HERITAGE 2022 - International Conference on Vernacular Heritage: Culture, People and Sustainability
September 15th-17th, 2022 Valencia, Spain
Doi: https://doi.org/10.4995/HERITAGE2022.2022.15136

The standardisation of vernacular architecture. Wine buildings in Andalusia

José-Manuel Aladro-Prieto[1], Francisco Javier Ostos-Prieto[2], María Murillo-Romero[3]
[1]University of Seville, Spain, aladroprieto@us.es; [2]fostos1@us.es; [3]University of the Basque Country, Donostia-San Sebastián, Spain, mariamurilloromero@gmail.com

Topic: T1.1. Study and cataloging of vernacular architecture

Abstract
Production buildings constitute a specific section of vernacular architecture, with distinct characteristics. In Andalusia, within this group, the architecture of wine, acquires an important relevancne, the wine cellars. They are a large number of buildings, which were built in the 18th, and 19th centuries. This happened when traditional Andalusian wine production was transformed into a modern wine industry. An industrial development generated a vast architectural ensemble of unique characteristics. This has been studied especially in the Sherry wine region, but it is also present in other regions such as Montilla-Moriles or El Condado de Huelva. The architectural, and industrial wine development in the 19th century was fundamentally based on the repetition of a specific model: the basilica cellar. A simplified formal, and constructive system that comes from the standardisation of the vernacular cellar, and that establishes early points of convergence with the industrial building. A model that continues the tradition in terms of construction, and structure, but conceptually modern in its modular, and repeatable condition. Its reiteration, and extreme simplification made possible the construction of large industrial complexes, and the city transformation. The industrial importance achieved by the wine agro-industry, and the vernacular quality of its architecture introduce different references in Spanish industrial historiography.

Keywords: *Wine cellars; wine architecture; pre-industrial architecture; sherry wine.*

1. Introduction [1]

Within what the National Plan for Traditional Architecture calls 'Arquitectures for work' are buildings related to processing activities. Those buildings intended for the processing, and preservation of food, beverages, processing, etc (MECyD, 2015, pp. 15-17). Their vernacular condition has not always been enough prominent. For this reason, they belong to the pre-industrial constructions. They are related to agricultural exploitations, especially traditional oil mills, and wine cellars. These buildings incorporate functional factors, scales, and formal references that differ from vernacular residential buildings, but they share their essential defining parameters (MECyD, 2015, pp. 8-14).

In addition to their rural variants, there is evidence of the existence of oil mills or traditional mills, and wine cellars in Andalusian cities since medieval times (Aladro-Prieto, 2021b, pp. 178-182, 206-209). Although the presence of the former would begin to decline with the arrival of industrialisation, wine warehouse reached their maximum expansion in this period.

During the 18th century, wine production was the most dynamic sector of Andalusian agricul-

1 Research framed within the R&D project "Sistema de Innovación para el Patrimonio de la Andalucía Rural (SIN-PAR)", Code PY20_00298. Andalusian Plan for Research, Development, and Innovation (PAIDI 2020), Junta de Andalucía, European Union, European Regional Development Fund.

ture and agro-industry (Maldonado Rosso, 2020, p. 38). Between the second half of this century, and throughout the following century, the traditional Andalusian wine production underwent an important transformation that turned it into a modern agro-industry of national importance (Maldonado Rosso, 2006, pp. 15-28). This phenomenon of agricultural industrialisation reached its maximum expression in the "Marco de Jerez" (Sherry wine region)[2]. It would become one of the main references in the Spanish foreign market in the central decades of the 19th century (Montañés Primicia, 2000, pp. 25-47).

The industrialisation of the traditional production system led to the construction of a vast architectural ensemble based on the vernacular winery model. These traditional constructions had evolved as autonomous buildings, from a common trunk, parallel to other rural, and urban vernacular references (estates, barns, warehouses, port warehouses, ...) (Aladro-Prieto, 2010, pp. 278-279). Related to these traditional cellars, the building expansion of the 18th century was fundamentally a quantitative leap in size, and number. Although it was based on the esta-blished traditional constructive, and typological parameters.

