VII. BÖLÜM / CHAPTER VII

TABİİ BİLİMLER

NATURAL SCIENCES

PROCEEDINGS PAPER / SEMPOZYUM BİLDİRİSİ

1. Uluslararası Prof. Dr. Fuat Sezgin İslâm Bilim Tarihi Sempozyumu Bildiriler Kitabı

The 1st International Prof. Dr. Fuat Sezgin Symposium on History of Science in Islam Proceedings Book

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An Overview of Some Important Medieval Sources Related to Olive Growing in Terms of History of Agricultural Sciences

Tarım Bilimleri Tarihi Açısından Zeytin Yetiştiriciliğine Dair Bazı Önemli Ortaçağ Kaynaklarına Genel Bir Bakış

Harun DIRAMAN*

ABSTRACT

Figs, olives, grapes and cereals (especially wheat) are known as symbols of the most important aspects of Mediterranean agriculture. Olive cultivation was carried out by many people in the Mediterranean basin from ancient times to medieval times. The aim of this study is to provide a contribution to the knowledge of the history of olive growing and culture in terms of the history of agricultural sciences. In this study some important historical sources are presented which were written on olive growing by various authors and–especially muslim–agriculturists during the middle ages. In this study the relationships between the oldest known medieval agricultural resources on the olive cultivation and their antiquity sources will be discussed. Firstly, a brief introduction to the subject will be given, including the ancient period and especially the Greek–Latin agronomists Theophrastus, Pliny, Cato, Virgil, Columella, Varro and the first works of Cassianus Bassus Scholaticus and Philemo's books, Greek-Byzantine writters, on olive cultivation. Secondly, the medieval Islamic world agricultural scholars (Abu Hanif al-Dinawari, Iraqi Ibn Wahsiyya, Abu Reyhan al-Bîrûnî, Abdurrahman b. Wafid, Ibn Bassal, Abu-Hayr al-Ishbili and Ibn al-Avvam al-Ishbili and Yemeni Rasulid Sultans Melikul al-Ashraf and Afdal's books) will be examined. In addition, the olive cultivation chapters in the books of Gabriel Alonso de Herrera (d.1539), the famous Spanish agriculturist of the Renaissance, will be covered within the scope of this study since his books include an important and strong effect on Islamic agriculture books.

Keywords: Olive cultivation, history of agricultural sciences, medieval Islamic agricultural manuscripts

ÖZ

İncir, zeytin, üzüm ve tahıllar (özellikle buğday) Akdeniz tarımının en önemli sembolü olarak bilinmektedir. Zeytincilik, Akdeniz havzasındaki birçok halk tarafından eski çağlardan orta çağa kadar yayılmıştır. Bu çalışmanın amacı, zirai bilimler tarihi açısından zeytincilik ve onın kültür tarihine bir bilgi katkısı sağlamaktır. Bu çalışmada, orta çağda çeşitli yazarlar ve özellikle müslüman tarımcılar tarafından zeytin yetiştiriciliği üzerine yazılmış bazı önemli tarihsel kaynaklar gösel biçimde ele alınmaktadır. Bu çalışmada, zeytin yetiştiriciliğindeki bilinen en eski ortaçağ tarımsal kaynaklar ile antik kaynaklar arasındaki ilişkiler ele alınacaktır. İlk olarak, özellikle Yunan-Latin agronomistleri Theophrastus, Pliny, Cato, Virgil, Columella ve Varro gibi antik dönem konularına kısa bir giriş ayrıca Yunan-Bizans yazarları olark Cassianus Bassus Scholaticus'un ilk eserleri ve Philemo'nun kitaplarındaki zeytin tarımı üzerine yazdıkları açıklanacaktır. İkincisi, ortaçağ İslam dünyası tarım alimleri (Ebu Hanif el Dineveri, Iraklı İbn Wahsiyya, Ebu Reyhan el-Bîrûnî, Abdurrahman ibni Wafid, İbn Bassal, Ebu Hayr iş-İşbili ve İbn-Avvam el-İşbili ve Yemen Rasuli Sultanları Melikul el-Ashraf ve Afdal'ın kitapları). Ayrıca, ünlü Rönesanslı İspanyol tarımcı olan Gabriel Alonso de Herrera'nın (ölm.1539) kitaplarındaki zeytincilik bölümleri ve İslami tarım kitaplarından önemli ve ciddi bir etki ihtiva eden kitapları bu kapsamda ele alınacaktır.

Anahtar Kelimeler: Zeytin yetiştiriciliği, tarımsal bilimler tarihi, ortaçağ İslami ziraat el yazmaları

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* **Corresponding author/Sorumlu yazar:** Harun Dıraman (Assoc. Prof. Dr.), Afyon Kocatepe University, Faculty of Engineering, Department of Food Engineering, Afyonkarahisar, Turkey, E-mail: hdiraman@aku.edu.tr, ORCID: 0000-0002-7431-7524

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Introduction

Figs, olives, grapes and cereals (especially wheat) are known as a symbols of the most important aspects of Mediterranean agriculture. The olive tree is among the oldest known cultivated trees in the world. Expansion of olive culture was carried out by means of the numerous people of the Mediterrannean region such as Phoenicians, Minoans, Hebrews, Greeks, Romans and Muslim Arabs around Mediterrannean sea from ancient to medieval ages. The Hebrews (Ban-u Israel) knew about olive tree thousands of years ago as can be seen in the Ancient Gezer Agricultural Almanac in the present Istanbul Archaeological Museum. This almanac is the oldest Hebrew inscription yet known. It is about olive harvest time (Janke 2015). In their culture, olive trees have symbolized peace and happiness since the Prophet Abraham. At the end of the Rome Empire, olive trees were cultivated throughout the Arab and Roman worlds. According to the famous cultural historian Victor Hehn (1813–1890) [his book of Olives–Grapes and Figs], olives have a very special and important place in Greek mythology. In fact, the hands that plant the olive tree are Phoenicians, not Greeks. These three (Olive, Grape and Fig) fruits are important products of the Semitic people culture. This culture was spread by the effects of cultural migration of the Semitic people throughout the Eastern Mediterranean. It is seen that there is a close relationship between the antique Mediterranean Phoenician trade routes and colonies and today's olive cultivation locations (Hehn, 1998).

