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FIELD BASED INSIGHTS INTO VERNACULAR OLIVE OIL PRODUCTION ON THE SYRIAN COAST (ROMAN–BYZANTINE PERIODS)

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Abstract

This paper examines how rural communities in the mountainous Syrian coastal hinterland adapted olive oil production technologies to rugged topography during the Roman and Byzantine periods. Based on the author's field documentation (September 2023; October 2024) in villages including al-Jibliyyeh, Baʿbda, Dirmāneh, Dweir Baʿbda (al-Bayyāḍa), Falsaqo, and Harama (near Beit Yāshūṭ), the study analyzes rock-cut press installations characterized by basin morphology, gravity-assisted drainage, and limited or absent built superstructures. These design choices are interpreted as pragmatic responses to marginal landscapes and small- to medium-scale production needs, rather than indicators of technological inferiority. A comparative perspective with inland northern Syria (e.g., the Limestone Massif/"Dead Cities") highlights a different investment pattern, where presses were more frequently integrated into architectural complexes and, in some cases, employed more elaborate mechanisms. The coastal corpus instead reflects decentralized production strategies shaped by terrain constraints, household or cooperative labor, and long-term reuse of stone-carved features. By integrating field observations with comparative archaeological and historical scholarship, the

paper argues for rural technological resilience and agency in peripheral eastern Mediterranean contexts.

Keywords:
Olive Oil Production, Rock-Cut Presses, Rural Technology, Syrian Coastal Mountains, Roman–Byzantine, Field Survey

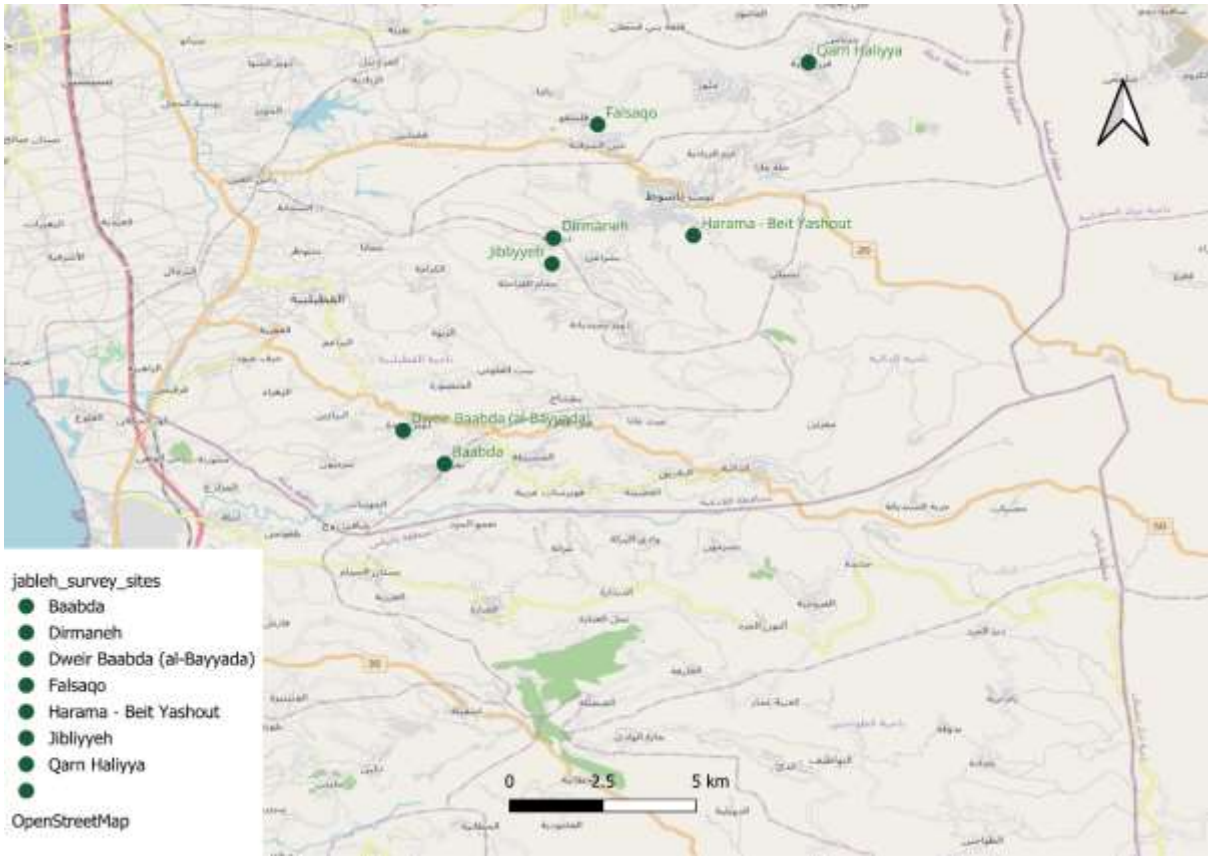

Figure 1: *Distribution map of documented olive press installations in the Syrian coastal highlands (QGIS plotting based on author's field survey, 2023–2024).*