The "industrialisation" of the traditional wine cellar has been studied mainly in the Jerez Region, specifically in its three main cities: Jerez de la Frontera (Aroca Vicenti, 2007; Aladro-Prieto, 2012, 2021a), Sanlúcar de Barrameda (Gómez Díaz-Franzón, 2002; Aladro-Prieto, 2010), and El Puerto de Santa María (Murillo-Romero, 2018a, 2018b). In the absence of further work on other Andalusian wine regions, we believe that what happened in Jerez can be extrapolated to other regions, especially to Montilla-Moriles (Torres Luque, 2008), and Condado de Huelva (Espina Boa, 2014, 2015; Raposo González, 2014; Rosado, et al., 2020).

2. The typification of the basilica wine cellar

The development of the sherry wine house in Jerez was based on a main logical model: the basilica cellar. A prismatic volume, with a gabled roof, internally made up of parallel longitudinal naves divided by structural porticoes (Fig. 1, 2, 5). A highly standardised model, which was the basis of hundreds of industrial buildings built in the Jerez Region. These buildings had to respond to the standardisation efforts made by the industry itself. During the 19th century, the sherry firms succeeded in establishing a pro-duction method, the Criaderas and Solera System[3]. They made possible the production of a natural, and heterogeneous product such as wine in a standardised manner.

Fig. 1. “Bodegas en Jerez de la Frontera”, ca. 1869 (Source: Institut Cartogràfic y Geòlogic de Catalunya. ICGC).

During the generation of this singular industry, the traditional wine cellar was subjected to a similar process of standardisation, and serialisation. This endowed it with formal, functional, and, conceptual values. They were close to the benchmark par excellence of industrial architecture, the warehouse. Both models arise from the simplification of the architectural fact to its most basic formalisation. In this way, it also derives its capacity for modularisation.

2 The region in which sherry wine is produced is made up of the cities and towns of Jerez del Frontera, Sanlúcar de Barrameda, El Puerto de Santa María, Chiclana, Chipiona, Puerta Real, Rota, Trebujena, and Lebrija.

3 “The Criaderas and Solera System is a dynamic system, where wines from different stages of the ageing process are blended together in order to perpetuate specific characteristics in the wine, which is finally sold on the market, and it is a result of combining all the different vintages”.https://www.sherry.wine/sherry-wine/production/ageing (Consulted 23/01/2020)

Fig. 2. Sequence of basilica cellars defining the space of the Vallesequillo neighbourhood, Jerez (Source: Author, 2012).

Throughout the century the new industrial typology moved "from the factories resolved with the inertia of classical or acade-mic composition to the concept of the abstract, homogeneous and neutral space of the great industry at the end of the 19th and 20th centuries" (Corredor-Matheos y Montaner, 1984, p. 31). From the factory with floors, it would evolve to the warehouses model. This could create, in shorter time, independent, modular, and easier repeatable pavilions. The growth of the factory, and an unknown flexibility were completely solved.

Likewise, the spread of the basilica cellar meant the abandonment of other cellar models, whose formal references remained anchored in the principles of classical composition. This ha-ppened especially with the cloister model, which took the courtyard as its formal, and functional structure. That was common during the modern age, when some of the largest cellars were built in the first decades of industrialisation (Aladro-Prieto, 2010, pp. 281-282; 2012, pp. 192-201). They were cloistered cellars that were conceptually close to the Royal Factories, and the factories of floors, in terms of finished, and closed buildings. Like the industrial warehouse, the basilica cellar would make possible to fragment, and modulate the industrial space in terms of construction, and time.

The case of Tarrasa, Corredor and Montaner offer an expressive description of the modular production system of the industrial complex: "The naves had a single rectangular floor plan, which dimensions depended on those given to the knives and the size of the available land. They were buildings assembled from a module - made up of four pillars, two trusses and two windows - they could be repeated boundless" (1984, p. 40). Once the cross-section, the number of naves and, the height had been determined, the Sherry building could be extended in an unlimited way. It must only follow a process of prismatic extrusion, which is limited only by the urban conditions.

The Sherry house is generated from the section. It would be codified as a clearly recognisable, modulated and easily repeatable model. It is valid for the construction of large industrial complexes. There, new buildings would gra-dually be incorporated in an organic manner, until they fill the urban plot (Fig. 3, 4). At the same time, the sherry companies managed to extend and reform the existing city (Fig. 9). A single industrial and urban reference, where its homogeneity is also indicated for the textile factories of the 19th century by Selvafolta. They can also be seen as the product of an ideology and an economic organisation (1985, p. 56). A codified expression of the wine bourgeoisie.