Our study shows that there is limited information known in referring to the history of olive growing and culture in terms of the history of agricultural sciences. The aim of this study is to provide a contribution to knowledge on this topic. In this study some important sources written on olive growing by various authors and agriculturists–especially in the Islamic World–during the middle ages (500 –1500 BC) are illustrated in chronological order.

1. A Short Overwiev on Olive Cultivation in Ancient Times

Theophrastus (371-287 BC), considered to be the father of botany and a student of Aristotle, noted the kinship of wild-*olives* (Kotinos in Greece & Delice in Turkish) with cultivated *olives in his Plants [De Causis Plantarum] book.* He also gives a considerable amount of information on taste (flavour) changes of olive fruits from bitter to sour and sweet (three stage process) in his book De Causis Plantarum (Int Source 1, 2, 3).

The first important ancient information about olive cultivation in the scientific sense and from the view of the history of agricultural sciences goes to Carthaginian Agriculturist Mago (probably 3–4th century BC). He wrote an agricultural manual in Punic including a record of the farming knowledge of North Africans based on a 28 volume agricultural treatise and he has been referred to as the Father of Agriculture–nowadays organic farming. The original of his book is missing and the Roman senate decreed that his agricultural works be translated after the conquest of Carthage by Rome. The existence of this book is known because of some extensive quotes made by some Roman/Latin agriculturist authors, especially Virgil and Columella (Mahaffy, 1889). Other ancient books include Latin agronomists of the ancient Roman period (agronomist) Marcus [the elder] Cato (234–149 BC) famous De Agricultura (about 160 BC on Agriculture) book (Int Source 2,3,5); Marcus Terentius Varro (116 BC–27 BC) Rerum rusticarum libri III (Agriculture Issues in Three Books) (Int Source 2,3,6) ;Latin Poet Virgil (70–19 BC) (Georgica contains an extensive citations from Mago of Carthage) (Int Source 2,3); Columella (4–70 AD) by Res Rustica (Agriculture) and De Arborius (on Trees) (with extensive quotes from Mago of Carthage) (Int Source 1,2,3,7) and Pliny (23–79 AD) Naturalis Historia (olive growing [propogations ways] and olive oil pressing also waste water problems) (Int Source 2,3,8; Rodgers,2002).

Table 1 presents the important ancient agricultural writers who gave information about olive cultivation and their connections with the medieval Islamic agricultural writers. (Rodgers 2002). All of these writers gave remarkable information on olive cultivation and this table shows a short academic history of olive culture from ancient to medieval times. In this presentation, historical olive cultivation knowledge is discussed, especially on the basis of scientific agricultural activities in the medieval Islamic world and this information is given in Table 1.

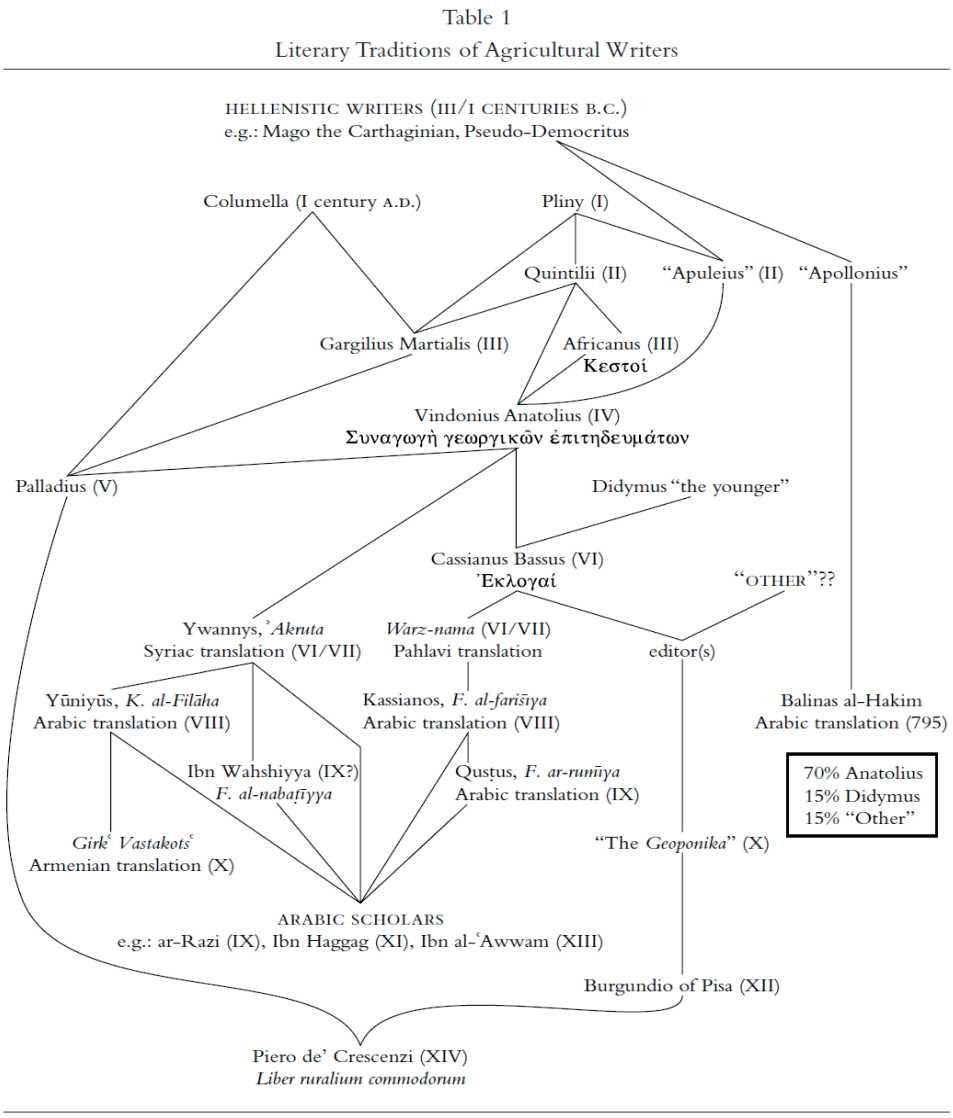


Table 1: The important ancient agricultural writers who gave information about olive cultivation and their connections with the medieval Islamic agricultural authors (Rodgers 2002).

