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Ethnobotanical Study on the Traditional Use of *Pistacia lentiscus* L. Among the Local Population of Northern Central-East Region of Algeria

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ABSTRACT

The botanical heritage of a region is an important resource for local people, which allows them to treat themselves with plants that have already been experienced from generation to generation for their benefits and effectiveness. The aim of this study was to highlight the different uses of lentisk pistachio products in the region of Jijel (Algeria). Systematic surveys have been carried out among different categories of people, by age group; have shown a growing interest in the use of medicinal plants. Two approaches (observation, and interview) were used to support this study, with an ethnobotanical worksheet, to obtain other recipes and more information on lentisk benefits and uses. The survey data processing showed that the lentisk is used for therapeutic purposes, to treat diseases of the skin (29%) and respiratory system (28%). The main and most used part of the plant is its berries. The plant is harvested in a spontaneous state and the picking of berries is done from November (in winter). Oil extraction is the principal preparation (72%). The use of resinous gum was not mentioned. Ten percent of surveys gave culinary recipes for some traditional meals preferred by Jijelians. The current study highlighted the ancestral practices and uses of the lentisk by Jijelians. It is necessary to develop this niche and promote its value chain in order to consolidate the economy of the local population.

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Introduction

The meaning of ethnobotany, is not in the data of botanical taxonomy, but is found in accordance with the botanical knowledge of peoples and in what it is organized. The botanical-scientific considerations are secondary and are primarily considered only for the purpose of elucidating the comparison between the two semantic systems. We still find with the linguist and botanist Harold C. Conklin (1926-2016), an American anthropologist, the same position: "ethnobotany is integrated into the humanities or social sciences" (Porteres, 1969). Ethnobotany is an interdisciplinary field, combining aspects of botany and ethnology, as well as many others. The subject has been approached from two perspectives: practical or utilitarian and philosophical (Bennett, 2010). Ethnobotany being a discipline encompassing ancestral knowledge (Toumi et al., 2015).

Mastic tree (*Pistacia lentiscus* L.), also called lentisk pistachio tree (Fig. 1), Derou or Tadist in local vernacular spelling, is generally a shrub of 1 to 8 meters high (Iauk et al., 1996). It belongs to the Anacardiaceae family, a cosmopolitan family that includes about 70 genera and more than 600 species (Bozorgi et al., 2013). It is distinguished from other pistachio trees by its evergreen foliage; the leaves of the compound type are paripinnate, ending in a pair of leaflets, while those of other pistachio trees end in a single leaflet. They are deciduous in winter, pale green and usually larger. The rachis bearing the leaflets is winged. The flowers are apetalous. The berry is a small red rounded drupe of about 5 mm, and then it becomes black. The seed is identical to pistachio trees but too small to be eaten. The inflorescence is a compound raceme, loose and as long as the leaves. Flowering stage takes place from March to May (Quezel and Santa, 1963).

The therapeutic qualities of this species have been known since antiquity. In ancient Egypt, it was used as an incense; it has also been used as a preservative, and breath sweetener (Akbar, 2020). The Egyptians used as well the mastic of *P. lentiscus* L. for embalming (De Pooter et al., 1991).

Figure 1. Lentisk shrub in fruiting phase
(Forest of Jijel, Algeria)

