An Industrial Zone and an Elaborate Winepress at Gan Ha-Darom, Israel

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Summary: An Industrial Zone and an Elaborate Winepress at Gan Ha-Darom, Israel

Remains from the Late Roman, Byzantine, Crusader, Ayubic and Mamluk periods were identified in archaeological excavations at the Gan Ha-Darom site. Two major stages of settlement in the Byzantine and Middle Ages were exposed in the excavations. Early remains were revealed indicating that a farmhouse or a monastery existed in the 4th–6th centuries CE, which includes a mosaic-paved chapel decorated with geometric designs and remains of at least four installations, probably winepresses. At the time, the site also served as an agricultural hinterland and an industrial zone, evidenced by an elaborate winepress that was exposed *c.* 120 m south of the farmhouse/monastery. In one of its collecting vats was built as secondary stage pottery-kiln. This article will discuss the industrial zone and the elaborate winepress.

Keywords: Byzantine – Winepress – Industrial – Agricultural – Rural – Monastery – Mosaic

Resumen: Un asentamiento agrícola e industrial en Gan Ha-Darom, Israel

Restos de los períodos romano tardío, bizantino, cruzado, ayubí y mameluco fueron identificados en excavaciones arqueológicas en el sitio de Gan Ha-Darom, Israel. En las excavaciones fueron expuestos dos importantes niveles de asentamiento durante el período bizantino y la Edad Media. Los descubrimientos en la capa más temprana revelaron que durante los siglos IV–VI e.c. existió en el sitio una granja o monasterio.

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Los restos incluyen una capilla pavimentada con mosaicos decorados con diseños geométricos así como restos de al menos cuatro instalaciones, probablemente lagares (prensas de vino). Durante ese período, el funcionamiento del sitio estuvo ligado con explotaciones agrarias e industriales, evidenciadas por otro sofisticado lagar que fue expuesto *ca.* 120 m al sur de la granja/monasterio. En una etapa secundaria en uno de sus pozos colectores se construyó un horno de alfarería. Este artículo tratará sobre dicha zona industrial y el elaborado lagar.

Palabras clave: Bizantino – Lagar – Industrial – Agrícola – Rural – Monasterio – Mosaico

Preface

The site is located on a low hill where remains of an extensive settlement in which *kurkar* (sandstone) building stones were found, along with the remains of installations and pottery sherds dating from the Roman to the Ottoman periods.[1] At Horbat Meshullam, *ca.* 1.5 km southwest of the excavation area, remains were excavated in the past of an installation dating to the Roman-Byzantine period.[2] In a survey that preceded the excavation at Gan Ha-Darom, architecture remains were detected: *kurkar* stones, some dressed, were found protruding on the surface, perhaps the remains of a structure, as well as pottery sherds, dated mostly to the Byzantine period. These included fragments of a *tabun*, jars, kraters, a casserole and a few sherds, dating from the late Roman-early Byzantine periods. Following the development survey, probes were made in this area, revealing remains of early walls and occupation levels. The present excavation was conducted in the wake of these findings. Archaeological excavations had been undertaken in the vicinity of the site in the past (see **Fig. 1**).

[1] Barda and Zbenovich 2005.
[2] Kanias 2006.

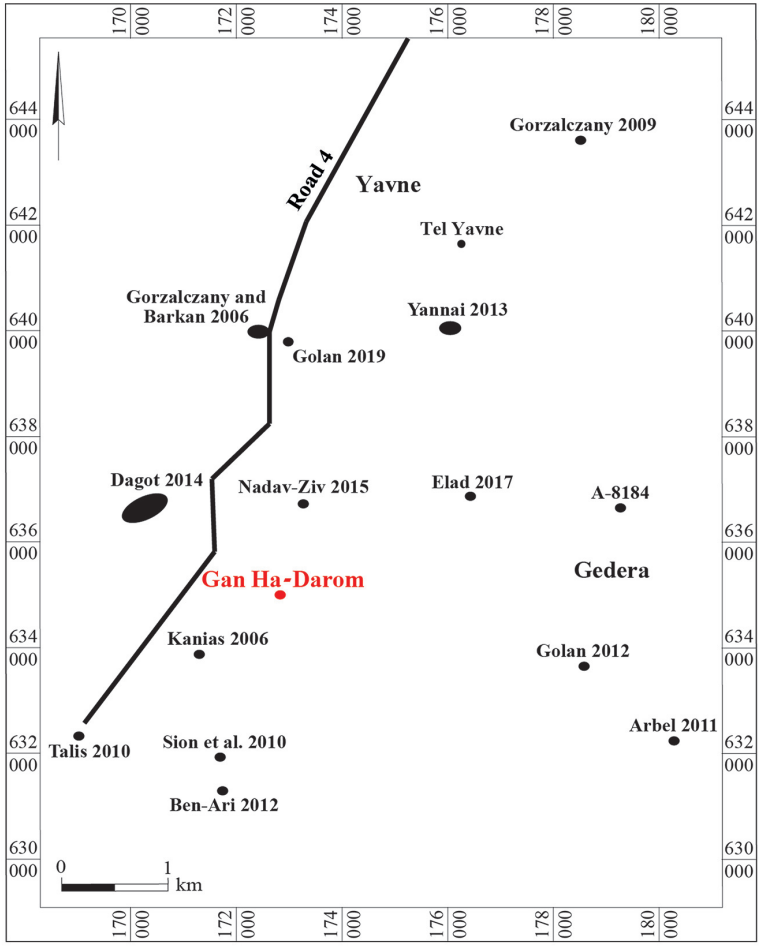

Fig. 1.
Location map
(map design: Angelina Dagot).