Fig. 3. Sherry building complex made by the basilica model reiteration (Source: Saldaña Trigo & Repeto Prieto, 2009, p. 130)

The basilica winery eliminates the courtyard as a structuring element, while it consolidates the "*almizcate*" as an industrial and urban space. The "*almizcate*" is the longitudinal area between two parallel cellars (Fig. 4). A space that guarantees the functional and constructive individuality of each cellar and provides the necessary

ventilation and lighting. From the "*almizcate*"-winery duality derives the specific organisation of the sherry building complexes and the functional flexibi-lity that characterises them. (Aladro-Prieto, 2021a, pp. 180-189).

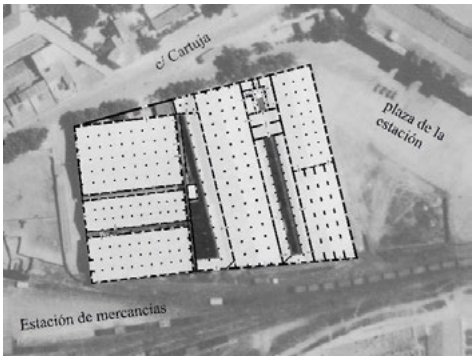

Fig. 4. Block made up of basilica cellars and "almizcates". Jerez, 19th century. Planimetry from the mid-20th century (Source: Aladro 2021a, p. 50).

3. Determinism of the construction system

Despite the high level of industrial and technological development in the Jerez region in the 19th century, the constructive resolution of the wine warehouses will be continuing very similar to the existing descriptions of wine cellars from the 16th, and 17th centuries. The main differrence will be the use of walling, which practically disappeared in the 18th century, but it was still frequent in the two previous ones (Guerrero Vega y Romero Bejarano, 2006).

The importance of the construction conditions for the microclimatic, and oenological functionning of the cellars was well known by the winemakers since ancient times. In this sense, Maldonado confirms that, at the end of the 18th century, the construction characteristics that these buildings had to have were stipulated to the master builders by a notary (Maldonado Rosso, 1999, p. 174).

These ancient characteristics would have been refined over centuries of experience storing wine, and the different technological and formal parameters (aeration, height, orientation, etc.) were gradually refined. This happened while the wine production was evolving. In the 19th century, these constructive-formal models were defined even before the consolidation to the great commercial expansion of wine types. Therefore, they were prior to any knowledge of their micro-climatic requirements. The buildings could have been participating agents, inducers, of this oenological evolution, active elements in the production process.

The traditional structural system significantly conditions the wine cellar spatiality, which is fractioned and qualified by the internal porticoes (Fig. 4, 5). The cellars are not open spaces, they do not meet the requirements of flexibility, and variability that should characterise the contemporary industrial space. Qualities that the warehouses architecture would achieve by supporting the roof exclusively on the perimeter, freeing up all the space below.

Fig. 5. “Bodegas Pedro Domecq” (Postcard. Source: Author’s collection) .

Despite the technological advances of iron architecture, and the steam engine were incorporated in Jerez at an early stage, the sherry architecture maintained the traditional structure of interior pillars up to the second half of the 20th century. Only in two known cases, the wineries with four naves decided to eliminate the central portico with different solutions (Fig. 6). However, in Sanlúcar de Barrameda, from the 1970s onwards, it became widespread the constructive solution eliminating these porticoes. In a group of warehouses of different sizes, the roofs are resolved with wooden or metal trusses, which totally or partially free up the space underneath (Aladro-Prieto, 2010, pp. 282-283). Innovative proposals, which have common points outside Andalusia with the wine cellars in Castilian-la Mancha. They were also built at the same time as those in Andalusia (Peris Sánchez, 2006). Moreover, these common points are found in cellars of th Montilla region, which were generally later built (Torres Luque, 2008).

Fig. 6. Interior of a four nave cellar in which the central portico has been removed (Source: Author, 2010).

The current image of these pillarless cellars graphically explains the continuous spatiality (Fig. 6). There was simply no need for more lights or greater diaphanousness. Because of the very arrangement of the "*andanas*"[4], it would end up generating identical passageways and identical lines of occupation. What was the point of making the cellar construction more complex and expensive? The "*andanas*" located under the ridge virtually restore the replaced pillar lines. The absence is more striking than the spatial and constructive achievements obtained. Maintaining the traditional structure was also, in last years, a business choice, not an imposition due to construction constraints.