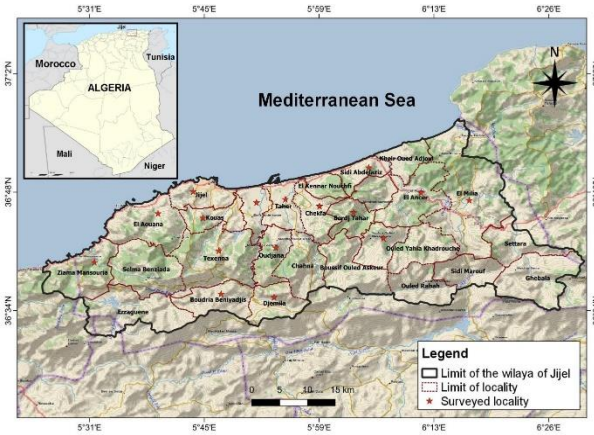

Figure 2. Geo-localization map of the study area

Dioscorides (1st century A.D.), one of the most famous medical authors of classical antiquity, gave detailed references to mastic and its numerous therapeutic effects (İsfendiyaroğlu, 2020). Different parts of *Pistacia* species, in particular the aerial part, including leaves, berries, and resin, have traditionally been used for a wide variety of purposes. Among them, *P. lentiscus* is most commonly used in different regions and its resin has been exploited for 5000 years ago (Bozorgi, et al., 2013). The incision of the stems induces the secretion of an oleoresin called "mastic", which has multiple medicinal uses. In the Mediterranean, the island of Chios provides mastic (maṣṭaka) or greek resin (al-ʿilk al-rūmī), which is the secretion of *P. lentiscus*. This gum is used in several forms in the pharmacopoeia, Abū Ḥanīfa al-Dīnawarī (d. av. 290/902-903) explicitly mentioned its use in duḫn, "in smoke" (Ducène, 2016). Young lentisk shoots are used for basketry. The leaves are used for tanning and dyeing black. The leaves are, together with the sumac of Sicily, used in Lyons for the dyeing of silks. The black color offers a particular shine and great solidity. The berries of lentisk have long been used by the natives for the extraction of oil for illumination and employed for the treatment of animal scabies (Trabut, 1935).

The chemical composition of lentisk essential oil includes Terpenes (30-40%): pinene, myrcene, sabinene; Sesquiterpenes (20%): cadinene, muurolene; Terpene alcohols (10%): terpinene 1 ol 4; Sesquiterpenols (5-10%): cadineol (Baudoux, 2017). The essential oil of oleoresin is also used in perfumery to make deodorants in cosmetics and as a flavoring agent in food preparations (Delazar et al., 2004).

According to a survey conducted in 2015 by the Algeria's National Institute of Agronomic Research (INRAA) with herbalists from the country's northern region, the most popular ways to market lentisk were just as oil, soap, and dried leaves intended for the preparation of herbal infusions. The herbalists assert that the lentisk oil of Jijel area was the most appreciated by users for its effective healing effects (Mazari et al., 2022). Therefore, the current work intended to identify the different uses of the lentisk pistachio tree and its derivatives by local people, particularly for the treatment of certain diseases in the study area.

Materiel and Methods

Study Area

The Jijel region (Figure 2) was chosen for its floristic diversity. This diversity is a very important resource for rural populations where a large proportion of them medicate with plants (Toumi et al., 2016). This area is known for its abundance in lentisk. The ethnobotanical survey was carried out in December 2017/2018 with 73 people (20 women and 53 men), at the level of the localities of the wilaya of Jijel: Jijel; El Aouana; Chekfa; El Milia; Kaous; Taher; El Ancer; Sidi Abdelaziz; Texenna; Ziama Mansouriah; Bordj Tahar; Ouadjana; Boudriaa Ben Yadjis; Djimla; Ouadjana. The survey was carried out among herbalists, employers, civil servants, farmers, as well as the training center for technical agents specialized in forests (CFATSF) Jijel, the city center of Jijel, the chamber of agriculture of the wilaya of Jijel, direction of forests, park of Taza, subdivision of the Directorate of Agricultural Services (DSA) of the wilaya of Jijel and stores.

Plant formation: Cork oak formation (Quercus suber)

Lentisk is found most often within cork oak formations. The cork oak spreads at the altitude between 750 and 900 m. It is more adapted to drought, and grows on uneven ground whose slope varies from 20 to 30%. Trees height ranges from 10 to 15 m. This practically impenetrable formation is due to the density of the undergrowth, which is characterized by xerophytic species such as heather, laburnum, myrtle and lentisk pistachio (*Pistacia lentiscus*). The height of this stratum reaches 3 m (Boubaker, 1996).

Ethnobotanical Survey

The survey conducted was based on descriptive statistics describing the main features of the distribution of important characteristics of the participants included in the study (Pickering, 2017) with a simple random sample.

The target population surveyed was constituted of adults classified into five age groups: 20~30, 31~40, 41~50, 51~60 and over 61 years old, divided between the two sexes. The sampling frame extends to the rural areas including villagers in contact with medicinal plants and herbalists in different localities of the wilaya of Jijel. The tool for our survey is a form reported by Toumi et al., (2016). The sampling technique was released through the distribution of the survey forms printed on paper.

The survey form comprises a set of questions, divided into two categories of data, namely:

- Descriptive characteristics of respondent (gender, age, level of education, family situation);
- Data about the surveyed plant (its uses, the type of diseases treated, the type of care practiced, the plant used part, the dosage and the form and the instructions for use).

The complete and well-informed survey forms were subject to an entry of all the collected data and were statistically analyzed by Excel spreadsheet.

The gathered data were processed and completed with graphic representations.

