EDIBILITY AND ECONOMICAL IMPORTANCE OF TURKISH MUSHROOMS

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Abstract

Turkey has a large mushroom potential due to suitable ecological features and 2400 macrofungi taxa have been identified by several researchers. Although, many species are edible, most of them are not known by local people as edible. Similarly, mushrooms have an economically importance besides biological diversity. Some mushroom species are sold in local bazaar and exported foreign countries. Morchella sp., Cantharellus cibarius Fr. and Tricholoma anatolicum H.H. Doğan & Intini, Terfezia clavaryi Chatin *are the most popular species exported. Turkey earned revenue nearly 189 million dollars between 2000 and 2015 years by exporting mushrooms. So, identification and collection of economically valuable mushroom is important for economy. For these reason, some edible and economically important mushroom species are evaluated in this study.*

Key words: *mushrooms, economy, edibility*

1. INTRODUCTION

Mushrooms are unique organism and attracted to people by its taste. Also, mushrooms have been collected and consumed since ancient times. By consuming wild mushrooms, sometimes poisoning cases have been occurred. In the history, it was believed that one of the most important mushroom poisoning case was Roman Emperor Claudius death by eating *Amanita phalloides* (Aveline, 2004). Also, *Amanita caesarea*, known as Caesar's mushroom, was one of the traditionally important mushroom. Additionally, some mushrooms were used for their hallucinogenic properties and some of them were used for healing effects by traditionally. Today, mushrooms are used for their taste and have an economically importance.

There are three main importance of wild growing mushrooms as (1) a source of food and health effects, (2) economically and (3) ecologically importance. 2327 macrofungi taxa were reported as wild edible and medicinal fungi in the world (Boa 2004). This situation is supported to mushrooms trade at the local scale and worldwide. Boa (2004) reported that the global economic value of cultivated mushrooms in 2001 was nearly 23 billion American Dollars. Also, global trade of wild growing edible mushrooms was nearly 2 billion American Dollars (Hall et al. 2003). These global trade values are much higher than other products.

As a consequence of taxonomical research on mushroom in Turkey, nearly 2400 taxa were reported (Solak et al. 2007; Sesli & Denchev, 2008; Solak et al. 2015), and also new taxa such as *Morcella anatolica* have been descript first time (Işıloğlu et al. 2010). Although some of them were collected for nutrition and economical values, most of edible species are not known by local people. For this reason, we attempt to discuss some edible and economically important mushroom species of Turkey in the present study. Also, the mushroom trade of Turkey is evaluated.

2. MATERIAL AND METHODS

In the present study, macrofungi biodiversity of Turkey is provided by evaluating macrofungi checklists and recent literature (Solak et al., 2007; Sesli & Denchev 2008; Akata & Doğan, 2015; Solak et al. 2015; Doğan & Akata, 2015; Doğan & Kurt, 2016; Güngör et al. 2016). Also, edibility of mushroom species is checked by these literatures. Besides of this, the knowledge about mushroom species known by local people as edible, is provided from field studies by meeting local people face to face.

The other part of this study is economical importance of mushroom species. For this purpose, economically values of mushrooms are provided by Turkish Statistical Institute (www.tuik.gov.tr., access date 01.04.2016). In this context, exportation and importation data of mushrooms and mushrooms products between 2000 and 2015 years, have been provided and analyzed.

3. RESULTS AND DISCUSSION

3.1. Mushroom Trade in Turkey

Mushroom collecting is popular activities among local people by several reasons in Turkey. Some people collect wild growing mushrooms for food and leisure activity. But, other people particularly live in the village, collect wild mushrooms for economic purposes and sell the mushrooms in local bazaar or exporter company. It has been reported that 9 wild growing mushroom taxa (*Amanita caesarae*, *Boletus* sp., *Chantarellus cibarius*, *Cratellus cornucoioides*, *Hydnum repandum*, *Morchella* sp., *Lactarius* sp., *Tricholoma anatolicum*, *Terfezia* sp.) are exported to other country from Turkey (Ak et al. 2016).

Turkey has earned revenue nearly 253 million American Dollars between 2000 and 2015 years by exporting mushrooms and mushroom products (Figure 1). This data shows total mushrooms and mushroom products such as culture mushroom, truffles, morels, *Cantharellus* sp., mushroom mycelium etc. Also, Turkey has been paying money nearly 63 million American Dollars between 2000 and 2015 years by importing mushrooms and mushroom products (Figure 1).

