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WINE AND OIL PRODUCTION IN 4TH-7TH CENTURY MONASTERIES OF THE EASTERN MEDITERRANEAN

PRODUCCIÓN DE VINO Y ACEITE EN LOS MONASTERIOS DEL MEDITERRÁNEO ORIENTAL, SIGLOS IV-VII

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Abstract

This paper examines the extent to which early Christian monasteries were involved in the flourishing production of oil and wine in the late antique eastern Mediterranean. In this region, monasticism was established by the late 4th century and widespread by the 6th century. Contrary to images of monasteries as remote retreats from everyday life, monks were engaged in productive activity and monastic communities were closely linked to rural villages and trade networks. Recent investigations show that at many monasteries wine and oil were produced on a large scale well beyond subsistence. In addition, monasteries were centres of migration and archaeological evidence suggests they may have served as sites for the transfer of productive technologies from other regions. Monasteries deserve close attention as an integral element of the late antique economy and rural life in the eastern Mediterranean.

Keywords: monasteries, late antique eastern Mediterranean, wine production, oil production, Late Antiquity.

Resumen

Este artículo examina hasta qué punto los primeros monasterios cristianos participaron en la floreciente producción de aceite y vino en el Mediterráneo oriental tardoantiguo. En esta región, el monacato se estableció a finales del siglo IV y se extendió a lo largo del siglo VI. En contra de la imagen de los monasterios como retiros remotos de la vida cotidiana, los monjes, la actividad productiva y las comunidades monásticas estaban estrechamente conectadas con las aldeas rurales y con las redes comerciales. Investigaciones recientes demuestran que en muchos monasterios se producía vino y aceite a gran escala, más allá

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de la de subsistencia. Además, los monasterios eran centros de migración y las pruebas arqueológicas sugieren que pudieron existir tecnologías productivas procedentes de otras regiones. Los monasterios merecen especial atención como elemento integrante de la economía de la Antigüedad tardía y de la vida rural en el Mediterráneo oriental.

Palabras clave: monasterios, Mediterráneo oriental de la Antigüedad tardía, producción de vino, producción de aceite, Antigüedad tardía.

1. WINE AND OIL PRODUCTION IN THE EASTERN MEDITERRANEAN[1]

Grape vines were first domesticated in the Near East about 11,000 years ago (Zohary, Hopf and Weiss, 2012, 124-126 ; Dong et al. 2023), and in the Roman Empire were grown throughout the region, from the fertile coastal area of Tyre to Egypt to semi-arid inland regions of *Phoenice* and the Negev highlands of *Palaestina* III (*Fig. 1*; Decker, 2009, 139; Lantos, Bar-Oz and Gambash, 2020). Some wines of the region were considered high quality, already listed among the best wines by the 1st century CE Italian writer Pliny (*N.H.* 14.9.7) and still noted for their quality by Sidonius (*Carmina* 17.15-16) in 5th century Gaul and by Isidore of Seville (*Etym* 20.7) in the 7th century. It has been estimated that in the Roman period tens of thousands of wine installations existed in the region (Frankel, 1999, 51), ranging from simple rock-cut treading floors and vats to huge and complex wineries (Avshalom-Gorni, Frankel and Getzov, 2008) such as that recently discovered in Yavne (Seligman, 2022). From the 4th century CE, southern Palestinian 'Gaza' wine in particular was traded throughout the Mediterranean and reached an export peak in the 5th to 6th centuries. Palestinian LR 4 and 5 wine amphorae are found in Carthage, Italy, and southern France, and even reach Spain and the Danube during this period (Kingsley, 2001; Lantos, Bar-Oz and Gambash, 2020).

The wild olive is native to areas of the Near East and cultivated olive is found in the region from the 7th millennium BCE (Langgut and Garfinkel, 2022). During the Roman period, olive cultivation flourished in the favourable ecological conditions that existed from northern Syria to southern Palestine, and it was also cultivated less extensively in areas of Egypt (Waliszewski, 2014, 39-40, 92). Oil production expanded into new and more marginal areas in late antiquity, including the Negev desert and semi-arid regions in the northern Syrian massif (Waliszewski, 2014, 208-220). While initial archaeological

1. For the purposes of this chapter, I have focussed on the ancient provinces of *Syria*, *Phoenice*, *Palaestina*, and *Aegyptus*, which today fall within the modern territories of Syria, Lebanon, Israel, the Palestinian Territories, Jordan, and Egypt. See Fig. 1 map.