Results and Discussion

Information about the Plant

Etymology: Pistacia comes from the Greek words pistakê or Persian posta which designate “this shrub”. Lentiscus comes from the Latin lentus which means “viscous”(Lebrun, 2016). This tree is so called because it is grown for its aromatic resin, also known as mastic, mainly on the island of Chios, a Greek island in the Aegean Sea. The word mastic derives from the Greek verb mastichein (“to grind one’s teeth”, origin of the word masticate) or massein (“to chew”). This resin is also called “Tears of Chios” due to its shape (Benyoucef & Kerouaz, 2018). The vernacular plant name is pronounced Trou as in Arabic but instead of pronouncing it with the "D", Drou may be pronunciation Trou is easier for them (Trabut, 1935). The term Drou would have come from the Arabic word Dhara meaning sweat or wound: blood flowed from it that would hardly stop (Alankaa, 2016) referring to the release of resin from its trunk and branches.

Used part: Majority of respondents were accustomed users of leaves and berries (100%). In previous studies conducted in North-Estern region of the country, Beldi et al., (2021) reported in their ethnobotanical surveys carried out among local populations of El-Tarf area a high frequency of use of lentisk fruits (66%) for the artisanal extraction of fixed oil which is the most used product of the plant. Leaves were used occasionally according to their survey. Whereas Souilah et al., (2023) reported that the majority of the surveyed people of El-Kala area use the leaves and few of them use the fruits. Charef et al., (2008) demonstrated that *P. lentiscus* fruit can be considered as an oleaginous product for its fairly high content in fixed oil. The reason why it is the most used part of the plant (Abdeldjalil, 2016). Furthermore, the use of leaves can be explained by their abundance and availability throughout the year (Souilah et al., 2023). The ease and quickness of harvesting in addition to the availability of active ingredients explains the use of this part of the plant (Beldi et al., 2021).

Harvest period: The majority of respondents do harvest in winter (100%), as well as the type of plant is spontaneous (100%) since it is not cultivated. This is explained by the fact that the harvest start at ripening of lentisk berries which befalls from the end of October to mid-December. Harvest season varies from year to year and from a location to another. Deviations of one month may occur. Exposure obviously affects ripening; the latter will, in fact, be earlier in the sunny areas of the hillsides and plateau summits than on the ubacs and in the valley floors (de Lanfranchi et al., 1999).

Sociodemographic Characterization of The Surveyed Population

Distribution of informants by gender

The result shows that among the participating population to the survey, the proportion of respondents of male gender was higher than that of female (73% against 27%). That may be a representative sample of the labor population of the wilaya of Jijel, from the age group of 20 to 60 years old and over (Figure 3).

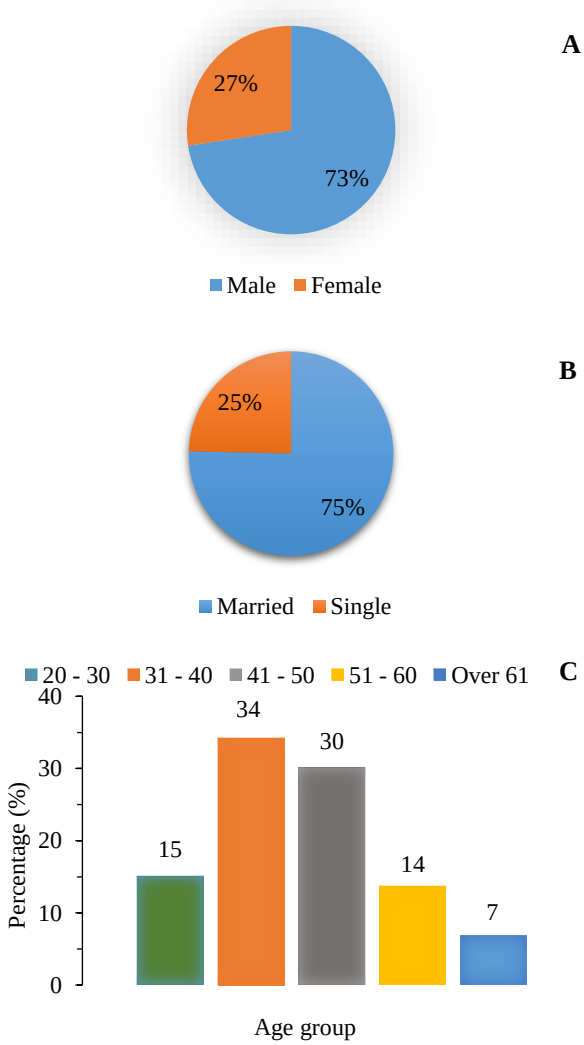

Figure 3. Distribution of informants by sex category (A), social status (B) and age group (C).

