

CROPS, CONSERVATION, AND COMMUNITY: A STUDY OF VEGETABLE STORAGE IN NORTHWEST ARGENTINA

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Abstract

The emergence of agropastoral villages in northwestern Argentina valleys approximately 2500 years ago marked a significant transformation in the region's social and economic landscape. This Formative period, spanning 1500 years, witnessed the establishment, growth, and eventual abandonment of clustered households and village settlements across various micro-regions. This period was characterized by the development of Andean crop agriculture, llama herding, demographic expansion, and the transition to a more sedentary lifestyle. These changes brought forth new challenges, resources, and social dynamics. One notable aspect of this transformation was the increasing demand for storage of agricultural products, essential for consumption, processing, or future planting—a shift toward deferred return economies. While storage practices were not unknown among hunter-gatherer groups, the Formative period saw a heightened emphasis on anticipating future needs and seasons.

This research explores the evolving nature of storage practices during the Formative period in northwestern Argentina. It considers how the growth of deferred return economies reshaped the ways in which communities managed and stored their resources. By examining the archaeological evidence, this study sheds light on the strategies and techniques used to address the pressing need for long-term storage and management of goods.

This investigation is informed by a multidisciplinary approach, drawing insights from the works of researchers such as Olivera (2001), Bandy (2010), Bocquet-Appel (2008), Kuijt (2008), Howey, and Frederick (2016). It offers a comprehensive examination of storage practices and their societal implications during this critical period in the region's history.

The findings contribute to our understanding of how communities in northwestern Argentina adapted to the challenges posed by the shift

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from mobile lifestyles to settled agropastoralism. Additionally, they offer valuable insights into the diverse strategies employed by ancient societies to ensure the availability of essential resources during times of scarcity or need.

1. Introduction

The earliest agropastoral villages appeared in northwestern Argentina valleys around 2500 years ago. Over the next 1500 years, commonly referred to as Formative period (Olivera, 2001), several micro-regions witnessed the onset, growth, and abandonment of clustered households and village settlements. The development of Andean crop agriculture, llama herding demographic growth, sedentarism, and the aggregation of people set up novel problems, resources, techniques and new ways of establishing, changing and managing social relationships (Bandy, 2010; Bocquet-Appel, 2008; Kuijt, 2008). One main aspect of this change was the enhanced need of keeping products to be consumed, processed or seeded after the moment of harvest, that is to say, the growth of deferred return economies. This does not imply the denial of storage practices in hunter gatherer groups but rather the recognition of the increased need to foresee future events or seasons when food and other items would be needed. Indeed, the relevance and diversity of storage practices within non-sedentary hunter-gatherers and low-level horticulturalist societies has largely been recognized (Howey & Frederick, 2016).

Storage is a variable and dynamic social practice essential for economic and political structures of complex and unequal societies (e.g., chiefdoms or states) as well as for small scale groups of farmers and hunter-gatherers (Cunningham, 2011). Storing food for the future constitutes a practice that solves certain problems and offers diverse possibilities in terms of planning, risk reduction, and surplus hoarding (Gremillion, 2011).

Therefore, it is a key aspect to understand economic strategies, social structures, and political negotiations in different cultural and temporal settings but especially in the context of early village societies. Nevertheless, it was commonly taken for granted in building models of the development of social complexity (Hendon, 2000; Smyth, 1991) and interpreted both as a consequence of the generation of agricultural surpluses as well as one milestone of social inequality. Therefore, some essentialist relations between agriculture, surplus, storage, and inequality were assumed as a given aspect of social evolution (Kuijt, 2009).

Then, since storage was related to social inequality, some small-scale egalitarian contexts where physical storage practices were recorded tended to be either dismissed or interpreted as study cases of the origin of inequality. On the one hand this tendency could be associated to the eclipse of equality in archaeological narratives (Osborne, 2007) and it is a disadvantage to the overall explanation of social dynamics, especially in constraining the comprehension of the heterogeneous roles that economic negotiations had in different historical trajectories.

On the other, archaeological narratives about this process were based upon theoretical taken-for-granted frameworks built within normative or evolutionary perspectives, dismissing actualistic data. The deep gap between pre and post-hispanic cultural traditions in northwest Argentina prevented the development of ethnoarchaeological studies to interpret material culture, daily life and social relationships within early villages. Nevertheless, there exist a few cases in which small scale peasants still practice traditional agriculture. Their social practices and the material traces they leave could contribute to the archaeological understanding of local histories and overall processes. This paper presents new archaeological data on Tafi valley early village vegetable storage practices and also ethnoarchaeological information on household storage originated in the nearby Anfama valley, with the aim of discussing surplus generation, resources control, and household autonomy in the context of early farmers and villagers from the South Andes.

2. Storage, surplus and archaeological interpretations

Archaeological and ethnoarchaeological analysis should be very clear about the concepts of storage and surplus and the relations between them. Storing means setting aside material things (food, tools, water, seeds for plants) for some future use (Halperin, 1994). Food storage includes three main types: physical storage, biological storage (as fat on one's body), and social storage (through exchange relationships) (Howey & Frederick, 2016). Throughout this paper, we will focus on the first type considering that it is the most trackable in the archaeological record.