1. Introduction

Olive oil production in Syria's coastal regions during the Roman and Byzantine periods offers a key vantage point for understanding the entanglement of agricultural labor, economic integration, and cultural continuity in the eastern Mediterranean. The olive tree—an enduring symbol of prosperity—was central to rural life from the Bronze Age onward, but it was during the Roman (64 BCE–395 CE) and Byzantine (395–640 CE) periods that its cultivation became systematized and its products deeply embedded in the economic and religious spheres of life. (Foxhall, 2007, pp: 11-014)

In regions such as Jabal al-Ansariyya and the uplands surrounding Jableh, the natural landscape of terraced slopes, seasonal wadis, and exposed limestone created conditions that shaped both olive farming and press construction. Many presses were carved directly into bedrock, a practice that reflects long-term adaptation to local geography as well as the endurance of technical traditions. Recent fieldwork in coastal Syria has revealed olive presses of relatively modest scale, typically cut into sloping rock faces and situated near agricultural terraces or seasonal water sources, suggesting a household- or community-based model of production.

These coastal installations contrast with the larger and more architecturally elaborate presses documented in inland northern Syria, particularly in the so-called Dead Cities such as Serjilla, al-Bara, and Ruweiha, where beam-and-weight or screw-press mechanisms were often integrated into residential, ecclesiastical, or public buildings. (Aliquot, 2009, pp: 189- 196) While lacking such architectural complexity, the coastal presses demonstrate remarkable continuity in both form and function. Their design—often limited to a single rock-cut basin (bātūs) with associated drainage features—reflects small-scale economies oriented primarily toward local consumption rather than mass export. (Tıbıkoğlu, H. O., Özdilek, B., & Karataş Yüksel, C., 2025).

Historical observations further support this continuity. Martin Hartmann's late nineteenth-century ethnographic accounts refer to olive-processing installations in the coastal hinterland, indicating that pressing facilities persisted in similar locations and forms over extended periods. Medieval Arabic geographical literature likewise attests to the enduring agrarian character of the Syrian coast, reinforcing the impression of long-term economic and environmental stability. (Hartmann, 1891, pp: 222- 223)

Beyond its economic value, olive oil also held religious and symbolic significance throughout the Roman and Byzantine worlds, particularly in Christian ritual contexts. Although fewer direct associations between presses and ecclesiastical structures have been documented

along the coast than in inland regions, the spatial proximity of some installations to rural chapels or shrines suggests comparable functions. Taken together, these observations frame olive presses not merely as tools of agricultural production, but as material expressions of social organization, environmental adaptation, and cultural continuity in the rural Syrian coastal landscape.

2. Materials and Methods

This study adopts a dual methodological approach that combines direct archaeological field observation with the consultation of institutional documentation in order to assess the distribution and typological characteristics of stone olive presses in the rural Syrian coastal region. The analysis focuses on installations attributed to the Roman and Byzantine periods, with particular attention to their preservation state, architectural form, and spatial setting. (Tapete, D, 2018)

Two field documentation campaigns were conducted in September 2023 and October 2024 across several mountain villages in the coastal hinterland, including al-Jibliyyeh, Baʿbda, Dirmāneh, Dweir Baʿbda (al-Bayyāḍa), Falsaqo, and Harama near Beit Yāshūṭ. These campaigns targeted both sites previously recorded by the Directorate-General of Antiquities and Museums and installations that had not been formally documented in academic or institutional records. In the case of known sites, existing archival data and photographic materials were reviewed and incorporated into the analysis. For undocumented locations, the study relied exclusively on the author's field observations and photographic documentation.

The documentation process involved systematic visual inspection of each installation in its original context, focusing on key architectural features such as basin morphology, stone type, dimensions, drainage systems, wear patterns, and evidence of reuse or later modification. Particular attention was given to topographic relationships, including the placement of presses in relation to agricultural terraces, seasonal watercourses, and nearby domestic structures.

Site locations were recorded during field visits and subsequently plotted to produce a distribution map illustrating the spatial pattern of olive press installations across the mountainous coastal hinterland. In addition, selected installations were documented through measured sketches and redrawn as CAD plans and sections. Interpretive three-dimensional reconstructions were produced for representative examples to clarify structural relationships and operational sequences, especially when preservation allowed for confident reconstruction.

