



## Harvest Amounts and Economic Value of the Acorn in Turkey<sup>□</sup>

S. Çizgen<sup>1,\*</sup>, G. TUTTU<sup>1</sup>, S. URSAVAŞ<sup>1</sup>

<sup>1</sup>Çankırı Karatekin Üniversitesi, Orman Fakültesi, Orman Mühendisliği Bölümü, 18000, ÇANKIRI

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\*Corresponding author's e-mail address:  
simgecizgen@karatekin.edu.tr

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### ABSTRACT

Acorn is consumed as food in some Mediterranean and European countries (Italy, Spain). It is rich in primary metabolites (protein, carbohydrate and various oils) and contains various secondary metabolites such as phenolics and alkaloids. In Turkey, the first records of acorn harvest backs to 1989 according to the data received from General Directorate of Forestry, Department of Non-Wood Products and Services. In 1989, for the first time, 9.000 kg acorn collected and 360 ₺ income gained in the region of The Forest Regional Directorate Balıkesir. According to the same data, 1.000 kg

cupula and cupula scale of *Quercus* were gathered from Mersin Forest District Directorate and 260 ₺ were obtained for the first time in 1990. Occasionally it appears that oak leaf and bark are found in the economy. Acorn has been harvested from the Forest Regional Directorate of Bursa, Balıkesir, Konya, Antalya, İzmir, Denizli and Isparta. Maximum amount of acorn harvested from the Forest Regional Directorate Isparta was 746.000 kg, and minimum amount was 500.00 kg in the Forest Regional Directorate of Bursa.

**Keywords:** Ethnobotanical, Forest Regional Directorate, *Quercus* sp.

## Türkiye'deki Meşe Palamudunun Hasat Miktarları ve Ekonomik Değeri

### ÖZ

Meşe palamudu, İtalya ve İspanya gibi bazı Akdeniz ve Avrupa ülkelerinde gıda olarak tüketilmektedir. Palamut, primer metabolitler (protein, karbonhidrat ve çeşitli yağlar) açısından oldukça zengindir ve ayrıca fenolik ile alkaloidler gibi çeşitli ikincil metabolitleri bünyesinde barındırır. Orman Genel Müdürlüğü, Odun Dışı Ürün ve Hizmetler Daire Başkanlığının 1989-2016 yılları arasındaki verilerine göre ilk meşe palamudu hasat verileri 1989 yılında 9000 kg ve 360 ₺ ile Balıkesir Orman Bölge Müdürlüğünden elde edilmiştir. Devam eden süreçte palamut tırnağı ve kadehi, ilk kez 1990 yılında 1.000 kg ve 260 ₺ ile Mersin Orman Bölge Müdürlüğünde kaydedilmiştir. Hasat verilerine göre zaman zaman meşe yaprağı ve kabuğu da ekonomide yer almıştır. Şimdiye kadar meşe palamudu hasat verilerinin; Bursa, Balıkesir, Konya, Antalya, İzmir, Denizli ve Isparta Orman Bölge Müdürlüklerinden elde edildiği görülmektedir. Değerlendirme sonucunda en çok hasat verisine sahip Orman Bölge Müdürlüğü 746.000 kg ile Isparta iken en az hasat verisine sahip Orman Bölge Müdürlüğünün 500 kg ile Bursa olduğu görülmüştür.

**Anahtar kelimeler:** Etnobotanik, Orman Bölge Müdürlüğü, *Quercus* sp.

### 1. Introduction

The *Quercus* L. (Oak), which belongs to Fagaceae family and one of the three genus that naturally grows in our country, is an important forest

tree that is widely distributed in the temperate and subtropical regions of the northern hemisphere. *Quercus*, which has 350-500 species in the world, has a total of 24 taxa in our country with 17 species, subspecies and varieties. Four of these taxa are

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endemic.

Oaks are deciduous or evergreen trees or shrubs. Buds spirally arranged; leaves have various appearances, sessile or petiolate, pinnatifid, serrate, dentate or lobed. Lobes rounded at tips or pointed with aristate tips, rarely entire. Flowers monocious. Fruit a nut (acorn), maturing in 1 or 2 years, subglobose to oblong or cylindrical, surrounded at base or nearly enclosed by cupule. Cupule covered outside with numerous imbricate scales (short or long, thin or thick). Acorn sweet or bitter to taste and called as “palamut” or “pelit” in Turkish (Hedge and Yalırık, 1982; Yılmaz, 2014).