Physical storage is an activity that involves the location of items in a specific place against future needs. It requires, on the one hand, different products eligible to be stored, and on the other, two kinds of containers; portable (bags, baskets, pots, boxes) and fixed containers (pits, rooms, features, structures). It also requires knowledge about how and what to conserve. The decision about the products to be stored would vary seasonally and would be based on historical considerations such as how much seed was held back in the previous years and whether the stored quantity was sufficient (Forbes & Foxhall, 1995; Hendon, 2000).

From a dynamic point of view, storage is also one stage within the long cycle that products go across to become edible food. *Surpluses* are significant food items beyond the subsistence and reproduction needs. The generation of surplus involves the production of enough food to cover the daily subsistence needs, keeping something in case of seasonal shortage and preserving a part for future production (Smyth, 1991). Therefore, the existence of food storage does not necessarily imply the generation of food surpluses. Indeed, a significant proportion of the ethnographic cases in which storage practices were recorded in small scale societies, the aim of storing food was to reduce risk against future shortage periods (Kuijt, 2015).

Archaeological and ethnoarchaeological researches have demonstrated that storage practices not only have the potential for yielding important information on diet subsistence strategies and environment but also for improving our understanding of larger social and cultural processes (Wesson, 1999). As stated by Rhoades, Benavides, Recharte, Schmidt & Booth (1988), storage should not be understood in isolation, as a purely technical phenomenon, but rather as a cultural practice which serves the needs and goals of rural households. Storage implies the control of raw materials and produced goods and how they will be distributed and consumed. Therefore, storage practices and their material contexts are key aspects to follow relations and entities that built collectivities during the process of early village consolidation.

Furthermore, because of the ubiquity in sedentary and food producing societies, these practices and their archaeological consequences have been proposed as one of the prime markers from which a comparative framework on social organization could be built (Rothman, 2016).

As repeatedly proposed, storage has several difficulties to be archaeologically addressed (Hendon, 2000; Kuijt, 2009). Nevertheless, as any other social practice, it generates different material traces. Architectural features, artefact assemblages, seeds, and botanical microparticles could be studied as markers of containers and stored products. It is the contextual relationship between different evidences that could give us clues about storage and social practices towards it. Household or communitarian spaces, scale, control in access, and stored products are key aspects to interpret how this practice is related to social structure and agents' strategies (Wesson, 1999). Ethnoarchaeological studies constitute another productive way of addressing storage practices in order to create interpretative models for functions of structures, devices and artifacts, uses of the stored products, scales and duration of storage practices, as well as the social implications of storing.

As part of our archaeological research program, we have made a deal with the authorities of the Diaguita native community of Anfama in order to record oral history and also traditional practices. Contextual information about

household storage practices carried out by Diaguita peasant households are described aiming at enhancing the interpretation of the archaeological record. Nevertheless, the introduction of Anfama ethnoarchaeological information on storage is not aimed at assessing direct historical links between 1700 BP early villagers and actual Diaguita farmers. It is necessary not to fall into direct analogies, always considering the multi-temporal nature of archaeological record which define great gaps and differences between agents who carry out practices in similar spaces, but at very distant times. We are just thinking of the material remains of certain practices carried out in similar ecological contexts and applying this as another interpretative tool together with the archaeological context and other ethnoarchaeological studies.

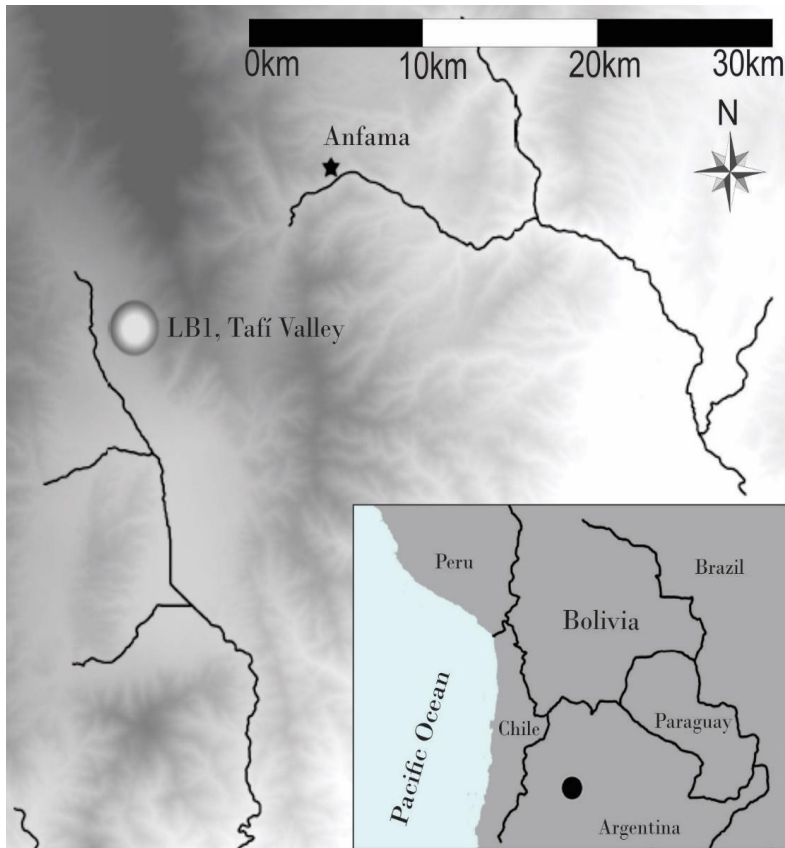


Figure 1. Regional map locating Anfama and Tafti basins and the two main locations presented in this paper: 1. La Bolsa 1 (LB1), BP 1800 archaeological village; 2. El Sunchal, location of Maza Household.