In the site discussed here[3] (6.1 dunams; **Fig. 2**) remains were identified from five periods: Roman (second-third centuries CE), Byzantine

[3] From October 2018 to May 2019, an archaeological excavation took place in a cultivated area within the archaeological site of Gan Ha-Darom (Permit Nos. A-8357, A-8348; map ref. 172680-728/634800-5010), ahead of the construction of road 3922 connecting Gan Yavne and road 42. The excavation, on behalf of the Israel Antiquities Authority and underwritten by the government

(fourth-sixth centuries CE), Crusader (twelfth-thirteenth centuries CE), Ayyubid (twelfth-thirteenth centuries CE) and Mamluk (fourteenth-early sixteenth centuries CE). The archaeological accumulations from the Roman period included pottery sherds and glass. Several construction phases dating to the Byzantine period were identified. Early remains were found that attest to the presence of a farmhouse or monastery dating to the fourth-sixth centuries CE. The complex contained a chapel paved with a mosaic featuring very well-executed vegetal and geometric patterns as well as remains of at least four agricultural installations, apparently winepresses. During that period the site served as agricultural hinterland and an industrial zone which contained an elaborate winepress unearthed *ca.* 120 m south, and the construction in a later phase of a pottery kiln in one of the winepress collection vats.

In addition, evidence of a rural settlement was also exposed from the Crusader and the Ayyubid/Mamluk periods, during the twelfth-fifteenth centuries CE. The medieval stratum, depth 0.3–0.5 m below the surface, featured in a variety of pits and surfaces consisting of small stones—foundation, flooring or a work surface—which overlay

urban development corporation Arim, was directed by A. Dayan and D. Barkan, with the assistance of Y. Amrani and E. Bechar (administration), D. Golan, M. Marmelstein, L. Nadav-Ziv and A. Tamir (area supervisors), G. Tal, K. Serezo and A. Reiss (area supervisors assistance), A. Waiman and A. Ben-Hamo (management of finds storage), I. Radashkovsky (metal detection), A. Gorzalczany and R. Be'eri (deputy area supervisors), R. Mishayev, M. Kahan and V. Essman (surveying and drafting), A. Peretz (field photography and aerial photography), E. Aladjem (photogrammetry), Y. Marmelstein (field photography, drone photography and photogrammetry), P. Gendelman (adviser and pottery identification), E. Stern (pottery identification), Y. Gorin-Rosen (glass), L. Perry and Z. Turgeman (faunal remains), Y. Nagar and V. Eshed (anthropology), Y. Asher (analytical laboratory), S. Krispin (metal detection), A. Dagot (GPS), I. Yonish (archaeological oversight), N. Sukenik (archaeobotany), A. Inbar, Z. Nagar, N. Lindberg, G. Fish, R. Levi and Y. Harmati (conservation), N. Davidov (photographing mosaics), M. Mulokandov and V. Shustin (preliminary probes), M. Ben-Yaakov, A. Rosenthal, A. Bar, A. Amit, Z. Firer, A. Sha'ibi and G. Stern (youth counsellors) and L. Habas, R. Talgam, A. Savariego, E. Ayalon, Y. Dray and R. Marom (consultation). Workers from Hebron, Ashkelon and Wadi 'Ara took part in the excavation, as well as young people from the urban social service project Nahal B'Kehila, the premilitary academies, Nofei Prat, Be'eri, Melah Ha-Aretz, Erez Yerushalayim, Erez Lod, Aderet Ayanot and Aderet Revadim, and students from the Neveh Hadassah and WIZO Hadassim high schools, the Karnei Shomron and Hatzim Itamar yeshivas, the Ma'aseh movement gap-year program, the Zvia High School in Lod and young people from Jaffa. The maps, photos and drafting are courtesy of the Israel Antiquities Authority.

part of the remains from the Byzantine period, mainly the northern part where the farmhouse/monastery complex was found. This article will discuss the industrial zone and the elaborate winepress.

An Industrial Zone: Description of the Findings

Industrial zone, total area: approximately 17.6 × 26.5 m (**Fig. 3**), includes the remains of a large building. The exterior walls of the building are built of small fieldstones bonded with a gray bonding material preserved in two to five courses. The foundations of the walls were built into the *hamra* (local red sandy soil) and in some places the stones were placed on top of the natural *kurkar* bedrock. The building is divided into four spaces (I–IV; room I *ca.* 4 × 8 m, rooms II–IV *ca.* 4 × 4 m) by internal walls. Room I has a plastered pool (depth 0.5 m); the walls of the pool are built of small fieldstones bonded with gray bonding material. A section of a bench or step survived in the northwest

Fig. 2.
The excavation, aerial view, looking north
(photographer: Assaf Peretz).

corner of the pool. In the wall next to the pool to the north is a semicircular niche, perhaps a remnant of an installation that was sunk into the wall. East of the pool are remains of a stone floor made of flat *kurkar* stones have that has been preserved. Remains of flooring that were found adjacent to the pool to the north and south may indicate that originally the entire room was paved with stone slabs that approached the pool. In Room IV, a section of another stone floor was preserved, similar to the floor in Room I. The pool indicates that the building was not used as a residence and was an integral part of the site's industry. No significant findings were revealed in rooms II and III.

Fig. 3.
The remains of a large building, aerial view, looking east
(photographer: Assaf Peretz).

Fig. 4.
The remains of a winepress, aerial view, looking east
(photographer: Assaf Peretz).

Fig. 5.
The remains of a winepress, aerial view, looking north
(photographer: Assaf Peretz).

Fig. 6.
The remains of a winepress, aerial view, looking south
(photographer: Assaf Peretz).

A large, elaborate winepress was exposed to the east of the building (**Figs. 4–6**). The winepress was built on a foundation, dug into the *hamra* soil, and made of small and medium-sized fieldstones. Winepress treading floor bounded by walls; The northern wall of the winepress was not preserved. The mosaic of the treading floor was robbed, evidence of which exists thanks to several stones that were preserved adjacent to the walls. In the center of the treading floor was a pit in which a screw-type squeezing device was installed; the base seems to have been robbed, while the wooden parts did not remain. To the west of the treading floor were two cells. The cell walls were built on the foundation that served for the entire complex. There was a narrow compartment between the two cells. The walls of the cells are made up of two rows of small fieldstones, bonded with a gray bonding material mixed with the shells. The cells were paved with white "industrial" mosaic. The inner face of the walls was plastered (about 7 cm thick),

so that the plaster also covered the connection between the walls and the floors. One was plastered on both sides with white plaster mixed with shells, and two openings were identified in it, clay pipes, which drained the cells to the central treading floor (**Fig. 7**).

