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Traditional buildings for tobacco processing in Val Tiberina (Tuscany-Italy)

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Topic: T1.3. Studies of traditional techniques and materials

Abstract

This paper focuses on the analysis of buildings used for tobacco processing, built in the first half of the 20th century in Tuscany (province of Arezzo), by studying construction techniques, materials, and preservation issues. Since the 16th century, in Tuscany, the sites involved in the cultivation of tobacco are both the upper Val Tiberina and Val di Chiana (in particular Arezzo and Siena areas). At first, tobacco was used either for medical purposes or as snuff and pipe powder. It soon became the most renowned cultivation throughout the Tiberina Valley, due to the excellent quality of the tobacco produced. The first significant crops date back to the early 17thcentury. The drying process took place in specific buildings named "tabaccaie", where tobacco leaves were placed over an oak wood fire to dry. This process was adopted until the 1970s. Subsequently, a profound crisis in the agricultural sector determined the falling into disuse and abandonment of numerous "tabaccaie". In some cases, these buildings have been reused as luxury hotels for tourism purposes, but many of them have been demolished or are in a state of ruin. They represent the testimony of agro-industrial vernacular architectures nowadays at great risk. Indeed, most of the recovery interventions have often completely obliterated the original structure to make the former "tabaccaie" able to satisfy housing and comfort requirements. The study aims to deepen the knowledge of these buildings to preserve cultural identities and transfer inherited values.

Keywords: *Tobacco processing, construction techniques, building material, preservation issues.*

1. Introduction

Tuscany and in particular the areas of Val di Chiana and Valtiberina (Fig. 1) are leaders in the Italian production of tobacco, which also extends to Campania, Veneto and Umbria. The cultivation of tobacco started in Valtiberina in 1574 when Cardinal Nicolò Tornabuoni, ambassador of the Grand Duke of Tuscany in Paris, sent some seeds of this plant, coming from America, to his nephew Alfonso Tornabuoni, Bishop of Sansepolcro. At first, the plant was used for medical purposes and as a snuff and pipe powder (Paoli, 2018). It soon became the most renowned crop throughout the Valtiberina, characterized by the excellent quality of the tobacco produced. The first significant crops date back to the early 17th century. Sansepolcro was granted the cultivation of 1,000,000 tobacco plants. Later, in 1868, the same concession was also extended to the neighbouring municipalities of Anghiari and Monterchi. Since 1910 the Tuscan Valtiberina has invested in the sector and has made the cultivation of Kentucky tobacco the main crop, becoming the basis of the area's economy as well as a real driving force for the local community's culture.

Fig. 1. The Valtiberina, in Central Italy, between Tuscany and Umbria (Source: rom Google Earth, modified).

A century after its introduction, the Kentucky tobacco of this area is known all over the world and is counted among the "Top grades" as regards its fine quality. It is used to produce the external part of the "Tuscan cigar" and in particular of the “Toscano Extravecchio", the only non-food product that "Slow food" has chosen as a praesidium and which is annually paired with excellent wines at the salon of taste (Santini, 1996).

The production of this cigar involves drying the tobacco leaves over a direct fire of oak wood. Specific dryers, still visible today in the area, were built by the landowners. They had been in use until the 1970s when a series of structural factors in the agricultural sector led to a profound crisis partially recovered through mechanization of the different production phases. The effects of this crisis were highlighted by the decommissioning and abandonment of the numerous tobacco processing buildings (called *tabaccaie*) in the area. In some cases, these buildings have been used for tourism purposes with the construction of luxury hotels or farmhouses. However, many of them have remained in a state of ruin or have been demolished and rebuilt adopting modern computerized processing systems for the production of tobacco. The interest, then, derives from different issues: on the one hand, the fact that these buildings bear witness to part of the social history of the area, and in particular to working conditions, to the more or less denied rights of a substantial part of the population, mainly female, up to the 1960s/1970s on the other hand, these buildings are examples of agro-industrial vernacular architecture, evidence of now obsolete construction techniques and industrial processes. They risk disappearing because of reuse interventions which often completely obliterate the original structure to satisfy current housing and comfort requirements. This research aims to deepen the knowledge of this type of buildings related to tobacco processing dating back to the first half of the 20th century, located in the surroundings of Anghiari, by analyzing their construction techniques and materials to preserve their cultural identity while designing reuse interventions. For this purpose, a survey was conducted in the territory of Anghiari. It was thus possible to identify 30 dryers representative of traditional construction techniques. Nearly twenty dryers are still in use, while others have been converted into residential dwellings or are in a state of abandonment. The historic working dryers have been analysed to assess:

