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Bio-prospecting Potential of Wild Edible Mushrooms in Eastern Hararghe Zone, Ethiopia

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Abstract

The composition of proteins, carbohydrates, fat and fiber contents in mushrooms make them ideal non-conventional food source for diabetic, cancer and cardiac patients. However, the study on indigenous knowledge of the community on wild edible mushrooms has not been well studied so far. Therefore, the present study attempts to document the overall indigenous knowledge associated with mushrooms in in Eastern Hararghe, Ethiopia. The study involved 44 males and 19 females in four different in four purposely selected districts of the zone. All respondents 63(100%) experienced eating mushroom and agreed that eating mushroom is very useful. such as: food, medicine, body building 34(54%), good flavor 2(3.2%), high protein food, good flavor 2(3.2%), Meat substitute food 1(1.6%). Identifying edible mushrooms from nonedible one is very important for the respondents to keep themselves from the poison non edible mushrooms, based on this, all study participants can identify wild edible mushrooms from nonedible ones easily. Traditionally it is believed that eating mushroom has the following anti infection benefits such as, anti-diabetic, anti-pressure, anti-stomach, anti-vomitand even for ear infection treatment.All participants showed their interest on cultivating wild edible mushrooms at home-based cultivation program. From this point of need of the community concerned bodies should make all the necessary extension package for its massive cultivation so as to sustain nutritional balance and food security.

Keywords: Bioprospecting, Food security, Medicinal value, Infections.

1. Introduction

Mushrooms are fleshy, spore-bearing fruiting body of a fungus, typically produced above the ground on soil or on its food source, mostly in forests. It is perhaps the most well-known and documented edible forest product (Boa, 2004, Lulekal *et al.,* 201, Abate, 2014). Mushroom is broadly defined as “a macro fungus with a distinctive fruiting body which can be either epigenous or hypogenous and large enough to be seen with the naked eye and to be picked by hand” (Chang,1992).

Mushrooms are valuable health foods, low in calories, high in vegetable proteins, iron, zinc, chitin, fiber, vitamins and minerals (Aaronson, 2000; Barros *et al.*, 2007). Mushrooms also have a long history of use in traditional Chinese medicine (Asfaw and Tadesse, 2001; Manzi & Pizzoferrato, 2001; Muleta *et al*., 2013). A wide variety of edible macro fungi or mushrooms are rich in dietary proteins (Melaku *et al*., 2014).

Mushrooms possess several essential amino acids required for children and adults (Semwal *et al*., 2014; Bernas *et al.* 2006). The nutritional composition of edible mushrooms is high and that is why they are consumed for their nutritional value and supposed medicinal value. Medicinal mushrooms are consumed by those practicing folk medicine for their nutraceutical composition (Bernas *et al.* 2006).The composition of proteins, carbohydrates, fat and

fiber contents in mushrooms make them ideal non-conventional food source for diabetic, cancer and cardiac patients (Tuno, 2001; Sharma, 1997; Usha and Suguna 2014).

In Ethiopia, however, wild edible mushrooms are the most neglected resources regardless of their importance, wild mushrooms have been given little attention, and they are less studied and rarely documented in Ethiopia (Muleta *et al*., 2013; Alemu, 2013). Then again, the justification behind forest resource management in the country has been primarily based on the production of wood products (Yemiru *et al*., 2010). The values of mushrooms have been neglected (Lulekal *et al*., 201, Tuno, 2001; Manzi *et al*., 1999). Wild edible mushrooms are also harvested in forests in Ethiopia during the rainy seasons. Thus, this study was conducted in Eastern Hararghe to fulfill the following objectives, (1) To assess the local community knowledge on wild edible mushroom (2) To assess the potential of wild edible mushroom in the region (3) To assess the market potential wild edible mushroom in the area (4) To promote the potentials wild edible mushrooms for bio-prospecting.

