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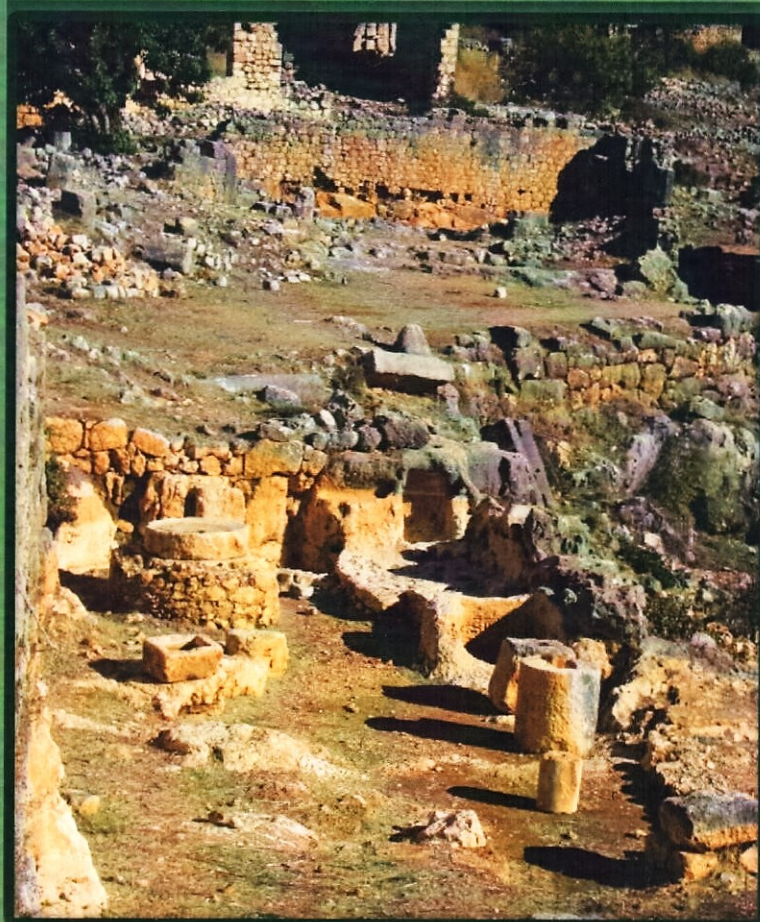
OLIVE OIL AND WINE PRODUCTION IN EASTERN MEDITERRANEAN DURING ANTIQUITY | ANTİKÇAĞ'DA DOĞU AKDENİZ'DE ZEYTİNYAĞI VE ŞARAP ÜRETİMİ

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**OLIVE OIL AND WINE PRODUCTION IN EASTERN MEDITERRANEAN DURING ANTIQUITY
ANTİKÇAĞ'DA DOĞU AKDENİZDE ZEYTİNYAĞI VE ŞARAP ÜRETİMİ**

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Olive Oil And Wine Production in Eastern Mediterranean During Antiquity

Antikçağ'da Doğu Akdenizde Zeytinyağı ve Şarap Üretimi

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Food technology/Drink technology/Eastern Mediterranean

II. Şarap üretimi/Dođu Akdeniz/Antik çağ
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Olive oil production/ Eastern Mediterranean/Antiquity

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Terebinth and Terebinth Oil Production in the Ancient Period

Ersin DOĞER
Yusuf SEZGİN

Özet

Antik Dönemde Menengiç ve Menengiç Yağı

Menengiç (*Pistacia terebinthus*) Akdeniz ve Batı Asya'nın tipik bir bitkisidir. Anadolu'nun önemli bir bölümünde yetişen Menengiç ağacı, yaklaşık 120 kilometre karelik, adına günümüzde Yund Dağları Antik Dönemde ise Aspodene adı verilen volkanik kayalıklarda ve özellikle Aiolis bölgesinin iç kesimlerinde yaygın olarak görülmektedir. Arkeolojik bulgular menengiçin eski çağlardan beri gıda olarak kullanıldığını göstermiştir. Yund Dağları üzerindeki köylerde, menengiç yağı yakın zamana kadar en yaygın yemeklik yağ olarak kullanılmıştır. Setlik Köyü'nde korunan ve elektrik motorunun kullanılmadığı bir menengiç yağı atölyesi üretimin nasıl yapıldığı konusunda önemli bilgiler sunmaktadır. Zeytinyağı ve menengiç yağı üretiminde kullanılan yöntemler birbirine oldukça yakındır. İç Aiolis bölgesi gibi kırsal alanlarda ele-geçen yağ üretimine ilişkin elemanların, sadece zeytinyağı için değil aynı zamanda menengiç yağı için de kullanılmış olabileceğini göz önünde tutmak gerekmektedir.