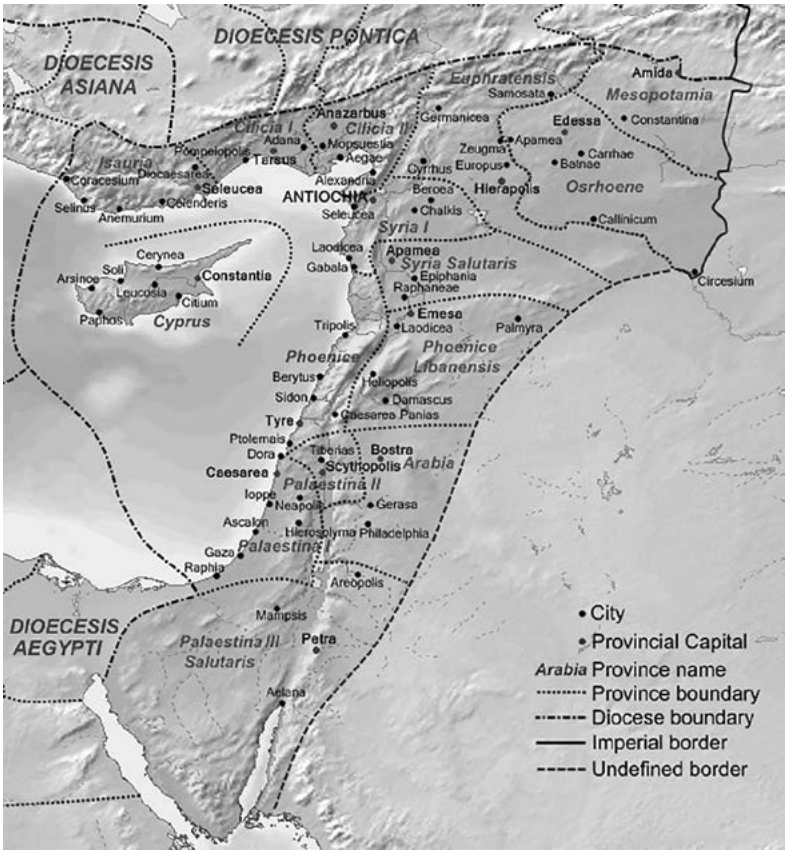

Fig. 1. Map of the eastern Mediterranean around 400 CE, by Cplakidas (Public Domain: https://en.wikipedia.org/wiki/File:Dioecesis_Orientis_400_AD.png).

investigation of the late antique villages of northern Syria proposed an intensive export oil monoculture (Tchalenko, 1953-1958), more recent work has reinterpreted many of the "oileries" as wineries. The proportion of oil to wine production in these villages, and the extent to which surplus oil was exported, are still matters of debate (Decker, 2009, 166-173; Waliszewski, 2014, 299-310; Van Limbergen, 2015).

Throughout the Roman period, the most common forms of press used to produce wine and oil in the eastern Mediterranean were lever and weights types, which were different from the winch or weight typologies used in the western Mediterranean. In the Near East, a row of several rectangular, cylindrical or bell-shaped weights, usually of around 600-800 kg and approximately 1 m in height, were raised by winches attached to the lever, not to the weight as in the West

Fig. 2. A reconstructed oil press of a type used from the Hellenistic to late antique period, at Maresha, near Jerusalem, Israel (Public Domain: https://ceb.wikipedia.org/wiki/Tel_Maresha#/media/Payl:Beit_Guvrin_4.JPG).

(Fig. 2). The most common method of attachment was a "reversed-T bore". The lever was supported by stone orthostats, or by a niche in a wall or rock face (Frankel, 1999, 76-86, 99-106; Waliszewski, 2014, 134-138, 405-536). While common elsewhere in the region, such lever presses with suspended weights rarely appear in Northern Syria, although examples are found in the three 2nd to 3rd century oileries at Déhès (Callot, 2013, 100-101). Single parallelepipedic weights with both reversed-T bores and external mortices were found at two sites, but most of the presses in this region post-date the introduction of screw press mechanisms (Callot, 1984, plates, 33-37; Waliszewski, 2014, 137-138).

It seems that lever and screw technology *(Fig. 3)* only became widely used in the eastern Mediterranean in Late Antiquity, since virtually all securely dated examples in this region belong to the 4th and later centuries CE (Waliszewski, 2014, 139-40, 172-175). For example, at the village of Déhès[2] in the 5th or 6th

2. The site and monastery of Dahis have been referred to in archaeological literature as Déhès and Dayr Déhès since the investigation by French archaeologist Georges Tchalenko in the 1950s. Monastery sites in Israel are differently transliterated as Deir. To avoid confusion, this paper will use the site name as it is given in the excavation report of each site, without imposing consistency.

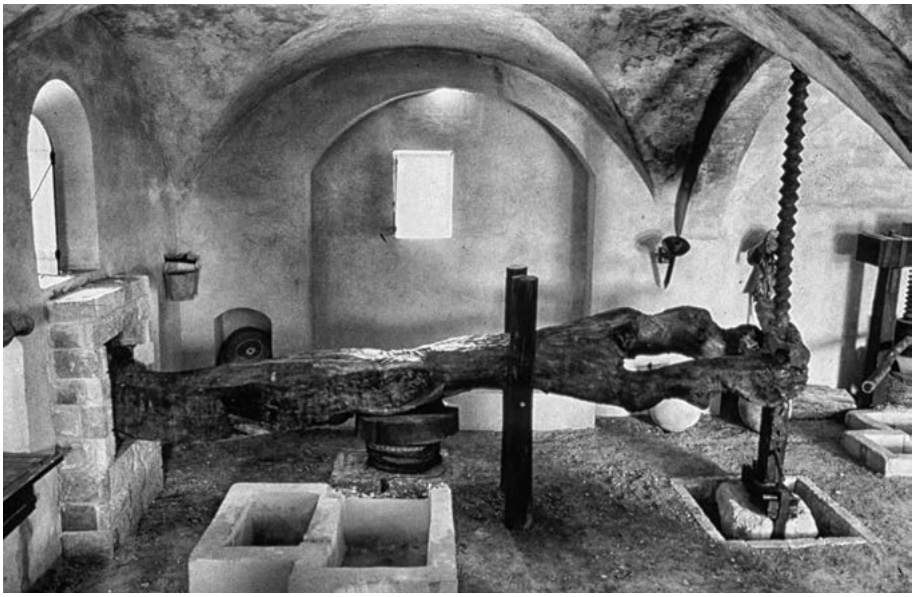

Fig. 3. Traditional lever and screw press, similar to that used in ancient Northern Syria and elsewhere in the eastern Mediterranean (Collection of Eretz Israel Museum, Tel Aviv, Israel. Reproduced with permission).