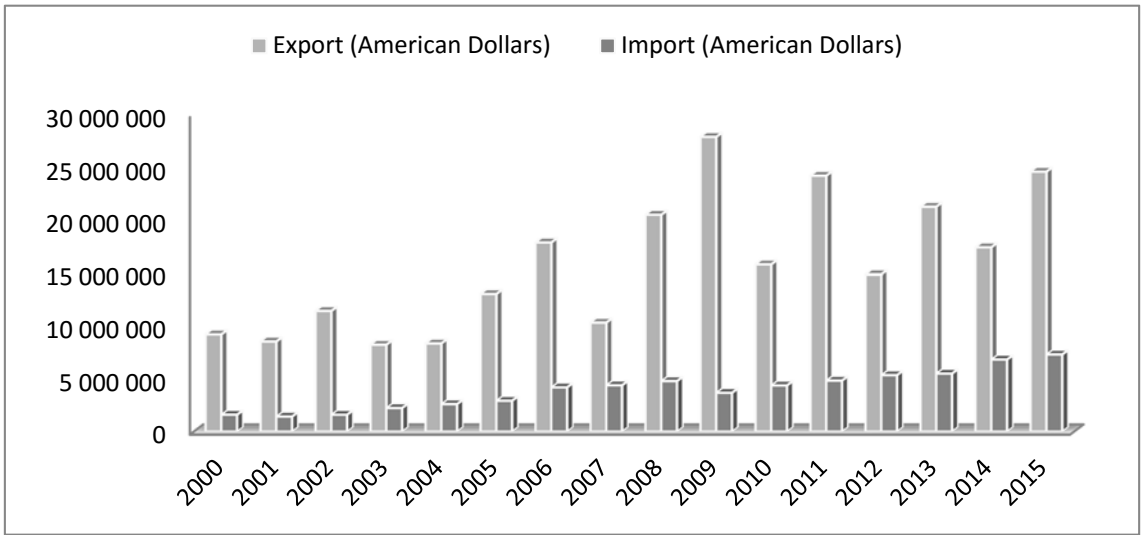


Figure 1. Total external mushroom trade values of Turkey between 2000 and 2015 years

The most popular imported product is mushroom mycelium and nearly 32 million American Dollars of imported rate is used for mycelium (Figure 2). But, recently Turkey has been exported a small amount mycelium as a consequence of the technological development of mushroom sector. Imported mycelium is generally used for cultivation of *Agaricus bisporus*. Large amount of *Agaricus bisporus* is cultivated and some of them are sold in the market. The quantity of sold *Agaricus bisporus* in the market couldn't provide, but the external trade rate was provided (Figure 3). As it seen in the Figure 3, exportation rate of *Agaricus bisporus* is much higher than importation rate, and Turkey earns revenue from external trade of this mushroom. According to Turkish Statistical Institute data, various products of *Agaricus bisporus* such as dried, fresh, canned material are exported and imported, and the data given in the Figure 3 contains total amount of *Agaricus bisporus* products. Turkey's income is nearly

12 million American Dollars between 2000 and 2015 years from external trade of *Agaricus bisporus* (this value is calculated by differences of exportation and importation rates).