This integrative methodology enabled both the verification of previously recorded data and the identification of new installations, contributing to a more comprehensive understanding of rural olive oil production and its architectural manifestations along the Syrian coast.

3. Results: Documented Olive Press Installations

Field documentation conducted in the rural villages of the Syrian coastal hinterland revealed a corpus of stone olive press installations varying in scale, preservation state, and technical detail. These installations are typically carved directly into the bedrock and display recurring morphological features, including circular crushing basins, rotary millstones, and, in some cases, rudimentary drainage elements. The following sections present site-specific descriptions based exclusively on field observation and photographic documentation, beginning with the best-preserved examples.

3.1 Jibliyyeh: A Well-Preserved Domestic Olive Press Installation

The village of Jibliyyeh retains a remarkably well-preserved example of a domestic-scale olive press, positioned within an open rural landscape devoid of substantial modern overbuilding. This installation consists of two primary components: a circular crushing basin (vat) and a rotary millstone (meta), both hewn from local limestone and preserved in situ.

The vat, carved directly into a single limestone block, has an internal circular profile with an approximate diameter of 90 cm. The inner walls exhibit a smooth finish, indicative of intentional shaping for the effective processing of olives. Notably, the absence of an outlet spout or decantation channel suggests that the press functioned in a relatively simple manner, with oil likely collected from the basin's base—characteristic of earlier or more rudimentary production types. (Figure 3)

Resting above the vat is a rotary millstone of similar diameter, featuring a central perforation (approximately 8–10 cm wide), which likely accommodated a vertical wooden spindle for rotational movement. The proportional coherence between the vat and the millstone supports the interpretation that these two components formed a single, original installation. Such alignment suggests an integrated crushing mechanism adapted to household or small-scale communal needs.

Additionally, a rectangular stone block currently lying atop the vat does not conform to known secondary millstones in typology or dimensions. Its shape and positioning point more

plausibly to its function as a counterweight or architectural element displaced from a neighboring structure—though this remains speculative due to the lack of direct context.

Crucially, no evidence of modern cement additions, structural tampering, or post-antique reuse was identified during the field visit. The press components remain embedded within their original topographic setting, with minimal signs of displacement or erosion. This exceptional state of preservation enhances the archaeological integrity of the site and allows for confident attribution to the Roman or Byzantine period, based on both formal typology and the broader historical context of olive oil production in the region.

Taken together, the Jibliyyeh installation exemplifies a localized mode of oil extraction tailored to the specific environmental and social conditions of the Syrian coastal countryside. Its preservation provides a valuable reference point for understanding rural agrarian continuity from antiquity through later historical phases.

Figure 2: *Olive press in Jibliyyeh documented during the field survey*

3.2 Baabda

The village of Baabda contains a remarkably well-preserved stone olive press carved directly into a fixed limestone outcrop. This installation, documented during the author's field visits, displays a complete configuration that includes a circular crushing basin and a detached rotary millstone—both exhibiting advanced features in terms of form and possible function.

The circular basin (bātūs) measures approximately 95–105 cm in diameter and 40–50 cm in depth. Its smooth internal walls and rounded base suggest prolonged mechanical use, potentially across multiple seasons. (Figure 4)

A notable feature is a lateral carved groove at the basin's rim, possibly serving as a drainage spout to channel extracted oil into a secondary container—indicating a level of technological refinement not always seen in early or household-scale installations. This feature may reflect production strategies from the later Byzantine period, when innovations in oil separation and decanting became more widespread. (Aliquot J. , 2009, pp: 189- 196)

The rotary millstone, though currently displaced, retains its original shape and central perforation, designed to hold a vertical spindle. Its proportional correspondence with the basin strongly supports its identification as part of the original installation. No cement or modern material was observed on-site, reinforcing the archaeological integrity of the structure.

Baabda's press is set within a minimally disturbed rural setting, integrated into the natural topography and surrounded by agricultural terraces. This context supports an interpretation of medium-scale production, potentially exceeding domestic needs and contributing to local surplus distribution. The presence of multiple installations in Baabda may indicate collective use or estate-level management, consistent with patterns seen in other Roman and Byzantine agrarian zones. (Rey, 1885, pp: 211-0214)

Figure 3: *Olive press in Baabda documented during the field survey*

3.3 Qarn Haliyya

In Qarn Haliyya, a fragmentary olive press installation was identified, offering partial yet valuable insight into the range of typologies employed in the coastal hinterland. The

main preserved element is a semi-circular vat carved in situ into a limestone outcrop. Though the basin is incomplete—possibly due to erosion, abandonment, or ancient mechanical stress (Figure 5)—it retains enough features to be classified as part of a traditional stone press system.