centuries nearly 30 new wine presses were built using this changed form of technology (Callot, 2013; Waliszewski, 2014, 190-92). Distinctive local forms of direct screw presses *(Fig. 4)* developed and are frequently attested from the 4th century onwards in the southern region, from Galilee to the Negev and Egypt. These usually had stone piers of various types, while others were cut in the walls of caves, or were placed in the corner of a room, supported by walls (Waliszewski, 2014, 152-155, 167-168; Brun, 2004, 160, 166, 177, 181, 183). A unique type of press was developed for wine production. This consisted of a wooden screw held in place within a wooden frame by a stone mortise, usually placed in the centre of the treading floor, which was often paved in industrial mosaic (Frankel, 1999, 140-145; Dar, 1999, 100, 106; Avshalom-Gorni *et al.*, 2008, 60; Mazor 2009; Turshan and Cox, 2015). Such presses also appear in visual representations *(Fig. 5)*. Stone rollers found at sites from northern Syria to central Palestine, and especially in the Mount Carmel and the Galilee regions, have been interpreted as crushing devices used in the production of the sweet raisin wine for which the region was famed (Van Limbergen, 2017).

Fig. 4. Traditional direct screw press with reconstructed stone piers, similar to that used in ancient southern Levant and elsewhere (Collection of Eretz Israel Museum, Tel Aviv, Israel. Reproduced with permission).

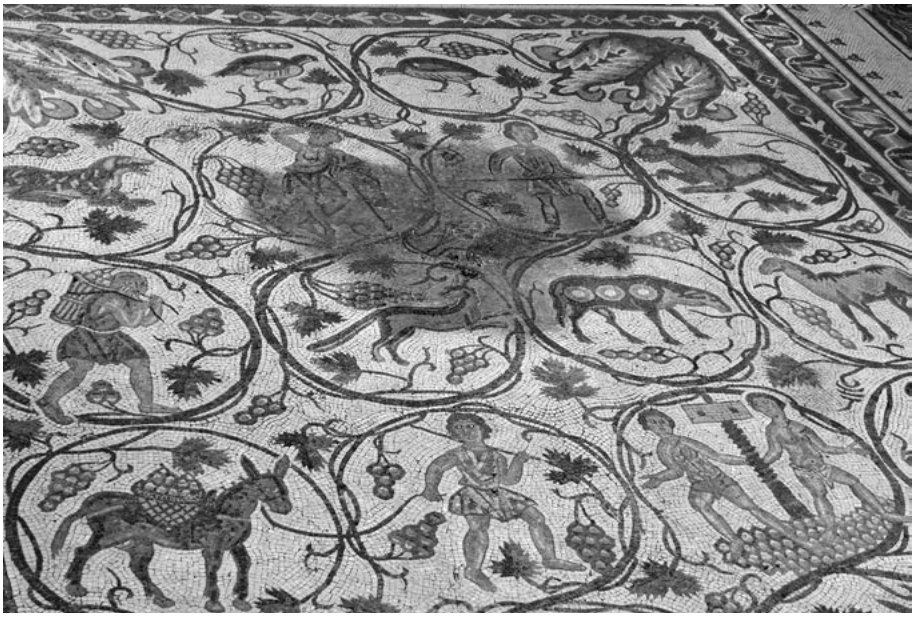

Fig. 5. Mosaic from the 6th century pilgrimage Church of Saint Lot and Saint Procopius, Khirbet al-Mukhayyat (Mount Nebo), Jordan. The mosaic shows scenes of the grape harvest, and the bottom right roundel illustrates the use of the innovative late antique winepress type with fixed wooden screw. (Photo: Manar al-Athar Digital Archive, Oxford 2013–, www.manar-al-athar.ox.ac.uk CC BY-NC-SA 2.0).

2. MONASTICISM IN THE EASTERN MEDITERRANEAN

During the course of the 4th century, when Christianity became widely established in the eastern Mediterranean, the Near East became a centre for fervent pilgrimage and monasticism due to its place within the Judaeo-Christian religious heritage. The late 4th to 6th centuries saw the widespread foundation and building of communal (coenobitic) monasteries (Patrich, 2004; Hirschfeld, 2004), which will be the subject of this chapter. Such monasteries varied greatly in size from only around 10-15 monks to monastic communities of several hundred in Egypt (Zeisel, 1980, 320-21).