2.1. Archaeological approach to storage

Our approach to household storage practices includes the study of three different and complementary material remains: architectural analysis of storage features and their context, artifact assemblages characterization, and botanical microremains identification in soil samples. *Architecture* structures are the main markers of storage location, scale, and control. A contextual and dynamic analysis of spatial features, can provide strong evidence not only on human practices but also on the interaction of the built environment and the modelling of the bodies, through encouraged, restricted, and forbidden movements. We defined the main features recorded on Tafti Formative house architecture which could be interpreted as stores, their magnitudes, and especially, their relative location considering dwelling spatial organization, movement within houses, visibility, and control relations with respect to other important spatial elements of the house compounds.

Artifact assemblages, especially *pottery* vessels studies, allow to reinforce hypotheses on activity areas and to consider container uses and volumes. Their performative characteristics, defined by a combination of technological and morphological analyses are key aspects to establish long term preservation of liquid and solid raw materials (Barrier, 2011; Blitz, 1993; Hally, 1986). Through a study of performative characteristics of vessels, we have defined five functional categories considering ethnoarchaeological physical and functional studies (Blitz, 1993; Hally, 1986; Henrickson & McDonald, 1983; Menacho, 2001; Tite, Killikoglou & Vekinis 2001).

Soil samples from storage structures were collected to carry out *botanical microremains* analyses to establish the presence of vegetable species, following specific methods proposed by Pearsall (1989). Different types of microremains like polen, phytoliths, hair cells, starch grains, spores, and fibers could be identified in samples. We focused exclusively on the recognition of phytoliths and starch grains, which allow to identify the stored vegetal species (Babot, 2004). These micro remains were identified by comparing them with those published in reference collections and classified according to the International Code for Phytolith Nomenclature (ICPN) (Madella, Alexandre & Ball, 2005).

3. Northwest Argentina Early Villages

The earliest village settlements in Northwestern Argentina emerged and grew during the Formative or early period (2500-1200 BP). As in many regions worldwide, there is clear archaeological evidence that this process implied a rapid demographic growth, as well as the development of intensification strategies and a high degree of landscape domestication. Nevertheless, the adoption of agriculture did not produce population growth to manifest in large aggregate communities but rather in spatially scattered and heterogeneous households spread over alluvial fans, riverine basins or *puna* (Andean high plateau) oasis (Albeck, 2000; Olivera, 2012; Scattolin, 2006).

This successful system, maintained for almost a millennium, allowed autonomous household members focused on farming and herding to inhabit valleys and high plateau areas yet avoiding the problems of institutional inequality and scale stresses due to overcrowding. Archaeological evidence on domestic storage practices shows that they were key aspects allowing household autonomy, not only in a material sense but also in the constitution of a strong segmentary identity centered on ancestors and reciprocity within kinship groups.

3.1. Tafí valley early village settlements

Located in Valliserrana region, Northwestern Argentina, the Tafí valley is an elongated basin crosscutting the Cumbres Calchaquíes and Aconquija ranges which constitutes an ecotonal zone between the humid forest or *yunga* on the east and arid highlands or *puna* on the west, ranging in height between 1800 and 3000 m a.s.l.

Between 2200 BP and 1200 BP, Formative period farmers and herders lived, farmed, and built house clusters in scattered locations along alluvial fans in Tafí valley (Berberían & Nielsen, 1988; González & Núñez Regueiro, 1960; Oliszewski 2017; Sampietro Vattuone & Vattuone, 2005). The archaeological households are composed of stone walled house clusters, often multiple crop growing structures and camelid handling enclosures. Some residential compounds are spatially isolated and dispersed across terraced areas. In other cases, however, there are numerous house clusters shaping discrete hamlets (Salazar & Kuijt, 2016). In some extraordinary cases, the residential areas are associated with monolithic carved stone sculptures (Berberían & Nielsen, 1988). La Bolsa 1 (Figure 1) archaeological site is formed by the aggregation of 21 house clusters and several crop growing plots, located on an alluvial terrace in the North area of the Tafí valley inhabited between 2100 BP and 1200 BP. The site layout shows a spontaneous outgrowth rather than strong communal planning.

House clusters are architectural units of about 200 m² spatially segregated between each other. This site shows a complex process of occupation, growth and abandonment along the first millennium of the CE (Salazar & Kuijt, 2016).

3.2. Storage evidences in Tafi valley house clusters.

The main archaeological feature in Tafi valley early village contexts (in terms of visibility, conservation and recurrence) are house clusters. Formative people constructed circular or sub-circular semi-subterranean roofed buildings ranging in size between 2 and 20 m² (Figure 2). These enclosures were placed around a single circular unroofed patio defined by large upright stones. A single entrance connected the patio and outside areas. At times, other irregular and larger structures were attached to the unroofed courtyard. These clusters vary in size and number of structures attached to the central patio courtyard (from 3 to 15, with five as the average) but in all cases with the same spatial organization with circular rooms on the outside of large patio. Excavations reveal that burial cists were often located in the center of these patios. Stratigraphic analyses and dating series have shown that these residences were probably occupied during several centuries becoming central places for the constitution of social memories and relational ties within households.