No rotary component (ḥajar raḥā) was found on site, and no drainage channels or pressing sockets were observed. However, the integration of the vat into the rock substrate and its modest scale suggest a fixed, non-transportable installation used for small-scale processing. The technological simplicity and absence of enhancement mechanisms likely place this installation within an earlier phase of rural development or a context of modest, household-oriented production.

Despite its damaged condition, the Qarn Haliyya press remains archaeologically significant. It illustrates the variability of olive pressing installations within the same geographic zone and supports the hypothesis that rural production operated along a spectrum—from basic household tools to more developed communal systems. As such, documenting even fragmentary remains contributes to reconstructing land-use patterns, technological adaptation, and agrarian life in the Roman and Byzantine periods.

Figure 4: *Olive press in Qarn Haliyya documented during the field survey*

3.4 Dirmaneh

The rural settlement of Dirmaneh preserves a notably well-integrated example of a traditional stone olive press, carved directly into the natural bedrock and positioned within a slightly recessed zone of the surrounding terrain. Field documentation—conducted through

direct visual inspection and high-resolution photography—confirms the installation's structural integrity and its archaeological authenticity.

The core of the installation consists of a circular press basin (bātūs), approximately 90 to 100 cm in diameter and over 40 cm deep. The interior walls are smoothly carved, indicative of prolonged mechanical use, while the exterior remains coarser, suggesting manual workmanship and the absence of later architectural refinements. Adjacent to the basin lies a rotary millstone (ḥajar rāḥā), with a centrally perforated hole meant to accommodate a vertical wooden spindle. (Figure 6-7) The proportional match between the two elements and their proximity strongly support the interpretation that they were functionally related and remained in site.

Topographically, the press is situated in a natural depression within the rocky slope—a setting that likely aided in gravity-assisted oil drainage or facilitated access to olive loads during the harvest season. Although no carved spout or channel is currently visible, the incline of the immediate terrain suggests the use of passive liquid flow mechanisms common in rural pressing contexts.

Crucially, no signs of modern modification—such as cement repair, reuse in construction, or agricultural disruption—were recorded, preserving the archaeological integrity of the feature. This installation, in both form and setting, stands as a reliable and well-preserved example of rural olive oil technology.

The Dirmaneh press exemplifies the localized technological adaptations observed in the Late Roman to Byzantine periods in the Syrian coastal highlands. Its relatively complete state and direct integration into the surrounding geology suggest a functional model rooted in small-scale or communal production. As such, it contributes to the broader understanding of decentralized, agrarian-based economies in upland Syria during Late Antiquity, and reinforces patterns of architectural and technical continuity across time.

Figure 7: *Olive press in Dirmaneh documented during the field survey.*

Figure 5: *ḥajar rāḥā*

3.5 Dweir Baabda – al-Bayyāḍa

Among the installations documented in the field survey, the olive press at al-Bayyāḍa in the village of Dweir Baabda stands out as one of the most complete and instructive examples of rural oil production infrastructure. Multi-angle photographic analysis, coupled with on-site observations, confirms the survival of all essential components in their original configuration.

The vat is finely hewn into a stable limestone outcrop, measuring more than 100 cm in diameter and approximately 50 cm in depth. Its walls are smooth and evenly cut, denoting both skilled craftsmanship and sustained use. (Figure 8) The accompanying rotary millstone, still positioned atop the basin, features a central shaft hole—suggesting the use of a vertical spindle for rotational crushing, consistent with late antique pressing technologies. The alignment and scale of the millstone and vat indicate their operational integration as a unified installation.

A particularly noteworthy element is the presence of a narrow groove cut into the basin's upper rim, interpreted as an outlet channel for directing oil into a secondary container. This structural refinement reflects the gradual evolution in press design during the later Byzantine centuries, aimed at enhancing processing efficiency and minimizing waste.

The al-Bayyāḍa press is remarkably well-preserved. No evidence of modern intervention—such as cement infill or structural repurposing—was identified. The natural environment surrounding the press remains largely undisturbed, with minimal vegetation and stable geological conditions, further supporting the archaeological credibility of the installation.

Given its completeness and technical characteristics, this installation likely dates to the fifth or sixth century CE—an apex in rural oil production along the Syrian coast. It serves as a typological benchmark for stone press construction in the region, offering insights into the mechanical and architectural strategies employed by rural communities for olive oil processing.

In addition to the surviving press at al-Bayyāḍa, fieldwork in Dweir Baabda revealed oral testimonies regarding another olive press that once stood in the village but has since been demolished. According to local residents, the missing press was a complete installation, similar in form to the one documented, and remained in use until relatively recent times. Although no physical remains are preserved today, an older photograph was shared during the survey, offering visual confirmation of the structure's former existence.