2. Materials and Methods

2.1. Study Area

The study was conducted in Oromia Region East Hararghe zone. East Hararghe zone is located 9^0 19' North of equator, 42^0 07' East of meridian; and it is 525 km east of the capital city, Addis Ababa, Ethiopia. East Hararghe Zone has 12 districts of which this study focused on two of them, namely Haramaya and Kersa.

2.2. Data collection

The data was collected using semi-structured questionnaires, interviews and focus group discussions using local dialects. The questions were prepared in English and then translated into local language. The whole processes were administered with the help of local interpreters.

2.3. Data analysis

The data was organized tabulated and summarized using descriptive statistics and presented by percentages, frequency distribution, tables, charts and graphs using SPSS version 24, software.

3. Results and Discussion

3.1. Demographic data

Questions were designed to collect demographic information such as zone, district, kebele, gender, age, education level, and occupation. The average age of the respondents was 35.78 ± 8.78 with the age range of 40 years and maximum 60 and minimum 20 years. The total sampled population had average of six family members per household. Among the sample population, 69.8% were male, and they were engaged in farming. The detail respondents' demographics are presented in table.

Table 1. Demographic information

		Kebeles								Total	
		Biftu Geda		Ifa Oromia		Yabeta Lencha		Yabeta Selama			
		N	%	N	%	N	%	N	%	N	%
Gender	Male	10	55.6	5	33.3	20	95.2	9	100	44	69.8
	Female	8	44.4	10	66.7	1	4.8	0	0	19	30.2
Age	< 36	2	16.7	16	48.5	7	58.3	9	39.1	34	42.5
	36-55	7	58.3	13	39.4	3	25	6	26.1	29	36.3
	55+	3	25	4	12.1	2	16.7	8	34.8	17	21.3
Education	Illiterate	13	72.2	11	73.3	6	28.6	1	11.1	31	49.2
	Primary	4	22.2	14	26.7	12	57.1	6	66.7	27	42.9
	Secondary	1	5.6	0	0	3	14.3	2	22.2	5	7.9
Occupation	Farming	18	100	15	100	21	100	9	100	63	100

3.2. Knowledge and best growing season of mushrooms

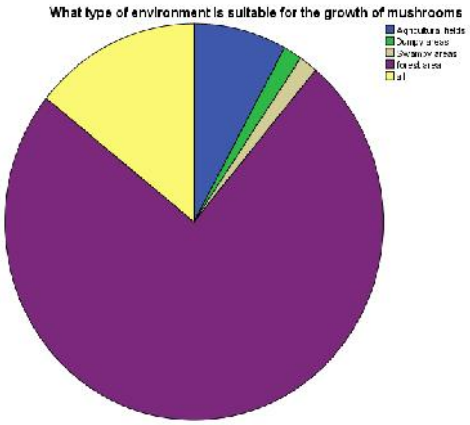
All respondents (100%) noted that they well know wild edible mushrooms and eager to eat when available. The other basic questions about mushrooms will be summarized in (Table-2).

Table 2. respondent's knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Is mushroom is a plant?	Yes	22	34.9	34.9	34.9
	No	34	54.0	54.0	88.9
	I do not know	7	11.1	11.1	100.0
	Total	63	100.0	100.0	
Where do you find Wild mushroom?	Around home garden	2	3.2	3.23.2	
	in forest areas	46	73.0	73.076.2	
	in fields	11	17.5	17.593.7	
	around garbage site	4	6.3	6.3100.0	
	Total	63	100.0	100.0	
Do you know about the best growing season of mushrooms	Yes	63	100.0	100.0100.0	
If yes, which season is suitable	Summer	15	23.8	23.823.8	
	Winter	37	58.7	58.782.5	
	Autumn	7	11.1	11.193.7	
	Spring	4	6.3	6.3100.0	
	Total	63	100.0	100.0	