4. The boundaries of the urban

The ideal basilica model would have to confront its validity in the particularity of the place, and in the urban circumstances of a city with a medieval and modern layout. In this dialectic between type, and place, architecture is truly forged (Martí Aris, 1993, p. 93). According to a normal guideline, the ideal “extrusion” of the cellar will frequently be interfered with the urban conditioning factors. In this situation, the basilica typological model shows all its flexibility, and capacity for adaptation.

In contrast to the autonomous referent, with a rectangular ground plan, and normal directrix, we find other examples. They show the "extrusion" process, which is guillotined by the urban alignments, and the pre-existing buildings. In the other hand, the encounter between the formal autonomy of the built volume, and the urban irregularity generates surplus spaces as access or service courtyards (Fig. 7). These spaces, despite their residual condition, are a determining factor in the city construction.

Fig. 7. Small complex articulated by the marginal spaces generated by the formal autonomy of the basilica cellars (Source: Google Earth, 2008).

4 “Arrangement of a row of butts placed contiguously, one-deep, and with their long axis horizontal, with other superimposed rows whose butts rest in the angles between the butts in the layer below”. https://www.sherry.wine/sherry-wine/production/ageing (Consulted 23/01/2020)

In other conceptually opposite situations, the sherry building complex takes the complexity of the city. It absorbes it through the deformation of its own geometric principles. In these examples, the tipology of the city prevails over the geometric logic of the buildings. They are subordinated to the urban form, and partially renounce the achievements obtained through standardisation. In some of these cases, this formal conditioning refers to the preservation of urban continuity. In others examples, it exemplifies the ductility of the formal construction system of the warehouses, and their capacity for deformation-adaptation.

5. The metric concreteness of the module

The use of wooden wine butts for storage, and transport has been documented in Jerez since the 15th century. The size of these containers, and their traditional arrangement in "*andanas*" establish a series of dimensional parameters. These establish the content, the wine, and the production system, the Criaderas and Solera System, entering into resonance with the container, the sherry house. According to these relationships, three types of cellars have traditionally been established. They depend on the width of the naves related to the size and availability for racking the butts[5].

If the above classification were decisive for the dimensioning of wine cellars, the modulation of 19th century cellars is the representation of a complex set of dimensional relationships, that were originated several centuries earlier. However, the large number of sherry houses studied and the recognised casuistry force us to relativise this assertion. The "*andanas*" are not always arranged parallel to the porticoes. There are constructions that repeat the same dimension in both directions, regardless of the arrangement of the "*andanas*". The size of the butts has varied over time, and the cellars have traditionally housed other types of vessels (Fig. 8).

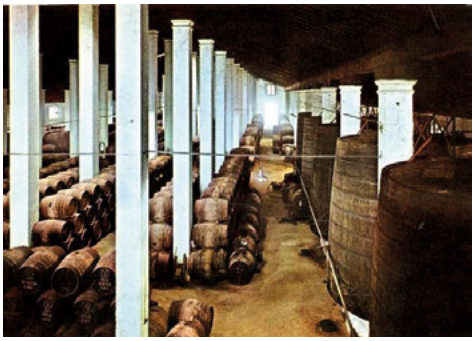

Fig. 8. Traditional layout of "andanas" and large truncated cone-shaped tanks (Source: Author's collection. Postcard).

It is necessary to read winery modulation from other perspectives far removed from immediate possibilisms. Without asking the philosophical bases of architectural modulation, A. Martínez establishes examples. They allow us to understand how the construction systems, and the availability of material could explain the modulated architectural systems from "easier" points of view: "they may have their origin in the accumulated experience of these small solutions applied against the difficulty. It may have its origin in the character that each material accumulates in the singularity of its construction system. Or it may be the mark left by that anonymous hand that left the cave to build itself a shelter and it turned out to be a temple" (2005, p. 758). From this perspective, the construction parameters of the industrial cellars could be understood as the distillation produced over centuries of immemorial construction procedures, and standards. These standards were conditioned by the local availability of materials, and contrasted in daily practice with functional, and microclimatic requirements. Only the arrival of new technologies generated the appearance of new modules and standards. However, these did not have a decisive effect on cellar architecture, which remained within the parameters of traditional construction.

5 In winemaking jargon, is said that a sherry house have "dos ruedos" if between two "*andanas*" there is space for two butts across; "ruedo y bretona" if there is space for one butt in parallel and one butt across; and "bretona" if it allows the passage of one man and one butt in parallel. (García del Barrio Ambrosy, 1984, pp. 14-15).