It is often not possible to identify archaeologically those monasteries named in texts, and the interpretation of an archaeological site as a monastery is not always certain. However, characteristics which serve to distinguish a monastery are a layout with cell-like rooms around a central courtyard, built in the 4th to 6th centuries, and associated with a church or chapel usually containing mosaics and marble fragments of screens, tables or reliquaries (Ashkenazi and Aviam, 2014, 162). A cemetery, a large hall, a cistern, tower, agricultural facilities and storage, and an enclosure wall are common features which also suggest the presence of a monastic community, and it has further been noted that monasteries were often situated in a highly visible location on a hill (Hirschfeld, 1992, 33 ff., who also notes textual descriptions; Hull, 2008). Crosses are usually engraved or carved on the building façade, on architectural features such as column capitals, and even on agricultural installations, as for example at Deir Ghazali[3] near Jerusalem (Avner, 2000).

Monasticism was seldom a literal retreat from society in desert or remote locations, and early asceticism developed into more organised communities, the majority of which were founded within or a short walk from rural villages. It has been estimated that more than 50% of monastic sites in the limestone massif region of norther Syria were located within 1 km of a settlement, and over 80% within 2 km (Hull, 2008). Other monasteries were built on the outskirts of villages or even within them, as seems to have been the case for many monastic communities in Egypt (Goehring, 1996).

Monasteries were not only physically located close to village centres, but also had close economic and social ties to the local community. Villagers worked on monastery land, served as traders or carriers of monastery goods, and often even constructed the monastery, as described, for example, in the *Life of Euthymius* 12.22. At the same time, saints' lives attest the important roles of monks in village

3. See note above regarding transliteration.

Fig. 6. The 6th century monastery of Khirbet es-Suyyagh. The church can be seen at the bottom left, the oil processing area on the top right (Photo: courtesy of I. Taxel).

life, providing guidance and arbitration, food assistance and other forms of help, and a kind of patronage (Goehring, 1996; Di Segni, 2005; Hull, 2008; Taxel, 2013a; Ashkenazi and Aviam, 2017, 125-133). Inscriptions and papyri also record local religious leadership within village administration and it has been suggested that the annexes to churches may have been used for meetings of village leaders, since many villages have no other public buildings (Gatier, 1994, 39-42).

The tight connections between the local lay population and the monasteries can be seen archaeologically not only in the physical locations of monasteries, but also in the points of access provided to their spiritual and agricultural facilities. For example, at Qasr al-Brad in northern Syria, the larger of two presses is located south of the monastery close to its enclosure wall, in the direction of the large ancient settlement of Brad situated only 700 m away, and from which it could be reached via a pathway and rock-cut steps (Hull, 2008, 98, 102). The 6th century monastery at Khirbet es-Suyyagh *(Fig. 6)*, 22 km from Jerusalem, lies about 1 km from an ancient village. The monastic enclosure included a church measuring nearly 17 × 14 m, with a coloured mosaic and marble tables - far larger than needed for the monks. The

church was accessible from outside the monastery complex, suggesting that it was used by the local population, even though there are also churches in at least two nearby villages. Perhaps it was accessed by people working the monastery fields or visiting sacred relics, since two marble reliquary chest lids were found (Taxel, 2009).

3. PRODUCTION OF WINE AND OIL IN MONASTERIES

Monasteries often produced oil and wine, along with other forms of production. Wine and oil were staple products, fundamental to the diet and for fuel. Wine was consumed by monks, in spite of occasional controversy around requirements for asceticism (Schachner, 2005a, 159). Both had a place in the celebration of rituals and blessings (Vizcaíno Sánchez, 2009) and were used in medicine (Mazzini, 2000). Oil was essential to ecclesiastical lighting, which became an important symbolic feature of churches (Dendy, 1959, 2-9; Parani, 2019). Both were also needed for the requirements of visiting pilgrims, and were also distributed in the form of charitable donations. It is also clear that – regardless of rhetoric against monks' involvement in commerce – they were produced for sale on ecclesiastical estates to provide income (Brenk, 2004; Schachner, 2005b, 156-159, 180; Taxel, 2009, 213; Seligman, 2020, 33). Church lands and trade also seem to have received tax exemptions (Elliott, 1978; Whittaker, 1983, 167-69). There is abundant textual evidence from ostraca, papyri and saints' lives for monasteries acquiring and cultivating vineyards and olive groves, exporting their produce, and even shipping goods (Goehring, 1996, 273-74; Schachner, 2005a; Wipszycka, 2011; MacCoull, 2011; Ashkenazi and Aviam, 2013 and 2017; Lopez, 2016). Export of monastic products is also possibly indicated by cruciform monograms on Cypriot LR 2 amphorae and crosses on LR 5 amphorae (possibly from Abu Mina or elsewhere in Egypt), from the mid-7th and the mid-8th century Ma'agan Mikhael B shipwreck (Creisher *et al.*, 2019, 111-12). Syrian oil amphorae have also been found with inscriptions of Christian formulae and what appear to be the names of monastic producers (Derda, 1992).