Key Words: Aigai, Aspodenen, Terebinth Oil, *Pistacia Terebinthus*, Menengiç

Just as it is today, viticulture and olive production was important in the ancient period in the Aeolis Region located between the Izmir Bay and the Edremit Bay, housing fertile plains watered by rivers such as Hermos (Gediz), Pythikos (Güzelhisar) and Kaikos (Bakırçay)¹. During the surface surveys carried out in the region, many fragmental and immobile archaeological findings regarding wine and olive oil production were brought to light². In addition, there are many terebinth trees located in the inner parts and the highlands of the Aeolis Region. Especially the Yund Mountains (Aspodenen) and Dumanlı Mountains (Sardene), on which Aigai is also situated, are densely populated with terebinth trees (fig. 1). Terebinth oil workshops still exist in the region today and they continue to use the same production technology which is similar to that of olive oil used in the ancient period.

Terebinth (*pistacia terebinthus*) is a typical plant of the Mediterranean and of Western Asia³. It had been given different local names in different parts of Anatolia such as menengiç, çöğre, çetlemik, çıtlık, sakız ağacı (mastic) and yabani fıstık (wild pistachio). Terebinth, which is from the *Anacardiaceae* family (sumac family), is approximately 6-9 m tall and sheds its leaves in the winter. The flowers, which bloom in March and April on the shoots of the previous year, have a reddish purple color, while the globular drupes are bluish green when they mature (fig. 2). In Turkey, terebinth can be found on rocky and hilly terrains on the coast, in the Kızılırmak and Yeşilirmak Valleys in Northern Anatolia, in the lowlands of Southeastern Anatolia and in the pine forests on the Taurus Mountains, in altitudes up to ca 1600 m. There are approximately 66 million wild pistachio trees in Turkey⁴.

The young shoots and the fruit of the terebinth tree are used in alimentation. The fruit can be used as an appetizer or it can be consumed as coffee or tea. Although nothing has been scientifically proven, various sources account for the many benefits of the fruit. The gum or resin of the tree seeps out naturally or it can be obtained by tapping the branches. This gum has a honey-like texture, a yellowish or greyish color and a pleasant scent and it is called terebinth gum (*terebentin chiotica*).

¹ Doğer 2004, 168.

² Erkanal Öktü-İren 2004, 246-248.

³ For extensive information on terebinth (*pistacia terebinthus*) see: Janick-Paull 2008, 20-23.

⁴ Özuslu *et al.* 2009, 100.

The gall formed by insects on the leaves are used in dyeing precious silk material, giving color to wine and as an incense substance. The ornithologists consider the oily seeds of this tree to be a very good energy source for the birds' autumn migration. The roasted oily seeds are still consumed on long winter nights accompanying pleasant conversations.

Since the terebinth tree has a very strong root system, it can easily grow in the most unsuitable places and situations. Besides being the dominating plant type in rocky and stony areas, it is also the most common pistachio species found in Turkey⁵. 48 kinds of terpen compounds were determined in the essential oil which has been identified to be 0.73 % based on the dry weight of the mature terebinth fruit. It has been suggested that the terpen compounds have important roles in preventing various illnesses⁶.



Fig. 1 Terebinth and wild olive trees on the southern part of the Gün Mountain where Aigai is located (Photograph: Archive of the Aigai Excavations).