6. Dimensional control

In the simplicity of the basilica model, the metric variations can be infinite. Inside the group of sherry houses analysed from the 18th and 19th centuries, constructions from two to eight naves, and from three transverse modules to twenty-nine have been documented (Aladro-Prieto, 2012, pp. 232-239). There is a wide range of dimensions. Paradoxically, it seems to be a proportional inversion between the number of large establishments built, and the volume of wine produced at any time. More than half of the very large wineries, with six or more warehouses, were built in the first phase of the sector. All of them before the half of the 19th century, and only a quarter of them in the decades of export groth (1860-1875).

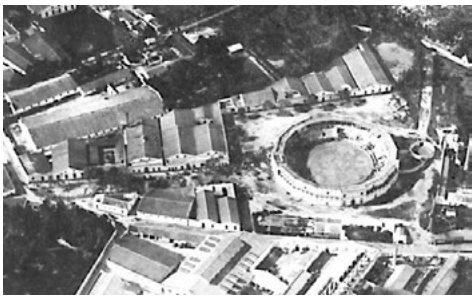

Fig. 9. Surrounding area of the bullring made up of wine cellars. Jerez, 1910-20 (Source: Author's collection).

This apparent paradox is reaffirmed in the two specifically winery-specific urban sectors built in Jerez in the final stage of expansion: the area around the bullring (Fig. 9), and a timid hypodamic extension called Vallesequillo, with industrial character (Fig. 2). Between these areas, the first one had not wine cellars which exceed four naves, and most of them had only two; in the second one, except for those that adopted positions of urban relevance, all the others were small, most of them with two or three naves.

In addition to other issues related to the business idiosyncrasies, the reduction of warehouses should be seen as a step forward in the modernisation process of cellar construction. Downsizing speeds up construction and reduces the initial investment costs, and the company's dependence on building. Moreover it also increases the flexibility and versatility of the industrial space.

7. Conclusions

The architecture of the sherry wine houses is an exponent of the ideological and economic transformations. They arose in the chronological and conceptual context of the Industrial Revolution, but not of its technical innovations.

The basilica cellar is not a new architectural prototype, but it has been backed by centuries of traditional building experimentation. However, it will be radically new how the production system will take it as a modular, and repeatable building, with capacity of adaption in different business and urban conditions. A typological model of the "sherry industrial nave" that would remain almost unalterable until the middle of the 20th century.

While the adoption of modular typologies in industrial architecture took place in the second half of the 19th century, the first sherry building complexes adopted them at the end of the 18th century, quite early on. Some of the architectural assumptions would later become the basic principles of the new industrial architecture.

The codification of this "sherry industrial nave" would come through the standardisation of a vernacular model of extensive experimentation. A parallel, and similar process to the one that turned wine, also "vernacular", into an industrial product, also standardised. In both processes, it must have been a phenomenon of feedback between container and content, where the constructions went from being containers to becoming inducers of industrial processes.

The industrial, and urban importance of the wine sector was extremely high in the Spanish 19th century. Due to this reason, the cellar construction of this period must be considered as a relevant exponent of Spanish industrialisation. An industrial architecture, with fully vernacular roots, which requires us to ask some of the parameters that define the traditional historiographical archetypes.

References

Aladro-Prieto J.M. (2010). La Arquitectura de las bodegas de Sanlúcar de Barrameda. En VVAA: *El Río Guadalquivir. Del mar a la marisma* (pp. 277-285). Junta de Andalucía.

Aladro-Prieto J.M. (2012). *La construcción de la ciudad-bodega. Arquitectura del vino y transformación urbana en Jerez de la Frontera en el siglo XIX*. (Doctoral Thesis, University of Seville).

Aladro-Prieto J.M. (2021a). *La Escala urbana del Jerez. Los complejos bodegueros jerezanos en el siglo XIX.* Peripecias Libros.

Aladro-Prieto J.M. (2021b). Aceite y vino en Jerez de la Fra. a finales del siglo XVIII. Espacios industriales y transformaciones urbanas en el cambio de siglo. En Pomar Rodil P. y Barros Caneda J.R. (Eds.). *Cádiz y su medio artístico. Reflexiones en torno a la Edad Moderna* (pp. 177-212). Sílex.

Aroca Vicenti F. (2007). *De la ciudad de Dios a la ciudad de Baco. La arquitectura y urbanismo del vino de Jerez (siglos XVIII-XX).* Remedios 9.

