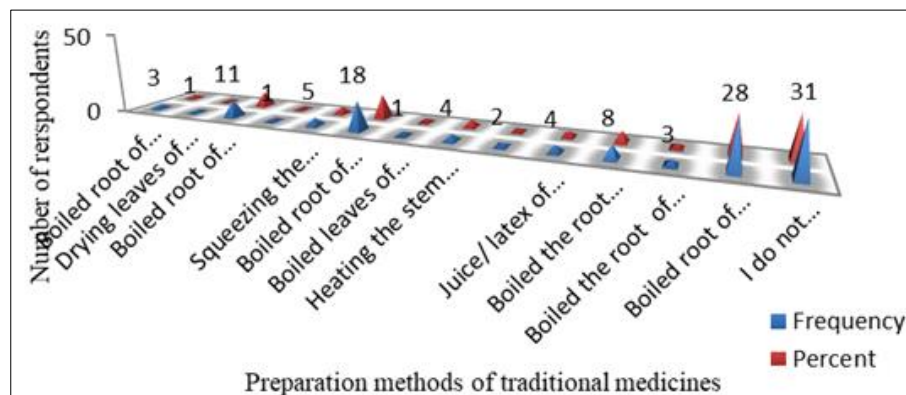


Fig 4: The traditional medicines preparations from underutilized and neglected root and tuber crops

### 4. Conclusions and Recommendations

Underutilized root and tuber crops and their wild relatives such as *Ipomoea batatas*, *Colocasia esculenta*, *Dioscorea villosa*, and *Manihot esculenta* have high bioprospecting potential for pharmaceuticals, bio-ethanol and food industries. Commercializing and bioprospecting this medicinal and food plant, would not only increase the Ethiopia's economic growth, but also contribute to the global stock of pharmaceuticals, food and bio-fuel industries. Traditional medicinal plants have lots of potentials, in terms of the provision for the primary health care as well as in the discovery of new drugs, if they are well-managed. Although *Ipomoea batatas*, *Colocasia esculenta*, *Dioscorea villosa*, and *Manihot esculenta* have high potentials for pharmaceuticals, food and bio-fuel industries, the result of this study indicates that the people in the study area give less attention to these plants. For future to earn better benefit, appropriate measures should be taken.

### 5. Acknowledgment

The people of Sidama and Gedio Zones, SNNPR, Ethiopia who gave us information are gratefully acknowledged. We are grateful to Ethiopian Biodiversity Institute (EBI) for financial support during fieldwork. We are also grateful to Agricultural workers in Dilla Zuria, Wonago, Kochere, Bensa, Dara and Aleta Wondo

districts for their kind assistance as translators of local language during the fieldwork.

### 6. References

1. Afiukwa CA, Ogah O, Okechukwu PCU, Oguguo JO, FU A1, Emmanuel CO. Antinutritional Characterization of Two Wild Yam Species from Abakaliki, Southeast Nigeria Research Journal of Pharmaceutical, Biological and Chemical Sciences Nutritional. 2013; 4(2):840-848.
2. Ahmed Z, Chishti ZM, Johri RK, Bhagat A, Gupta KK, Ram G. Antihyperglycemic and Antidyslipidemic activity of aqueous extract of *Dioscorea bulbifera* tubers. Diabetologia Croatica, 2009, 38-39.
3. Atsukwei D, Daniel EE, Adams MD, Tende JA, Tope OO, Lami Danmallam L. Contraceptive Effect of Ethanolic Extract of *Dioscorea villosa* Tuber on Reproductive Hormones of Female Wistar Rats International Journal of Biochemistry Research & Review. 2015; 5(2):135-144.
4. Awasthi CP, Singh AB. Nutritional quality evaluation of edible leaves of some Taro (*Colocasia esculenta*), 2000.
5. Crellin JK, Philpott J. A reference guide to medicinal plants. Durham, NC: Duke University Press, 1990.
6. Devarkar VD, Marathe VR, Chavan DP. Dietary and medicinal significance of wild Vegetables from Osmanabad