- the presence of possible decay phenomena of the stone materials;
- the cohesion of bedding mortars and renders;
- the presence of fractures due to use (heat/humidity) or structural problems (stability of foundations, seismic events);
- the integrity of roofs;
- the functionality of downpipes and gutters. [MC, MM, FF, SR]

2. Productive process

The main type of tobacco produced in Tuscany (Tiberina valley) is Kentucky tobacco, derived by hybridisations of the North American flue-cured type with some local varieties. The favourable environmental conditions of the Tiberina valley (both climatic and soil consistency) and the strict curing and drying process adopted, makes Kentucky tobacco a very typical tobacco, particularly suitable for the production of Tuscan cigars. The production process starts in February-March with the sowing of the very small seeds in the seedbed, followed by transplanting of the 10-15 cm tall plants (in May-June), the harvesting and drying of the leaves (in August-first half of

October), and finally the sorting of the dried leaves before sending them to the machining centres (in November-January). All steps of the production process require adequate procedures and attention to obtain good quality tobacco, but the harvesting and drying phases are the most crucial to obtain leaves with suitable characteristics (substantial and elastic tissue, dark brown colour, good combustibility) (Fig. 2).

Fig. 2. Image of a Kentucky tobacco leaf after drying (about 90 cm in length), suitable as cigar wrapper.

Before flowering, the tobacco plants are tipped leaving 12-20 leaves and eliminating the floral bud and upper leaves. After 40-50 days from the tipping and periodic elimination of the axillary shoots, the upper leaves are increased and ripening begins. Depending on the type of Kentucky tobacco hybrid, ripening occurs from the bottom to the top or from the top to the bottom of the plant, and a change in the colour of the leaves (from dark green to lighter green with yellow-greenish spots) is observed. The harvesting proceeds (from the bottom to the top, or vice versa) with the detachment of 2-4 ripe leaves at a time from the stem every 15-20 days. The leaves are then tied to each other through the stem, placed on a pole, and stored at room temperature and humidity. When the leaves turn yellow (typically after 4-6 days), they are transferred to the dryers for the drying and browning process. During this step, the temperature and humidity of the room are regulated by fires, typically one in the middle of the room and one or more in the corners, depending on the needs. The fires are mainly obtained with dry oak, which produces smoke without flame. The temperature is kept at around 30 °C for one day, then raised to around 35-40 °C until the leaves turn brown (typically 4-5 days). During this phase, excess moisture in the leaves is eliminated by opening the small windows located in the upper part of the structure. Finally, the temperature is further increased (45-50 °C) to reduce the moisture content in the leaves and activate the bulk fermentation, which gives a particular scent and bouquet to the tobacco (Fig. 3).

After extinguishing the fire and lowering the temperature, the tobacco leaves are transferred to the storage barns until the sorting step. [MC]

Fig. 3. Tobacco leaves after sorting and prepared for sending to the machining centres. The colour of the ribbon indicates the quality: red (best quality) for Tuscan cigar wrapper, blue for Tuscan cigar filler; yellow (poorer quality) for filler of some kinds of cigarettes.

3. Tobacco dryers in the Anghiari territory: types and construction techniques

In the Anghiari area, tobacco dryers are characterized by the presence of a curing room and shelter spaces for the storage of leaves and tools. The curing room consists of a high empty volume with a hanging system made of wooden beams and poles. During the drying phase, tobacco leaves are hung on the poles to be cured by the fire. (Fig. 4).

Fig. 4. Interior of the treatment room in which there are leaves in the drying phase (credits Manuela Mattone).

The treatment room (a real oven) has an almost square plan with load-bearing walls made of stones or mixed stones and bricks with corners made of dressed stone ashlars or bricks (Fig. 5). In the more recent buildings the walls are made of tuff blocks, sometimes interrupted by a brick course (Fig. 6). The two-pitched roof is characterized by the presence of a structure consisting of a double wooden framework on which a layer of brick slabs and brick tiles are located.

The spaces used for the storage of leaves and tools have a load-bearing structure made up of brick pillars on which the trusses supporting the double row of beams of the roof and the tile covering rest. Where present, the curtain walls are in brick (Fig. 7).

The oven has a small number of openings: a small door to limit the temperature range, a window on the façade opposite the entrance, and small holes in the top of the side elevations to ensure the necessary ventilation. The openings are generally finished with bricks or elements of natural or artificial stone. [MM]

Fig. 5. Detail of the masonry at the corner of a drying room (Source: Mattone).

Fig. 6. More recent drying rooms in Anghiari (Source: Mattone).