Social Status of the Participants and Source of the Information

According to the results, the social status of the sample (Figure 3) showed that the category of married (75%) was higher than that of single (25%). This is explained by the fact that 64% of the sample of participating informants belong to the age group of 31~50 years old, which represents the mature group that is capable of founding a family and providing social stability. Moreover, the use of herbal remedies is more common among married people due to their responsibility over their families (Souilah et al., 2023).

Source of the Information

Regarding the different sources of information, the survey results showed that the experience of others was the most cited by the interviewees compared to those who acquired the information by reading. Moreover, the information received by the herbalist and the phytotherapist is very low. This can be explained by the fact that the lentisk plant virtues are a heritage that is transmitted from generation to generation by word-of-mouth, as well as by the experience that visibility recommends. This experience offers the continuity of the indigenous knowledge of the wilaya of Jijel.

Diseases Treated by Lentisk

The results in Figure 4 show that lentisk is mainly used to treat dermal injuries and diseases (29%), and the respiratory and digestive systems (28% each, respectively). The type of diseases caught in this area may had been incurred due to poor dietary habits, smoking, humid climate (coastal area) and increasing air pollution.

The form of use of lentisk (Figure 4) showed that oil extraction from its berries was the most used process (72%). According to the survey results, the preparations based on *Pistacia* species are in more than half of the cases, lentisk oil. This is in agreement with the survey of INRAA mentioned above; which revealed that the main marketed product of lentisk was its oil.

The form of use is usually external/bodily use or orally. In fact, the survey recorded major uses of lentisk oil, on three subjects of diseases: dermal, digestive and respiratory tract, as a treatment of burns and as scars and wounds reducer. Besides, it is also used to treat ulcer and allergy. The duration of treatment varies from 2 to 7 days depending on the disease and the advice of the healer. Indeed, some previous work had addressed the beneficial effect of lentisk oil for the treatment of pulmonary fibrosis (Abidi et al., 2016), colitis (Naouar et al., 2016), burns (Khedir et al., 2017), skin explants. (Ben Khedir et al., 2016), the growth of colon tumors (Spyridopoulou et al., 2017), gastric ulcers (Boutemine et al., 2018) and lung cancer (Magkouta et al., 2009). Furthermore, the aqueous extracts of the leaves have been used against colitis (Boutemine et al., 2021) and the distillate of leaf waste for wound healing (Elloumi et al., 2022).

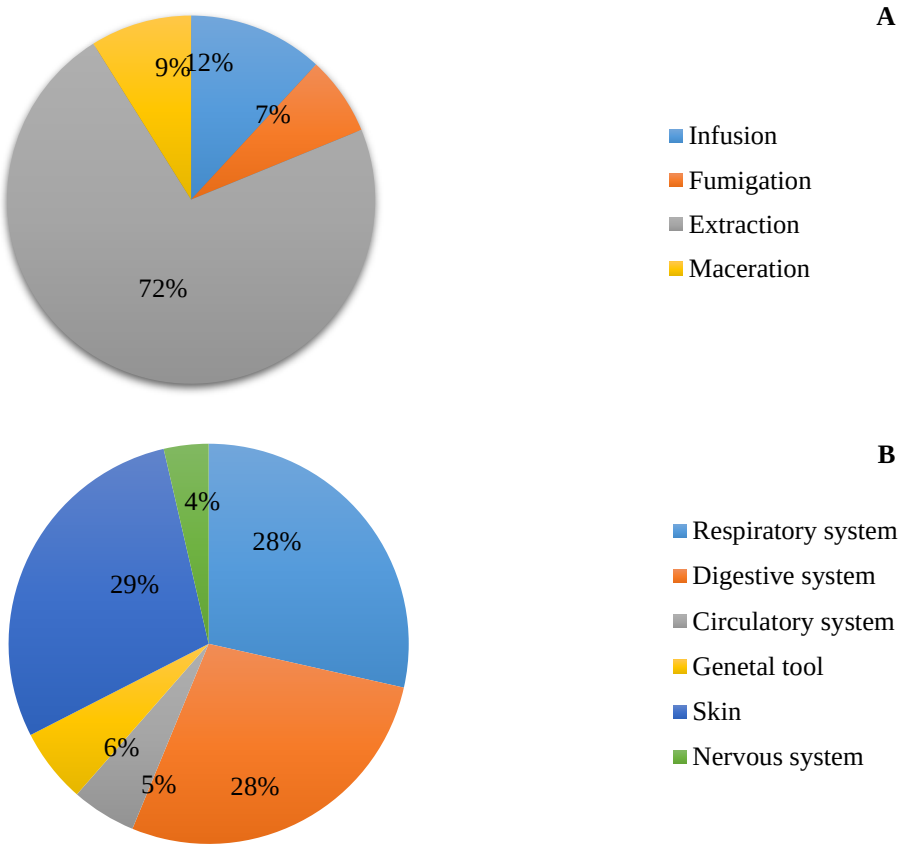

Figure 4. Different forms of use of lentisk by the local population of Jijel (A) and health troubles affecting body parts targeted by lentisk treatment (B).