Fig. 7.
A clay pipe which drained the cells to the central treading floor, looking west (photographer: Assaf Peretz).

From the main treading floor, a plastered channel led to an oval filtration vat, with a small settling pit at the bottom, which is in fact the lower part of a clay jar (**Fig. 8**). The filtration vat was paved with white industrial mosaic, and many repairs were made to it on pottery using the *opus spicatum* method. From the central filtration vat the liquid was poured on two collecting vats to the west and east of it. The collecting vats have an octagonal outline and are plastered with white plaster. Inside each vat there is a sedimentation pit and at the bottom is a small

den—the base of a clay jar. The collecting vats were also paved with mosaic and corrections of *opus spicatum* were identified.

Fig. 8.
The filtration vat and the eastern collecting vat, looking north (photographer: Assaf Perezt).

Access to the collecting vats was made through two staircases, bounded by walls. Between the stairs there is a wall with a plastered shelf next to it. The vats area is bounded by walls; the lower and thicker part of the walls is built of fieldstones, similar to the foundation of the treading floor, and the upper and narrow part is made of gray bonding material made of small stones, shells and plaster. This is how the other walls in this complex are built. In some places, dents inside the bonding material could be seen, indicating the location of the fieldstones in the past. The walls were plastered on the inside, except for two walls that were plastered on both sides. Two stages of plastering were discerned: white plaster with pink plaster on it.

At least three phases of paving were identified in the mosaic floor around the vats: white industrial mosaic stones with weathering, colored industrial mosaic stones (white, black, red) and pottery (*opus spicatum*). A lot of fragments of roof tiles were found in the fillings that

blocked the collecting vats, and in general in all the excavation areas. The pottery found in the vicinity of the winepress, in the fillings that canceled it and in the accumulations that covered it, dated mainly to the fifth century CE.[4]

At an unknown period, probably after the winepress was out of use, a kiln for pottery was built in the western collecting vat (**Figs. 9**, **10**). East of the kiln, above the eastern collecting vat, was probably an infrastructure made of white and compacted calcareous material, which covered the eastern vat, about half of the middle filtration vat and the mosaic floor around the filtration vat and around the eastern part of the eastern collecting vat, where the kiln was built. The infrastructure appears to have been used as a work surface while the kiln was in use. The infrastructure covered only half of the filtration vat, as its western half was used for descent to build the kiln's combustion chamber (**Fig. 11**).

Fig. 9.
A pottery kiln that was built in the western collecting vat, looking north (photographer: Assaf Perezt).

[4] The dating to the fifth century is based on pottery. At this stage of the study, it is not possible to accurately date the time of construction of the winepress and the various stages identified in it. Plaster samples were taken from the winepress and from the pool that was exposed in the nearby building. Further research may be able to give an accurate dating of the elements discussed.

Fig. 10.
A pottery kiln that was built in the western collecting vat, looking north-west (photographer: Assaf Peretz).

Discussion

The large winepress at Gan Ha-Darom was built with considerable investment in massive infrastructure, walls and stairs. In the winepress, several stages of mosaic floor repairs were made by inlaying new mosaic stones or by inlaying pottery (*opus spicatum*)—a technology that began in the Roman period and lasted until the Byzantine period. The pottery repairs were also identified in facilities located to the north; in some of the installations, the collecting vats were paved only with this method, and in some, mosaic stones and pottery were incorporated. It is possible that the reason for the use of pottery was a shortage of raw material for creating mosaic. The large winepress could produce very large quantities of wine for export.

Fig. 11
A pottery kiln that was built in the western collecting vat and the descent passage used to develop the kiln's combustion chamber, looking west (photographer: Assaf Peretz).

It seems that the cells west of the central treading floor were originally covered, and were used for fermenting must that flowed through an opening in the cell ceiling, above which there was a treading floor—a second floor, which did not survive—on which the grapes were trodden (**Fig. 12**). One possibility is that the must flowed directly into the fermentation chamber, and after the fermentation was finished, through the clay pipes leading to the treading floor, from there to the plastered channel, which led to the filtration vat and from there to one of the collecting vats. The remains of the grapes were transferred from the tread to the central treading floor, were squeezed through the screw press. Then the liquid was transferred to the second collecting vat.[5]

[5] Dray 2011: 89; 2015.

Another possibility is that the must runs from the upper treading floor on the second floor, through a small hole in the ceiling of the fermentation chamber, into jars placed through the "window" in its front wall and installed under the small hole, so that the fermentation was actually done inside jars. It is accepted by scholars that the second fermentation took place in jars that had a hole in the shoulder for the gas to escape.[6] This possibility is less plausible, in our opinion, because according to the sources there is evidence that strong wines continued to ferment after being transferred to various jars, and even broke the jars in which they were stored. Accordingly, we assume that the fermentation was carried out in the cells or in the collecting vats. The Gemara discusses the halakha of exposure with regard to various foods and beverages. The Sages taught:

> *Wine that is still fermenting is not subject to the halakha of exposure. And how long is its fermentation process? It is three days. Cress-based dishes are not subject to the halakha of exposure, but the residents of the Diaspora are accustomed to treating them as prohibited if they were left exposed. And we said this only in a case where the dishes do not contain vinegar; but if they do contain vinegar, the vinegar repels the snakes, and in such a situation even the inhabitants of the Diaspora do not treat them as prohibited*.[7]

To the north of the central treading floor, trenches were identified, probably of the walls of cells that were north to the main treading floor and according to parallels, perhaps also to the east, possibly additional fermentation chambers (see **Fig. 12**) or cells for storing tools and jars. Complex wineries began to appear in the middle of the fifth century CE, at the height of the Byzantine period. These wineries contain a rather complex system and are the pinnacle of technology in wine production. In fact, these facilities made it possible, among other things, to produce large quantities of good quality wine.[8] The wine pro-

[6] See for example Gudovitch 2009: 207.
[7] Talmudic tractate, *Avoda Zara* 30: 2.
[8] Avrutis 2015: 42–54.