Fig. 7. Ancient drying room in Anghiari (AR) (Source: Manuela Mattone).

4. Dryer building materials

As previously mentioned, the walls of the oldest dryers are in mixed type masonry, made of river pebbles and bricks laid with abundant mortar and rendered. The river pebbles reflect the geology of the surrounding area, being characterized by the presence of arenaceous lithotypes (Cervarola sandstones), marly limestones, and ophiolites (belonging to the External Ligurids Units) (Fig. 8).

Fig. 8. Particular of masonry made of river pebbles and bricks laid with abundant mortar (Source: Fratini).

The corners show dressed sandstone ashlars alternating with bricks (Fig. 5). Stones are not affected by decay. Therefore the research focused in particular on the study of bedding and rendering mortars (which can most influence the durability of the masonry) and bricks of the mixed masonry (Fig. 9, Fig. 10 and Fig. 11).

Fig.9. Analysed rendering (Source: Fratini).

Fig. 10. Analysed bedding mortar (Source: Fratini).

Fig. 11. Analysed ancient brick (Source: Fratini).

These materials have been studied with the following methodologies:

- the mineralogical composition has been determined through X-ray diffraction (X'Pert PRO diffractometer by PANalytical equipped with X'Celerator detector and HighScore software for acquisition and interpretation of data according to the following operative conditions: Cu Kα1= 1,545Å radiation, 40 KV, 30 mA, 2Θ = 3-70°);
-a petrographical study has been performed on thin sections with optical microscopy under transmitted light (ZEISS Axioscope A1) for evaluating the microstructural parameters (Pecchioni et al., 2014).

The bedding mortars show good cohesion and have been made with a binder/aggregate ratio of about 1/3. The aggregate is well selected with a grain size of less than 1 mm. The granules have a sub-angular to sub-rounded shape and are composed of quartz, fragments of micritic limestones, and serpentinites. The binder is a slightly hydraulic air-hardening lime as evidenced by the

presence of small dark inclusions referable to calcium silicates. There are also numerous lumps. This indicates the lime was produced with a traditional technique, slaking the quick lime to obtain the lime putty. Concerning the raw materials, the aggregate comes from the sediments of the nearby Tiber river while the binder was produced by burning slightly marly limestone as shown by the texture of the lumps, referable to underburnt lime fragments (Fig. 12).

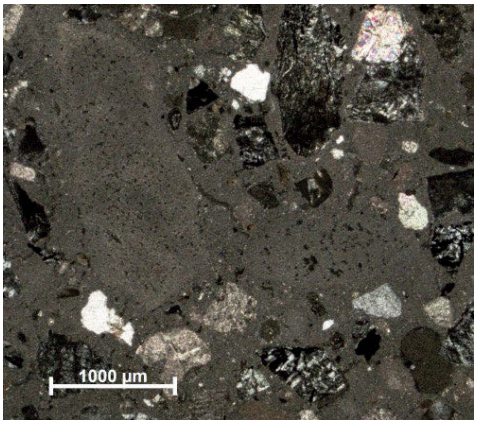

Fig.12. Bedding mortar: lumps referred to the burning of a slightly marly limestone (image at the optical microscope in thin section, polarised light) (Source: Fratini).

The renders are in a bad state of conservation due to the low cohesion of the mortar and the lack of adhesion to the substrate. This can be explained by the too high amount of aggregate (binder/aggregate ratio of about 1/4) (Fig. 13). The aggregate has not been selected and has a coarse grain size. The granules have a subrounded shape and are composed of serpentinites, fragments of micritic limestones, and quartz. The binder is similar to that of the bedding mortars. Numerous lumps are also present. The raw materials used to make these mortars are similar to those of bedding mortars.

In summary, the bedding mortars seem to have been made with greater care, compared to the mortars of the renders. One possible explanation is a greater interest in the quality of the structure rather than the aesthetic features of the building.

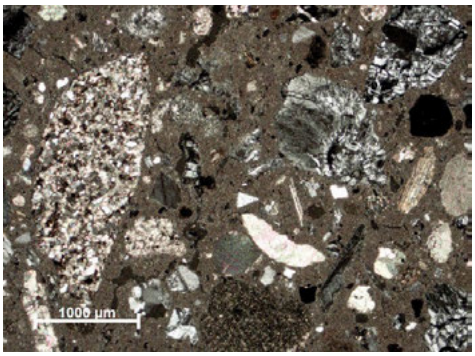

Fig. 13. Rendering mortar: the low binder/aggregate ratio is evident (image at the optical microscope in thin section, polarised light) (Source: Fratini).