2. Some Historical Medieval Documents on Olive Growing and Its Culture

Abu Hanifah Ahmad ibn Dawud Dinawari (815–896 AD), a famous Islamic Golden Age linguistic, agriculturist, botanist, and historian and the founder of Arabic botany, is an important personal resource for many of the missing Muslim early botanical works (al-Shaybani [d.820], Ibn al-Arabi [d.844], Al-Bahili [d.845] and Ibn as-Sikkit [d.857]). His book Kitab Al Nabat (Book of Plants) describes about 1120 plants based on the phases of production of flowers and fruit (Encylopedia of Islam, e 1960 on; Hamidullah, 1973). He classified all plants in the following seven different categories and chapter 7 is on the olive tree and the date-palm. He also described those plants whose branches and roots are used as toothbrushes. According to Abu Hanifa al Dinawari the olive harvest in Syria was at XI:2 and he records some poems praising the olive trees in Kitab al Nabat (Hamidullah, 1973; Varisco, 1994; Fahd,1976 and 1996).

Kitab al Filaha al –Nabatiyya "Nabtaen Agriculture" was the first Islamic agriculture book written by Ibn Wahshiyya in 9th century AD in Iraq and gave the first serious information related to olive growing and culture collected from various ancient sources in Mesopotamia and the Greek World. This book is known as the oldest and prime Arabic and Islamic

agriculture manuscript which its translator called "*The Book on the Cultivation of the Soil, and the Improvement of and Arbors and Fruits, and Their Defence Against Disease (Kitab al İfIahu'I-ard ve ıslah'uz -zeri' ve'ş-şecer ve'ş-şimar ve def'u'l-afati 'anha'"* (Encylopedia of Islam, d on ; Sezgin 1971, Int Source 9). The large information regarding ancient sources of KFN book is shown in detail in Table 1 (Rodgers, 2002). The author dedicates three substantial chapters to olive trees (*zaytun*) (at the beginning of Book of Agr Nab: I., 36–53).The exposition starts with the required conditions for the culture of the olive tree (country, winds, weather , modification of the taste, remedies); the properties: the roots, leaves, ashes, oil, nuts; olive juice. (Fahd,1976 and 1996). The pages of the first chapter on olive culture of the book are shown in Figure 1. (NA, pp. 51–53 original ms) [the Debate of the Olive with Other Trees based on its agronomic properties [ecology, botany and usefull] (irrigation, soil, fruit characteritics, live longer, blessed, nourishment prosperity, live in every holy and blessed land] from The last pagans of Iraq : Ibn Waḥshiyya and his Nabatean agriculture [Text 51] (Hämeen-Anttila, 2006). The information about grafting a shoot of sebesten onto an olive tree is recorded in section 11 of KFN. The grafting operation aims to give new properties (fruit yield, tasty, flavour) to the grafted tree or to improve it in terms of early or late maturing, quality properties and against disease / insects or to diversify its olive fruits. This book is the main source and model for Muslim agronomists because it contains the richest and most complete classification. This book, playing an important role in the early development of the Arabic and Islamic sciences, is an important source due to its unique nature, for studying the agricultural and botanical knowledge attained by the pre-Islamic inhabitants of the Arabian Peninsula. The book of Ibn Wahsiyya is important as a primer source of agricultural information for agriculturists of medieval Islamic world because it is derived from various and rich ancient sources (Encylopedia of Islam, d 1960 on; Fahd,1976 and 1996; Hämeen-Anttila, 2006; Int Source 9). The original Al Filaha Al Nabatiyya is published by Fuad Sezgin (*Director, Institut für Geschicte der Arabisch –Islamischen Wissenschaften Frankfurt Universität, Deutschland*) in 1984 as 6 volumes and based on the Arabic manuscript in *Topkapi Sarayi Muzesi III* th *Ahmed Kutuphanesi*, Turkey (Int Source 9). In the introduction of this facsimile publication Fuad Sezgin says, ''We hold that the *Nabatean Agriculture* is one of the forgeries current in the Mediterrannean basin shortly before Islam and during its inception. Most them were written in Greek. However, the *Nabatean Agriculture* was composed in Syriac. It was translated by Ibn Wahsiyya under the impression that it was an ancient writing, as the alleged author Quthami pretends. This book was among the numerous works forged in many scientific fields, and translated into Arabic from various languages. They, along with translations of genuine writings, played an important role in the early development of the Arabic and Islamic sciences (Sezgin;1971).