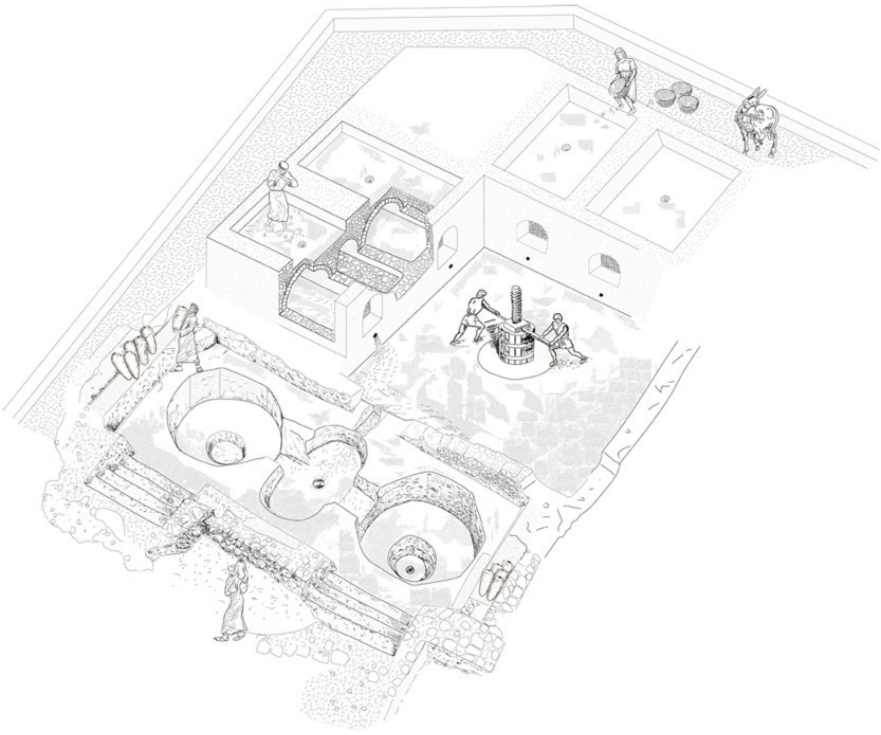

Fig. 12.
Restoration proposal for the winepress
(drawing: Rivka Mishayev).

duction process in the winery was based on gravity. In other words, installations were built so that the flow process was possible from a high to a low place, hence its beginning at the top and its end at the bottom.[9] Most wineries were found mainly in estates, villages, or the periphery around major cities. These wineries are relatively spacious and large[10] and although they are not similar to each other they have common characteristics and features. Five main components form the cornerstone of any complex winepress: a large treading floor, two collecting vats and a common intermediate vat—the filtration vat, a screw press or a squeezing device and sub-surfaces.

[9] Dray 2011: 2015.
[10] Avrutis 2015: 42–54.

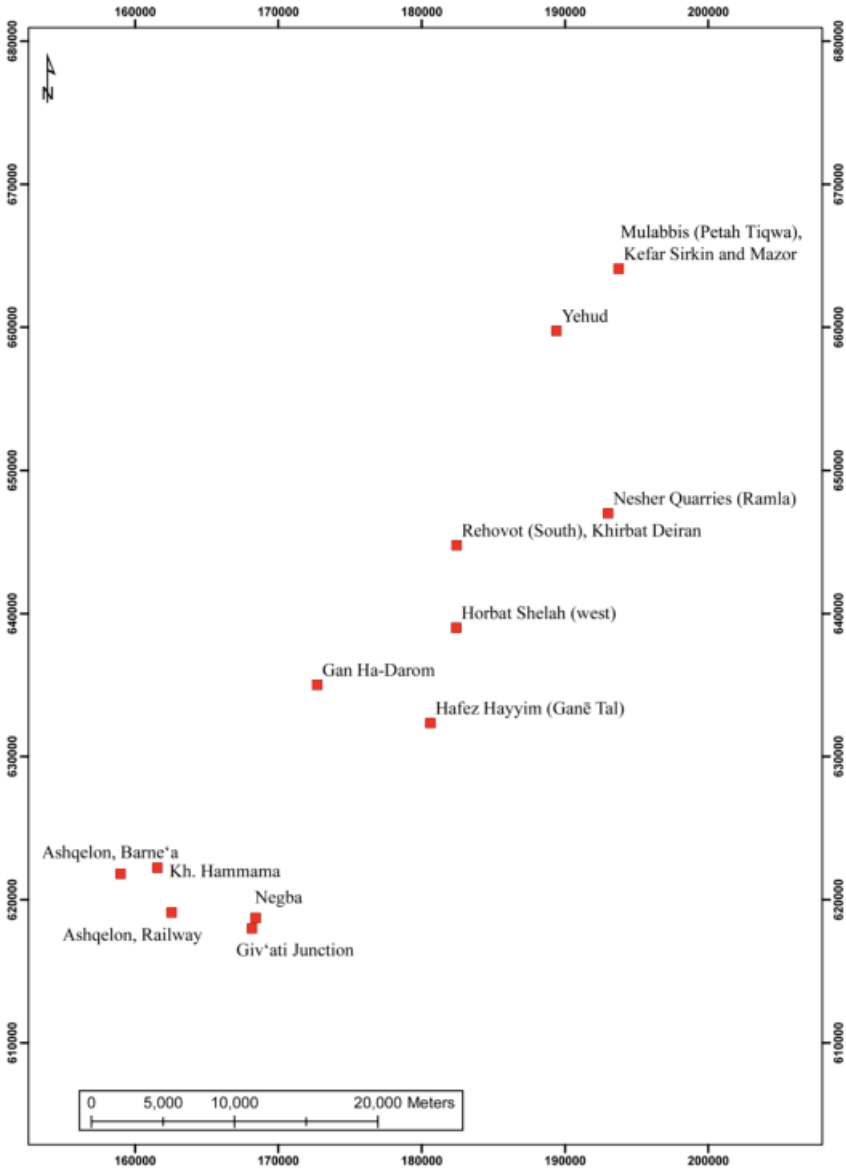

Fig. 13.
Map of the distribution of the elaborate winepresses
(map design: Angelina Dagot).