Residential cluster unit U14 is located in the densely occupied area of the LB1 settlement. It is formed by seven stone structures, four circular rooms (R2, R3, R4 and R6) attached to the main courtyard (R1), and two peripheral irregular enclosures (R5 and R7) (Figure 2). Analysis of architectural features, artefact distribution, and silicon phytoliths identification have allowed us to define residential compound activity areas, and especially storage practices from around 1200 BP (Molar, 2015).

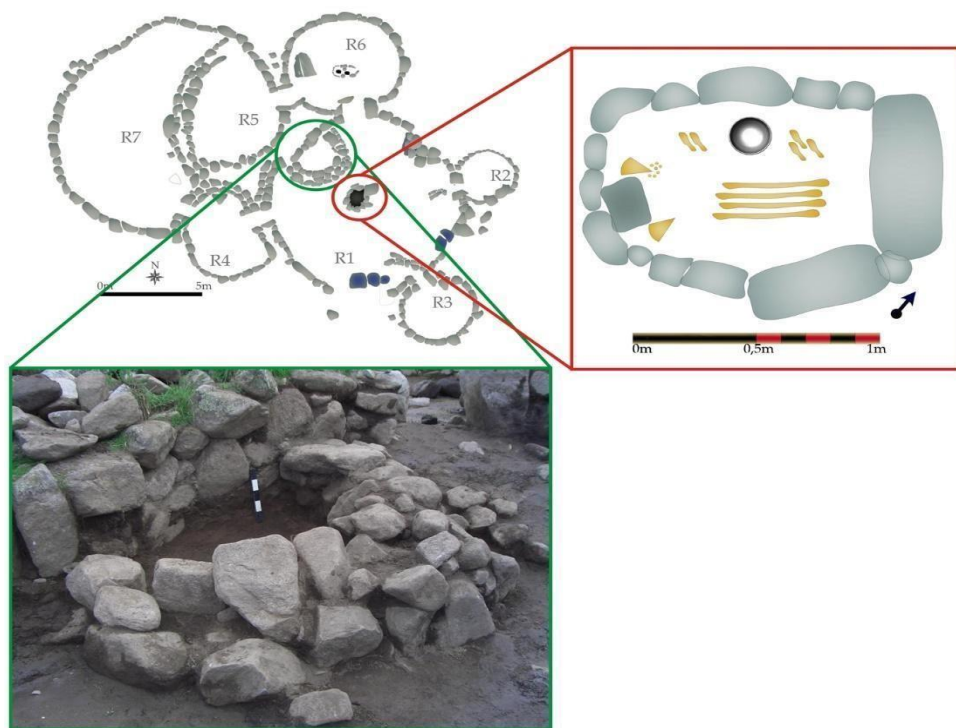


Figure 2. Internal storage feature in LB1-U14 household compound. Top left: LB1-U14 archaeological floor plan; Bottom left: indoor storage feature; Top right: burial cist.

The peripheral smallest enclosure shows possible use as a store. R2 is a small circular room in the east of U14, with 2.4 m diameter, and only communicated with R1. The walls were built with an irregular stone masonry and the structure did not evidence inner features, allowing us to think that this space was used as a warehouse. This

possibility is sustained by three different evidences. First, architectural characteristics of the building, being a small and roofed room, consequently dark and fresh, as was recorded by Rhoades et al. (1988) for actual potato storage between peruvian peasants. Also, the narrow pathway to access room R2 and the presence of two metates in the entrance, show the low and difficult transit to this enclosure. Second, the scarce material assemblage identified within the structure which was only composed by one *mano*, a few coarse pottery fragments and scarce lithic debris, reduces the practices being carried out there, but it is still compatible with the storage of potato in the highlands of Peru where the families stocked piles of potatoes directly above the ground (Rhoades et al., 1988).

Third, the reduced pottery assemblage detected fits to dry storage functions. The inferred vessels are characterized by inflexed or simple restricted contours, allowing easy sealings, although losing access to the content. Thick walls (13 mm or more) provide humidity insulation. The predominance of technological class characterized by porous texture, and coarse quartz, mica, and feldspar inclusions in high densities, in these forms together with the red thick slips, reduce permeability. They do not show evidences of fire exposition, such as soot marks. Those vessels suited to liquid storage functions are characterized by complex or inflexed contours, with everted rims. Highness is proportionally larger than width, allowing pouring of the content. Handles are arc-shaped vertically positioned, with circular section, lip added and clinched to the body. Thick walls (12 mm or more) give good thermic insulation to the liquid content, while good porosity keeps fresh the liquid content.

Finally, the studies of microremains into sediments from R2 made possible to identify starch grains and phytoliths from different vegetal species. We have found cross shaped phytoliths (from 15.2 to 20 μm size) identified with *Zea mays* grass (Piperno, 2006), and starch grains from *Zea mays* corn (spherical, from 15.2 to 22.8 μm size, hilum as a dot, distinct centric cross). We have also identified starch grains from a native microthermic tuber, similar to *Oxalis tuberosa*, according to descriptions provided in different reference collections (oval and spherical grains with a truncated end, from 50 to 68 μm size, distinct eccentric cross to one end irregular arms) (Figure 3) (Babot, 2011; Cortella & Pochettino, 1995; Korstanje & Babot 2007). These remains point out at the recurrent presence of vegetable within the structure neither processing nor consuming activities at that place. Furthermore, the storage possibility is enhanced by the connection of the enclosure with the central place of the house, the patio R1, where almost all the grinding activities were carried out.

