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## Bio prospecting potential of *Colocasia Esculenta* in Selected Districts of Gedio and Sidama Zones of SNNPR, Ethiopia

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**Abstract:** Recently, many tropical root and tuber crops have wider range of industrial applications. However, their bioprospecting potential in Ethiopia has not been well studied. Therefore, the objective of this study was to identify the bio prospecting potential of *Colocasia Esculentain* selected districts of Sidama and Gedio Zones, SNNPR, Ethiopia. Accordingly, a bio prospecting potential study was conducted between November and December, 2017 in two zones of SNNPRS. The results of the study revealed that *Colocasia esculenta* is the one that can be found abundantly in the study area like other root and tuber crops. 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. It has high bio-prospecting potential for pharmaceuticals and food industries. Traditional medicinal plants have lots of potentials for the provision of primary health care as well as to the discovery of new drugs, if they are well-managed. In conclusion it needs further laboratory based study on bio prospecting potentials of *Colocasia esculenta* to exploit it for industries.

**Key words:** Traditional medicinal use, Bio-prospecting potential, *Colocasia esculenta* and industries

### 1. Introduction

Biodiversity prospecting is the exploration, extraction and screening of biological diversity and indigenous knowledge for commercially valuable genetic and biochemical resources. Moreover, bio prospecting has been proposed as a potential means to encourage the conservation and sustainable use of biodiversity<sup>[1, 2]</sup>. Bio prospecting covers a wide range of commercial activities in different industrial sectors including pharmaceuticals, food and beverages, biotechnology, seed, crop protection, horticulture, botanical medicines, cosmetics and personal care. It provides valuable leads for new product development and many companies look for new applications of biological species that have not been studied earlier. As such, they enter into collaborative programmes with collectors in different countries to procure their needed supply of bio resources<sup>[1]</sup>.

For areas with high biodiversity, such as the tropics, bio prospecting may be an economic use of biodiversity that effectively promotes habitat protection. Nevertheless, the utility of bio prospecting for providing benefits for developing countries and for enhancing the protection of their biodiversity has been controversial. This controversy results, in part, from changing perceptions on who owns and who should benefit from biodiversity<sup>[3]</sup>.

Root and tuber crops are the most important food crops after cereals. They have the highest rate of dry matter production per day and are major calorie contributors. Tuber crops find an important place in the dietary habits of small and marginal farmers especially in the food security of tribal population. Tuber crops not only enrich the diet of the people but also possess medicinal properties to cure many ailments or check their incidence. Many tropical tuber crops are used in the preparation of stimulants, tonics, carminatives and expectorants. The tuber crops are rich in dietary fiber and carotenoids<sup>[4]</sup>.

*Colocasia* species are among the root and tuber crops which can play vital role in subsistence farming and

food security of country<sup>[5]</sup>. 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. 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<sup>[6]</sup>.

Many 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 and traditional medicinal uses<sup>[6]</sup>. Therefore, this research aims at bio prospecting the indigenous knowledge on *Colocasia esculenta* for industrial application and identifying potential distribution areas of the species around the study area so as to promote it for access and benefit sharing purposes.

### 2. Materials and Methods

#### Study area

The study was conducted from 20, November to 20, December 2017, in Sidama and Gedio Administration Zone in a six selected districts, namely, Dilla Zuria, Wonago, Kochere, Bensa, Dara and Aleta Wondo of the Southern Nations, Nationalities, and Peoples' Region (SNNPR). Sidama zone 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. Its geographic location lies between 6014' and 7018' North latitude and 370 92' and 39014' East longitude with an elevation ranges from 1500 and 2500 m above sea level<sup>[7]</sup>. Gedio Zone is located in north eastern part of the region and surrounded by Oromia region in the south, southwest, and Abaya district in the northwest and east directions, and Sidama zone in north direction. It is found between 60.59-60.62 north, latitude and 380.40-380.43 east longitude and 365km to Addis Ababa<sup>[8]</sup>.