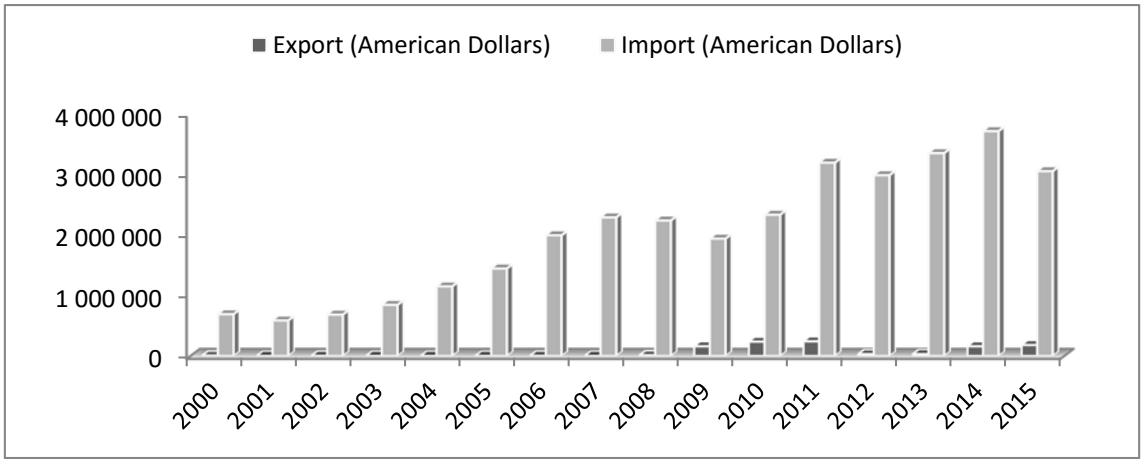


Figure 2. External trade values of mushroom mycelium between 2000 and 2015 years

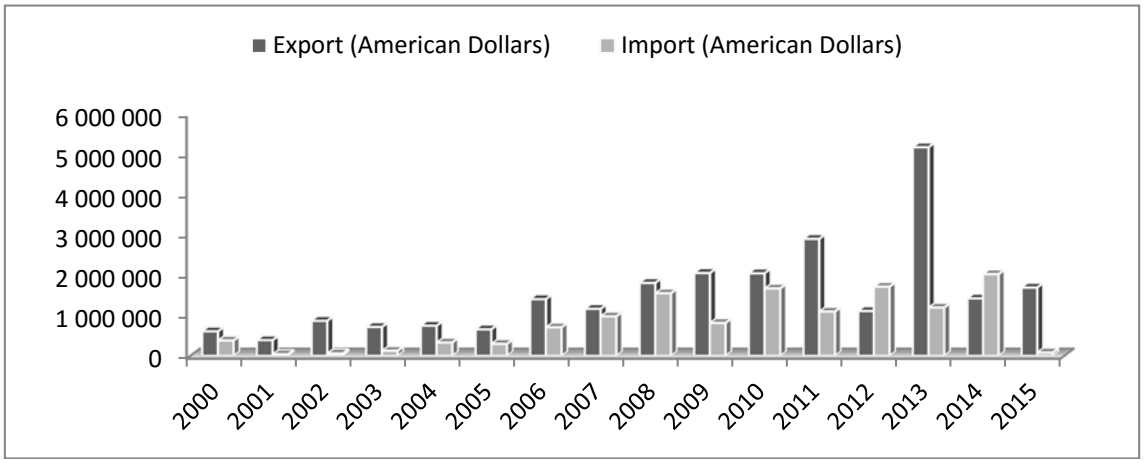


Figure 3. External trade values of *Agaricus bisporus* between 2000 and 2015 years

Truffles are one of the most valued mushroom groups in the world. Turkey is natural habitat of truffles with Spain, France and Italy by its suitable climatic conditions and 48 truffles taxa have been identified in Turkey (Türkoğlu, 2015). Truffles are one of the most expensive mushroom groups per kilos by their unique taste and aroma. But, these taxa grow under the soil and therefore, it is too hard to collect. Truffles collected from Turkey, have been exported various amount (Figure 4). But, it is not known which taxa have been exported clearly.

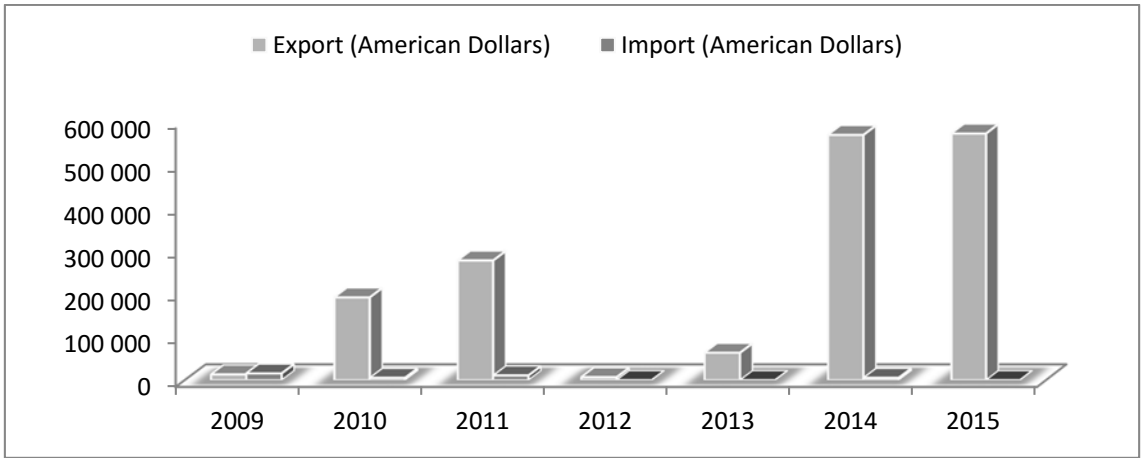


Figure 4. External trade values of Truffles between 2009 and 2015 years

In Turkey, other economically popular mushroom taxa are *Cantharellus cibarius* and *Morchella* species. Especially *Morchella* sp. are sold in the local bazaar and its prize is nearly 100 Turkish Liras (35 American Dollars) per kilos (Figure 5). But, the amount of *Morchella* species sold in local bazaar is not known. Also, they are export other countries and the external trade values of these species are given Figure 6 and Figure 7.