Acorn has an important place in various usage fields and economy. *Quercus ithaburensis* Decne subsp. *macrolepis* (Kotschy) Hedge, *Quercus robur* L., *Quercus cerris* L. are species with economic value. In Turkey, *Q. ithaburensis* subsp. *macrolepis* has an area of 142.293 hectares (OGM, 2017). In this context the aim of this study Using General Directorate of Forestry, Department of Non-wood Products and Services between 1989-2016, it is aimed to reveal the amount of hardwood production and the income earned, at the same time emphasizing the importance of the materials it contains and its usage areas.

## 2. Ethnobotanical uses

Acorns of the oak species, which are important species of the Fagaceae family have been the subject of many fields, especially traditional medicine due to the polyphenolic compounds (flavonoids, pseudotannins, tannins). Extracts of *Quercus* species and compounds obtained from these extracts were found to be antimicrobial, antiinflammatory, antioxidant, gastroprotective and anticancer (Baytop, 1984; Şöhretoğlu and Sakar, 2004). Acorns of the species of *Q. robur*, *Q. coccifera* L., *Q. ilex* L. and *Q. vulcanica* (Boiss.Heldr.ex) Kotschy contain gallic acid (10-20%), gallic acid, coloring matter and bitter substances and have a strengthening and antiseptic effect. It is used internally against diarrhea, externally in throat diseases as mouthwash. In addition, poisonings caused by alkaloids, copper and lead salts are prevented from passing through the blood by drinking infusion prepared from the crust (Baytop, 1984). Species used in the treatment of acorns are *Q. ithaburensis* subsp. *macrolepis*, *Q. robur* and *Q. cerris*. About 3 to 5% gallic acid-bearing acorns are used in stomach diseases, antidiabetics, inflammatory diseases and diarrhea (OGM, 2017; Şöhretoğlu et al., 2012; Leporatti and Ivancheva, 2003; Tuzlacı, 2006). *Q. ithaburensis* subsp. *macrolepis* cups and acorns are used for respiratory tract disorders and influenza treatment

(Sargın et al., 2013). The *Q. coccifera* is used in the treatment of candidiasis, haemorrhoids and kidney stones, as well as external burns (Tuzlacı, 2006). The brown acorns of *Q. cerris*, which is commonly known as Red Oak or Hairy Oak, used as stain and branches of its used as made of the broom. *Quercus infectoria* Oliver subsp. *infectoria* which is named as Oak, Shrub Mash, Mazi Shrub or Mazi Oak. The taxon is used as stain (Polat et al., 2013).

Oak acorns are consumed as food in some Mediterranean and European countries. It is rich in primary metabolites (protein, carbohydrate and various oils) and also contains various secondary metabolites such as phenolics and alkaloids. In this context, *Q. cerris* (Turkish vein) and *Q. robur* contain unsaturated fatty acids such as omega 3 and  $\alpha$ -linoleic acid (Bernardo-Gil et al., 2007; Rakic et al., 2007). At the same time, it has been determined that the bonito oil obtained by various techniques contains oleic acid, palmitic acid, stearic acid, linolenic and linoleic acid (Al-Rousan et al., 2013). In the literature review, it is seen that one of the active ingredients of the tannins, ellagic acid, has blood-clotting and blood pressure-lowering effects (Ratnoff and Crum, 1964). Especially abroad, it was also found that the tannic acid present in the body acts as an antidote against snake and insect poisoning. It has also been shown in laboratory investigations that it has an immune system potentizing effect and regulates insulin secretion. To develop methods that can be used at the active level and to create a lasting positive effect, studies supporting the clinical findings are needed (Kuppusamy and Das, 1993).

Tannin which is found especially in *Q. ithaburensis* subsp. *macrolepis*, shows its ability to be hydrolyzed, is often used in sepsis (tanning). Tannin is different in each organ of the plant. Gallic tannins are found in the cupule and cupule scale, while tannins in the acorn are lower. The rate of tannins in the cupula of oak is quite high. This ratio is shaped by the characteristics of the plant and the characteristics of the growing environment (OGM, 2017). *Quercus brantii* Lindl, one of the important species of the red oak group with wide spread in the south and eastern Anatolian regions in our country and contains active ingredients in the form of p-comeric acid, gallic acid, quercetin, epiktesin, methyl gallate, routine and elagic acid (Çoruh et al., 2014). In another study, it was found that the active ingredients of the *Q. brantii* strain were protective against liver and pancreatic damage caused by diabetes (Yaman and Doğan, 2016).

