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Review Article

Mushroom Production in Ethiopian and its Significance in Ethiopian Food Access: A Review Paper

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ABSTRACT

The review is assessed in Debre Berhan University college of agriculture and natural resource science and it mainly focuses on the importance of mushroom cultivation in Ethiopia, how its cultivation starts in Ethiopia rather than hunting mushrooms in the forest and its challenge and future opportunities in the country. The production of horticultural crops like mushrooms is economically rewarding in this changing world. From the overall review assessment, the production of mushrooms has great significance for the attainment of food and nutritional security, medicinal value, bio-conservation and soil fertility in Ethiopia. The production of mushrooms becomes more important for Ethiopia as it has favorable agro-climatic regions that favor its production and its production substrate is simply waste agricultural by-products. The use of waste by-products as mushroom substrates on the other hand considered as protecting environmental pollution.

Keywords: Food access; Ethiopia; Mushroom; Hunting

INTRODUCTION

There are different views on the definition of mushroom among those mushroom is a fungal growth that typically takes the form of a domed cap on a stalk, with gills on the underside of the cap (Dictionary). Mushrooms are one of the most loved foods not only for their exotic taste but also for the benefits with which they come. Mushrooms are a special group of macro-fungi that possess distinctive sporocarp, which are typically produced as either epigeous (above ground) or hypogeous (underground) and large enough to be seen with the naked eye and to be picked by hand. It can be consumed in various forms like fresh, pickled, dried, powdered, canned, etc. Its farming has picked up a fast pace among contemporary entrepreneurs owing to its nutritional and medicinal benefits and low-cost input with high output. Mushrooms are fleshy fungi (*Basidiomycota*, *Agaricomycetes*) having a stem, cap and gills underneath the cap. They can be edible and some of them can be toxic too. It contains more than 90% water and less than 1% fat, is loaded with vitamin B, copper and selenium and is low in sodium [1].

Mushroom is a delicious food consumed throughout the world. It is also called the future vegetable which guarantees food insecurity and malnutrition problems and has medicinal value. World production of mushrooms is growing and now exceeds three million tons worth a market value of 10 billion USD. Major mushroom producers are China, the USA and the Netherlands share 47%, 11% and 7% of world supply respectively. The remaining about 35% of the total production was from Italy, France, Poland, Ireland, the United Kingdom, Canada and India. Nowadays, mushroom farming is being practiced in more than 100 countries and its production of mushrooms reached 23 million metric tons and its production is increasing at the rate of 7 percent per annum. The world market for the mushroom industry in 2014 was valued at over $59 billion, where China is the leading producer and exporter. Global per capita consumption of mushrooms is said to range from 9 to 14 kg per year, where Europeans, USA and Asians are the leading consumers.

In Ethiopia, mushrooms are widely known as Ye-Jib Tilla (Shadow of a hyena) to mean Hyena's Umbrella, Ye-abahoy fes (The spirit of Abhay), to mean fart of Monk and Dem Astefy (Blood donor) to mean to the causes of vomiting of blood. The mushroom collections widely come from wild forests, although in the past few decades, there have been flourishing efforts to grow exotic mushroom species and marketing both local and few

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volumes of exports by private sectors. The earlier research and capacity-building efforts of Doctor Dawit Abate from Addis Ababa University, later other public universities and research organizations played pivotal roles in advancing mushroom farming to reach its current levels.

In the world, it is estimated that a minimum of 14,000 species of fungi can be considered mushrooms. From the above estimation, at least 2000 species are edible. In Ethiopia, there are a lot of mushroom varieties grown especially in forests but mushroom consumption habits and practices of the people in different parts of Ethiopia have not been well documented so far. Even if Ethiopia was rich in mushrooms it does not earn so many benefits from it like that of other world countries. But now growing interest has developed during the last decade in assessing the human-mushrooms interaction among different areas in Ethiopia. Therefore, this systematic review is initiated to show the great role of mushrooms in improving food self-sufficiency, nutrition security, reduction of malnutrition and poverty, livelihood and enhancing the bio-economy in Ethiopia.

LITERATURE REVIEW

Starting of mushroom production in Ethiopia

The presence of inadequate food supplies then the coming of diminishing quality of health and living standards and increasing environmental deterioration in a certain country are the key underlying problems that affect the future well-being of mankind in the area. The magnitude of these problems seems increasing as the world's population continues to grow for this matter the continuous effort of needing a solution becomes a main concern of the country [2].

Ethiopian food is mainly based on cereals like maize, sorghum, wheat and teff which are low in their protein content. The addition of a mushroom recipe to the Ethiopian food diet will close the protein gap and improve the overall health of the economically and economically disadvantaged communities. In the past, mushrooms were considered an important vegetable and were popular with wealthy people for cooking purposes. Currently, most ordinary people consider mushrooms as a quality food because of their health benefits.