Corredor-Matheos J., Montaner, J.M. (1984). *Arquitectura industrial en Cataluña. Del 1732 al 1939.* Caja de Barcelona.

Espina Boa A. (2014). La antigua destilería de Domecq en Bollullos Par del Condado, un caso de expansión vitivinícola del Marco del Jerez en la provincia de Huelva. En *II Jornadas Andaluzas de Patrimonio Industrial y de la Obra Pública.* (pp. 1-5). Junta de Andalucía y FUPIA.

Espina Boa A. (2015). De la cepa a la copa, pasando por la bota. Las rutas de comercialización del vino en el Condado de Huelva. *PH, Boletín del IAPH,* 88, pp. 74-81.

García del Barrio Ambrosy I. (1984). *Las bodegas del vino de Jerez.* Instituto Nacional de Investigaciones Agrarias. MAPA.

Gómez Díaz-Franzón A.M. (2002). *La manzanilla. Historia y cultura. Las bodegas de Sanlúcar.* Pequeñas ideas editoriales.

Guerrero Vega J.M., Romero Bejarano M. (2006). The Origins of the Wine House Architecture in Jerez de la Frontera. En *II International Congress on Construction History*. *Tomo II* (pp. 1441-1454). University of Cambridge. Queens College.

Maldonado Rosso J. (ed.) (2006). *Las rutas del vino en Andalucía.* Fundación José Manuel Lara.

Maldonado Rosso J. (1999). *La formación del capitalismo en el Marco del Jerez. De la viticultura tradicional a la agroindustria vinatera moderna (siglos XVIII y XIX)*. Huerga y Fierro.

Maldonado Rosso J. (2020). Las vinaterías andaluzas en el siglo XVIII. En Ramos Santana A. y Maldonado Rosso J. (Eds.). *La vinatería andaluza entre los siglos XVIII y XX* (pp. 11-55). Peripecias.

Martí Aris C. (1993). *Las variaciones de la identidad. Ensayo sobre el tipo en arquitectura.* Demarcación de Barcelona del Colegio de Arquitectos de Cataluña. Serbal.

Martínez A.A. (2005). La modulación implícita de la arquitectura a través de los sistemas tradicionales de construcción. En *Actas del Cuarto Congreso Nacional de Historia de la construcción, Cádiz, 27-29 de enero de 2005-2005* (pp. 749-758). Instituto Juan de Herrera et al.

Ministerio de Educación, Cultura y Deporte (2015). *Plan Nacional de Arquitectura Tradicional.* Secretaría General Técnica. MECD.

Montañés Primicia E. (2000). *La empresa exportadora del jerez. Historia económica de González Byass, 1835-1885.* Universidad de Cádiz.

Murillo-Romero M. (2018a). El paisaje urbano del vino en El Puerto de Sta. María. En *II Jornadas Doctorales Interuniversitarias. Santander, 29-30/11/2018* (pp. 91-105). Universidad del País Vasco.

Murillo-Romero M. (2018b). Estrategias y oportunidades del patrimonio industrial bodeguero. Una aproximación al Campo de Guía (El Puerto de santa María). En *Ciudad industrial. V Seminario internacional sobre patrimonio cultural de la arquitectura y la industria* (pp. 161-176). Aula de Formación: Gestión e Intervención en el Patrimonio Arquitectónico e Industrial.

Peris Sánchez D. (2006). *Arquitectura y cultura del vino II. Bodegas de Castilla-La Mancha.* Munilla-Lería.

Raposo González J.J. (2014). *El Condado del vino y la vid. Paisaje vitivinícola de Bollullos Par del Condado. Vid-a y patrimonio de un pueblo.* (Master Thesis, Master in Architecture and Historical Heritage 2013-14, Univ. of Seville).

Rosado A.C., Aladro-Prieto J.M, Pérez-Cano M.T. (2020). Wine cultural landscape and vernacular typologies in southwestern iberia: three case studies in Alentejo and Andalusia. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLIV, pp. 87-94.

Saldaña Trigo J., Repeto Prieto J.L. (2009): *La imagen del vino de Jerez.* Junta de Andalucía.

Selvafolta O. (1985). El espacio del trabajo (1750-1910). *Debats*, nº 13, pp. 52-69.

Torres Luque E. (2008). *Las bodegas industriales urbanas en el marco de la denominación de origen Montilla-Moriles* (Master Thesis, Master in Architecture and Historical Heritage, 2007-08, University of Seville).