This account highlights the ongoing risk faced by archaeological features in rural Syria, particularly those left unprotected or integrated into active landscapes. It also

underscores the urgent need for systematic documentation, especially in light of accelerating modern interventions and the loss of communal memory.

Figure 6: Olive press in Dweir Baabda – al-Bayyāḍa documented during the field survey

3.6 Falsaqo

The olive press remains identified in the village of Falsaqo constitute a partially preserved installation carved into a natural rocky surface. Although incomplete, the existing structural elements offer valuable data on the local typologies of rural olive oil production infrastructure in the Syrian coastal hinterland.

The principal feature consists of a circular vat carved into a flat limestone platform, measuring approximately 80–90 cm in diameter. The internal surface appears relatively even, though the precise depth could not be determined. (Figure 9) A small lateral aperture located at the edge of the basin may have functioned as a rudimentary drainage outlet for channeling oil into a secondary container.

The rotary millstone is absent from the site, a detail which may suggest post-abandonment loss, secondary reuse, or displacement due to environmental factors or anthropogenic intervention. The press is positioned on a naturally semi-leveled rock shelf, suggesting that its placement was deliberately chosen to take advantage of terrain stability and easy access. This practice aligns with broader patterns observed in other small-scale or domestic installations across the mountainous interior of the region.

No evidence of modern interventions, cement applications, or architectural modifications is visible. The installation remains in a raw, undisturbed state, enhancing its archaeological credibility despite the partial loss of components.

Though incomplete, the Falsaqo press likely served a domestic or village-scale production context, reflecting the decentralized and self-sufficient nature of rural olive oil systems during the Roman or early Byzantine periods. Its modest design, reliance on the natural rock landscape, and apparent lack of complex mechanical components reinforce the image of a pragmatic and locally adapted press model.

Figure 7: Olive press in Falsaqo documented during the field survey

3.7 Harama – Beit Yashout

The olive press at the site of Harama, near the village of Beit Yashout, is carved directly into a large natural rock formation, forming part of the wider agricultural infrastructure of the region. Despite its well-preserved core elements, the site has been subject to recent modifications that compromise its original archaeological setting.

The press includes a circular stone vat measuring approximately 90 cm in diameter and over 40 cm in depth. It is hewn into a substantial limestone outcrop with smooth internal surfaces indicative of sustained use. (Figure 10) However, patches of modern cement—visible around the edges and basin perimeter—suggest recent stabilization efforts, likely undertaken by local inhabitants without professional archaeological supervision.

A rotary millstone (rāḥa) with a central perforation is positioned directly above the vat. While the component appears functional and proportional to the basin, the marked difference in stone color and texture suggests that it may have been relocated or reassembled

at a later stage. A secondary, slanted stone lies beside the main installation, though its original function remains unclear. It may have served as a structural support or as part of an auxiliary mechanism, or it may have been introduced during recent interventions.

Although the structural elements of the press are physically preserved, the application of cement and the ambiguity of component relocation diminish the archaeological integrity of the installation. Nevertheless, the core features remain legible and suggest an originally complete press.

The Harama press likely is tentatively attributed to typical Byzantinethe Byzantine period and shares typological affinities with other presses in the region. Its preserved condition, despite recent modifications, supports its classification as a small-to-medium scale rural installation. The site's compromised authenticity, however, illustrates a recurring challenge in heritage preservation: the well-intentioned but archaeologically detrimental impacts of untrained restoration.

During field visits to Beit Yashout, conversations with local residents yielded additional insights. One informant recounted the existence of a fully preserved stone olive press within his property, including a uniquely shaped pressing stone. Unfortunately, the installation was dismantled to make way for residential expansion. A historical photograph of the now-demolished press was provided, substantiating the account and underscoring the urgent need for rapid documentation in rapidly changing rural environments.

Figure 8: *Olive press in Harama – Beit Yashout documented during the field survey*

Table 1: *Analytical Comparison of Documented Olive Press Installations in the Syrian Coastal Hinterland*

Site Name	Type of Press	Diameter of Vat (cm)	Millstone Present	Drainage Feature	Preservation State
Jibliyyeh	Basin + Rotary Millstone	~90	Yes	No	Excellent
Baabda	Basin + Rotary Millstone	95â€“105	Yes (displaced)	Yes	Good
Qarn Haliyya	Partial Basin (No Millstone)	Unknown	No	No	Fragmentary
Dirmaneh	Basin + Rotary Millstone	90â€“100	Yes	Not visible	Very good
Dweir Baabda (al-BayyÄ • á¸ • a)	Basin + Rotary Millstone	>100	Yes	Yes	Exceptional
Falsaqo	Basin only (No Millstone)	80â€“90	No	Yes	Good
Harama â€“ Beit Yashout	Basin + Rotary Millstone (with modern modifications)	90	Yes	Yes (ambiguous context)	Compromised by modern c

3.8 Concluding Synthesis: Interpreting the Olive Press Corpus

The comparative analysis of olive oil presses across the surveyed Syrian coastal villages, as summarized in Table 5.1, reveals a consistent reliance on a technically conservative yet resilient model of rural oil production during the Roman and Byzantine periods. While none of the installations exhibit the mechanical sophistication found in urban or estate-based contexts—such as beam-and-weight or screw systems—the recurrence of carved stone basins

paired with rotary millstones reflects a regionally coherent tradition adapted to topographic and socio-economic constraints.