Fig. 2 The young shoots, blooms and fruit of terebinth (*pistacia terebinthus*) (http://www.bgflora.net/families/anacardiaceae/pistacia/pistacia_terebinthus)

Archaeological Data

Pollen analyses have proven that the *Pistacia* genus has been an important part of the Mediterranean flora since the Late Pleistocene Period⁷. The archeobotanical researches carried out during archaeological excavations have shown that the terebinth fruit has played a role in alimentation since the Neolithic Period⁸. The earliest *pistacia terebinthus* examples in Anatolia were found in the Öküzini and Karain B Caves (15000 BC) and these samples have been identified as wild pistachia⁹. It has been determined that terebinth has existed in Dja, Jerf al Ahmar and Halula located in the north of Syria since the 9800's BC¹⁰.

Pistacia fruit dated to the Mesolithic period (ca 10000 BC) was found in the Franchiti Cave in Greece¹¹. The C14 analysis carried out on the terebinth found in the Abrigo del Pozo settlement situated in southwest Spain

⁵ Özuslu *et al.* 2009, 103.

⁶ In a research published on the official website of the Agricultural Research Service unit (ARS) of the United States Department of Agriculture (ASDA) (<http://www.ars-grin.gov/duke/>), it was noted that the compounds in the terebinth essential oil play an important role in preventing many diseases such as cancer, Alzheimer, etc. It has been determined that the limonin substance found in abundance (~% 95) in the oil obtained from orange peel and in the terebinth fruit prevents pancreas cancer by stopping the cancerous cells to increase and prevents stomach cancer by increasing the death of the apoptosis programmed cells and also by decreasing the DNA synthesis. It has also been suggested that on various animal models the limonin substance prevented the formation of skin, breast, kidney, lung and foregut cancer, which are triggered off by chemicals.

⁷ Riehl 1999, 5.

⁸ Perlès 2001, 17.

⁹ Martinoli 2009.

¹⁰ Willcox 1996, 146, Tab.1; 147, Tab. 2.

¹¹ van Andel-Sutton 1987, 57. 11000 *pistacia* fruit was found in the Franchiti Cave, all dating to the Paleolithic and Neolithic Periods. It has been noted that *pistacia* was used from 10500 BC onwards in the Thessalia Region. Peachey 1995, 89. Terebinth seeds were uncovered in the Late Neolithic – Early Bronze Age strata (4775-2200 BC) excavated in Mandalo located in Western Macedonia. Valamoti-Jones 2003, 6 Tab.1; 7 Tab.2; 8 Tab.3; 9 Tab.4., 10. The researches carried out in Cyprus have proven that terebinth existed there since the Prepottery Neolithic Period. Murray 1998, 318, Tab. 23.1; 319, Tab. 23.2; Murray 2003, 61, Tab. Kissonerga, Khirokitia, Kalvassos-Tenta, Cape Andreas Kastros and Dhali-Agridhi are the locations dated to the Prepottery Neolithic Period in Cyprus where the *pistacia* fruit was found. Murray 1998, 328, Tab. 23.3.

indicate ca 6000 BC¹². Archaeobotanical researches carried out in settlements dating to the Neolithic period in the southwestern part of Bulgaria have shown that the terebinth fruit played an important role in daily nutrition in the Early Neolithic Period (6159-5630)¹³. Limenaria¹⁴ on the Thasos Island and Makriyalos¹⁵ near Thessaloniki are among the other centers where terebinth examples of the 5th millennium BC have been unearthed.

Resin is one of the most important products of the terebinth tree and it can be obtained from four different types of the *pistacia* genus (*P. atlantica*, *P. khinjuk*, *P. lentiscus* ve *P. terebinthus*)¹⁶. Ancient writers also give information on *turpentine*. The terebinth tree and its fruit are called *terminthos* in Greek, and *terebinthus* in Latin. The resin of this tree is identified by the words *retine termintine* in Greek and *resine terebinthina* in Latin¹⁷. Theophrastus used the term “*terminthos - τερμινθος*” for turpentine¹⁸ and Plinius¹⁹ used “*resina terebinthina*”²⁰.

Archaeological data provide very extensive information on the use of this resin in the ancient period. It is not possible to clearly distinguish the rather similar *Pistacia lentiscus* (mastic tree – μαστίχα) and *pistacia terebinthus* (menengiç) from one another with chemical analysis. Therefore the general term *pistacia* resin has been used for the remains of resin from the ancient period, found in various areas. Resin was very often mixed with wine in the ancient period. The earliest known example of this is from Hacı Firuz Tepe, located in the northwestern part of the Zagros Mounrains in Iran. *Pistacia* resin mixed with wine was identified inside large jars dated to 5400-5000 BC²¹.