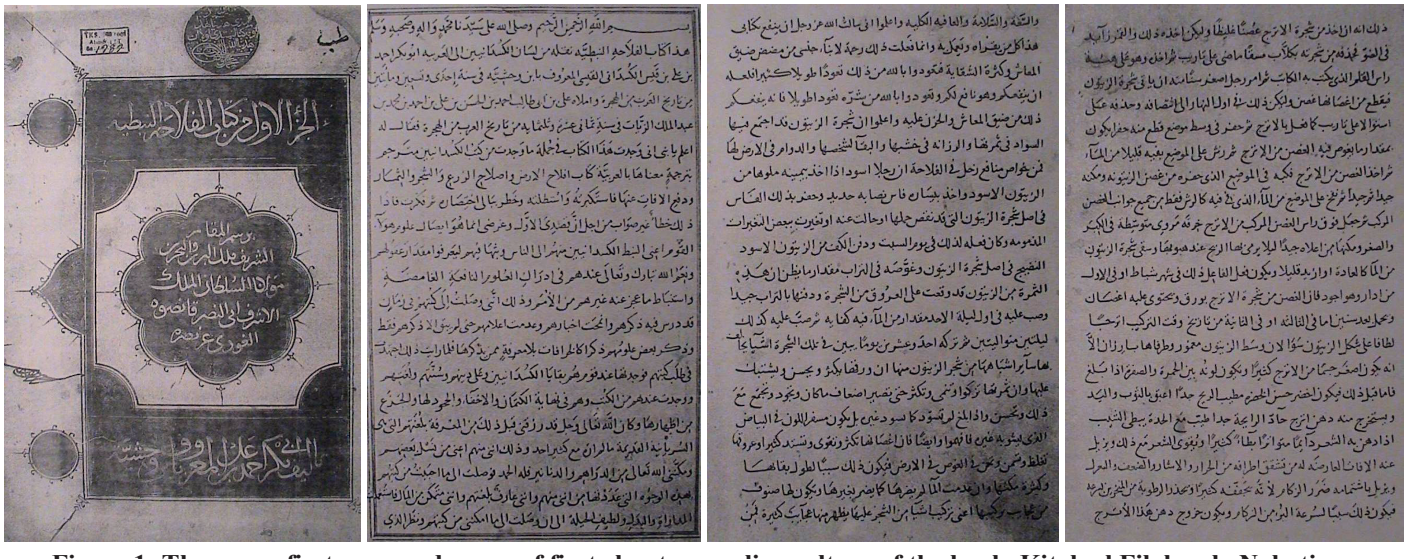


Figure 1: The cover, first page and pages of first chapter on olive culture of the book, Kitab al Filaha al –Nabatiyya "Nabtaen Agriculture" of Ibn Wahsiyyah (published by Fuad SEZGIN (*Director, Institut für Geschicte der Arabisch–Islamischen Wissenschaften Frankfurt Universität, Deutschland***) in 1984 as 6 volumes and based on the Arabic manuscript in** *Topkapi Sarayi Muzesi III* **th** *Ahmed Kutuphanesi***, Turkey)**

The second medieval source on olive growing is an Arabic translation (Georgika or Geoponika) of the Book of Cassianus Bassus Scholaticus (about 600 BC), a Byzantine agriculture manual / handbook or encyclopedia (Table 1). There are different copies of Georgika or *Geoponika* for various ages and it was last devoloped by Constantine VII, East Roman Emperor (9th century AD). The *Geoponika* has Greco-Roman agricultural knowledge in the Latin West and in the World of Islam (Rodgers, 2002). It was translated into Arabic under the title al ***Filaha al Rumiyya*** by Sarjis bin Hiliya al Rumi around 827 BC, directly from the Geeek (Encylopedia of Islam c,1960 on; Fahd, 1996). It is no doubt, that this book (including 22 chapters) is of great importance to the circulaton of knowledge about olive culture between the East and West in the Mediterrannean basin because there have been a lot of citations by many agricultural writers of this book for hundreds of years (Rodgers, 2002). There are some subjects (cultivation, cutting, disease, oil quality etc) on olive growing between pages 99 and 110 in the book. Some pages from the book are given in Figure 2. Also, different writers give the chapter (bab) 9 on olive growing and olive oil pressing in 33 parts (Fasl).



Figure 2: The pages include the cover [Left] index (showing the titles of chapters on olive growing in 99–111 pages) [right] and chapters on olive growing (108-109 pages) [below] in the book of Kustus.

Arīb ibn Sa‘d**,** Abū ’l-Ḥasan (or less likely Abū ‘Alī) ‘Arīb ibn Sa‘d al-Kātib al-Qurṭubī al-Andalusī wrote Kitāb al-anwā’, ‘The Calendar of Cordoba, accepted as one of the earliest known Arabic/Islamic farming calendars, for the year 961’ in Cordoba. Olive culture information in Kitāb al-anwā’ (The Calendar of Cordoba) are given in January: The props for olive, pomegranate and other trees are driven into the ground. April: The month when ..... The early grapes begin to form, the olive trees blossom. September: The month when ..... the certain olives turn black; there is fresh oil. October: The month when ..... the olive harvest is evaluated and picking commences (Ibn Sa’d, 1961).

Abu Rayhan Muhammad ibn Ahmad al-Biruni (973–1048 AD), known for his great contribution to many of the natural sciences (especially botany and farmacy), wrote Kitab al Saydana (pharmacy in the medicine). This book is known as the first private book carrying the title pharmacy in medicine. There is detailed information on zaytun in the letters (the zal, şin and zı) in some parts of the only Arabic Printed Text of Kitab al Saydana, known as the first private book carrying the title pharmacy in medicine. This part includes the names of oils (olive oils titles [amraki, mizyati and ab –ı zeyt in Persian and some names [zita daşina and akarna /mala] in Syriac and Latin] and olive varieties based on growing zones (small olive fruits in the mountains - Afghan olives, Ethiopian olives, Syrian and Palestine olives, Zeytin al Ma [olive fruit protected in the water) and white olives), medicinal properties and ages of olive trees (3000 years reported from Abdullah bin Salih Ali). The section also names the varieies of olives which are harmful (Ziz for Syrian olive trees). The sources of this part are given as Galenos, Paulus and Al Razi (Rhazes, Kitab al Havi) also Al Nabigha, a famous Arab poet before Islam (Kahya, 2011). Al-Biruni, Athar ‘ul Baqiyya, mentioned the pressing of olive oil at XI:23 in Syria (Varisco, 1994).