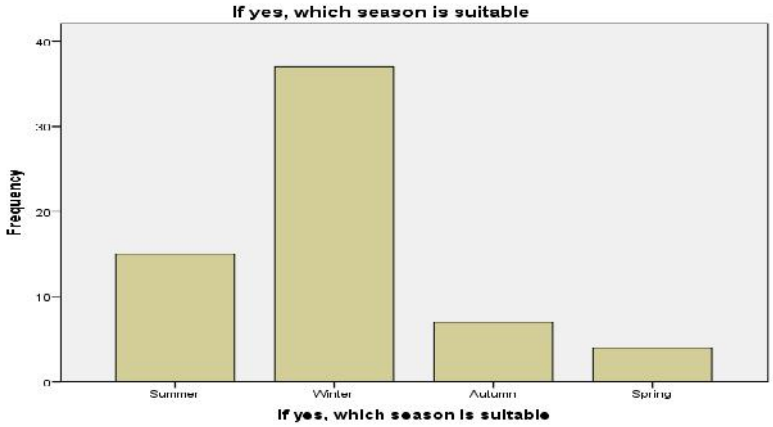
With regard to the best growing environment of wild edible mushrooms, forest areas (74.6) were the most prominent ones for the respondents. The others search for mushroom in agricultural fields (7.9%), Dumpy areas (1.6%), Swampy areas (1.6) and are some of the known suitable environments for the growth of Mushrooms.

Figure.1 Type of environment suitable for mushrooms



Similarly, all the respondents replied that they know the best season for the growth of wild mushrooms 58.7%, winter season is the best season to get mushroom, the rest of the respondents 23.8% summer, 11. 1% autumn, 6.3% spring, respectively.

Figure. 2 Best growing season for mushrooms.



Respondents were also asked about the major benefits of eating mushrooms from their earlier experience. Based on this they have mentioned as follows; food value, medicinal value, body building 34 (54%), good flavor 2 (3.2%), high protein, good flavor 2 (3.2%), Meat substitute food 1(1.6%).

Table 3. Knowledge on importance of eating mushroom

		Frequency	Percent	Valid Percent
Valid	food, medicine, body building	34	54.0	54.0
	good flavor	2	3.2	3.2
	high protein food	16	25.4	25.4
	high protein with good flavor	2	3.2	3.2
	meat substitute food	7	10.1	10.1
	protein source	1	1.6	1.6
	protein source, meat substitute	2	3.2	3.2
	Total	63	100.0	100.0

3.3. Knowledge on identification of wild edible mushrooms

Identifying edible mushrooms from nonedible one is very important for the respondents to keep themselves from the poison non edible mushroom, similarly all respondents (100%) respondents have the knowledge and can identify wild edible mushroom from nonedible ones. All agreed that wild edible mushrooms can be identified from non- edible ones by different mechanisms. Some of the mechanisms are by its height, color, surface texture, umbrella structure and so on. Most of the respondents can identify the wild edible mushrooms from other species of fungi.

Table. 4 Traditional ways of identifying wild edible mushrooms non edible ones

	Frequency	Percent	Valid Percent	Cumulative Percent
bigger, smooth surface, wide umbrella, thickness	35	55.6	55.6	55.6
gray color	3	4.8	4.8	60.3
gray color, smooth surface	3	4.8	4.8	65.1
longer height	4	6.3	6.3	71.4
longer height, wide umbrella, thick umbrella	1	1.6	1.6	73.0
longer height, wide umbrella, thick umbrella, gray color	1	1.6	1.6	74.6
longer height, wide umbrella, thick umbrella, gray color, smooth surface	5	7.9	7.9	82.5
thick umbrella, gray color, smooth surface	2	3.2	3.2	85.7
thick, longer, smooth surface, gray color	5	7.9	7.9	93.7
wide umbrella	1	1.6	1.6	95.2
wide umbrella, thick umbrella	3	4.8	4.8	100.0
Total	**63**	**100.0**	**100.0**	

Similarly, respondents described very peculiar features of non-edible mushrooms.