At the beginning of the study, a proposal was made to attribute these types of wineries to southern ones due to their large distribution in the Negev region and the southern coastal plain. Following the development of the study, additional cases were discovered in other areas that indicated a wider spread of facilities.[11] There are two types of elaborate wineries with one or two collecting vats.[12] Prominent features are sub-cells separated by an indoor treading floor, octagonal collecting vats and an oval-shaped filtration vat. Octagonal collecting vats were mainly exposed in the southern coastal plain (see above; **Fig. 13**). The cons-truction of these collecting vats is considered more complicated than the "classic," round or square shapes. Moreover, the multiplicity of corners is also a disadvantage due to the multiplicity of waste accumulated on them. It is therefore likely that the purpose of their construction was mainly aesthetic.[13] As part of this work, some wineries will be presen-ted, both with octagonal collecting vats and with "classic" shapes with similar characteristics.[14]

Kh. Hammama

Two winepresses were documented, north of structures, some of which were apparently used for residence. A western winepress that was almost completely discovered and its dimensions (12 × 17 m) were the same as that discovered in Gan Ha-Darom. The winepress has a treading floor, four fermentation chambers, a filtration vat and two collecting vats. The walls of the winepress were built as a casting of fieldstones and cement and then plastered. In the center of a treading floor lays a base for a squeezing screw, but it was dislodged along with the flooring apparently for reuse. Two pairs of squeezing or fermentation chambers were built on the northern and western sides of the treading floor, between which a lead pipe was connected. From the treading floor, the must flowed into a rec-

[11] Avshalom-Gorni, Frankel and Getzov 2008.
[12] Dray 2011; 2015.
[13] 'Ad 2011.
[14] For comprehensive comparative studies on winepresses exposed in Eretz Israel, see Frankel 1999 and Ayalon *et al.* 2009.

tangular settling basin with rounded corners. On both sides of the basin, octagonal collecting vats were built, with a basin at the bottom. The descent to each of the vats was made from the south through three plastered steps. Near the western collecting vat, a number of round cells were built that were probably used for storage or a work area. The winepress was filled with brown alluvial soil and dune sand and appeared to have been deliberately filled. The eastern winepress was partially excavated, and in fact the remains of cement-bonded potsherds were preserved, indicating the location of a central treading floor. A collecting vat smaller than those discovered in the western winepress was discovered south of the treading floor. It is likely that this winepress was used to produce a smaller amount of wine and may even be of a different variety. This phenomenon probably existed in Gan Ha-Darom, where a large central winepress with a significantly lower production capacity was discovered next to a large central installation. It is possible that these wineries were used to create a different type of wine and may even be more selected or more expensive.[15]

The "Third Mile Estate"

The site is located 500 m southwest of Kh. Hammama. At the site were an agricultural estate and a cemetery from the Byzantine period. The estate complex included a bathhouse, pools (one of them for raising fish), warehouses, a pottery kiln and two winepresses. One winepress (130 sq m) was built next to the bathhouse. The treading floor (5.5 × 5.8 m) paved with marble and in the center was a pit for a screw. Five square cells of the same size (1.5 × 3.5 m) were identified around the stone base of the treading floor. Another square cell (1.1 × 2.3 m) was discovered a short distance west of the treading floor. Walls separated the treading floor from the cells, that were built on a different level. In the center of the walls remains of a channel were identified, through which must had passed. The excavators believed that the cells were originally covered and above them was another treading floor. Two square collecting vats (2.5 × 2.4 m and depth 2 m) and an oval filtration

[15] Taxel *et al*. 2019.

vat (1.2 × 2.5 m, depth 1 m) were identified in the northeastern part of the treading floor.[16]

Another winepress that was discovered is larger than its neighbor (220 sq m) and belongs to a rare type of octagonal collecting vats. The winepress was built in the natural soil. A central treading floor (6.5 × 6.5 m, 42.25 sq m) was paved with marble and in the center was a stone that surrounded a hole that served as a base for a screw-type squeezing device. The inner face was covered with hydraulic plaster. A plastered surface was discovered near the southeast corner of the treading floor, which continued to a nearby warehouse. In the southwestern and northeastern part of a treading floor were probably four square cells. The cells were separated from the treading floor by a massive wall. There were canals that connected through the wall to the central treading floor, allowing the wine to flow into it. The cells were not adjacent to each other and were separated by a stone-covered surface. The filtration vat and the collecting vats were lower than the treading floor. The treading floor was lower than the cells that surrounded it, and they seemed to drain into it. Apparently this winepress operated similarly to the one found in Gan Ha-Darom.

Ashqelon, Railway

Along the route of the ancient Via Maris an estate complex was excavated. The complex included a large building, possibly the home of a wealthy family, a storehouse or part of a monastery, as well as a winepress and an industrial pottery-production area, of which only the refuse pits were exposed. The construction of the estate began in the early Byzantine period, and it continued to be occupied until the end of the Byzantine period. The winepress was similar to winepresses with octagonal collecting vats, but was characterized by a single octagonal collecting vat, and is a particular case of winepress of this type. The winepress (9 × 10 m) was sealed with double-faced walls built of two rows of stones, with small stones between them. The winepress has a

[16] Israel and Erickson-Gini 2013.

treading floor with a screw in the center, a single collecting vat depicting an octagon and two cells, probably for fermentation.[17]

Ashqelon, Barne'a

Remains of a church and three winepresses from the Byzantine period were exposed about three kilometers north of Ashkelon. So far, one winepress has been published. The winepress was almost entirely preserved. The complex of the Winepress was hewn in *kurkar* and comprised a work surface, pressing areas and two vats. The treading floor (5 × 6 m) was paved with different size marble tiles and stones in secondary use, with coarse white tesserae incorporated between them. An elliptical vat for a screw was cut in the treading floor's pavement. The walls were built of small stones and gray cement. Four fermentation cells were located around the treading floor. The two cells south of the surface (1.25 × 2.70 m, depth 0.6 m), coated with pinkish gray plaster, were partly paved with stone tiles and partly coated with gray plaster; the two cells to the west of the surface were paved with large white tesserae. Lead pipes connected the floors of the cells to the treading floor. Pottery sherds covered with mortar were discovered above the cells' floors and may indicate that a second treading floor was located above them. Two vats were exposed to the east of the work surface, a settling pit in south and a collecting vat in the north. The settling pit was paved with different size marble and limestone slabs that were apparently removed from a large building and pottery sherds were incorporated in-between them. The sides of the pit were coated with two layers of gray plaster. The must flowed to the settling pit both from the pressing floor and, by way of a hole that was blocked, from the screw. The must flowed to the collecting vat through a lead pipe that was set inside a semicircular niche in the northern side of the settling pit. The sides and floor of the collecting vat were also built of different size stones and marble slabs in secondary use and coated with gray plaster.[18]

[17] Varga 2018.
[18] Varga 2010.