The field data suggest that most installations fall within a small- to medium-scale operational spectrum. Presses such as those in Dweir Baabda (al-Bayyāḍa) and Baabda stand out for their completeness and technical refinement, including the presence of drainage grooves—possibly pointing to surplus-oriented or semi-communal production. In contrast, sites like Falsaqo and Qarn Haliyya preserve more fragmentary remains, likely reflecting modest, household-level use or early phases of installation now partially lost to erosion or modern encroachment.

Topographic placement emerges as a recurring strategy. Presses are often carved into naturally sloped outcrops or rock-cut terraces, demonstrating a conscious use of gravity and terrain—particularly evident in Dirmaneh and Jibliyyeh. This architectural pragmatism, coupled with the absence of modern interventions in most locations, underscores the organic integration of these installations into the agrarian landscape.

Thematically, the olive press corpus supports the interpretation of a decentralized but technologically stable countryside. Rather than exhibiting abrupt innovation or decline, the presses reflect continuity and adaptability—technologies honed through generational knowledge and shaped by seasonal rhythms, communal labor, and the constraints of mountain life. From an academic standpoint, this material record challenges any simplistic narrative of rural marginality. Instead, it reinforces the idea that small-scale production, when viewed across multiple sites and with attention to technical detail, represents not a lack of complexity but a different mode of rural resilience.

Accordingly, these findings provide critical empirical support for broader discussions of economic and cultural continuity in the Syrian coastal hinterland during Late Antiquity. They also affirm the value of site-specific, field-based research as a vital corrective to overly centralized or urban-centric historical interpretations.

While the textual evidence does not allow for a full reconstruction of the operational sequence, the proposed 3D models (Figs. 11–15) illustrate a plausible working process in two successive stages, from the initial crushing of the olives to the final pressing and drainage of oil.

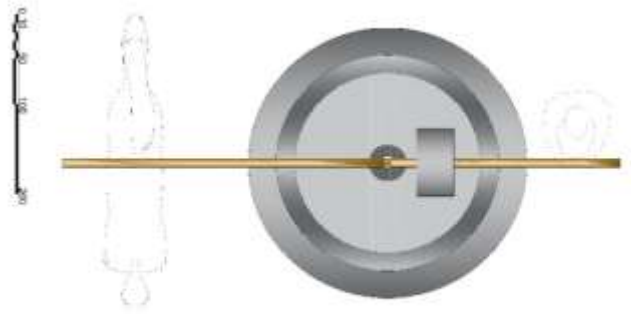

Figure 9: *reconstruction of the olive press in its resting state. First pressing stage*

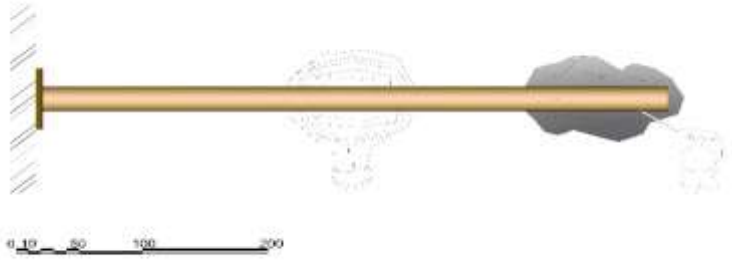

Figure 10: *Reconstruction of the olive press in its resting state. Final pressing stage. Plan view*

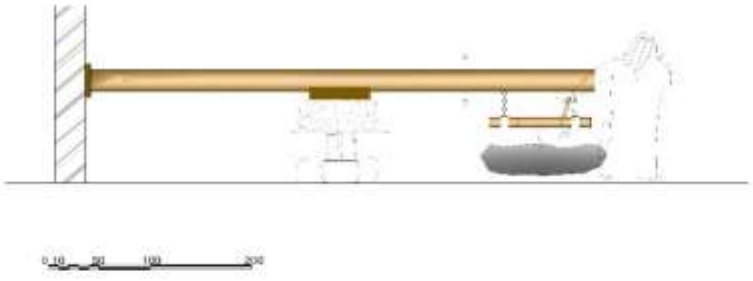

Figure 11: *Reconstruction of the olive press in its resting state. Final pressing stag. elevation view*