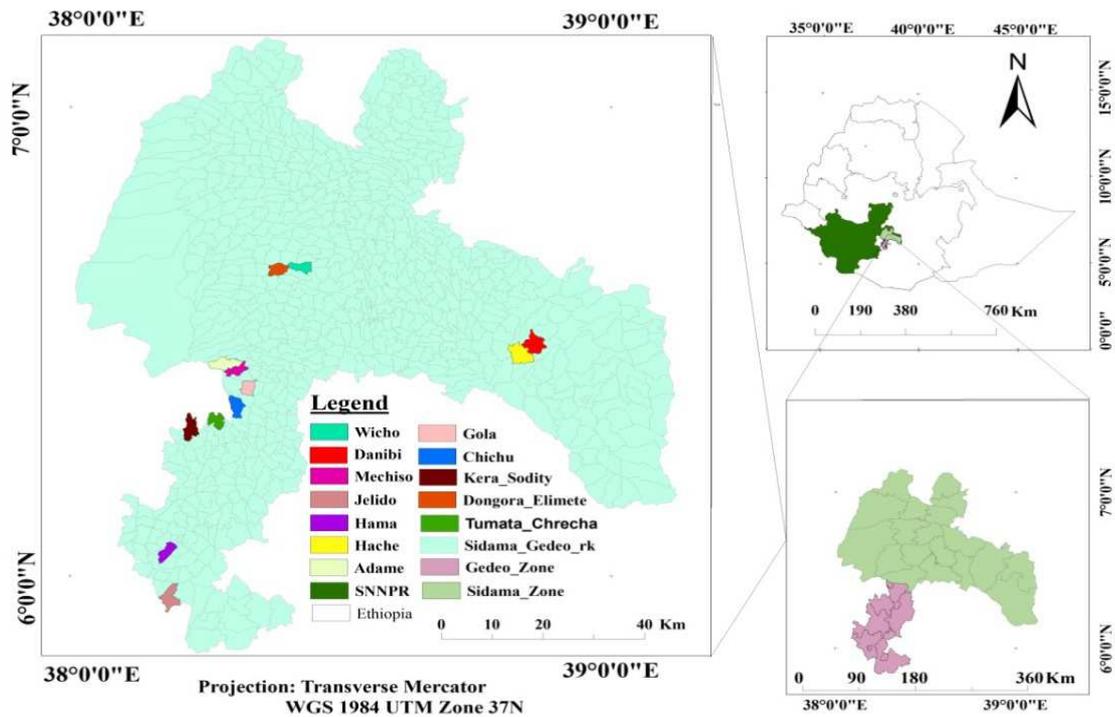


Fig.1 Administrative Map of the study area

**Sampling Design**

The study areas were selected purposively based on diversity and abundances of *Colocasia esculenta* according to the information obtained from agricultural offices of the study areas. Accordingly, six potential *Colocasia esculenta* growing districts were selected from Gedio and Sidama zones. Dilla zurya, Wonago, and Kochere districts were from Gedio zone; and Bensa, Dara and Aleta Wondo district were from Sidama zone. Proportionally, the selection of 12 sampling sites (kebeles) two from each district were done.

**Data Collection**

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, journals and research article. 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 kebeles extension agents based on knowledge and experience on agricultural activities of underutilized and neglected root and tuber crops and their wild relatives.

**Abundance**

Population density of plant species expressed as the number of individuals of plants per unit area, which is calculated as  $A = \Sigma W/N$ , where, A = abundance; W = number of individual species/sample; N = sample size.

**Data Analysis**

The survey data was 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 *Colocasia esculenta* and its wild relatives.

**3. Results and Discussion**

**Households Characteristics**

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 (20.8%) were females. All the participants were married. Concerning the educational status of respondents, 8% of the respondents were uneducated, while 2.5% of them had informal education, 69.2% of them had primary education and 17.5% of them had secondary school education.

As to duration of the respondents living in the study areas, the maximum year the respondents living in the study area was 82 years while the minimum age was 5 years. The mean year the respondents living in the study area was 37.8 years. 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.

**Distribution and Abundance of C. esculenta in the Study Area.**

Out of 120 respondents 29.2% were indicated that *Colocasia esculenta* was found in their home garden, farmland, and in the wild, 28.3% reported that it was found both in their home garden and farmland, 26.7% responds *Colocasia esculenta* was found only on their farm land but not elsewhere and the rest 15.8% reported that only found in their home garden. *Colocasia esculenta* is the second most abundant (5.16%) and frequently found (91.67%) in the studied districts and kebeles next to *Discorea spp.* This might be due to better productivity, suitability of the crop for food, suitability of agro ecology for the production of *Colocasia esculenta*, high market demand, better price, and it requires little follow up.