The most important resin finding from the ancient period was approximately one ton of resin cargo, found in 130 Phoenician amphorae in the Uluburun Shipwreck (near Kaş), dated to the 14th century BC. The mentioned amount is the largest amount to have been archaeologically identified to the present day²². As a result of various analyses, *pistacia* resin was found in Phoenician amphorae and local production bowls dated to the XVIII Dynasty Period found in Egypt Tell el- Amarna²³. The archaeological data obtained until the present day have proven that Phoenician amphorae frequently carried *pistacia* resin.

Terebinth was determined among the trees that were used in the West House dated to the 17th century and located in Thera²⁴. The archaeobotanical examinations carried out on the pollen samples unearthed during the archaeological excavations and sight surveys in the Messenia Region have verified that *pistacia terebinthus* (terebinth) was among the dominating species in the region also in the Mycenaean Period.²⁵ Resin of *pistacia terebinthus* was determined in the 8 transport amphorae found in a shipwreck dated to the 4th century BC, located on the coasts of Chios²⁶.

The information provided by ancient writers do not give clear data regarding terebinth oil. The only existing information on terebinth oil production in the Ancient Period is from a text attributed to Aristotle²⁷. Xenophon²⁸ (τερμίνθινον), Dioscorides²⁹ and Theophrastus³⁰ mention that a nice scented oil (perfume) and balm was

¹² Sánchez-Gómez *et al* 2011, 111.

¹³ Popova-Marinova 2007, 502; Marinova-Thiebault 2008, 227.

¹⁴ Megaloudi 2006, 63.

¹⁵ Valamoti 2011, 4-5.

¹⁶ Colombini-Modugno 2009, 16.

¹⁷ Dalby 2003, 323-324.

¹⁸ Theophrastus *H.P.*, III.3.1; V.3.2.

¹⁹ Plin. *nat.*, 13.2.8-9.

²⁰ Thiselton Dyer 1905, 54.

²¹ Golan Goldhirs 2009, 69.

²² Pulak 1988, 11. As a result of the analysis, it was determined that the resin in question was from the west of the Dead Sea. Yalçın *et al* 2006, 584.

²³ Stern *et al.* 2003, 458; Stern *et al* 2008, 353.

²⁴ Bottema Mac Gillavry 2003/2004, 109; Doğer 2004, 81.

²⁵ Palaima 2000, 17.

²⁶ Foley *et al* 2009, 297; Foley *et al.* 2012.

²⁷ Aristot. *Mir. aus.* 837^a.88.30.

²⁸ Xen. *an.* 4.4.13.

²⁹ Diosc. 1.58.3.

³⁰ Theophrastus *H.P.*, III.3.1 – 4th century BC.

obtained from terebinth³¹. It has been suggested that *Ki-ta-no* cited in the Linear B tablets among the plants from which oil was extracted, is the fruit of terebinth (*pistacia terebinthus*)³². It has been agreed that *Ki-ta-no* was an industrial plant used in perfume oil production in the Mycenaean Period³³.

Since refined oils did not exist in some parts of Anatolia until 50 years ago, terebinth oil was an important element in food culture. Besides the use of terebinth oil in the kitchen, it is known that this oil was added to a cauldron of water in order to be rubbed on to the body for oil wrestling³⁴.

The researches have revealed that the terebinth is an oil-rich fruit³⁵. It has been registered that terebinth contains 58-60 % oil and that this oil is rich in oleic, linoleic and palmitic oil acids³⁶. According to the evaluations, 20-25 kg of terebinth oil can be obtained from 100 kg of fruit. The fruit of terebinth, which is the only species among the pistacia genus which is used in oil production, reach their maturity in August- September. The matured and darkened fruit is then picked either in bunches by breaking off the branches or they are knocked off the branches and dropped on the cloths spread beneath the tree.