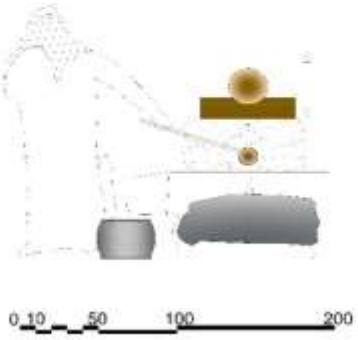

Figure 12: *Reconstruction of the Olive Press in Its Resting State. Final Pressing Stag.*

Figure 13: *3D reconstruction of the olive press in its resting state. Final pressing stag. Axonometric view*

3.9 Analytical Discussion: Patterns, Interpretation, and Context

3.9.1 Spatial Distribution and Socioeconomic Patterns

The geographical distribution of olive presses across the mountain villages of the Jableh region reveals patterns indicative of differentiated modes of rural production. Villages like Baabda, which contains at least three presses, and Falsaqo, where two installations have been identified, suggest a capacity for surplus production, potentially reflecting cooperative estate agriculture or extended household economies. (Author, 2023) Conversely, settlements such as Dirmaneh and Jibliyyeh, with only one documented press each, may point toward more modest, subsistence-oriented systems based on nuclear family labor.

These observations resonate with Julien Aliquot's (Aliquot J. , 2009) findings in Mount Lebanon, where he notes a correlation between production density, demographic concentration, and the presence of religious or estate infrastructures. Similarly, Clive Foss (Foss, 1997, pp: 185- 187) highlights how agricultural installations in Byzantine Anatolia were often situated close to monastic institutions, reinforcing their role in both local provisioning and regional economic integration. This rural pattern was not exclusive to Syria: for example, in northern Palestine, there are mentions of similar concentrations of olive presses in villages that maintained a strong agricultural base from the Roman into the Byzantine period periods. (Waliszewski, 2012)

The spatial distribution of olive presses in the Syrian coastal highlands thus reflects more than agricultural activity—it reveals patterns of rural intensification and local autonomy, sustained through micro-networks of cooperation and seasonal labor. (Van limbergen, 2017)

3.9.2 Typological Variety and Technological Constraints

From a typological perspective, most olive presses identified during the survey fall within simpler categories—predominantly single-basin types (bātūs), some accompanied by a rotary stone (ḥajar raḥā). These installations, typically carved into limestone or basalt bedrock depending on local availability, lack the complex beam-and-weight or screw-press mechanisms found in inland cities or monastic complexes (Author's. 2023). While socket holes observed in Dweir Baabda may hint at simple lever-based enhancements, the absence of full mechanical assemblies suggests a localized technological adaptation rather than systemic underdevelopment.

These types align with forms documented by Georges Tchalenko(Tchalenko, 1953) in the Limestone Massif, where domestic-level production prevailed in rural settlements. In contrast, P.J. Riis (Riis, 1995, pp: 108-115) describes more elaborate screw presses from northern Phoenicia, which are absent in the Jableh region—likely a result of both topographical limitations and the decentralized nature of the coastal agrarian economy.

3.9.3 Temporal Continuity and Reuse

Despite the absence of stratigraphic excavation layers in most surveyed sites, architectural features, wear patterns, and typological consistency suggest long-term continuity of use, possibly extending from the Late Roman into the Middle Byzantine and even early Islamic periods. Semi-buried installations in Beit Yashout, for instance, show erosion patterns consistent with extended use and occasional reuse. (Author, 2023)

This architectural persistence challenges earlier historical models that posit a rural decline after the 5th century. Rather, as noted by Foss (Foss, 1997, pp: 252) the continuation and adaptation of olive oil production technology in the countryside reflect a durable local economy resistant to political fluctuations. The integration of older press basins into newer domestic or agricultural settings—without significant structural modification—further supports this interpretation of adaptive reuse.

3.9.4 Technological Specificities: Rotary Stones and Local Innovations

Detailed field observations highlight the use of two main rotary stone types in the grinding stage of olive oil production. The first type contains a central pivot hole, likely used with a wooden or metal shaft connected to a horizontal arm operated manually or by draft animals. This system allowed for a more even and efficient grinding of olives, producing a consistent paste prior to pressing. The second type, lacking a pivot hole, represents a more rudimentary form, operated manually by rotating the stone from its edges. Despite its simplicity, circular friction marks on these stones suggest effective mechanical use for grinding olives.