Figure 5. *Morchella* species in the local bazaar

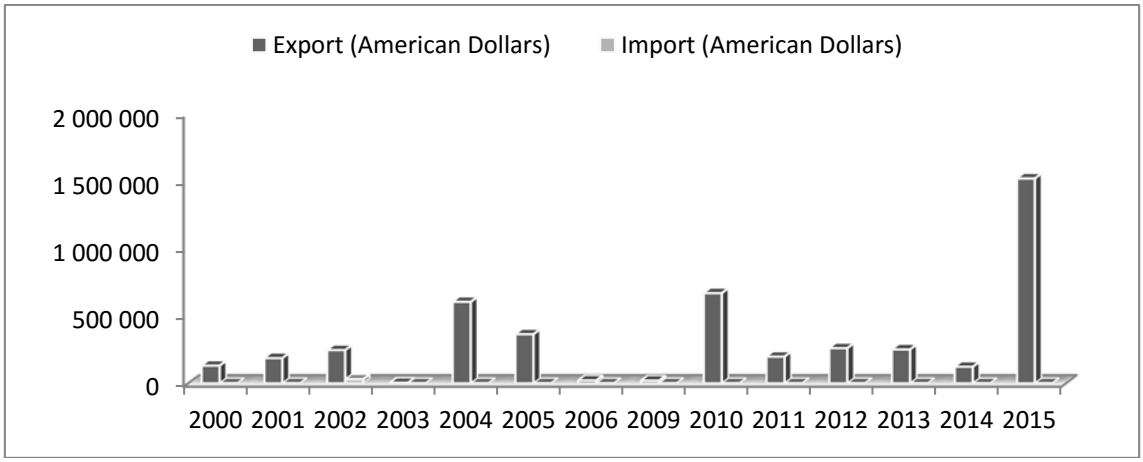


Figure 6. External trade values of *Cantharellus cibarius* between 2000 and 2015

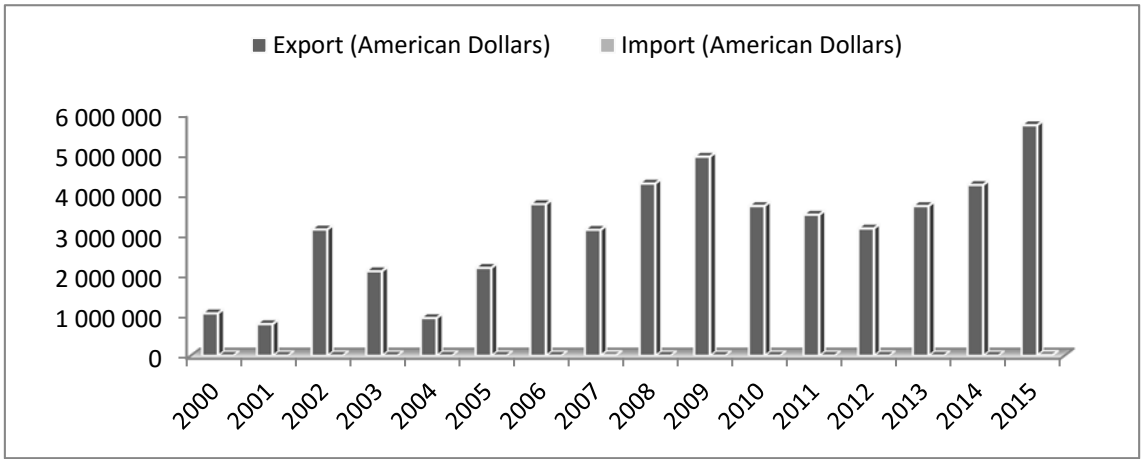


Figure 7. External trade values of *Morchella* species between 2000 and 2015

It can be said that another most popular species is *Tricholoma anatolicum* and it is exported to Far East Countries (Figure 8). According to Doğan & Akata (2011), more than 50 tonnes of *Tricholoma anatolicum* is exported per year. But, this reported amount is not certain because there is not official data about it.