Mushroom cultivation has almost a new activity in Ethiopia in the last decades. As well as being a method of bioconversion of non-edible plant biomass into nutritious food, mushrooms are a cash crop, the market for which is growing worldwide. This being a new activity for Ethiopia, she has a lot of opportunities for mushroom cultivation. Among those opportunities, there is a favorable climate, comparatively abundant land and labor as well as reasonably good water resources that created ample opportunities for mushroom production. However, the cultivation of mushrooms in Ethiopia is not sustainable as people who joined the business are continuously flowing out of the market and in turn, the level of product to be supplied is declining year to year. As a result, Ethiopia is not benefiting from mushrooms as the rest of the world while wild mushrooms are harvested in forests in Ethiopia during the rainy season, they are not a staple part of the diet and were not cultivated previously. Research on mushroom cultivation in Ethiopia started in 1993 at the Department of Biology, Addis Ababa University. Currently, mushroom production in Ethiopia is increasing manner because they contain many essential amino acids and are thus good sources of protein and some unsaturated fatty acids; provide several vitamins (B vitamins and vitamin D) as well as the minerals potassium, phosphorus, calcium and magnesium.

Current status of mushroom production in Ethiopia

In Ethiopia, there is no such huge commercial mushroom farm that can reach the demand of large cities and towns. According to the market survey conducted in 2006/07 in Addis Ababa, the supply of fresh mushrooms is close to zero. Currently, some small-scale producers sell their products to large-scale producers. Large-scale producers, produce, buy process and export mushrooms. These show that the cultivation and business of mushrooms is an untouched and wholly vacant business sector in Ethiopia. Therefore, research and training support is critically needed at all stages. Despite the growing demand, the Ethiopian supply is generally poor and local companies import most mushrooms from China: While cottage farmers sprang up to fill the demand, they lacked training and types of equipment such as storage and contamination often ravaged their production was common to lose 30-40% of a crop to mold and bacteria.

Significance of mushroom production in Ethiopian

Income generation: Research results showed that between the years 1997-2016, Ethiopia exported mushrooms to a total of twelve countries. This implies that the country can generate income from the production of mushrooms which intern used to satisfy other food choices. On the other hand, there are producers, especially in Addis Ababa who directly sell to hotels and restaurants for local consumption. Lastly, the production mushroom needs some labor therefore used as an employment opportunity at the same time [3].

Food value: Nowadays, mushrooms are popular and valuable food worldwide because they contain many essential amino acids and are thus good sources of protein and some unsaturated fatty acids; provide several vitamins (B vitamins and vitamin D) as well as the minerals potassium, phosphorus, calcium and magnesium. Wild mushrooms were rich in carbohydrate and protein content and were low in fat content. Mushrooms have been used as food in Ethiopia, particularly in the southwestern part of the country. Mushrooms are locally called by different names in different regions of the country and the habit of mushroom consumption differs from region to region. Some studies indicated that wild edible mushrooms gathered from the natural forests and utilized as a food source in southern Ethiopia. For example, hunting wild mushrooms is a traditional and cultural practice in Kaff ethnic groups. The importance of mushroom cultivation for food security is high. The great benefits of mushroom-derived dietary supplements, medicines and new foods are already available in the global markets. Different ethnic groups in Ethiopia have good traditional knowledge and practices in the utilization of wild

edible mushrooms. The Ethiopian population is increasing at an alarming rate which can directly influence the livelihood of the communities as a whole by increasing the demand for food. Thus, domestication and cultivation of indigenous varieties of mushrooms by using cheap agricultural wastes can be taken as a solution for food insecurity, environmental pollution and unemployment. Population growth in Ethiopia a non-green alternative called mushroom cultivation is one of the best ways to address this challenge because mushrooms grow on litter without needing extra soil.

Medicinal value: Mushrooms can be used as medicine for compromised health and their crude extract products mainly can be used as dietary supplements in addition, they contain various bioactive molecules such as polysaccharides; terpenoids, glycoprotein, antimicrobial compounds, antioxidants, etc. can play a significant role in the treatment of many ailments such as improved immune system, lowering the level of cancer in the body, lowering blood sugar. Moreover, it is found that few mushrooms produce various bioactive phenolic compounds such as pyrogallol, polysaccharides, flavones, ascorbic acid and carotenoid compounds that can be used to control various diseases such as antitumor, antimicrobial, antioxidant and antihypertensive, hypocholesterolemia and hepatoprotective activities [4].