The presence of such basic yet efficient devices in multiple villages suggests localized adaptations to technological limitations and terrain. Notably, these types were rarely used in grape pressing, as the softer texture of grapes required only minimal crushing. Thus, the rotary stones in this context appear functionally specialized for olive processing, reinforcing the hypothesis of oil-focused agrarian specialization in these settlements.

3.9.5 Comparative Outlook: Between Coast and Hinterland

When compared to better-documented inland sites in Syria and the Levant—such as Serjilla, Ruweiha, and Al-Bara—the presses of the Syrian coastal villages display lower mechanical complexity and smaller scale. Yet this difference should not be read solely as evidence of technological inferiority. Instead, it reflects the socio-economic realities of the coastal highlands, where decentralized land ownership, steeper terrains, and limited surplus capacity shaped production strategies.

This raises a compelling sub-research question: Why did coastal presses not develop into the large-scale, industrialized complexes seen in the Dead Cities? Potential explanations include the fragmented topography of the coastal mountains, the absence of strong ecclesiastical estates, and a greater reliance on household-level labor. The lower degree of

Centralization may have limited investment in mechanized infrastructure while still allowing for sustainable, multi-generational production.

Rey's early work (Rey, 1885, pp: 214-219) emphasized the endurance of such installations as evidence of cultural and economic continuity—a conclusion that remains valid today. The combination of archaeological, ethnographic, and historical evidence thus supports a narrative of rural resilience and technological pragmatism rather than abrupt collapse or stagnation.

Table 2: *Comparative Analytical Table of Olive Presses in the Syrian Coastal Mountains*

Site Name	**Site Selection**	**Technical Features**	**Presence of Built Structures**	**Architectural Style**	**Indicators of Continuity**
Jibliyyeh	Rocky slope, exposed bedrock ideal for carving	Rock-cut basin, basic drainage, traces of wooden pressing beam	No visible structure, open-air	Fully local, no resemblance to urban-style presses	Continuous use indicated; no signs of abandonment
Baabda	Near agricultural fields, relatively low terrain	Oval deep basin, remains of a small carved channel	No walls or roofing preserved, likely open-air	Clearly simple, no decorative or formal elements	Multiple wear marks suggest frequent and prolonged use
Dirmaneh	Carved into a sloped corner near a seasonal water channel	Irregular circular basin, no visible drainage	Possibly had light structures now gone	Primitive but effective construction	No evidence of limited or temporary use
Falsaqo	Located on a rocky ledge within a	Rectangular basin, visible	Fully exposed, no	Locally adapted,	Deep pressing pit implies

	cultivated zone	beam slot marks	permanent built elements	practical in execution	repeated seasonal use
Dweir Baabda	Near a small stream, gently sloping terrain	Simple basin with minor carved symbols, no drainage system	Likely had organic or removable cover	Traditional, highly rural design	Old but intact technology, likely maintained over time
Harama	In open terrace area beside cultivated land	Sloped circular basin, clearly carved drainage outlet	Open-air, no signs of architectural enclosures	Simple rural adaptation to terrain	Worn edges suggest long-term or intensive utilization

4. Conclusion

The comparative analysis of olive oil presses documented across the surveyed villages of the Syrian coastal hinterland reveals a consistent reliance on a technically conservative yet resilient model of rural production during the Roman and Byzantine periods. None of the installations exhibit the mechanical complexity associated with urban or estate-based presses, such as beam-and-weight or screw mechanisms. Instead, the repeated use of rock-cut basins combined with rotary millstones reflects a regionally coherent technological tradition adapted to local topographic and socio-economic conditions.

The field data indicate that most installations operated on a small- to medium-scale level. Presses such as those documented at Dweir Baʿbda (al-Bayyāḍa) and Baʿbda stand out for their relatively complete preservation and technical refinement, including the presence of drainage features that may point to surplus-oriented or semi-communal production. In contrast, installations at sites such as Falsaqo and Qarn Ḥaliyya preserve more fragmentary remains, likely reflecting modest household-level use or early phases of installation now partially lost due to erosion or modern intervention.

Topographic placement emerges as a recurring strategy across the region. Many presses were carved into naturally sloped outcrops or terraced rock surfaces, allowing for gravity-assisted drainage and efficient integration into the agricultural landscape. This

architectural pragmatism, coupled with the limited presence of permanent built structures, underscores the organic embedding of olive oil production within the rural environment.

Taken as a whole, the olive press corpus supports an interpretation of a decentralized yet technologically stable countryside. Rather than indicating stagnation or decline, these installations demonstrate continuity and adaptability shaped by generational knowledge, seasonal labor rhythms, and the constraints of mountainous terrain. The material record thus challenges narratives that equate technological simplicity with marginality. Instead, it highlights a form of rural resilience in which small-scale production represents a distinct and enduring mode of economic organization in the Syrian coastal highlands during Late Antiquity.

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