Monastic production seems to have involved both employing and supervising local hired, tenant or slave workers, and agricultural work by the monks themselves, who seem to have also taken on the roles of "treading grapes in the winepress and squeezing oil in the oil press together with [their] village neighbors" (Ashkenazi and Aviam, 2013, 293). In southern Palestine, Saint Hilarion is said to have timed his visits to monasteries "before the vintage" (Jerome *Life of Hilarion* 26.25), indicating that this was a key date in the monastic calendar (Lantos, Bar-Oz and Gambash, 2020, 59). After the 4th century,

ecclesiastical leaders increasingly came to view manual labour favourably as part of the spiritual life. Monastic vineyards were blessed by saints and praised as a source of alms for charity, the planting of olive groves and vineyards is recorded in saints' lives, and the regulation of agricultural work came to be included in monastic rules (Schachner, 2005b, 108-115, 157-58, 182-84). The association of the religious life with production was symbolised by the frequent appearance of crosses on, within, and around wine and oil making equipment. Crosses are chiselled onto wine presses, and placed in vats where they would be covered by the must, suggesting a spiritual purpose of blessing the product (Ashkenazi and Aviam, 2017, 130). For example, in the wine making rooms at the monastery of Deir Ghazali just outside Jerusalem, crosses are depicted in the plaster coating on the walls, on the sides of the wine vat, and in the mosaic of the floor on which the grapes were trodden (Avner, 2000, 160). The sanctity or religious purpose of the products is also reflected in the amphora, found at a monastery in Egypt, inscribed with the words "first quality sacred oil" (Schachner, 2005a, 166 ; further examples in Derda, 1992.).

4. SYRIA

More than 120 monasteries have been identified in the limestone massif of northern Syria. Presses are certainly present at 29 of these, and are possibly present at a further 53, totalling nearly 70% of monastic sites (Hull, 2008, 110-113). Several seem to have produced a very significant surplus above the needs of the resident monks. At the site of Qal'at Sirmada, it has been estimated that the press had the capacity to produce around 4,000 litres of oil per year, probably enough to supply at least 100 people (Hull, 2008; Van Limbergen, 2018, 16 for a summary of varied calculations of quantities of oil use). More than double this quantity was produced at the monastery of Qasr al-Brad, which contained a tower, a small church with martyrion, a large accommodation building, and a press capable of producing around 10,800 litres of oil per season (Hull, 2008, 101-02). More than double again could have been produced by the two 6th century lever and screw olive presses at Dayr Déhès, which had an estimated capacity of up to 25,000 litres per year. At this monastery, a small rock cut treading floor and vat were also found, presumably to produce wine for the monks' consumption (Biscop, 1997, 21-26, 42-43). In addition, a stone roller was found (Biscop, 1997, 21, plate, 115), of the type now identified as used for making sweet raisin wine

(Van Limbergen, 2017)[4]. A survey of c. 160 km² of the Gabal al-A'la identified 35 cenobitic monasteries, at which more than 30 wine-treading floors were identified and nearly 20 of which contained wine presses. Most of the treading floors measure between 5m² and 9 m², as would be expected for small to medium production, but two are much larger (around 19 m²) and four are exceptionally large, measuring approximately 32-42 m² (Schachner, 2005b, 66-8, plate, XV). Some have multiple treading floors and presses, as at Dayr al-Malik, which has three presses and three treading floors ranging in size from 3.6 to 11.5 m² and totalling nearly 24 m²; and Qasr ad-Dayr, which has two presses and two treading floors ranging in size from 10.2 to 11.5 m² and totalling nearly 22 m² (Schachner, 2005a, 165-8, 184). Both of these sites also contain rollers for the production of sweet raisin wine (Van Limbergen, 2017). While it is very difficult to accurately estimate how much wine is produced from the size of installations, since it is unknown how many times during a harvest season a floor or vat would be refilled, a 10-13 m² floor implies a production of wine on a scale suitable for more than 100 people per annum, and 20-40 m² for several hundreds (Van Limbergen, 2015).

5. *PHOENICE* AND *PALAESTINA* II

The fertile Galilee region in *Palaestina* II was densely occupied by monasteries which produced wine and especially oil from the 5th century onwards. In western Galilee, 26 pressing installations have been identified in monasteries. Six have been recorded in just one small area around the town of Karmiel, a previously unexploited hilly region made cultivable (mainly for olives and vines) by late antique terracing. The total production of oil would have far exceeded the needs of these monasteries or even the region, especially taking into account that more olive presses were also located in nearby villages. A number of monasteries also had a large wine-making capacity (Ashkenazi and Aviam, 2013). For example, the small monastery of Ḥorvat Zaggag had a lever and screw oil press, a 20 m² treading floor and an 8 m³ capacity wine vat. At only 400 m distance away, another small monastery Ḥorvat Qav had a very large wine production facility including a treading floor of 36 m² and a vat with a 20.5 m³ capacity, as well as an oil press from which two weight stones have been found (Ashkenazi and Aviam, 2014, 165-68).