Ibn Wafid (1086 – 1074 AD in Toledo), a doctor of medicine and an agricultural theorist, is the first of Andalusian agriculturists and is a key figure of Andalusia agronomy school (Encylopedia of Islam c,1960 on). The botanist-physician Ibn al-Lūnquh and the agronomist Ibn Baṣṣāl from Andalusi Agronomy School are known to be Ibn Wāfid’s students. Ibn Wafid’s botanical knowledge is more important than his agricultural knowledge and he was a member of the Dioscorides Botanical School according to the historian D. Fairchild Ruggles. Before the Renaissance in Europe, the first translation related to Islamic agricultural books was Ibn Wafid’s work (***Majmu’ al Filaha*** [Tradato de Agricultura]) probably (Int Source 10). According to the determination of C. Cuadrado ROMERO, a Spanish researcher, this study was translated into Spanish (Castellano) as a common translation by Corominas and Bodo Müller from the famous Translators School of Toledo in the court of King X Alfonso El Sabio. This manuscript was recorded under 10.106 number in Biblioteca Nacional, Madrid. Abd al rahman Ibn Wafid (Abencenif or Albumaharan Abencenif) directed the Huerta del Rey gardens in Toledo of Mohad Sultan Guadix and carried out his agricultural experiments there. The book included many different earlier agricultural sources such as Aristotles, Columella, Galenos, Bolos Democritos of Mendes (2nd century BC), the 4th century AD agronomist Vindonius Anatolius of Beirut and the writings of a certain Filemon probably the 3rd century BC Philo of Byzantium by Al-Kindī’s (9th century AD) a summarized work, from the ancient World known as reference to the ‘ancients’ and ‘sages’ (Encylopedia of Islam c,1960 on; Int Source 10). There are a few different editions of this book. However, a new edition of Ibn Wafid’s book was also published by C. Cuadrado Romero in the Department of Spanish Philology at Malaga University, Spain, in 1998 as compared to a new edition in modern Spanish. Even though today we have the greater part of the castellano manuscript in question at hand unfortunately there are some lost parts, for example the beginning part as to the olive growing, which is little in this manuscript (Romero,1997). Pages involved related to the olive culture (especially the chapter of table olives production) in his book were illustrated in Fig III. The information in this book is about the processing of olives (oil and table) rather than the general plant growing in other known agricultural books of the Middle Ages. Chapter 73 of Ibn Vafid’s book is about the production of olive oil and table olives (agricultural technology). It is estimated that the missing 74th chapter is about this subject. It is highly probable that much of this information about olives was obtained from Latin agronomists Virgilio, Varro and Columella. According to the present manuscript, olive-related issues are grouped into two main groups: 1. The improvement of the smelly (sedimentary) olive oil (removing pulp by heating the olives, blending with a small amount of good oil, adding salt, adding olive leaves, mixing 1/3 of the early harvested olives with water and salt) three times a day. It is stated that the oil will heal if these operations are done 2.Table olive production (picking olives by hand or hooked pole, making brine [use of hot water and salt and addition of olive leaves, use of oregano], quick sweetening [green olive, water, salt and vinegar and olive leaf holding for 6 days and flavoring in clean water], dry salting [rounding] method (first treatment with coarse salt, olives, olive leaves and oregano followed by second flavoring with vinegar and salt water) (Romero, 1997).

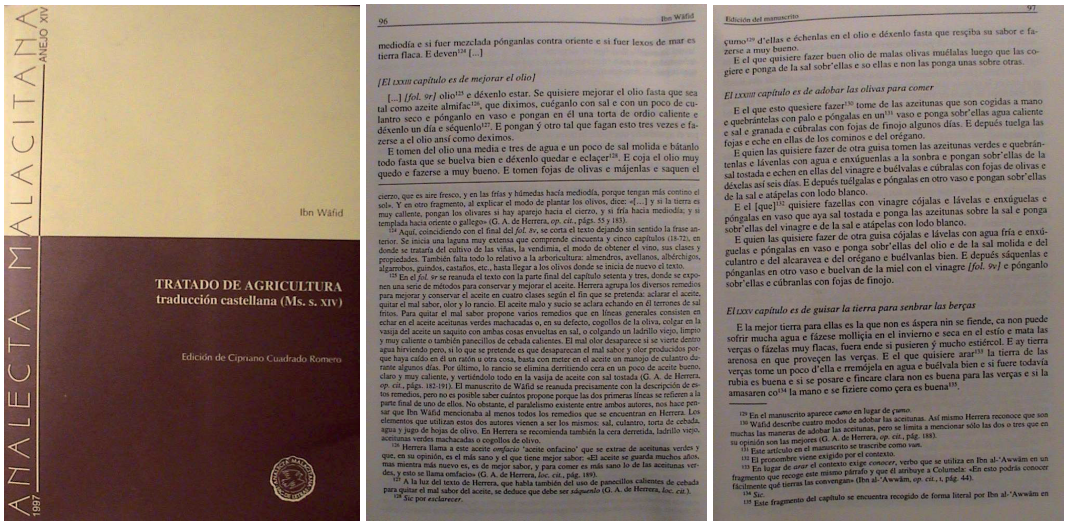


Figure 3: The book's cover (left) and pages (middle and rigth) related to the table olives production in the book of Ibn Wafid (taken from the study of C. Cuadrado Romero, Malaga University–Spain)

This castellano translation of Ibn Wafid's work was widely used in his two books by the famous Spanish agriculturist of Renaissance Gabriel Alonso de Herera (d.ca. 1539). He wrote two books in Spanish with reference to agriculture and their titles are ***Obra Agricultura*** and ***Agricultura Generale*** in Spanish. According to the determination of C. Cuadrado ROMERO even ***The Obra Agricultura*** of Alonso de Herrera from their topics' titles to the chapter numbers is very similar to Ibn Wafid 's book in all respects (Romero, 1997).The pages related to olive trees and how to grow them given from ***The Obra Agricultura*** of Alonso de Herrera are shown in Figure 4.