Hafez Hayyim (Ganē Tal)

A large winepress complex dating to the sixth-seventh centuries CE was exposed on the northern slope of a low hill. The winepress included a large square treading floor, a filtration vat, two collecting vats and secondary surfaces. The treading floor (6.5 × 6.8 m) was paved with a white mosaic that was laid on a bedding of small stones, *wadi* (dry stream) pebbles and light gray lime-based mortar. The pit in the middle of the floor was apparently used for the stone base of a press screw, which has been robbed. A filtration vat, installed to the west of the treading floor, was flanked on either side by collecting vats. A perforated hole, through which the must flowed via a niche to the collecting vats, was installed in the middle of the northern and southern walls of the filtration vat. The octagonal collecting vats (length per side *ca.* 1.3 m, depth 1.2 m) were coated with hydraulic plaster and paved with a mosaic. A circular sump, whose sides were slanted and coated with hydraulic plaster and its floor paved with a mosaic, was installed in the center of each of the collecting vats. A Gaza jar, whose upper part is missing or has been deliberately removed in antiquity, was exposed in the northern sump. A mosaic floor was exposed around the filtration vat and the collecting vats. Four secondary surfaces were discovered north and east of the treading floor. The surfaces were paved with a mosaic that was laid on square fired mud bricks, set on a bedding of small stones and wadi pebbles, mixed with light gray lime-based mortar. The secondary surfaces were surrounded by walls that were built of small and medium fieldstones. The secondary surfaces were higher than the treading floor and sloped in its direction. A perforated hole in the middle of the wall that separated it from the treading floor was exposed in each of the secondary surfaces. It seems that the winepress was surrounded by at least six secondary surfaces.[19]

[19] ʻAd 2011.

Negba

Remains of a residential complex or mansion from the Byzantine period were exposed *ca*. 12 km southeast of Ashkelon, and an elaborate winepress (15 × 10 m) was exposed next to it. Its walls were built from a mixture of cement, stones and shells. The winepress had a central treading floor (6 × 6 m), with a stone foundation on which a mosaic floor was laid. In the center of the treading floor was a pit that was used to install the stone base of a screw-type squeezing device made of wood. A channel that drained the must into an oval filtration vat (1.7 × m, depth 0.6 m) was identified at the bottom of the vat, with a white mosaic-paved settling pit. To the north and south, the filtration vat was continuing under the now missing floor through two pipes to octagonal collecting vats (3 × 3 m, depth 1.2 m and 1.15 m). These vats were of almost equal sizes with round basins, identified in two stages and they were paved with mosaic. Five cells were built around the treading floor, which were probably built at a later stage. The cells were not adjacent to each other. From the cells must drains to the central treading floor through lead pipes. Meiron,[20] believed that the grapes were stored there before they were pressed, but it is not impossible that they were placed there in order to create a natural fermentation of the fruit (this according to Dray).[21]

Giv'ati Junction

On the road from Ashkelon to Qiryat Gat, *ca.* 1 km southeast of Kh. 'Ajjis er-Ras, where a Byzantine settlement was partially exposed, an industrial winepress was excavated and reconstructed. The winepress was dated to the Byzantine period; has two cells paved with a lime-based clay substrate with stone slabs on it. The cells have a common wall and from it came two channels that connected the cells to a treading floor. A space between the two cells was sealed with a wide wall

[20] Meiron 2009.
[21] Dray 2015.

built of medium-sized fieldstones. The treading floor was partially preserved (6.5 × 4.7–6.5 m), its flooring was robbed and its foundations were stone slabs. The walls of the cells and the treading floor were built of pure bricks and covered with hydraulic plaster. In the center of the treading floor was a socket in which a screw was placed. A plastered trench led to a filtration vat. The filtration vat was partially preserved (1.4–1.6 × 1.5 m), its shape was trapezoidal and it was paved with stone slabs covered with plaster, as well as its walls. In the center of the vat was a round sump made of a clay jug. Two partially exposed collecting vats were documented on both sides of the filtration vat. The collecting vat had a rectangular outline (2.4 × 3.0, depth 1.3 m) and its sides were covered with hydraulic plaster; In the center of its floor are two single-core plastered depressions. A step was built around the collecting vat and at its western end was a work surface. The second vat was not preserved, except for a corner, but was probably like the first. The finds from the winepress date to the Byzantine, Umayyad and Abbasid periods and it seems that the complex continued to exist in the early Islamic period.[22]

Rehovot (South), Khirbat Deiran

At Khirbat Deiran remains were excavated ranging in date from the Roman period to the Early Islamic period, including three settlement strata, installations, burial caves and a winepress. The winepress was dated to the Byzantine period; included a central treading floor, a filtration vat with a sump made of pottery jar and two collecting vats with double sumps.[23] Around the main treading floor with a screw press base, there were six cells drained to it in tubes and between them were additional treading floors, perhaps for laying the grapes. It appears that above some of the cells were additional treading floors. The upper cells were paved with mosaic. A drainage opening was installed in the floor of each cell that led to the smaller cell below it. Most researchers

[22] Paran 2009.
[23] Roll and Ayalon 1981; Barkan 2014.

believe the upper cells surrounding the treading floor served for placing the grapes prior to pressing. The must that collected in these cells flowed into the bottom cells by way of the openings; this was considered the choicest must.[24] According to Dray,[25] the fermentation process occurred in the upper cells and the wine was conveyed via the bottom cells and the treading floor to the collecting vats.