4. My thanks to Dimitri Van Limbergen for his advice on this site (Pers. Comm. 15/11/21).

6. *PALAESTINA* I

More than 100 presses have been identified in the hinterland of the city of Jerusalem. Monasteries were exceptionally prominent in this area and were the characteristic form of agricultural exploitation in late antiquity, due to the dispersion of village populations following the 2nd century Jewish revolts. The city of Jerusalem was the destination for a huge number of pilgrims, and probably also saw migration of workers involved in building and other forms of labour due to the resulting surge of population and the unparalleled building of churches, monasteries, and other infrastructure for pilgrimage. These processes would have generated a very high demand for oil and wine (Seligman, 2020). Two excavated monasteries in the Jerusalem area yield examples of exceptionally large wine-treading floors. At Deir Ghazali, an extensive two storey architectural complex with crosses engraved on the façade and finds including fragments of a marble reliquary, marble chancel screen, and marble colonnettes has been identified as a communal monastery, built in the 5th or early 6th century. An oil press was contained in a room on the ground floor of the North wing, and two wine presses were located in the South wing. Crosses were also moulded in the plaster coating of the walls of the treading floor and the collecting vat of the wine press in Room 9. The treading floor was very large, measuring 35.8 m^2 (Avner, 2000). The monastery of Ras et-Tawil, also founded in the late 5th-early 6th century, had by contrast only 5 rooms, and probably housed 10-15 monks. However, the treading floor was similarly large, measuring 34 m^2, with a vat of 4.9 m^3. As noted above, a treading floor of this size implies a production of wine on a scale suitable for several hundreds of people (Van Limbergen, 2015). Such a large quantity of wine would presumably have been sold to the Jerusalem market (Gibson, 1985; Gibson, 2009, 271-276).

Wine and oil were produced at monasteries throughout most of central Palestine (regions of Samaria and Judaea), both North and South of Jerusalem. At the 6th century Monastery of Khirbet es-Suyyagh, the oil presses could have produced up to 15,000 litres of oil annually, more than ten times the supply needed by the approximately 20 monks who resided in the monastery *(Fig. 7)*. Wine was also produced, and the large treading floor measuring 49 m^2 *(Fig. 8)*, together with two vats of 5 m^3 and 3 m^3, imply a production of wine on a scale suitable for several hundreds of people (Taxel, 2009, 210-15, 184). The 6th century monastery at Mevo Modi'im also produced both wine and oil. A fixed screw wine press located to the West of the main building was set into a

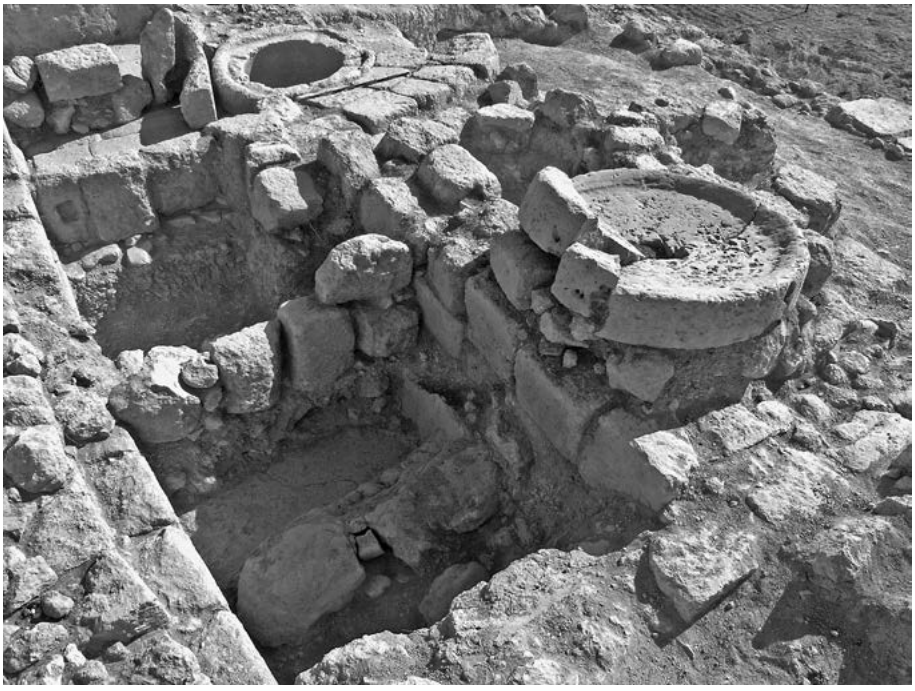

Fig. 7. The oilery at the monastery of Khirbet es-Suyyagh (Photo: courtesy of I. Taxel).

treading floor of 14 m^2, with an 8 m^3 wine collection vat. The lever and screw oil press, located in a large 103 m^2 hall to the East of the chapel, had a press bed measuring 1.2 m, and it has been estimated would have used a beam around 8 m in length. While the pit for a screw weight has been found, the cylindrical screw weight of only 470 kg, found out of place, would probably have been too small to be used alone (Eisenberg and Ovadiah, 2009; Kingsley, 2002, App.2). A huge treading floor of 45.5 m^2 and two vats with capacities of 7 m^3 and 18 m^3 were found at the Zur Natan monastery. A 6th century oil press complex was also present (Kingsley, 2002, 118-19). The monastery in the village of Ḥorvat Zikhrin, near Jaffa, contained a large oil making complex within its enclosure wall, consisting of a crushing mill, a press and a storeroom with 25 jars (Fischer, 1989, 1795-96; note that the interpretation of this building as a monastery has been challenged: Taxel, 2013b).

In the Judaean desert region, at least 65 hermitages and communal monasteries were established, but here they were relatively small and due to the arid and rocky conditions, only small quantities of wine or oil were produced at a few in slightly less unfavourable locations (Hirshfeld, 1992). A small winepress

Fig. 8. The wine treading floor at the monastery of Khirbet es-Suyyagh (Photo: courtesy of I. Taxel).

with a 6m^3 vat appears at the site of Khirbet Bureikut near Bethlehem; a larger press with a mosaic treading floor and a 6.8 m^3 vat embossed with a red cross was found at the site of Khirbet Umm-Rukba near Hebron. Nearby, substantial direct-screw oil presses with large stone piers and crushing mills were found at the monasteries of Khirbet el-Quneitira and Khirbet el-Qasr. A much smaller olive oil press was also used in the kitchen of the monastery of Khirbet el-Deir, in the southern Judaean desert (Hirshfeld, 1992, 107-111). The wine and oil needed by monasteries in this region were probably mostly provided by villages, which developed on marginal land at the edge of the Judaean desert, probably due to monastic demand for supplies (Seligman, 2011, xviii).