Figure 8. *Tricholoma anatolicum*

3.2. Edible Species of Turkey

Mushroom collecting is popular activity in Turkey. Also, the taxonomical studies have been carried out by several researchers recent years, but the macrofungi biodiversity of Turkey are not determined fully. This situation is indicated by several new record reports for Turkish mycota (Güngör et al. 2015; Doğan & Kurt, 2016). According to Solak et al. (2007), Sesli & Denchev (2008) and Solak et al. (2015), 2400 macrofungi taxa are reported in Turkey. Among these taxa, many species are edible and some of them are given in Table 1 with their local names. The taxa given Table 1 is known local people and consumed. But, most of edible species is not known by local people in Turkey. Also, some examples of these edible mushrooms' photos are given in Figure 9.

Table 1. Some edible species of Turkey and their local name

Taxa	**Local name**	**Taxa**	**Local name**
Agaricus bisporus	Kültür mantarı	*Lepista nuda*	Mavi cincile
Agaricus campestris	Çayır mantarı	*Lycoperdon perlatum*	Puf mantarı
Agrocybe cylindracea	Kavak mantarı	*Macrolepiota procera*	Dedebörük, Sığır dili
Amanita caesarea	İmparator mantarı	*Morchella* sp.	Kuzu göbeği, Göbek
Amanita ovoidea	Beyaz mantar	*Pleurotus eryngii*	Çakşır mantarı
Armillaria mellea	Bal mantarı	*Pleurotus ostreatus*	Kavak-İstiridye mantarı
Boletus edulis	Ayı mantarı	*Ramaria* sp.	Gelin teli
Cantharells cibarius	Tavuk ayağı	*Rhizopogon* sp.	Domalan
Chroogompus rutilus	Geyik mantarı	*Russula delica*	Akçıntar
Coprinus comatus	Mürekkep mantarı	*Suillus bovinus*	Öküz mantar
Craterellus cornucopioides	Borazan mantarı	*Suillus collinitus*	Sünger mantarı
Fistulina hepatica	Ciğer mantarı	*Suillus luteus*	Kaypak mantar
Hydnum repandum	Sığır dili	*Sparassis crispa*	Karnabahar mantarı
Lactarius sp.	Çıntar, Melki, Kanlıca	*Terfezia claveryi*	Domalan
Lactarius blennius	Dilburan	*Tricholoma anatolicum*	Sedir mantarı
Lactarius volemus	Tirmit	*Tricholoma terreum*	Karaca, kara kafa
Laetiporus sulphureus	Kükürt mantarı	*Tuber* sp.	Domalan, yer mantarı



Figure 9. Some edible mushroom of Turkey. a. *Cantharells cibarius,* b. *Chroogompus rutilus,* c. *Laetiporus sulphureus,* d. *Lepista nuda,* e. *Lycoperdon perlatum,* f. *Macrolepiota procera,* g. *Suillus collinitus,* h. *Rhizopogon luteolus,* i. *Lactarius deliciosus*, j. *Amanita caesarea,* k. *Hydnum repandum,* l. *Craterellus cornucopioides*

4. CONCLUSION

Mushrooms have been collected since ancient times by people for several reasons. Recent years, mushroom collecting has an economical importance. In the present time, wild growing mushrooms are collected to earn money more than 80 countries (Boa, 2004), and Turkey is one of the mushroom exporter country. Turkey has earned nearly 189 million American Dollars between 2000 and 2015 years by external trade of cultivated and wild growing mushrooms (this value was calculated by difference of exportation and importation rates). This revenue is much higher several circle of trade. But, it can be said that Turkey might earn more than this revenue, because she has much more economically important mushroom taxa such as *Lepista nuda*, *Lactarius* sp. *Sparassis crispa* etc. For this, local people should be educated about mushrooms. Several activities about mushroom collection have been carried out locally. Morel Feast is an example of this educational activity in Fethiye (Muğla) province. In this feast, some seminars about mushrooms have been given by experts. In these seminars, general information about mushroom and mushroom hunting rules are introduced to local people. Also, mushroom hunting activity is conducted and information about mushrooms given in seminars is applied in the field study. Similarly, Morel mushroom soap is prepared for the participant and preparation of this soap in the feast is given in Figure 10.



Figure 10. Morel feast from Turkey, a. Morels collected by local people b. Preparations of Morel soap for participants, c. Morel collection rules

Education activities about mushrooms are important in order to protect next generations of them. For example, there is no rule for collecting *Tricholoma anatolicum* which is considered as an endemic species of Turkey and its mycelia cords are damaged by collectors (Doğan & Akata 2011). So, it is necessary to be monitored of their populations for its sustainability.

Edible mushrooms should be introduced local people for economical purposes. Mushroom hunting is a trend which is rising as worldwide for its taste recent years. Especially, mushrooms hunting should be supported with protection policy by government in Turkey.

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