- region, Maharashtra (India), Life Sciences Leaflets. 2011; 11:317-332.
7. Dutta B. Food and medicinal values of certain species of *Dioscorea* with special reference to Assam Journal of Pharmacognosy and Phytochemistry. 2015; 3(4):15-18.
  8. FAO. The food security through commercialization of Agriculture programme in the Rome, Action plan, 2013.
  9. Fernandez ME. Gender and indigenous knowledge. Indigenous Knowledge & Development Monitor. 1994; 2:6-7.
  10. Foster S, Duke JA. Eastern/Central Medicinal Plants. Peterson Field Guides, 1990. ISBN No. 0-395-35309-2 also 0-395-46722-5.
  11. Fukumoto L, Mazza G. Assessing Antioxidant and Pro-oxidant Activity of Phenolic Compounds. Journal of Agricultural and Food Chemistry. 2000; 48:3597-3604.
  12. Gedeo Zone Finance and Economic Development (GZFED). Zonal population by woredas and city Administrations; zonal annual crop area coverage. (unpublished), 2016.
  13. Howell P. Medicinal plants of the southern Appalachians. Mountain City, GA: Botano Logos Books. Indices of orange-fleshed sweet potato (*Ipomoea batatas* Lam) hybrid clone. J Nutr Food, 2006.
  14. Jansz ER, Uluwaduge DI. Biochemical aspects of Cassava (*Manihotesculenta* Crantz) with special emphasis on cyanogenicglucosides – a review. J. Natn. Sci. Coun. Sri Lanka. 1997; 25(1):1-24.
  15. Kano M, Takayanagi T, Harada K, Makino K, Ishikawa F. Antioxidative Activity of Anthocyanins from Purple Sweet Potato, *Ipomoea batatas* Cultivar Ayamurasaki. Bioscience, Biotechnology and Biochemistry. 2005; 69:979-988.
  16. Krochmal Arnold, Connie. A guide to the Medicinal plants of the United States. Quadrangle, the New York Times Book Co, 1973. ISBN No. 0-8129-0261-0.
  17. Mazza G, Kay CD, Cottrell T, Holub BJ. Absorption of Anthocyanins from Blueberries and Serum Antioxidant Status in Human Subjects. Journal of Agricultural and Food Chemistry. 2002; 50:7731-7737.
  18. Panda V, Sonkamble M. (Anti-ulcer activity of *Ipomoea batatas* tubers (sweet potato) Functional Foods in Health and Disease. 2012; 2(3):48-61.
  19. Senanayake SGJN. Indigenous Knowledge as a key to sustainable development; the Journal of Agricultural Sciences. 2006; 2(1):87-94.
  20. Sheikh N, Kumar Y, Misra AK, Pfoze L. Phytochemical screening to validate the ethnobotanical importance of root tubers of *Dioscorea* species, Journal of Medicinal Plants Studies. 2013; 1(6):62-69.
  21. Sidama Zone Finance and Economic Development (SZFED). Distribution of population by woredas, city Administrations and urban-Rural Residence. (unpublished), 2016.
  22. Walter WM. Changes in Amyloid Carbohydrates during Preparation of Sweet potato Flakes, Journal of Food Science. 1976; 41:1374.
  23. Wang J, Mazza G. Inhibitory Effects of Anthocyanins and Other Phenolic Compounds on Nitric Oxide Production in LPS/IFN-Activated RAW 264.7 Macrophages. Journal of Agricultural and Food Chemistry. 2002; 50:850-857.
  24. Williams JT, Haq N. global research on underutilized crops an assessment of current Activities and proposals for enhanced cooperation international centre for underutilized crops Southampton, UK, 2000.
  25. Woolfe JA. Sweet Potato—Past and Present, In: JA Woolfe, Ed., Sweet Potato: An Untapped Food Resource, Cambridge University Press, 1992.