7. *PALAESTINA* III

The Negev desert region of southern *Palaestina* III appears to have been brought into intensive cultivation for wine during the 4th-6th centuries using terracing, water harvesting, and pigeon manure as fertiliser (Avni, 2008; Avni *et al.*, 2013). It seems that the famous sweet white "Gaza" wine, traded and renowned as far as the western Mediterranean in the 4th to early 7th centuries,

was also produced in this region and traded via the port of Gaza (Lantos, Bar-Oz and Gambash, 2020). It is likely that monasteries participated in the flourishing production: at the village of Avdat, a very large complex winepress of typical Negev type has been found 50 m to the South of the southern church and monastery complex (identified by the epitaph to an abbot at the entrance: Figueras, 1995, 432). The winery covers an area of 66 m^2, including an exceptionally large treading floor of 33 m^2 (Ashkenazi and Aviam, 2017, 123-124).

In the very harsh environment of southern Sinai, the peak of monastic occupation was reached in the late 6th century, with 50 sites identified as monasteries for between 5 and 15 inhabitants. Archaeological investigation has identified cells, places for communal prayer, and walled agricultural areas, but only five small wine production installations, in line with the textual evidence that the Sinai monks did not drink wine (Dahari, 2000, 158, 167-168). For example, at the site of 'Ein Najila a central building of fieldstone and mud brick contained a chapel on its upper floor, radiocarbon dated by a building beam to the late 4th-early 5th century. A winery on the ground floor, with a 1.2 x1.2 m treading floor, space for a press, and a small collecting vat, was used until the end of the 7th or early 8th century (Dahari, 2000, 86-93, 165).

8. EGYPT

Based on both archaeological and textual evidence, Egyptian monasteries do not seem to have produced much olive oil, which was not a traditional crop in this region (Schachner, 2005b, 169). Evidence for oil production in the form of crushing mills has been found at a few monasteries in the provinces of Thebaid and Arcadia. These include the sites of Dayr Anba Hadra, Dayr Mustafa Kasif, and Dayr Apa Jeremiah - where a screw press was also found. There is, however, abundant textual evidence for wine production at Egyptian monasteries. This is attested in letters, contracts, accounts, receipts, census documents and property lists found in the form of papyri, ostraca and the Aphrodito Cadaster (Schachner, 2005a and 2005b, 180-197, plates, XII-XIV; Wipszycka, 2011; MacCoull, 2011). A large wine press installation has been discovered at Dayr Anba Hadra and kilns for producing LR7 amphorae have also been found (Schachner, 2005a and 2005b, 180 ff). At the 5th century religious complex and pilgrimage site of Saint Menas (Abou Mina), an exceptionally large wine factory has been excavated inside the boundaries of the ecclesiastical centre. It had five press units and a vat with a capacity of more than 15.6 m^3 (Grossmann and Kościuk, 2014). Based

on the evidence of ostraka, the quantity of wine processed there is estimated to have been around 60,000 litres per annum, probably mostly for the pilgrims who visited the shrine. Calculation based on the Aphrodito Cadaster also indicates production of around 4000-6000 litres per annum at other monasteries in the area (Schachner, 2005b, 189-190), in addition to the wine production at other nearby sites from the 4th to 8th centuries revealed by excavation (Abd el-Aziz Negm, 1998; Brun, 2004, 158-161).

9. MONASTERIES AS COMMUNICATION HUBS AND SITES OF TECHNOLOGICAL TRANSFER

In the context of a pre-modern communications system lacking even printing technology (ewit, 2020), monasteries were important communication hubs in the countryside, and may even have played a role in the diffusion of new press technologies. As the location of many sacred places relating to the Bible and the lives of Jesus and prominent saints, this region drew the devout from around the Empire and even beyond. Monasteries housed pilgrims and drew significant immigrant populations, and maintained written and personal contact with other monasteries and the ecclesiastical network throughout the Mediterranean (Di Segni, 2005). Through their close links and influential role in relation to local village communities, they also linked these communities to the broader Mediterranean.

Monasteries situated at pilgrimage sites and along pilgrimage routes served as hostels for the massive late antique influx of pilgrims, who as far as possible lodged in Christian holy communities both en route and at their destination (Hirschfeld, 1992, 11; Patrich, 2004; Schachner, 2005b, 49, 285; Hull, 2008; Ashkenazi and Aviam, 2013; Taxel, 2013a; Taylor, 2019; Schick, 2019; Loosley, 2019; Seligman, 2020, 32). Archaeological evidence supports the textual attestations. For example, at the excavated 6th century monastery of Khirbet es-Suyyagh, located between Jerusalem and Judaean pilgrimage sites, a long hall and side room seem to have been places for guests and pilgrims. A pilgrim flask has been found there of a type used for the 'holy' water, oil or earth bought as blessing souvenirs from the Holy Land (Taxel, 2009, 37-38, 107, 218-19). A very large example is the monastery of Martyrius, in the Judaean desert: here a mid-6th century building measuring 43 x 27 m at its widest points, with kitchen, stables and dormitories capable of housing about 70 people, was situated just outside the monastery walls (Hirschfeld, 1992, 197).