**Cultivation Methods of Colocasia Esculenta**

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. Based on direct observation and the reports of the respondents, associated species that grew with *Colocasia esculenta* was *Coffea Arabica*, *Ensete ventricosum*, *Persea americana*, *Annona senegalensis*, and *Mangifera indica*. The respondents were also reported that cultivation of the 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. According to the respondents report the favorable seasons for growing *Colocasia esculenta* was summer and autumn (28.3%), summer (25%), spring (19.2%), summer and spring (15.8%).

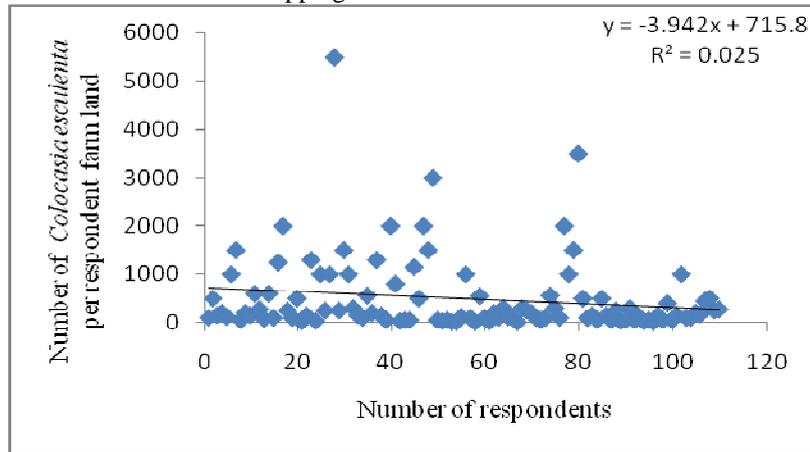


Fig.2 Relationship between numbers of *Colocasia esculenta* in the respondents' farms and sample size



Fig.3 *Colocasia esculenta* (Photo by Amare Seifu and Manaye Misganaw)

**Ethno-medicinal uses of underutilized and neglected root and tuber crops**

Most of the respondents (74.2%) replied that underutilized and neglected root and tuber crops used as traditional medicine. Based on the responses of the respondents some of the diseases treated by underutilized and neglected root and tuber crops were malaria, mound, earache,

abscess, brain tumors and derma to-mycosis. Almost similar result had been reported by,<sup>[9-13]</sup>. *Colocasia esculenta* is one of the underutilized and neglected root and tuber crop which has tremendous ethno-medicinal uses as per the information obtained from the respondents.

		Malaria, Ulcer, Earache and Abscess	Ulcer caused by accidents	to get ride off Leech from the mouth of cattle, Malaria and Abscess	Earache	Malaria, to get ride off leech from the mouth of cattle and gastritis
		Root	Stem	Leaves	Leaves and Stem	Root, Stem and leaves
■ Percent		3.33	8.3	9.17	10	4.17
■ Frequency		4	10	11	12	5

Table.1 The traditional medicinal use of *Colocasia esculenta*

***The Traditional Medicinal Use of Colocasia esculenta in the Study Area***

The results of this study revealed that the traditional medicinal use of *Colocasia esculenta* in the study kebeles were paramount. It is used to treat malaria, ulcer, and earache, abscess, to get ride off leech from the mouth of cattle, brain tumor and gastritis. Considerable numbers of the respondents (34.97%) were familiar with the medicinal use of it. 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 (Table 1). Almost similar result by <sup>[14, 15]</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.

**4. Conclusions and Recommendations**

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 in modern industry, if they are well-managed. The results of this study revealed that *Colocasia esculenta* and its wild relative has high bio-prospecting potential for pharmaceuticals and food industries even though; less attention are given to it in Ethiopia. Commercializing and bio-prospecting this medicinal and food plant, would not only increase the Ethiopia's economic growth, but also contribute to the global stock of pharmaceuticals and food industries. Furthermore, we recommended that the government, the societies, research institutes and other concerned bodies should be better to give more emphasis to *Colocasia esculenta*.

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