Table. 5 Traditional identification of non-edible mushrooms.

Characteristics	Frequency	Percent	Valid Percent	Cumulative Percent
short umbrella, thin surface, thin surface, white color	11	16.5	16.5	32.4
shorter height, short umbrella, thin surface, white color	8	12.7	12.7	30.2
shorter height, short umbrella, thin surface, white color, rough surface	4	6.3	6.3	36.5
thin surface, white color, rough surface	4	6.4	6.4	42.9
white at bottom, thin	33	52.4	52.4	95.2
white color, rough surface	3	4.8	4.8	100.0
Total	**63**	**100.0**	**100.0**	

Based on the findings of this study eating non edible wild mushroom would lead to death (22, 34.9%) causes abdominal pain because of worms (33,52.4%) poisonous vomiting with blood (5, 7.9%) stomach problem (2, 3.2%) slight vomiting with blood (1, 1.6%). With regard to the medicinal use of wild edible mushrooms all 63 (100%) agreed that eating wild edible mushrooms have a prominent medicinal use (table 5).

Several of the mushroom polysaccharide compounds have proceeded through clinical trials and are used extensively and successfully in Asia to treat various cancers and other diseases. A total of 126 medicinal functions are thought to be produced by selected mushrooms (Nordt *et al*., 2000).

Table. 6. Traditional beliefs of eating wild edible mushrooms.

	Frequency	Percent	Valid Percent
anti-diabetic	10	14.9	14.9
anti-pressure	4	6.3	6.3
anti-stomach	44	69.6	69.6
anti-vomit, anti-gastric	8	12.7	12.7
ear infection treatment	1	1.6	1.6
Total	63	100.0	100.0

3.4. Availability of mushrooms

Searching for wild edible mushrooms in the study area as previous times is very difficult. Majority of the respondents (33, 52.4%) agreed that shortage of fertile land, shortage of rain, population increase, farm expansion is among the most common factors, the rest of the respondents have reflected their reasons (Table.3).

Table. 7 Reasons for the decrease in availability of wild edible mushrooms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	drought, use of fertilizers	7	11.1	11.1	52.4
	drought, inorganic fertilizer, farm expansion	11	16.4	16.4	63.5
	lack of fertile land, shortage of land	1	1.6	1.6	71.4
	population increase, farm expansion	2	3.2	3.2	74.6
	shortage of fertile land, shortage of rain, Population increases	4	6.4	6.4	81.0
	shortage of fertile land, shortage of rain, population increase, farm expansion	33	52.4	52.4	87.3
	shortage of rain, population increase, farm expansion	5	7.9	7.9	100.0
	Total	63	100.0	100.0	

Mushroom foods are prepared in different ways by the community, some (4, 6.3%) add to traditional “Wot”, (9, 14.3%) roast on hot plate, (37, 58.7%) roast with oil and tomato (13, 20.6%) pieces, roast with oil, paper and tomato and additional spices to get good flavor.

		Frequency	Percent	Valid Percent
Valid	Collection, washing, cutting in to pieces, add in to traditional 'Wot'	4	6.3	6.3
	Collection, washing, cutting in to pieces, roast simply on hot plate	9	14.3	14.3
	Collection, Washing, Cutting in to pieces, roast with oil and tomato	37	58.7	58.7
	Collection, washing, cutting in to pieces, roast with oil, paper and tomato	13	20.6	20.6
	Total	63	100.0	100.0

4. Conclusion

Since, Ethiopia is among few mega biodiversity countries in the world, there will be is a huge diversity in terms of availability of new wild edible mushroom species in the country if studied well. In this study all respondents have showed their interest to have the spawn of mushroom which enable them to cultivate edible mushrooms at home and even for their livelihood and nutritional supply. Therefore, all concerned bodies should give attention for further studies and identification of wild edible mushrooms in the country.

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