The Seklik Village Terebinth Oil Workshop

There is a workshop that produces terebinth oil in the village of Seklik, located within the borders of Bergama, on the Yund Mountains (Aspordenen). The Seklik oil production workshop, which is situated 7 km air distance to Aigai, provides for a small number of people with all its components (fig. 3). A certain oil press technology, whose foundations were layed in the ancient period and continued without much change until the appearance of the electrical motor, was used in the terebinth oil workshop in Seklik. This terebinth oil production technology, which completely depended on man power, is almost the same as the technology used for olive oil production except for the roasting procedure of the terebinth fruit after being crushed into a paste consistency in the mill.

The first phase of terebinth oil production is the crushing. The crushing phase is the same for both olives and terebinth. First of all the terebinth is crushed with a volcanic crushing stone (fig. 7a-b) rotated by man power until it becomes a paste. During the crushing phase a second person following the person who is turning the millstone lifts the terebinth stuck to the bottom of the vessel with a pointed scraping tool (fig. 4).

After the crushing phase, the terebinth is roasted, ready for the oil to be extracted. It differs from olive oil production only with this phase. The crushed terebinth that is now ready to be roasted, is poured onto an metal sheet which has an opening for the fire to burn beneath it (fig.7c-d). The center of the terebinth is then cleared, water is added and it is then mixed (fig. 5a-b). There is no certain measure for the amount of water. The village ladies who become experts in time estimate the amount of water just by looking. Next, the fire that was prepared in order to give a very strong and high heat is lighted. The most important phase of terebinth oil production is the roasting. If the amount of water is not enough and the roasting is not sufficient, then oil can not be extracted from the fruit. The paste-like mixture is mixed continuously throughout the whole roasting process that takes approximately 20-25 minutes (fig. 5c). The mixing is done with a disc-shaped round and flat spade.

The terebinth paste is filled into sacks after reaching the right consistency and is taken to the press (fig. 5d). Until very recently flat cloths made of goat hair was used for this process. The terebinth paste was spread on the cloth and the edges were folded on top of one another creating a triangular shape. The terebinth paste placed in the sack is then tightly compressed with the help of a mallet (fig. 6a). The sacks that are now ready to be pressed are placed on the press bed of the direct pressure screw press (single screw press)³⁷. A metal ring is placed around the sack to prevent the oil spreading around during the pressing phase. Afterwards, a weight which is obtained from the terebinth tree itself (locally called *bağa*) is placed on top and the pressing begins (fig. 6b). The whole mechanism used in the press system (the press beam – *prelum*, press tray, press lever etc.) are all made of the terebinth tree itself (fig. 8).

³¹ Theophrastus obtained a part of his information on *pistacia* from the examples that grow on the Kaz Mountains (ancient Ida Mountains) This fact indicates that terebinth was among the dominating plant species of the northern part of Western Anatolia. See Negbi 1995, 323.

³² Chadwick 1976, 120; Melena 1983, 91.

³³ For detailed discussions on this subject see Peachey 1995, 130-134.

³⁴ http://www.isaalan.org/viewpage.php?page_id=21.

³⁵ Couladis *et al.* 2004, 242; Kivçak *et al.* 2004.

³⁶ Agar *et al.* 1995.

³⁷ The direct pressure screw press, whose archaeologically earliest examples have been dated to the 2nd century AD, were widely used in the Late Antiquity. Decker 2007, 80-82, fig. 4.

In the first phase of pressing the turning lever is placed in the hole located on the bottom tip of the screw (fig. 6c) The screw is then turned until it becomes difficult to turn. In the second phase the pressure is increased with a winch attached to the base and top (fig. 6e). At the end of the pressing phase a pure oil is obtained (fig. 6d). It is not necessary to do any filtering or straining process as is done for olive oil.

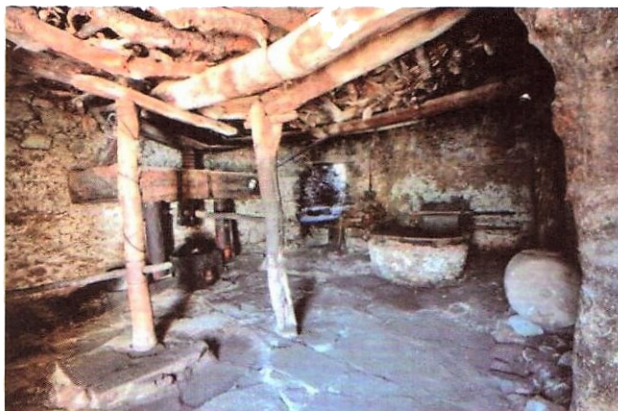


Fig. 3 General appearance of the Seklik terebinth oil workshop.