Horbat Shelah (west)

An industrial winepress was discovered in an agricultural area west of Horbat Shelah (**Fig. 14**). This winepress is similar to a facility discovered in Ashqelon and has one octagonal collecting vat.[26] As in Ashqelon, this is a particular case of wineries with octagonal collecting vats. It began with a simple winepress and continued with its transformation into a complex industrial one, hence in fact these are two phases of construction that date to the sixth-seventh centuries CE. The beginning of the winepress in Horbat Shelah is in a treading floor and a collecting vat. The treading floor (9.5 × 10.9 m) was paved with white mosaic, most of which was not preserved. The mosaic rug was laid on a foundation built of small stones and cement. From the treading floor, the liquids drained into a square collecting vat (3.0 × 3.2 m). It is probable that around the collecting vat was a paved surface from which not much was preserved. In the second phase of construction, it was decided to convert the winepress into an industrial one, mainly by adding cells (0.8 × 2, depth 1.4 m) on the eastern and southern side of the treading floor. The cells were paved with mosaic and their walls were covered with a thick layer of plaster. In each of the cells, in the area on the roof, a treading floor paved with mosaic was built. The cells were open at the top and had tubes that led to the central treading. The screw stood in the center of a lowered treading floor (5.4 × 5.5 m), apparently at a later stage, as part of the addition of cells. In the center of the treading floor was a

[24] Dray 2011; 2015.
[25] Ayalon, Frankel and Kloner 2013: 23.
[26] Varga 2018.

square basin and the remains of a lead pipe that connected to one of the cells on one side and another pipe that connected to a filtration vat to the west. The filtration vat (1.1 × 1.6 m, depth 0.7 m) like the rest of the installation was covered with a thick layer of plaster and to the east connected through a ditch to the base of the screw in the center of a central reading floor. An octagonal collecting vat was built within the walls of the square collecting vat from the earliest stage. Its sides are covered with a layer of plaster and the floor is mosaic and in fact built in the same way as a work surface. At the space between the early (square) and the late (octagonal) phase small stones and bonding material were inserted.[27]

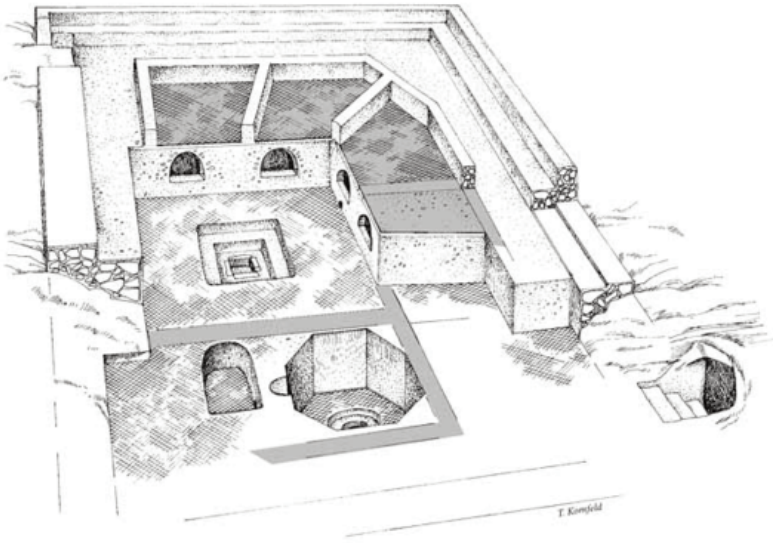

Fig. 14.
Restoration proposal for the winepress at Horbat Shelah (courtesy of the Israel Antiquities Authority; Draft: Tina Korenfeld; Haiman 2009).

Nesher Quarries (Ramla)

The site is located in the Lod Valley, near the cities of Ramla and Lod. During the excavations that were carried out in recent decades, 14

[27] Haiman 2009.

wineries of different types and periods have been discovered. The largest and most impressive of the complex winepresses contained ten cells, seven of which were well preserved and had two levels—open upper cells and vaulted lower ones. Its walls are built of fieldstones trapped in cement. The upper floors of the cells, which were around the treading floor, were of different sizes. All the floors were covered with white mosaic and their walls were plastered. Each of the cells has a tube that drains the liquids to the lower level. The winepress has a treading floor (6.35 × 7 m) whose floor is partly built of stones and partly a mosaic, above a foundation. In the center of the treading floor was a square stone that served as a base for a screw-type press. A clay pipe drain the screw base and the liquids were drained to a round middle filtration vat (diameter 1.55 m, depth 0.6 m), the bottom of which was partly covered with stones and partly with mosaic. A collecting vat was located nearby (diameter 2.6, depth 1.55 m). The winepress dates between the fifth and eighth centuries CE.[28]

Yehud

Remains of a large house and a complex winepress (225 sq m) dating to the Byzantine period were discovered. The winepress had a large treading floor flanked by rectangular cells to the south and east, filtration vat and two collecting vats to the north. The main treading floor (7.5 × 8.5 m) was rectangular and paved with an industrial mosaic. The treading floor's foundation was an aggregate consisting of stones and mortar (thickness 0.5 m). Since the central part of the treading floor, where the screw is usually installed in this type of winepress, was not remaining, it is impossible to determine with certainty if a screw was indeed used to produce the must. The must flowed from the treading floor to a plastered channel in the middle of the northern wall of the floor, and from there to the filtration vat and to the two adjacent collecting vats. The filtration vat was circular (diam. 1.5 m) and octagonal

[28] Avrutis 2015: 42–54.

collecting vats (diam. 3.1 m) were built on either side of it. The excavator assumes that the side cells were likely used for producing must by means of a secondary process. A niche was exposed near the western collecting vat, which was built of ashlars, might also have been used for pressing grapes. Four rectangular cells (*ca.* 1.6 × 2.6 m, max. depth *ca.* 1 m) were discovered south and east of the main treading floor; however, there seems to have originally been five cells. The cells were built near each other, *ca.* 1.6 m apart. The excavator assumes that the spaces between them were probably used to transfer the produce between the cells. The cells were treated with white plaster and paved with a white industrial mosaic. They drained into a gutter that led to the main treading floor. Each cell had three niches which had a stone tile at their bottom. The niches were probably used as a base for a raised treading floor. The excavator assumes that the cells were probably used as storage spaces and for the initial aging of the must. This winepress probably went out of use in the late sixth or early seventh century CE, and from the Abbasid period was used as a refuse pit.[29]