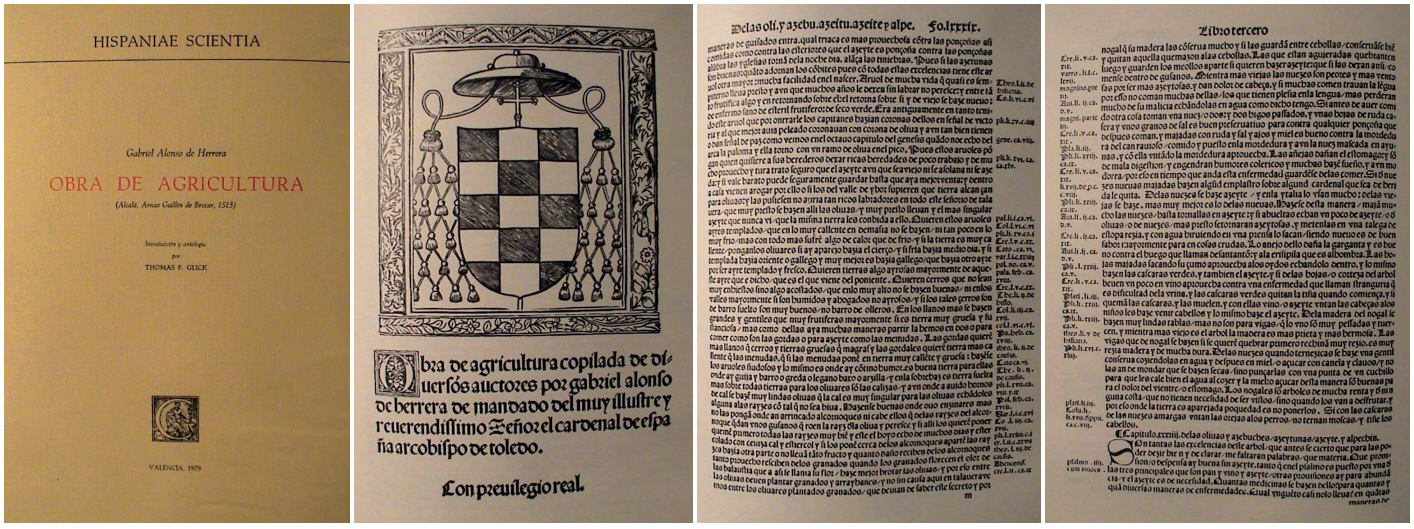


Figure 4: The cover (above) and pages (belove) related to olive trees and how to grow them taken from *The Obra Agricultura* of Alonso de Herrera.

Even today, Spanish agriculturists have cited the olive cultivation knowledge of Alonso Herrera, in well known used Andalus Agronomy School sources. For example, in this book, Culture and Knowledge Inspired by Olive Oil ([by Jose Humanes; Juan Vilar; Manuel Fialho and Pilar Higueras in 2011–Madrid, Spain], Chapter: Olive Tree Pruning, p.189), information about olive pruning techniques and their benefits and importance is taken from Gabriel Alonso de Herera, the famous Spanish agriculturist of the Renaissance**,** and his book *Agricultura Generale* in Spanish (the first printed in 1513).

Ibn Baṣṣāl's work – *Kitāb al-qaṣd wa'l-bayān (The Book of Concision and Clarity* – Chapter 5: On planting olive trees (first the palm-tree, followed by the olive) Chapter 9: On certain types of graft (especially olive trees). Different methods of propagation–by seed or stone, shoots, cuttings and grafts–are explained. Each species is treated in terms of propagation, preparation of the soil, care and watering (Ibn Bassal,1995). These chapters were translated into English by S. Fitzwilliam-Hall from *Ibn Baṣṣāl: Libro De Agricultura* (ed. J.M. Millás Vallicrosa and Mohamed Aziman, Tetuan: 1955, pp. 21–29)

Abu Umar Aḥmad ibn Muhammad ibn Ḥajjaj al-Ishbili (as *wazīr* [minister of state], *khāṭib* [orator/one who delivers the sermon at Friday prayers], and *adīb* [man of letters]), known as Ibn Hajjaj al Ishbili, the famous Muslim agronomer of Sevilla in the eleventh century, mentioned important knowledge related to olive tree between pages 85 and 98 in his book, ***Kitab al Mughni fil Filaha*** **(**Sufficiency in Farming). His important references were Democritus and Pythagoras, Yūniyūs/Iūnīus (Junius Moderatus Columella of Cadiz, or, more likely, Vindanius Anatolius of Beirut) and Varro from ancient Greek and Latin agronomers, known as the classical agronomical text. Also he records sources of some Islamic botanical or medical authors such as Rāzī, Ishāq ibn Sulaymān, Ṭhābit ibn Qurra and Ad-Dīnawarī (Encylopedia of Islam b,1960 on; Int Source 11). He experimented with olive propagation in the Aljarafe district outside of Seville, referred to as the kingdom of olives, according to Ibn 'Awwām's information.