Figure 5. Picture of traditional lentisk oil extraction tools "*Guergaba*"

Transmission of Traditional Knowledge

A proportion of the surveyed peoples (10%) gave a culinary recipe on some traditional meals preferred by Jijelians such as *"El meslouk"*. The main ingredients of this dish are wheat, chickpea, and broad bean, boiled and evaporated with lentisk berries. A traditional dish that has been passed down orally from generation to generation.

Lentisk branches are used to protect the olive harvest. The leaves are mainly used for cleaning reservoirs, plastic water containers (bottles and barrels) as well as for water treatment.

The leaves are placed inside with water within a few hours or for a day, as the plant has antiseptic properties (Benhammou & Atik, 2007).

Traditional Know-How about the Method of Extracting Vegetable Oil from Lentisk Seeds

When the lentisk berries ripen, through the coloring of the red grains that become black, a cloth is placed under the tree. The tree is gently swayed to make the berries fall on the mat, then the berries are purified from the leaves and branches. The harvested berries are put in a bag. A quantity of berries is placed in a place intended to be crushed on a lower wheel, using an upper crescent-shaped stone called *"Guergaba"* (Figure 5), are added consecutive quantities up to the end of the harvest ; to do this, the squatting position must be taken.

Next, the ground berries are placed in a jute "*Khicha*" fiber bag like an oil filter and then hung there, until the oil is drained into a vase. This is considered the oil of first-class origin.

The next day, the peeled berries residue is drained and put in hot water with constant stirring until the remaining oil in the cake is extracted. As oil floats on water, it is recovered. It constitute the second-class oil.

According to Mr. Soufi, a farmer in the region, to obtain one liter of lentisk fixed oil, it is required 10 to 15 kg of ripe berries.

Floating crusts with the name "*Lemsh"* are used in some popular dishes as a spice, and they are mixed, for example: with "*Berkouks"*. The residues of the grains at the bottom of the pot is locally called *"Derba"*.

To trick lentisk oil, some sellers have cut off the twigs and berries of the plant, then crushed and trapped them in oil. The next day, the oil will be ready for sale. Respondents of the survey did not mention the use of mastic resinous gum, despite its highly recognized value in many areas as culinary, pharmaceutical, medicinal and commercial. The results of the survey of knowledge and know-how carried out during the same period, concluded in its fruitfulness.

In terms of economic development, the lentisk pistachio tree is mainly exploited in Algeria for the production of fixed vegetable oil from the berries, for the drying of the leaves intended for sale in the form of herbal teas, for the production of soap and to a lesser extent, since the yield is quite low, to extract the essential oil.

The harvested lentisk berries are sold to local processors for the manufacture of lentisk oil. The purchase price of a kilo of berries from collectors varies between 0.91 and 1.37 USD on average, depending on the season and the place of collection (AIFM, 2022).

The lentisk products market is a growing niche market. The marketing of lentisk products and derivatives takes the form of raw oil, coveted for its therapeutic virtues (treatment of respiratory diseases, digestive system problems, eczema and burns) and processed products such as cream, soap, balm and shampoo. The selling price of this oil varies between 39.76 and 49.74 USD/Kg on the local market (AIFM, 2022).

The various lentisk derivatives products are sold in specialized shops. Indeed, in recent years, the marketing of this type of products has become more and more widespread and we are witnessing opening premises intended for the sale of different products based on medicinal plants, particularly in large localities. This commercial activity is carried out by herbalists, whom are in fact paid professionals in the sense that they have business premises, approved by the state, in which they sell all types of natural products based on medicinal or aromatic plants (Beldi et al., 2021).