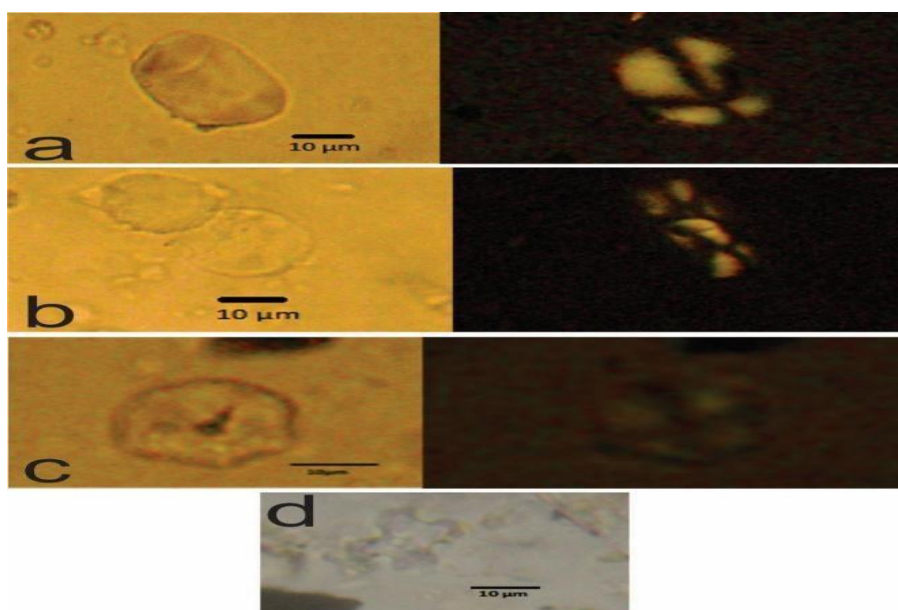


Figure 3. a.-b.) Starch grains of *Oxalis tuberosa*. c.) Starch grain of *Zea mays* d.) Cross shaped phytolith from *Zea mays*.

Within the main residential courtyard an internal feature was recognized (Figures 2 & 4). It is a small subcircular enclosure with no door. It is formed by a short rock wall, 0.50 m high, attached to the north and main wall of the patio R1, in front of the burial chamber of the residence. Although we do not know the roofing techniques, we assume that it was covered with thatch and mud. The access to the content may have been allowed by a window. Within the sediment which capped the storage structure inside the patio R1, coarse pottery sherds were identified and they belonged to one big vessel suited to storage as primary function (Figure 4). Nevertheless, no more evidence from the pottery assemblage was recorded. This absence could be explained by the use of perishable technologies for storage such as leather or fabric bags or by the direct disposition of the products within the structure, as it is actually recorded in the region. Within the sediments that capped this feature, a small clay anthropomorphic figurine was found.



Figure 4. Top left: Internal storage feature in LB1-U14. Bottom left: Anthropomorphic figurine. Top right, bottom right and centre: big storage vessel in site, reconstructed and rendered.

The microremains analyses have shown the presence of phytoliths identified with *Zea Mays*, corn, and grass. The presence of *Zea mays* leaves could be probably explained by the practice of storing cereals as ears, making it possible to conserve the products for long terms (Morales et al., 2014: 801). Cereals could be processed and covered with leaves, or stored in the way they naturally occur on the plant to protect them from the infestation by insects. Rather than fragmented, entire grains were probably stored, and only at times when they were required to eat or to prepare food, they were processed, because the flour is more likely to rot than dry grains (Pazzarelli, 2013).

This new data on storage practices within Tafi valley first millennium houses strongly supports previous but fragmentary proposals for analog archaeological sites. Berberían excavated another house compound within LB1 archaeological site recording the existence of three empty walled chambers below the occupational floor.

Considering their formal characteristics, they were interpreted as subfloor storage facilities (Salazar, Franco Salvi, Berberían & Clavero, 2008). In LB2 settlement, three domestic silos were identified. They were subsurface walled chambers with metates reused as the basin of the structures (Berberían & Nielsen, 1988: 58).

Cremonte (1996) proposed the function of an attached and small enclosure of house compound as a tuber store, upon a thick ash deposit above the occupational floor. This particular evidence was related to the ethnoarchaeological record of Central Andean peasants who used the ash to conserve and protect potatoes from insects and humidity.

Finally, Sampietro Vattuone and Vattuone (2005) established that in a specific area of a house cluster in El Tolar site, the levels of organic phosphorus were higher than in the rest of the enclosures while the pH values were lower, suggesting storage of vegetal products such as potatoes and corn.

The archaeological evidence shows that storage features were key material devices within Tafi valley early village dwellings. They were located in the most visible and nodal place of the house in front of the burial chamber, a highly controlled and symbolically relevant locus. Maize was probably the paramount crop being stored, followed by microthermic tubers. Although containers could have been used, and indeed there are evidences of pottery vessels with good performative characteristics for the activity, they are so far fragmentary. But the main questions of the paper are not to be solved exclusively with archaeological remains: Is this archaeological evidence for storage also evidence for surplus? How could we understand the role of stored food in the reproduction of households? Are these evidences for unequal access to economic resources? Ethnoarchaeology could help us think about all this problems from a complementary and illustrative perspective.