Abu'l Khayr Al Ishbili, [the Shajjār] an arboriculturist and a native of Seville, lived in the 11 th century. His Kitab al Filaha *(Treatise on Agriculture)* gives some information on special treatment of olive trees in the first chapter, under the title 'General considerations on planting'. Abū 'l-Khayr carried out his personal experience, experiments and observations in the gardens, olive groves, and *ramblas* of Aljarafe according to Ibn Ḥajjāj. Abu'l Khayr's book contains some quotations from Abu Hanifa Al Dinawari, Aristotle, Anatolius, Cassianus Bassus Scholasticus, Philemo and Ibni Wahsiyya such as (Encylopedia of Islam a ,1960 on; Int source 12). Olives may be propagated in three different ways (by cutting, by layering and sowing, or propagation by stone or pit). Diseases of the Olive (wilt and fall of fruits). The Longevity of the Olive Tree (information form Abu Hanifa Dineveri). Grafting of olives (grafted in the last two weeks of March). Harvesting the Crop (bluish tint of olives colour for harvest; harvested by hand; on the same day, to the press for excellent oil). Properties of the Olive (nutritional properties, there are two types of olives: dry and oily, black olives very favourable to weak stomachs, the reddish olive (yākoutī) combines, according to him, the properties of both the green and the black olive, preservation with honey and the zest of citron (utrunc).Purification of the Oil (mixed with olive or fig leaves for five or six days). Clarification of Thick Oil (clarified by two different methods: with a certain amount of salt and to expose it to the sun, in jars).Preparation of Olives in Brine (first method: green olives lightly crushed and scald with boiling water in a container with well-salted water and cover them with the leaves of bay, fennel and citron. A few days after this, add a little salt and a bundle of thyme. Second method: olives in autumn - pit with a pointed reed and wash with plenty of water, then put in a jar with leaves of thyme, mountain balm, bay, citron and mint and then fill with a liquid [third drinking water and two thirds vinegar] then seal the container until the olives are preserved. Third method: put olives in October in a jar and sprinkle with salt, then with oil, then flavour with leaves of mint, thyme, coriander, fennel, citron and bay leaves. Complete the process by covering the olives with a syrup of honey and vinegar). Preserving black olives (After washing the olives, apply drying treatments and then cover with a layer of paste: mixed bay leaves, citron leaves, mountain balm, *za'tar,* and thyme) and these are filled with 1 part vinegar, 2 parts oil, and 5 parts fresh water and then cover the container with the leaves of bay and citron, and some quarters of quince and it is ready to eat after 20 days). English Summary from the translation of *Kitāb al-Filāḥa ou Le Livre de la Culture*: notice et extraits traduits par A. Cherbonneau, éclaircissements par Henri Pérès (1946), Algiers: Editions Carbonel (www.filaha.org) English translated from the French by A.H. Fitzwilliam-Hall, September 2010).

Kitab al Filaha was written by Abu Zakariyya Yahya ibn Muhammad ibn Ahmad ibn al-Awwam, better known as Ibn al-'Awwam al-Ishbīlī (Sevilla), in of the first half the 12 th century A.D. in Andalusia. Kitab al Filaha of Ibn Awwam is a large collection of excerpts from Andalusia (for example, Abul Khayr Al Ishbili, Al Hajj Al Garnati, Ibn Hajjaj, Ibn Bassal, Ibn Abu Jawad, Arib ibn Said and Sheikh Muhammad bin Fadl Al Andalusi) and Eastern texts (for example, Ibn Wahshiyya, Abu Hanifa al Dinawari, Al Razi, Ishak bin Sulaiman, Galenos, Kustus, Aristotles, Mahraris al Yunani). From 112 named authors (Ibn al- Awwām, Banqueri 1802, I, pp. 61-2) he includes one thousand nine hundred direct

and indirect citations – 615 or 32.5% from Byzantine sources, especially from Cassianus Bassus, 585 or 31% from Near Eastern sources, 85% of which are from Ibn Waḥshīyya, and 690 citations or 36.5 % from earlier Andalusi agronomists according to Glick's findings (Glick 2005, pp. 12-13).There are 34 chapters in his book. This book was first translated into Turkish in 1590-91 by Mehemmed bin Mustapha of whose life not much is known. There is important information on growing of olive trees, a symbol of Andalusia, and the production of olive oil in this book (Encylopedia of Islam b,1960 on; Int source 13). Ibn al-'Awwām (his predecessors were Abū'l-Khayr and Ibn Hajjāj from famous Andalusi agronomists) carried out successful agricultural experiments in the Aljarafe Gardens (including mostly olive orchards) in the west of Sevilla according to his textual evidence. He was probably an aristocratic landowner. His book was translated into western languages, Spanish by Banqueri in 1802, and French by Clément-Mullet in 1864–67 (Int source 13). His book's chapter (bab) [in all translations] 7 includes the cultivation of particular species of trees, fruit-trees and flowering plants grown in Spain [vilayet-i Endelüs in Turkish translation], including the olive, vine, sugar cane, banana, rose and jasmine. This chapter is composed of four parts (Fasl) and the first part (ghrasa'tuz zeytun: olive is kind of two [berri (wild olive- delice in Turkish) and ehli (cultivated olive (in Turkish: akilli zeytin or smart olive/sensible olive)], soil properties for olive cultivation [suitable:sandy soil and unsaline soil], fruit properties [table& oily or big/ little], transporation of olive trees, their fertilization and planting time of olive tree issues taken from Bolos Democritos of Mendes (2 nd century BC), Ibn Wahsiyya, three grand masters of farming science (Ehl-i Filahat) [probably the three ancient (Mesopotamian) sources of KFN], Yuniyus (Vindonius Anatolius of Beirut), Ibn Bassal, Ibn Hajjaj and his experiments, second part : olive propogation by seed (Ibn Bassal and Abu'l Khayr Al Ishbili), third part: the recharge of burning olive trees (Tamitri Hakim???), fourth part: abscision of olive fruits by various way/forms, the history of olive cultivation in Andalus based on the history of prophets, olive oil production (Ibn Wahshiyya Encylopedia of Islam b,1960 on; Int source 13). The book cover, the index with regard to olive cultivation are pages taken from the Turkish translation of Ibn Awwam's book were shown in Figure 5.



Figure 5: The index (pages 5 -6 [Left]), introduction page (middle) an pages regarding olive cultivation (101- 102 and 103 -104 [right] taken from the Turkish translation of Ibn Awwam's book.