Despite, a good part of the valorization of lentisk in Algeria remains in the traditional way or in small family businesses with limited capacity. It is therefore recommended to carry out a detailed study of the market for lentisk products in order to establish, an insight on the basis of a cluster implementation aimed at developing the value chain of the lentisk sector on the national market and facilitating national economic operators access to other external markets. Efforts should focus on the development of high value-added products and the creation of lentisk plantations intended for the production of mastic, a product in demand on the international market. The valorization of lentisk products opens the way to other therapeutic or cosmetic applications, which could be developed from its derivatives and may be eligible for export or destined for specialized laboratories, which may constitute a significant potential source of income for operators, particularly in rural regions.

Conclusion

Investigating the significance of plants in a culture has largely been the domain of anthropologists while anthropologists and botanists have studied the utilitarian aspects of plants. The utilitarian approach dominates today's research agenda on a separate page (Bennett, 2010). Ethnobotanical research has made it possible to highlight the ancestral practices used by the Jijelians. To enhance the

valorization of lentisk, it is necessary to give a specific interest in view of the benefits on social and economic life. It is necessary to develop this niche and promote the value chain of its products and derivatives, as an example, developing methods for extraction of lentisk gum resin. These steps could constitute an additional contribution for the consolidation of employment and the economy of the rural population. Finally, it is essential to give importance to the skills, knowledge and local know-how of lentisk value-chain, to promote and encourage cultural and agro-eco-tourism.

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References

Abdeldjelil, M. C. (2016). Effets cicatrisants de produits à base d'huile de lentisque (Pistacia lentiscus L.) sur les brûlures expérimentales chez le rat. (Publication No. : 02/DS/2016 Série: 01/VET/2016) [Doctoral dissertation, Université des Frères Mentouri, Constantine, Algeria]. https://bu.umc.edu.dz/theses/veterinaire/ABD6908.pdf

Abidi, A., Serairi Beji, R., Kourda, N., Ennigrou, S., Ksouri, R., & Jameleddine, S. (2016). Effect of *Pistacia lentiscus* oil on experimental pulmonary fibrosis. *La Tunisie Médicale, 94(7)*, 401-406. PMID : 28051231.

AIFM, (2022). Good practice guide on lentisk fruit oil: from the field to the laboratory. International Association for Mediterranean Forests (Ed.), Marseille, France. ISBN: 978-2-494188-00-6. https://aifm.org/wp-content/uploads/2022/08/Good-practice-guide-lentisk-1.pdf

Akbar, S. (2020). Handbook of 200 medicinal plants – A comprehensive review of their traditional medical uses and scientific justifications. Springer, Stockton, CA, USA, pp. 2156. ISBN 987-3-030-16806-3.

Alankaa. (2016). Mega-dictionary for the arabic language. https://alankaa.com/dictionary/**ضرو** [Accessed 3 January 2024].

Baudoux, D. (2017). 53. Lentisque Pistachier. In : D. Baudoux (editor). Aromathérapie : 100 huiles essentielles. Dunod, Paris. pp. 319-322.

Beldi, M., Merzougui, H., & Lazli, A. (2021). Etude ethnobotanique du Pistachier lentisque *Pistacia lentiscus* L. Dans la Wilaya d'El-Tarf (Nord-est algérien) – Ethnobotanical study of *Pistacia lentiscus* L. in El-Tarf region (Northestern Algeria). *Ethnobotany Research & Applications, 21 (09)*, 1-18. http://dx.doi.org/10.32859/era.21.09.1-18

Ben Khedir, S., Moalla, D., Jardak, N., Mzid, M., Sahnoun, Z., & Rebai, T. (2016). *Pistacia lentiscus* fruit oil reduces oxidative stress in human skin explants caused by hydrogen peroxide. *Biotechnic & Histochemistry, 91(7)*, 480-491. doi: 10.1080/10520295.2016.1232840.

Benhammou, N. & Atik, B. F. (2007). Activité antibactérienne de l'huile essentielle de *Pistacia Lentiscus* L. de deux stations de la région de Tlemcen (Algérie). In : Greche, H. & Ennabili, A. (editors) 2009. Actes du congrès international de recherches sur les plantes aromatiques et médicinales, Mezraoua (Taounate) & Fès, Maroc, 22-24 Mars 2007, pp. 281-285.

Bennett, B. C. (2010). Ethnobotany and economic botany: subjects in search of definitions, encyclopedia of life support systems (EOLSS), p5. https://www.eolss.net/sample-chapters/c09/E6-118-01.pdf [Accessed 8 September 2022].