### 3. Economic value

The data of acorn, cupula and cupula scale of *Quercus*, which are important for Turkey as non-wood products and medicinal aromatic plant were gained from Republic of Turkey General Directorate of Forestry, Department of Non-Wood Products and Services and literature survey were the main sources of this study and these data were used for determining the harvest and income amount of these oaks. Tables were used to determine harvest (kg) and income (₺), which were carried out depending on years. One American dollar (\$) is equivalent to approximately 5.37 Turkish Lira (₺).

*Quercus* (Oak), a member of the Fagaceae family, is known to 17 natural species in Turkey. Both of wood and fruit have wide use areas. The aim of this study was to review the use of this species in different areas in Turkey. The production, income, and use of acorn will be discussed, as well. The Cork Oak (*Quercus suber* L.) is of great economic importance in forestry of Turkey. The fungus has a flexible structure in its form. It is resistant to severe working conditions and is subject to many sectors. It has a fourteen square shaped cellular structure that blocks air and is a fairly light product that does not leak liquids and gases, does not break or crush, and protects the natural flexible form at high speed. *Q. suber*, approximately lives two hundred years old and it has been found to have an appropriate age range of 50-150 with a high quality (Günel, 2006).

### 4. Results

Acorn harvest, cupula and cupula scale of *Quercus* harvest amount and income received between 1989 and 2016 are given in Table 1 and 2 (Source: Republic of Turkey General Directorate of Forestry, Department of Non-Wood Products and Services). According to the data of 27 years, the total amount of harvest of acorn was 1.299.165 kg and the income was 452.165 ₺. In Table 2, cupula and cupula scale of *Quercus* were first recorded in Mersin Forest District Directorate. 1.000 kg product was yielded and 260 ₺ was obtained from this harvest in 1990.

Table 1. Acorn harvest amount and income received.

General Directorate of Forestry	Harvest (kg)	Income (₺)	Years
Denizli	5.000	-	2016
Konya	1.000	50	2014
Bursa	500	15	2011
İzmir	194.105	3.882	2008
İzmir	3.000	60	2006
Isparta	746.000	249	2006
Antalya	51.150	1.020	2003
İzmir	41.080	28.756	1997
Antalya	63.000	25.200	1997
Antalya	144.000	28.800	1996
Antalya	41.330	4.133	1994
Balıkesir	9.000	360.000	1989
TOTAL	1.299.165	452.165	

According to Table 1, the first data on the acorn harvest were recorded in Balıkesir Forest District Directorate in 1989, 9.000 kg was harvested and 360 ₺ was obtained.

Table 2. Cupula and cupula Scale of *Quercus* harvest amount and income received.

General Directorate of Forestry	Harvest (kg)	Income (₺)	Years
Balıkesir	7.000	140	2008
Balıkesir	3.400	102	2006
Balıkesir	77.200	1.312	2005
İzmir	5.600	95.200	2005
Balıkesir	14.900	223.500	2003
İzmir	8.333	50.000	2001
Mersin	1.000	260.000	1990
TOTAL	117.433	630.254	

### 5. Discussion

The geographical location of Turkey provides favorable conditions for the growth of medicinal and aromatic plants. This situation should be considered as an opportunity that can be transformed into an advantage for our country. Medical aromatic plants are the basis of products used in various fields such as medicine, cosmetics, pharmacology and food. Turkey flora is therefore of paramount importance. Many kinds of species, which have commercially important spreading naturally in the Mediterranean, Southeastern Anatolia, Marmara, Eastern Black Sea regions, and mainly in the Aegean region (Faydaoğlu and Sürücüoğlu, 2011). In these regions, important species can be identified and meetings on the subject can be organized to increase the public awareness. The main aim should be to reduce the most harmful damages that may result from unconscious approaches by hanging interesting

banners describing the importance of plants on the important centers of the city.

Especially when the studies in the 1990's are examined, there are contradictions about the health effects of tannin active substances. Some researchers have claimed that they have anti-cancer properties, while others have claimed that they increase cancer risk. Various research and scientific publications, which were performed between 2010 and 2015, revealed that the active ingredients of tannin had the anti-cancer, anti-bacterial and anti-inflammatory effects. But more research is needed to explain these contradictory statements.

In addition to the traditional usage areas of the oaks in medicine, usage of oaks as alternative renewable resources to fossil fuel consumption was reported in the literature in recent years. It has been concluded that the use of liquefied oak wood as fuel is more effective than that of raw solid wood in a study, which was performed in 2016 (Yoğurtçu and Kamışlı, 2016). There are also surveys that study the resistance levels of oak wood. It was also shown that wood of *Quercus hartwissiana* Stev. (Istranca oak) the oak shows a dense structure and quite high level of resistance (Dündar, 2002). The most important input to this situation in forestry will be in industrial restructuring areas.

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