4. Anfama Diaguita Community

Anfama is a small and disperse hamlet, located on the eastern slopes of the Cumbres Calchaquies range (between 1300- 3000 masl), 15 km north from La Bolsa 1 archaeological site described above. Anfama includes 15,000 ha and is part of the *yunga* ecoregion, specifically its highest floor: the montane forest. According to palaeoenvironmental pollinic studies, current Anfama conditions could be similar to those inferred for Tafi for the first millennium CE (Collantes, 2007; Sampietro Vattuone 2007).

Currently, Anfama is inhabited by a little Diaguita community conformed by 56 families which maintain traditional small scale agro-pastoral practices centered on growing maize in small plots and herding sheep and goats. As it is not accessible by car or trucks and it could only be reached after a 18 km mountain trail, no machinery is used at all. The production is characterized by smallholders which plant less than one hectare and depends entirely on human labor and animal force. This makes the Anfama case an extraordinary one in the current Argentinean context and therefore worth to be studied and deeply recorded. Apart from the informative value in itself, the case study could also give us some actualistic keys to interpret the archaeological phenomena related to household storage practices during the period of consolidation and reproduction of the village life.

4.1. Storage practices in Anfama house compounds

Anfama's actual house compounds are formed by different rectangular enclosures built with adobe bricks around an open patio. Traditional roofings are made with multiple capes of canes, thatch and mud, over a wood timber structure, tied with leather strings. Generally, the enclosures are separated by a few meters, and in the open areas multiple tools, constructive or even raw materials are deposited. Between the multiple functions of the buildings it is relevant for the aims of this paper to analyze a traditional storage structure, called *pirhua*. Maza and Balderrama families allowed us to record the material characteristics of their place and to have several interviews with them to explain the organization of the productive system.

Maza Family is formed only by five members: Teresa and Desiderio, the elder couple, and their grandsons Miguel, Carlos and Julia. They hold a small-scale farm and raise sheep, goats, chickens, pigs, mules, cows, and horses. In a delimited area, Desiderio plows, plants, and harvests maize. Teresa performs all the domestic activities, including quartering lambs and grinding corn. Maza's household compound is formed by a residential area, enclosed by a wire fence, it has a kitchen, a dining room, three bedrooms and the *pirhua* (Figure 5). The *pirhua* is a traditional feature built with perishable materials. It is rectangular, 3 m long and 2.5 m wide. This structure was built by Desiderio three years ago and it can last two more years with minimal improvements.

As it can be seen in Figure 6, it has a simple structure made with aliso ("*Alnus acuminata*") timbers, closed with cane walls and roofed with a zinc sheet (traditionally it would have been roofed with cane, thatch and mud). The *pirhua* floor is raised 0.5 m from the ground with the purpose of preventing access and destructive effects of insects, rodents or other plagues. The structure lacks doors and the access is restricted to a small window. At its maximum capacity, it can contain more than two tons of dry ear of maize.

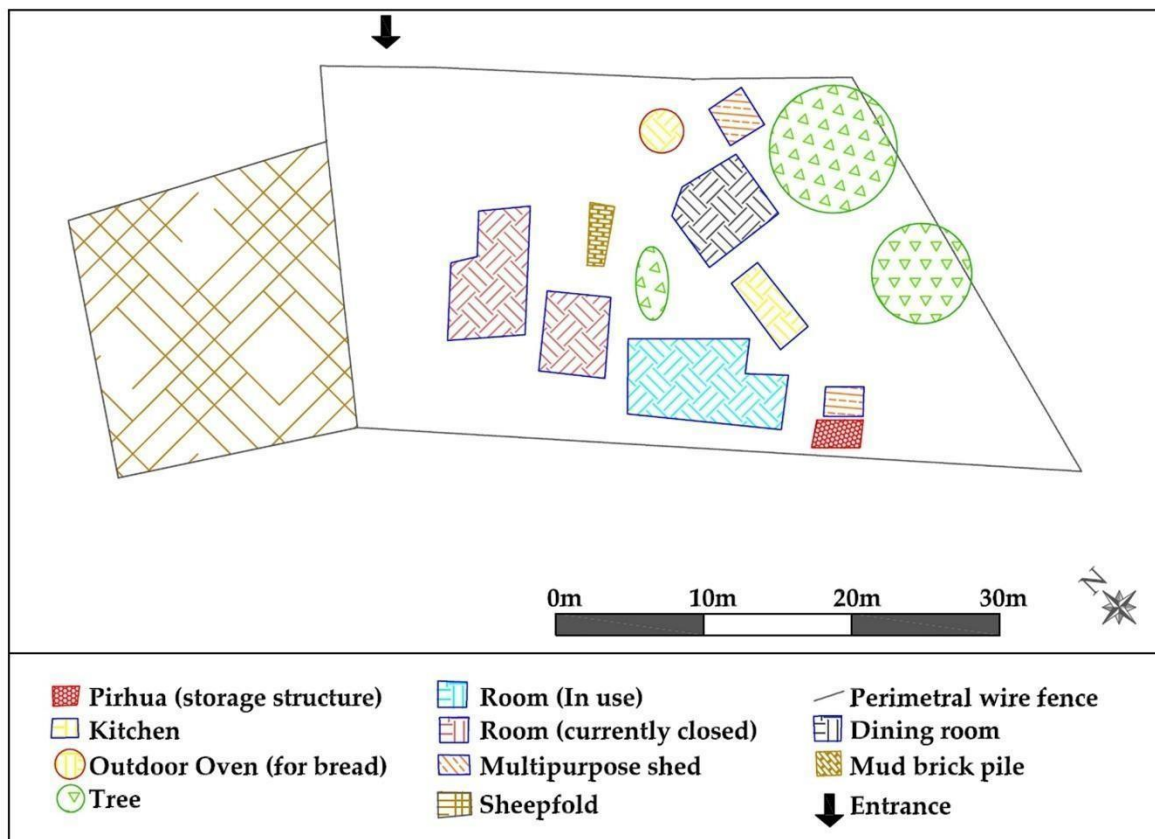


Figure 5. Maza-Monasterio Household map, showing the distribution of rooms within the wire fence.