Benyoucef, H., & Kerouaz, Z. (2018). Etude phytochimique et évaluation des activités antioxydante, antibactérienne et antiinflamatoire des deux sspèces: *Pistacia lentiscus* L. et *Matricaria recutita* L. MSc Thesis, Université des Frères Mentouri, Constantine, Algeria. https://fac.umc.edu.dz/snv/bibliotheque/biblio/mmf/2018

Boubaker, Z. (1996). Contribution à l'étude de l'avifaune forestière nicheuse du massif forestier de Guerrouch (w. Jijel) : Cartographie des ornithocénoses et ecologie de sittelle kabyle (*Sitta ledanti*). MSc Thesis, Institut National Agronomique, El Harrach, Algeria.

Boutemine, I. M., Amri, M., Amir, Z.C., Fitting, C., Mecherara-Idjeri, S., Layaida, K., Sennoun, N., Berkane, S., Cavaillon, J.M., & Touil-Boukoffa, C. (2018). Gastro-protective, therapeutic and anti-inflammatory activities of *Pistacia lentiscus* L. fatty oil against ethanol-induced gastric ulcers in rats. *Journal of Ethnopharmacology, 224*, 273-282. doi: 10.1016/j.jep.2018.05.040.

Boutemine, I.M., Amri, M., Dorgham, K., Amir, Z.C., Benazzouz, S., Ameur, F., Layaida, K., Yssel, H., & Touil-Boukoffa, C. (2021). Beneficial role of *Pistacia lentiscus* aqueous extract in experimental colitis: anti-inflammatory and potential therapeutic effects. *Inflammopharmacology, 29(4)*, 1225-1239. doi: 10.1007/s10787-021-00831-w.

Bozorgi, M., Memariani, Z., Mobli, M., Surmaghi, M. H. S., Shams-Ardekani, M. R., & Rahimi R. (2013). Five *Pistacia* species (*P. vera*, *P. atlantica*, *P. terebinthus*, *P. khinjuk*, and *P. lentiscus*): A review of their traditional uses, phytochemistry, and pharmacology. *The Scientific World Journal*, DOI: https://doi.org/10.1155/2013/219815

Charef, M., Yousfi, M., Saidi, M., & Stocker, P. (2008). Determination of fatty acid composition of acorn (Quercus), *Pistacia lentiscus* seeds growing in Algeria. *Journal of the American Oil Chemists' Society, 85*, 921-924. doi : 10.1007/s11746-008-1283-1

de Lanfranchi, F., Mai, B. T., & Girard, M. (1999). La fabrication d'huile de lentisque (Linsticu ou chessa) en Sardaigne. In: *Journal d'agriculture traditionnelle et de botanique appliquée. 41e année, bulletin n°2*, 81-100. http://www.persee.fr/web/revues/home/prescript/article/jatba_0183-5173_1999_num_41_2_3712

De Pooter, H. L. , Schamp, N. M., Aboutabl, E. A., El Tohamy, S. F., & Doss, S. L. (1991). Essential oils from the leaves of three *Pistacia* species grown in Egypt. *Flavour and Fragrance Journal, 6*, 229-232. doi : 10.1002/ffj.2730060313

Delazar, A., Reid, R. G., & Sarker, S. D. (2004). GC-MS analysis of the essential oil from the oleoresin of *Pistacia atlantica* var. *mutica*. *Chemistry of Natural Compounds, 40(1)*, 24-27. doi : 10.1023/B:CONC.0000025459.72590.9e

Ducène, J. C. (2016). Des parfums et des fumées : Les Parfums à Brûler en Islam Médiéval. Bulletin d'Études Orientales LXIV, DOI : https://doi.org/10.4000/beo.4693

Elloumi, W., Mahmoudi, A., Ortiz, S., Boutefnouchet, S., Chamkha, M., & Sayadi, S. (2022). Wound healing potential of quercetin-3-o-rhamnoside and myricetin-3-o-rhamnoside isolated from *Pistacia lentiscus* distilled leaves in rats model. *Biomedicine & Pharmacotherapy, 146*, 112574. doi: 10.1016/j.biopha.2021.112574.

Iauk, L., Ragusa, S., Rapisarda, A., Franco, S., & Nicolosi, V. M. (1996). In vitro antimicrobial activity of *Pistacia lentiscus* L. extracts : preliminary report. *Journal of Chemotherapy, 8(3)*, 207-209. doi : 10.1179/joc.1996.8.3.207

İsfendiyaroğlu, M. (2020). Mastic tree: past, present, future, and its potential importance for Turkey. *Acta Horticulturae, 1287*, 79-86. doi:10.17660/actahortic.2020.1287.11

Khedir, S. B., Bardaa, S., Chabchoub, N., Moalla, D., Sahnoun, Z., & Rebai, T. (2017). The healing effect of *Pistacia lentiscus* fruit oil on laser burn. *Pharmaceutical Biology, 55(1)*, 1407-1414. doi: 10.1080/13880209.2016.1233569.