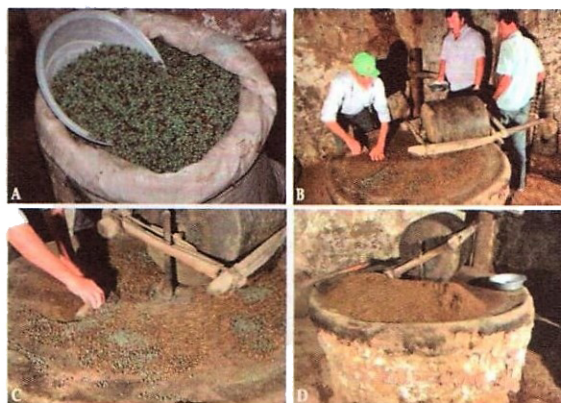


Fig. 4A Terebinth fruit ready to crush. B - D The crushing of terebinth

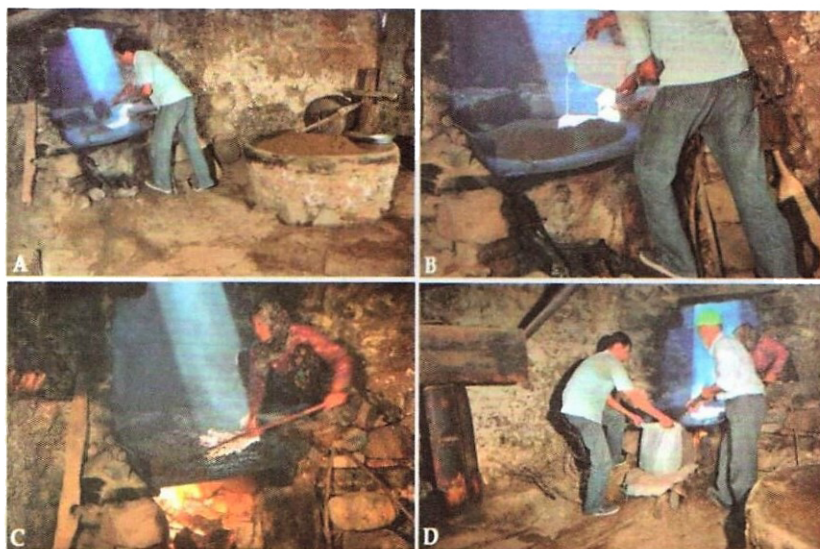


Fig. 5A Transferring the crushed terebinth on an iron sheet. B Adding water to terebinth. C. Roasting terebinth. D. Filling sacks with roasted terebinth.

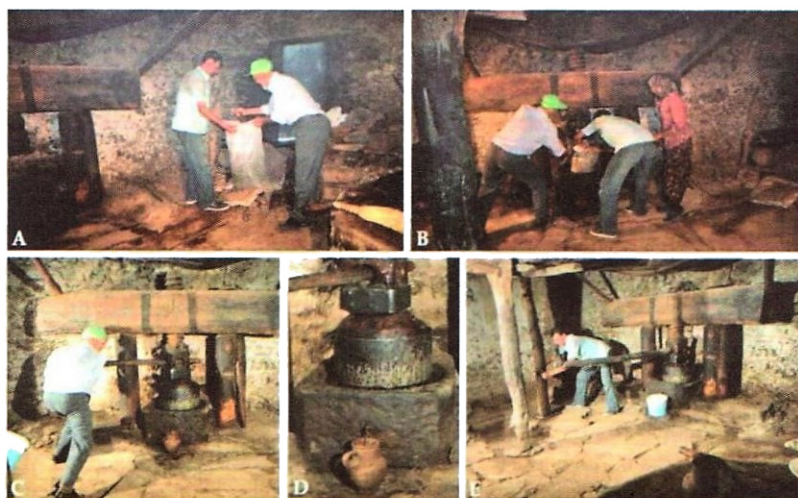


Fig. 6A Pressing the terebinth down with the help of a mallet. B Placing terebinth on the press bed. C Pressing with the help of the press lever. D Pure terebinth oil pouring out while pressing. E Pressing with the help of a winch.