The family has a wired-enclosed plot of half a hectare, 700 m away from the house. One season a year, they plant maize, leaving it fallow during the rest of the year. Between October and November, the plot would be cleaned, the stubble fired, and the ground plowed with a traditional plow pulled by two oxen. The cobs mature in March but, except from a few freshly consumed as corn, they are left to dry on the plant. The harvest is manually carried out in early May. In each harvest, an average of forty bags of 20 kg of corn could be obtained. Almost all the product is saved within the *pirhua*, where the whole maize ears, rather than the kernels, are stored, even with their leaves, which serve to protect the grain from insects (Figure 6). Only those kernels that are not completely dry are left outside the *pirhua*.

The maize is stored in the *pirhua* for six months. Afterwards, it is likely to be attacked by insects and not further apt for human consumption. In some cases, when insect activity is high, the kernel is removed out of the ear and saved indoors within special containers called *capachos*, circular cow leather baskets with different sizes, being 25 kg their maximum carrying capacity (Figure 6, Center-bottom).



Figure 6. “Pirhua” storage structure in Maza House compound. The photographs show constructive details, a *capacho*, leather basket for storing dekerneled maize; the presence of “chala” (leaves) in some of the stored husks. (Photographs by R. Molar).

In addition to storing cereals for human and animal consumption, a proportion of the seeds is saved for the future planting season. The selection of the grains to be used with this aim is determined by the internal color of the husk which should be as strong reddish as possible. These husks are dried in external spaces without sunlight exposition and stored in net fabric bags in the multipurpose shed.

Maza family is one of the last few groups that can still organize traditional agriculture cycle in Anfama. Nevertheless, there are other interesting cases where these practices were reproduced until recent times. Flora Balderrama is an elder woman who owns a household and a crop growing plot. Together with her husband and her daughter, they cultivated the land until the husband’s death, three years ago. They used to plow a three hectares wired enclosure, planting mainly maize and some other vegetables such as lettuce, chards, and potatoes. Because they were a small family group, other people helped them in the planting season in return for a part of the products after the harvest.

In Flora’s house there is also a *pirhua*, located near the central patio. However, in this case the traditional store room is made of adobe mud bricks. It is a 2.5 m wide by 3 m long structure with a cane and bush saddle roof (Figure 7). As in the *pirhua* of Maza family, the floor is elevated 0.5 m over the natural surface and the access to the content is also possible by a narrow square window located in the frontal side of the building. After the harvest, the *pirhua* was filled with dry maize husks up to the window level. Furthermore, in extremely productive seasons another complementary *pirhua* would be built with perishable materials to store all the products.

Although this amount of crop could seem to exceed the needs of the local family, Flora remembers that it was used just with subsistence aims. Eventually, other people would bring their animals to exchange them. They did not use money to make the transactions which were thought within reciprocity relations. Nevertheless, a volume unit was used to count the exchanged grains: the *talmud* (an arabic capacity measure, consisting in the fill of a wooden crate) (Figure 7, bottom right). All the products were saved for consumption during the winter within the nuclear family group, and eventually with some friends or relatives.



Figure 7. “Pirhua” storage structure in Flora’s house, constructed with perishable material (adobe, aliso timbers, cane, and thatch). On the right bottom, a talmud to calculate the amount of *Zea mays* to exchange (Photographs by J. Salazar).

The stored maize in Anfama households can consequently be thought as one key element for the material subsistence of these social units. It would be directly consumed or transformed into animal proteins to be consumed along the year. This is not any kind of surplus product offering a possibility for accumulation. Even in the good years when harvest could exceed the basic needs described above, and some maize bags were sold in the city markets, money would be rapidly exchanged by another product so as to be consumed within the domestic economic logic. This specific and local case study provides us with some useful facts for archaeological interpretation: 1- small scale peasant households build their own storage facilities which generate identifiable material traces; 2- these structures are architectural buildings made of different raw materials, which could

contain one or two tons of maize without the use of other technologies as baskets, fabric bags or pottery; 3- the production needed to fill storage facilities in Andean valleys could be reached with the work of a small family group; 4- the storeroom is a critical part of the residential compound, and it is under the physical and visual control of the household members; 5- within these conditions the saved cereals are not used or thought as surpluses, but as the material milestone for the subsistence and reproduction of the group.

5. Discussion: early village household vegetable storage

This paper has shown archaeological evidence which allows proposing that early villagers from Tafi valley stored vegetables in especial structures located within the house clusters.