Lebrun, L. (2016). Le Pistachier lentisque, l'Arbre au mastic. In : Les conseils phyto-aromatiques de Laurence et ses experts. https://conseilsphytoaroma.com/2016/07/03/le-pistachier-lentisque-larbre-a-mastic. [Accessed 30 December 2023].

Magkouta, S., Stathopoulos, G. T., Psallidas, I., Papapetropoulos, A., Kolisis, F. N., Roussos, C., & Loutrari, H. (2009). Protective effects of mastic oil from *Pistacia lentiscus* variation chia against experimental growth of lewis lung carcinoma. *Nutrition and Cancer, 61(5)*, 640-8. doi: 10.1080/01635580902825647.

Mazari, A., Louisa, A., Dif, N., Fedjer, Z., Blama, A., & Mahdeb, A. (2022). Phytochemical composition and antioxidant activity of *Pistacia lentiscus* L. leaves and berries oilcake extracts. *Turkish Journal of Agriculture - Food Science and Technology, 10(4)*, 669-677. doi : 10.24925/turjaf.v10i4.669-677.4843

Naouar, M. S., Mekki, L. Z., Charfi, L., Boubaker, J., & Filali, A. (2016). Preventive and curative effect of *Pistacia lentiscus* oil in experimental colitis. *Biomedicine & Pharmacotherapy, 83*, 577-583. doi: 10.1016/j.biopha.2016.07.021.

Pickering, R. M. (2017). Describing the participants in a study. *Age and Ageing, 46(4)*, 576–581. https://doi.org/10.1093/ageing/afx054

Porteres, R. (1969). Cours d'éthnobotanique générale par le Professeur Roland Porteres. 3rd cycle. https://cel.archives-ouvertes.fr/file/index/docid/654364/filename/Cours_ethnobotanique_1969_-_1970-1_Porteres. [Accessed 4 September 2022].

Quezel, P. & Santa, S. (1963). Nouvelle flore de l'Algérie et des régions désertiques méridionales, Tome II, Editions CNRS, France, pp. 1170.

Souilah, N., Benabdallah, A., Bendif H., Miara, M. D., Daoud, N., Mustafa, A. M., Yilmaz, M. A., Öztürk, M., Caprioli, G. & Maggi, F. (2023). Ethnobotanical investigation of *Pistacia lentiscus* L. grown in El Kala (Algeria), and phytochemical study and antioxidant activity of its essential oil and extracts. *Natural Product Research, 37(9)*, 1583-1588. doi: 10.1080/14786419.2021.2024825

Spyridopoulou, K., Tiptiri-Kourpeti, A., Lampri, E., Fitsiou, E., Vasileiadis, S., Vamvakias, M., Bardouki, H., Goussia, A., Malamou-Mitsi, V., Panayiotidis, M. I., Galanis, A., Pappa, A., & Chlichlia, K. (2017). Dietary mastic oil extracted from *Pistacia lentiscus* var. Chia suppresses tumor growth in experimental colon cancer models. *Scientific Reports, 7(1)*, 3782. doi: 10.1038/s41598-017-03971-8.

Toumi, M., Benkhalifa, A., & Hadoun A. (2015). Analyse des données d'enquête ethnobotanique auprès des participants au 2éme atelier de formation en phytothérapie. In Benkhalifa, A., Toumi, M., & Madani, L. N. (editors). 2ème Exposition ethnobotanique et 3ème atelier d'initiation à la phytothérapie. Recueil des résumés "Ethnobota 2015", Jardin d'Essais du Hamma, Alger, Algeria, 6 June 2015, pp. 9.

Toumi, M., Missirene, A., & Benkhalifa, A. (2016). Les plantes à usage thérapeutique dans le Hoggar : cas de la ville de Tamanrasset et son environnement rural. In Madani, L. N., Toumi, M., & Benkhalifa, A. (editors). 3ème Exposition d'ethnobotanique et 4ème atelier d'initiation à la phytothérapie. Recueil des résumés et des expositions "Ethnobota 2016", Jardin d'Essais du Hamma, Alger, Algeria, 15 May 2016, pp. 63-65.

Trabut, L. (1935). Répertoire des noms indigènes des plantes spontanées, cultivées et utilisées dans le nord de l'Afrique. Typo-litho & Carbonel, Alger, Algérie. pp. 355.