The ancient bricks were made with the traditional method of wet pressing and show no signs of decay. The study under the optical microscope in thin section shows a birifrengent groundmass and an abundant framework made of quartz, feldspars, micritic calcite with a grain size of about 400µm- 1mm (Fig. 14). The birifrengent appearance of the groundmass indicates a firing temperature lower than 750 °C, therefore not capable of completely destroying the lattice of clayey minerals and carbonatic grains. [FF, SR]

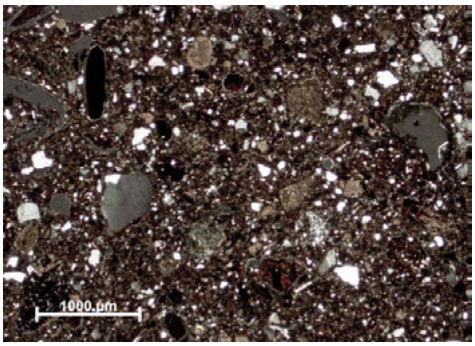

Fig. 14. Brick with an evident birifrengent groundmass and an abundant framework (image at the optical microscope in thin section, polarised light) (Source: Fratini).

5. Preservation issues

Since the 1970s, as a result of the crisis in the tobacco sector, many *tabaccaie* have been closed down. Some have been demolished, many have undergone interventions that have often altered their original layout, while others, deprived of any maintenance work, are in a state of total

abandonment. These buildings are interesting examples of industrial architecture that characterise the rural landscape of some of the Tuscan provinces, bearing witness to the history, production activities and culture of these territories.

In recent years, actions have been taken to promote the knowledge and appreciation of this heritage. In particular, in 1998, the first work of cataloguing the *tabaccaie* in the municipality of San Miniato (province of Pisa) was carried out with the dual purpose of encouraging the acquisition of more widespread awareness of the existence of this heritage and the recognition of its cultural value through the census and cataloguing of the still existing constructions (Cavazza & Cavazza, 1998). More recently, in 2001, as part of the project promoted by the Province of Pisa entitled "The Memory Industry" (Torti, 2005), an attempt was made to promote both knowledge of the tobacco processing buildings (by disseminating drawings, photographs, archival and bibliographical material on the *tabaccaie* in the Province of Pisa) and their use by developing a specific cultural itinerary aimed at enabling tourists to approach this heritage and deepen their knowledge of these places, their history and the transformations they have undergone.

Unfortunately, some of these buildings have been irretrievably lost and with them part of the history of the agricultural activities, while others are at risk because they have been totally abandoned or are destined to undergo highly invasive renovation work. Safeguarding this heritage requires in-depth knowledge of it in terms of construction, structure and materials, and the development of proposals for its preservation by promoting its compatible reuse (Bartali, 2014). Permanence must be ensured not through simple musealisation and immobilism, but the identification of new uses, adapting the buildings to the changed performance and functional requirements, without altering their identity features. Since not everything can be simply maintained or transformed into a museum, cultural space, or exhibition hall, to guarantee a future for this heritage it must be re-introduced into an economic circuit that uses it and lives it, guaranteeing its maintenance. As Franco Milella points out, "the processes of enhancing the value of minor assets can and must take on the value of contemporary use" (Milella, 2015), the only means by which they can be used. This is the only way to guarantee their permanence over time.

To preserve the material as well as aesthetic features of these buildings, the analyses undertaken provide useful indications on the conservation work to be carried out. In particular, it was possible to verify that the bedding mortars have been made with care and have good cohesion, while the mortars of the renders are of worse quality and have often fallen off, leaving the masonry exposed. Therefore, for the bedding mortars only punctual interventions with mortars based on natural hydraulic lime, compatible with the original ones, should be adopted. As far as plasters are concerned, given their precarious state of conservation and poor quality, it is not advisable to preserve them, but it is recommended to remove detaching plasters and replace them with new ones based on natural hydraulic lime so as to protect masonry from external agents. [MC, MM, FF, SR]

6. Conclusions

The dryers (*tabaccaie)* of the Valtiberina are an interesting testimony to the history of the production activities that characterised and still characterise this area. The analyses conducted so far highlight not only their historical and cultural value but also the close link established with the surrounding territory. Built using local materials, they characterise the landscape. Having recognised their cultural value, their safeguarding requires projects respectful of their building technology and capable of ensuring their continuity of use. The needed and inevitable transformations must be designed with care to maximise the permanence of materials and identity features of this legacy, because “preserving the evidence of our past means picking up the broken threads, mending the broken wefts, weaving new ones, using all this for the future” (Ermentini, 2007).
[MC, MM, FF, SR]

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