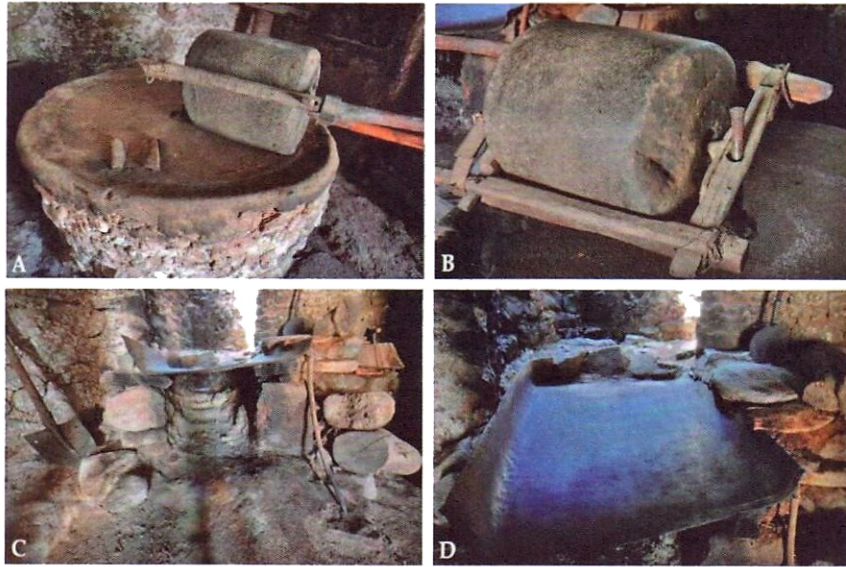


Fig. 7 A Grinding vat and crushing stone. B Crushing stone. C Fire. D. The iron sheet where roasting takes place.

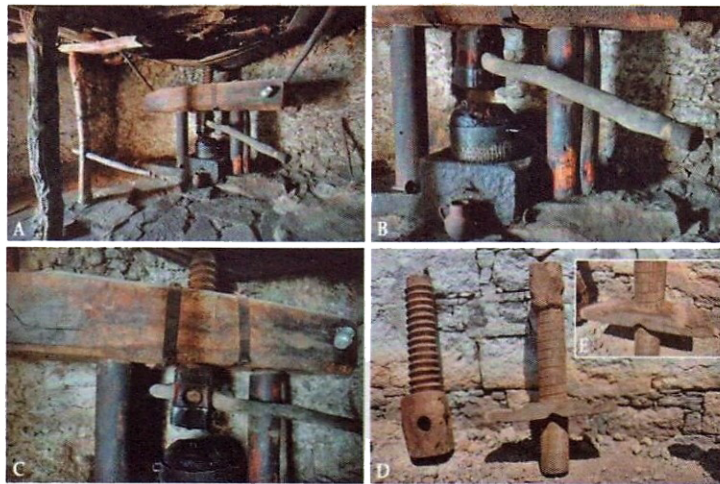


Fig. 8 A Press. B Detail of a press. C Press beam and worm screw. D An old worm screw and an unfinished worm screw. E. Detail from the unfinished worm screw.

Conclusion

The Seklik terebinth oil production workshop located in the inlands of the Aeolia Region, close to Aigai, indicate that the oil of the terebinth fruit was extracted in order to be used with various purposes. It can be put forward that terebinth, which can be archaeologically traced back to the Neolithic period, has been used for its oil in the Aeolis Region since the Ancient Period. It should not be ruled out that certain elements (grinding vat, crushing stone etc.) that are generally associated with olive oil production found in the region, could also be indications to terebinth oil production³⁸.

³⁸ Seyhan Yıldırım and his family deserve the greatest acknowledgement for assuring the protection of the Seklik terebinth oil workshop and for looking after their cultural inheritance to this day. We would also like to acknowledge Dr. Nezih Aytacılar who meticulously took the photographs of the workshop and Research Assistant Baykal Başdemir for his help.

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