These products were mainly maize and some variety of tubers which were cultivated in domestic plots, plowed, seeded and harvested under the control of domestic work (Franco Salvi, 2012). Storage buildings, built of stone and specially designed ceramics, allowed keeping grains during variable periods of time, protecting them from insects and pests (Pérez et al., 2016). The few Formative period dwellings so far excavated in this valley (Berberían & Nielsen 1988; Cremonte 1996; Salazar et al., 2008; Sampietro Vattuone & Vattuone 2005) evidenced the presence of storage indoor facilities, making this element a ubiquitous feature of houses, and probably constitutive of households. Nevertheless, are these evidences pointing at the emergence of individual agents or groups with the capacity to hoard and centralize some social surpluses? As demonstrated by multiple studies, storage is not some kind of prelude to complexity (Howey & Frederick, 2016; Sanger, 2017) but an extended and variable practice which has important informative potentials on social, economic, and even ideological realms (Rothman, 2016). Different interpretations proposed the existence of public storage systems as a consequence of the competitive strategies emergent authorities with the capacity to hoard and redistribute surpluses (Laguens, 2014; Smith 2002; Smyth, 1991; Wesson, 1999). However, this could be a misleading and simplistic interpretation. If we acknowledge that storage should be thought as a diverse set of activities that *vary* in scale, intensity, and distribution and that are deployed in different manners based on a variety of factors (Morgan, 2012), we can assume that the social structures that allow storage practices could correlate with the variation of the scale and centralization of the practice (Wesson, 1999; Sanger, 2017).

As stated by Sanger (2017), large-scale centralized storage practices often facilitate the development of social complexity and inequality, while more moderate storage practices typically have a relatively minor impact as they provide for occasional dietary short falls yet are too dispersed or too small to be effective tools for elite control (Cannon & Yang, 2006; Kuijt, 2008; Morgan, 2012). Indeed, small-scale and dispersed catching of foods may actually reduce the threat of emergent elitism and, instead, allow increased levels of autonomy as families and individuals could provide for themselves with little *need* or *desire* for centralized authority (Morgan, 2012). The ubiquity of domestic stores leads us to another main attribute of this practice among early village of Tafi valley: its decentralization. No public nor communitarian scale of food storage was identified, implying that each household had control over the products being saved. On the contrary, we could assume that the predominance of domestic storage was the result of household strategies (Wesson, 1999) to keep the material conditions for the reproduction of their quite autonomous structure against the formation of a centralized elite.

The archaeological evidence on storage from Tafi valley is concordant with the few results of colleagues' researches in other Northwestern Argentina early village contexts: food is deposited inside the residential buildings into specially designed pots, in underground vaults covered with slabs, within niches in the walls or in small rooms (Raffino, 1977; 1988). There are no records, during the first millennium of the CE of spaces outside the residential units that could show some type of community storage.

If we take into account what Anfama peasant households showed, the archaeologically recorded storage practices were part of the strategies developed to keep domestic material autonomy. Ethnoarchaeological case study shows us that Diaguita autonomous peasant families manage time, space, raw materials, artifacts and knowledge to plan the deferred consumption of the maize. As in the archaeological case, special features are built for this activity, but the perishable materials would prevent their archaeological visibility. Interestingly, the scale of these devices is quite similar to the archaeological ones, allowing storage of comparable amounts of maize ears.

If we analyze the archaeological evidence in this light, the practice and the materiality of storage could be thought as a relevant enabler for the reproduction of quite autonomous households. Within the archaeological Tafi house cluster, it is under the control and sight of the house dwellers. We think this is a key aspect since the quotidian interaction within the house was mediated by the material existences of these particular structures. The degree of visibility relates to differences in the application of an ethic of storage that varies in conjunction with the need to define and validate social status, reflecting how people in different kinds of societies build social relations and enact social values. Even more, the archaeological study case offers evidence on the close relation between food storage and ancestors' corpses conservation and worship. This critical relationship has been studied by Hendon (2000), who interpreted storage from the perspective of a moral economy, the location, visibility, and control of storage features are key aspects to understand social principles about economic generosity. In Tafi Formative houses, the close spatial relation between storage features and indoor household burial chambers and especially the controlled place where they are emplaced prompt us to think that the naturalized situation of stored food is within the house, and therefore under the control of the household.

Andean early village societies have demonstrated several ways of understanding and developing storage practices. In Tafi early villages, the households were built and maintained through generations with the intervention of different material entities. Architectural facilities and raw materials involved in storage were key factors in the social negotiations developed in this new social setting. Their dynamics did not follow the trend of centralization or emergence of elites but rather ensured the reproduction of fragmented and quite autonomous collectivities.

6. Conclusions

This paper has shown the variability and critical role of storage practices in social structuration, making this phenomenon a critical study object in order to understand early village societies. This is especially true in valleys in Northwest Argentina where archaeological researches specialized in this issue are really scarce. The few indirect studies have only mentioned storage facilities or containers and directly assumed the presence of food surplus hoarded by individuals or groups, leading to the emergence of inequality or centralization. We have presented archaeological and ethnoarchaeological evidence that points to a radically different possibility. Storage practices could also be part of strategies to reject centralization and to keep autonomy from supra household entities. At least in early village contexts of Tafi valley, keeping food inside houses and under the control of the household was a spread and decentralized practice which allowed the reproduction of the material conditions of social fragmentation within a context of scale increase. Nevertheless, storage intervention does not reduce to economic realms. A particular relationship between nodal places of dwellings, storage features and ancestor worship materiality allows us to propose that the constitution and negotiation of kinship and communitarian relationships were mediated by material and symbolic aspects of routine daily life, and storage devices were key aspect of this mediation.

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