Bio-conservation: The production of indigenous varieties of mushrooms by using cheap agricultural wastes for this matter mushroom production is considered a solution for food insecurity, environmental pollution and unemployment. Mushrooms along with some bacteria are valued for their quality to degrade lignin, organic matter on forest floor. Lignin is a polymer and hence very strong and found in tree tissues, responsible for strength, keeping trees upright in high winds and gravity and hard to break down. Mushroom secretes extracellular enzymes and acids which break down lignin into simpler molecules, then utilized for their growth and metabolism, consequently as humus, rich in nutrients. Moreover, according to Semwal et al mushrooms form a mycorrhizal association with tree roots and with the mutual association, the host plant gains more mineral nutrients (Nitrogen, Phosphorus and Potassium), increasing tolerance to stresses and the fungi receive carbon compounds from the tree and optimized environment to grow and survive well [5].

DISCUSSION

Challenges of mushroom production in Ethiopia

The production of mushrooms in Ethiopia has been considered among small and large-scale farmers in the near last years. Even if the production of mushrooms gets this opportunity still some problems affect the mushroom production in Ethiopia. Mushroom cultivation is a new activity in Ethiopia. The present study shows that some districts like Menge are rich in wild mushroom diversity and associated indigenous knowledge. However, anthropogenic factors together with loss of indigenous knowledge and very poor conservation efforts threaten the survival of economically and ecologically important mushrooms in the area. While wild mushrooms were harvested in forests in Ethiopia during the rainy season, they are not a staple part of the diet and were not cultivated previously. This makes the growth of mushroom production more or less slow.

In Ethiopia, mushrooms are widely known as Ye-Jib Tilla to mean Hyena's Umbrella, Ye-abahoy fes to mean fart of Monk and Dem Astefy to mean to the causes of vomiting of blood. This different naming of mushrooms in the society has negative implications to fasten mushroom production in Ethiopia; as these local names have negative meanings in the society. Lastly, research on mushroom cultivation in Ethiopia started in 1993 at the department of biology, Addis Ababa University [6].

The other challenges of mushroom production in Ethiopia are the lack of an institutionalized sector for mushroom cultivation and utilization, lack of the availability of quality spawn, limitation of skills and experience among mushroom cultivators, lack of marketing system and there is no national quality control mechanisms and safety assurance. On the other hand, it clearly stated that the major constraint to mushroom production in Africa including Ethiopia was the lack of spawn vegetative seed of mush-rooms. Some of the constraints beyond the capacity of mushroom producers are the high cost of spawn and substrate, lack of quality spawn; extension service and market access. It is known that Ethiopia has a favorable agro-climate, topography, relatively low-cost labor and rich fungal biodiversity. However, the government of Ethiopia has a poor response to mushroom production and hence, currently, a huge amount of mushrooms is imported into the country. There are still some gaps in training and awareness programs of technology transfer to the farmers or local population regarding mushroom utilization and cultivation. A review of existing literature on mushroom studies of the country indicated that the fungal resource of the country is poorly studied, documented and not properly utilized. Even if the mushroom is abundant in the country, the practice of cultivation is very poor and if present, it is mostly restricted to urban areas.

Opportunities for mushroom production in Ethiopia

Ethiopia has a favorable agro-climate, topography, relatively low-cost labor and rich fungal biodiversity and the required raw materials to grow mushrooms are abundant in Africa including Ethiopia. Agro-industrial waste is produced in huge amounts and it becomes an interesting substrate, due to its commercial exploitation as well as associated environmental problems. The societies of Ethiopia are often considered as easy trainable societies [7]. Therefore, the farmers are willing to be involved as key participants in sustainable programs if they are compensated for their work in cash by long contracts; they prefer that the collection site is not very far from their homes and to collect mushrooms in groups. Urban consumers want to buy and pay for Ethiopian wild mushrooms and are interested in the sustainable production of mushrooms. The most common opportunities include the availability of spawn and substrate and increasing local consumer's awareness about the nutritional value of mushrooms. In addition, special attention given by the government to urban agriculture in general and to mushrooms

in particular provides the opportunity for mushroom producers to expand their business [8].

CONCLUSION

The production of mushrooms in Ethiopia is started by Doctor Dawit Abate rather than hunting and eating from the forests nearby the surrounding. Mushroom cultivation has great importance for food and nutrition security, income generation, medicines, bio-conservation soil fertility. Having such importance and available agro-climatic conditions for its production the production of mushrooms in Ethiopia is still very fraction. This is clearly shown in large cities like Addis Ababa the supply and demand aren't balanced and owners of hotels and restaurants import for their foreigners, visitors and diasporas. Moreover, the population of Ethiopia is increasing greatly which needs to increase the demand for food. Thus, domestication, preparing training and giving awareness to the society to increase the production of indigenous varieties of mushrooms by using cheap agricultural wastes can be taken as a solution for food insecurity, environmental pollution and unemployment rather than hunting and eating wild mushrooms near forests.

CONFLICT OF INTEREST

The author declares there is no conflict of interest in the work.

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