Mulabbis (Petah Tiqwa), Kefar Sirkin and Mazor

During the 1990s, two wineries were excavated near Mulabbis (Petah Tiqwa), Kefar Sirkin and Mazor. A complex winepress built on two levels (13.5 × 15.7 m) and dated to the Byzantine period was exposed in the village of Sirkin. The winepress has a treading floor with a basin for establishing the screw, a filtration vat that connects with a large collecting vat and ten storage compartments. The walls of the facility were not preserved and are therefore likely to have been looted in a later period. It seems, therefore, that these preserved elements were composed of dressed stones and fieldstones trapped in cement and pebbles. In the center of the winepress was a treading floor (5.9 × 5.9 m). The floor was covered with white mosaic and appears to have been repaired at least once. A trapezoidal vat (0.5 × 0.56 × 0.6 m, depth 0.6 m) inside

[29] Korenfeld and Bar-Nathan 2014.

which a screw was installed was placed in the center of the treading floor. A wall was built to the west of the treading floor, to the south of which was a narrow canal made of stone. This canal connected the treading floor to a round filtration vat (0.8 × 0.85 m, depth 0.75) whose sides were covered with several layers of partially preserved hydraulic plaster and a mosaic floor. From the filtration vat, the liquids drained into a relatively large round collecting vat (2.3–2.5 m, depth 1.6 m), the sides of which were covered with a layer of plaster and the mosaic floor. In the center of the vat is a sump and in its northern part a round stone step, possibly a column in secondary use. Southwest of the collecting vat is a square plastered installation. Two additional collecting vats (1.36 × 0.43 m, 1 × 0.3 m) were discovered on the treading floor in its eastern part. The walls of the collecting vats were covered with hydraulic plaster and in the center was a hollow with a mosaic floor. Ten rounded cells, of various sizes, separated by walls, plastered and paved with mosaic, were discovered around a treading floor. These cells were at a higher level than that of the central treading floor, which allowed liquid to drain from the high to the low.

In the nearby Mazor, another complex winepress was discovered similar to the one in Sirkin. The winepress had a treading floor (6.2 × 6.4 m) from which a foundation made of stones and plaster preserved, and it is likely that it had a mosaic floor. In the center of the treading floor was a square basin that formed the foundation for the screw. A long clay trench (3.7 m, diameter 0.25–0.3 m) was identified in the southern wall of the basin and carried liquids to a round collecting vat (diameter 2.5 m, depth 1.5). In the center of the vat is a small dent. At a later stage the collecting vat served as a cistern, by filling the canal with plaster. From the treading floor, a plastered channel led to a small filtration vat (1.25 × 1.25, depth 1.0 m) that also connected to the collecting vat. Eight cells were discovered around the treading floor, seven of which were preserved. The cells were covered with plaster and a mosaic floor.[30] In Mulabbis three winepresses were excavated.[31]

[30] Sidi, Amit and ʻAd 2003.
[31] Gudovitch 2009.

According to the excavator, there were six or nine fermentation cells around the winepresses. Above the cells were mosaic-paved surfaces, which were used to storage the grapes. The weight of the grapes produced the must, which flowed into the fermentation cell (or jars).

Conclusions

The current archeological excavation conducted at Gan Ha-Darom revealed an industrial zone that operated during the Byzantine period, in the fourth-fifth centuries CE. The industrial zone includes a large building divided into four spaces, including a pool that indicates that the building served as an integral part of the site's industry. To the east of the building, a large elaborate winepress was exposed. The collecting vats of the winepress have an octagonal outline and are plastered with white plaster. Collecting vats of this type are a particular and special case. The reason for the outline is probably merely aesthetic although it may have a broader meaning. The number of facilities for this type of outline is very small and contains individual units throughout the country. Their main concentration is in the south of Israel, although in recent years it seems that their geographical distribution is wider. Access to the collecting vats was via two staircases. In most of the installations that have been uncovered so far in the Holy Land, no stairs have been found or have not been preserved, so this winepress is unusual. In the fillings that blocked the collecting vats, and in general in all the excavation areas, many fragments of roof tiles were found, possibly suggesting the roofing of the complex. To the north of the winepress was a round foundation built of stones, which may have served as a base for a wooden pillar that did not survive, which held the roof. The pottery finds from the vicinity of the winepress, the fillings that eliminated it and the accumulations that covered it, date mainly to the fifth century CE.

A kiln for pottery was built in one of the collecting vats. This phenomenon is also unique to this case. It was suggested that the kiln and the winepress existed at the same time, and that the kiln was used

to create jars intended for wine produced in the winepress. The kiln and the winepress do not appear to have operated simultaneously, the reasons for this: (1) East of the kiln opening there was a need for an operating area for the introduction of combustion materials, as well as removal of the Jars produced in the kiln; (2) An environment of a kiln is a polluted environment, shrouded in soot and smoke and it does not appear to be suitable for an environment of wine production; (3) If the installations had worked together we would have found a lot of burnt material and kiln debris inside the vats of the winepress during the excavation, and no kiln debris was found inside the vats because they were intentionally clogged during the kiln construction phase.

Complex wineries such as the one discovered in Gan Ha-Darom began to appear in the middle of the fifth century CE, in the Byzantine period. These wineries contain a rather complex system and are the pinnacle of technology in wine production. Most winepresses were found in estates, villages or the periphery around major cities of the period, including Jerusalem, Ashkelon, Gaza, Jaffa, Lod or Amman. In many cases, such as in a winepress that was exposed in Gan Ha-Darom, the winepresses were attached to the complexes of a monastery or a church. A study of the installations exposed north of the winepress, in the estate/monastery complex, may provide an understanding of why they were used and whether they were used at one time or at different stages in the Byzantine period, in the fourth-fifth centuries CE.

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