Monks moved from region to region within the monastic network, as can be seen in the Lives of saints such as Euthymius, Gerasimus, Melania the Younger, Hilarion, Daniel the Stylite or Theodore of Sykeon (Hunt, 1982; Hirschfeld, 1992; Hirschfeld, 2004). Many monks were also themselves pilgrims (Dietz, 2004). Monasteries attracted a cosmopolitan and socially mixed migration (Kennedy and Liebeschuetz, 1988) from the Latin speaking West, from eastern regions of Asia Minor and Syria, and even beyond limits of the Roman empire from Armenia, Georgia, Mesopotamia and Arabia. Recent radiogenic strontium isotope analysis of teeth from 22 monks buried in the crypt of St. Stephen's monastery in Jerusalem confirms that at least 36% had migrated as adults from other regions of the Near East (in the case of four individuals) and in the case of four more individuals also from further afield, possibly Africa or Europe (Sheridan and Gregoricka, 2015). Another vivid example is that of the wine and oil producing monastery of Bir el-Qutt on the outskirts of Jerusalem, at which the 6th century mosaic inscriptions are in Georgian script. Textual sources record the presence of "Iberian and Greek brethren" at monasteries and pilgrim hostels (Tchekhanovets, 2018, 213, 223; Ameling *et al.*, 2018, 605-612). The Life of the 5th century Euthymius records the visit of 400 Armenian monks on a group pilgrimage to Jericho (Seligman, 2020, 31).

Monasteries seem to have played some role in the transfer of agricultural technologies across regions. Mattingly points to the importance of a local workforce already familiar with a technology to its successful diffusion (Mattingly, 1996, 594). Migrating monks appear to have brought with them technological innovations that they knew from their home regions. Foreign styles of screw weights appear at several monasteries, particularly in the Jerusalem area, which was the focus of pilgrimage and migration. At the small monastery of 'Ain el-Jedide outside Jerusalem, the screw weight is of a very unusual octagonal design, with mortises on two sides joined by an upper groove, and attached by metal clamps. Some if its elements are paralleled in northern Syria, or Anatolia, while the mortises joined by an upper groove find parallels in southern France. The oil crushing mill is also unusual, and similar to Syrian examples (Seligman, 2009). At the Monastery of Deir Ghazali, 5 km north of Jerusalem, an oil press weight type has been found similar to some used in Anatolia (Editor's note, Avner, 2009, 296). In the oilery of the Monastery of Khirbet es-Suyyagh, South-West of Jerusalem, a highly unusual hybrid type of weight was used, which seems to reflect foreign influences, perhaps from Syria (Taxel, 2009, 206; pers. Comm. 13/4/22). Approximately 20 km further South, in the southern Judean foothills at the monastery of Beit Loya, two very unusual oil screw weights were

found. They are very similar to two of a unique design found at a single site in the Gebel Sim'an of northern Syria. At the same site a large olive crushing mill of an unusual form also has parallels in the Gebel Sim'an (Frankel, 2009). In northern *Palaestina* III, at Khirbet El-Quseir in the Galilee (identified as a monastery by a stone screen possibly from its chapel), there are three lever and screw oil presses, probably used consecutively. They represent a blending of technological traditions, having slotted piers and weight types characteristic of those in *Phoenice*, to the North, but a central oil collection system typical of more southern regions (Frankel, 1992; Frankel, 2009).

All these monastic sites seem to demonstrate an unusual importation and intermingling of technological methods from other regions, seemingly reflecting the migration of monks who brought with them technical ideas (as suggested by Frankel, 1999, 169, 178). Foreign artisans were also brought to the region for major ecclesiastical building projects (Seligman, 2020, 32). It is possible to that we are seeing traces of a similar transfer of technical knowledge in the form of new and varied types of presses.

The theory of communities of practice provides a framework for understanding how the nature of monastic communities would have fostered the sharing of innovations and consensus in applying new ideas. This framework emphasizes the importance of social relationships and a communal purpose for coordinated action which can successfully use innovations (Wenger, 1998, 125, 177-87). Ancient monasteries can be conceived as such communities of practice, in which innovation was nurtured by social relations and aligned with the communal purpose.

10. CONCLUSIONS

Monasteries were a major part of the agricultural as well as the social landscape of the late antique eastern Mediterranean. They were often producers of either or both oil and wine, and were closely linked to the everyday life of local villages, in spite of theological emphasis on retreat from the world. Monks consumed wine and oil, often produced significant surpluses, and even engaged in commerce. Monks also communicated with villagers and provided them with spiritual and material assistance, as well as employing them and working alongside them on monastic land. At the same time, monasteries had significant connections with the outside world, drawing pilgrims and new members from East and West. The impact of broad monastic communication networks and migration seems to be reflected in the

unusual presence of non-local press types at some monasteries, particularly around Jerusalem, but also in regions further North and South. It seems that technological ideas as well as spiritual ones may have circulated in the world of late antique pilgrimage and monastic migration.

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