Some of Turkoman Rasulid Sultans in Yemen, referred to as the agronomist and scientist sultans, wrote a number of treatises on agricultural sciences. The earliest of these works is ***Milh al-malâha fî ma'rifat al-filâha*** (The Knowledge of Elegance in the Science of Agriculture) of al-Malik al-Ashraf 'Umar bin Yusuf (died in 1296). The book of this Yemeni sultan provides a detailed look at the crops and rare plants cultivated in Yemen. Information is provided on the agricultural cycle for the major crops and specific cultivation methods. The page on olive trees was given in Figure 6. According to this book, the olive tree was planted in Tishrini al–Awwal (X). The sultan gave some knowledge on budding and cutting techniques of olive trees. The longest and most important agricultural treatise from the Rasulid period was written by al-Malik al-Afdal al-'Abbâs, who died in A.D. 1376**, *Bughyat al-fallâhîn fi al-ashjâr al-muthmira wa-l-rayâhîn*** (Desirable Practices of Farmers for Flowering Trees and Aromatic Plants). This sultan said in his book that the olive tree was not known in Yemen, that there was a wild tree resembling the olive near the fortress site of al –Dumluwa in the southern highlands. It is known that there are some quotations from Al Andalus and North Africa (Ibn Bassal and Abu al Khayr of Seville) and Iraqi agronomers (Ibn Wahsiyyah) and also various authors of the Hellenistic world (especially ***Kitâb al-Filâha al-Rûmîya*** of the 6th century A.D. Cassianus Bassus) in the so–called Yemeni Rasulid texts (Varisco,1994).

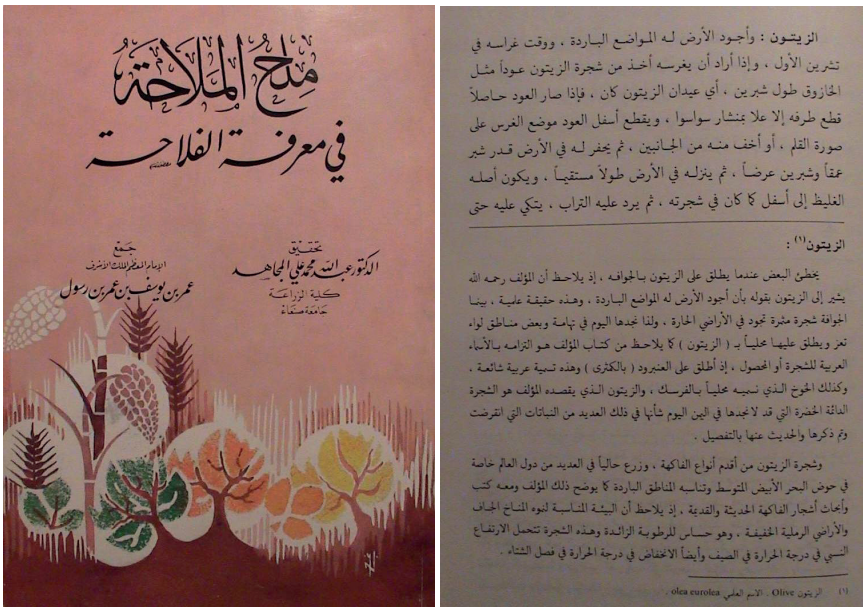


Figure 6: The cover (left) and pages (right) on olive tree in al-Malik al-Ashraf 'Umar bin Yusuf's book (This book was published in Damascus-Syria with partially edition made by agriculturist Dr. Abd Allâh Mujâhid, San'a University, in 1987)

Conclusion

An agricultural movement, called "***The Islamic Agricultural Revolution***" by historians, appeared between 7th and 11th A.D. centuries in the whole Islamic world from Spain and Sicily to Transoxiana. Actually, this revolution affected agricultural industries (flour milling, sugar production and oil extraction), population levels, distribution of the labour force, clothing (textyl industrie), cooking and diet in the Islamic world during the middle ages (Watson,1983). There is no doubt that these works of Muslim agriculturists in Spain, named as "***The Andalusi School of Agronomy***" by various historians of the sciences, played a great role in the development and expansion of olive culture in Europea before the Renaissance.

When Muslim Arabs were present in the Iberian Peninsula they planted the first olive groves in Toledo and Madrid. The olive tree was originally introduced to Spain by the Phoenicians and the Romans. Later, it was the golden age during the time of the Andalusian caliphate thanks to the flourishing of the sciences and culture. During the central Caliphal government, Taifa Emirates (Pretty Kings), Almoravid and Almohad in Muslim Spain established royal botanical gardens for acclimatization of plants brought back from the Near and Middle East. These gardens were built in Cordoba (*Al*

Rusafa and *Madinat Al Zahra*), Seville (*Aljarafa* and *Buhayra gardens), Toledo* (*Hait al Sultan*), Almeria (*Sumadihiyya*), and Granada (*Jannat al Arif* or Generalife) cities of Muslim Spain in different times. Some Muslim agriculturists (Ibn Bassal, Abu'l Khayr al Ishbili, and also Ibn al Awwam) carried out part of their research and some of their experiments in the royal botanical gardens. There is no doubt that these gardens played a very important role in the process of diffusion which we are trying to understand. Through such gardens, as well as from their extensive travels, Muslim botanists and agronomes gained a knowledge of the plant world (especially about olive cultivation) that was deeper and more extensive than that of the ancient world. Therefore, some European names of olive culture are of Arabic origin, that is to say borrowed directly or indirectly from words either purely arabic or long Arabized. In Spanish and Portuguese today, for instance, there are a number Arabic origin words on olive growing which being used now, such as the names azeituna or aceitona and achebuche (olive fruit and olive tree, *al zaytun and shacara al zaytun* in Arabic), aceite in Spanish and azeituna in Portuguese (olive oil) (Watson, 1983 and 1994).

Also, Muslim agriculturists and farmers played effective roles in the diffusion of various olive varieties from the East (Middle East) to the West (Europe) and in the development of different growing techniques during medieval times. Actually, agriculture heritage related to olive growing of ancient times came by means of books of Islamic agriculturists from the middle ages to the modern age.

In addition, Islamic agriculture books have very large sources of traditional agriculture teaching which is necessary for ecological agriculture, especially olive growing based on organic farming. In this connection, these books about soil, water, plant and animal resources contain priceless knowledege in their field. Finally, there are many things to be learned about the agricultural heritage of Islamic culture.

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