Chapter V

AGRICULTURE AT ARSLANTEPE AT THE END OF THE IV MILLENNIUM BC. DID THE CENTRALISED POLITICAL INSTITUTIONS HAVE AN INFLUENCE ON FARMING PRACTICES?

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INTRODUCTION

The reconstruction of the economy, meaning the *modes of production* and *distribution of goods*, at Arslantepe, at the end of the IV millennium BC, when we assist to major social and political changes that bring to the development and then collapse of the first proto-state in Anatolia, is central for understanding the role of the central institutions occupying the public complex and the true essence and functioning of the proto-state system.

Certainly, agriculture formed the basis of the Arslantepe economy since the beginning of the occupation of the site, in the fertile Malatya plain, near major water courses and springs. The millennia long occupation of the area testifies to this, as do the botanical data.

Specifically of interest to us here is how increasing complexity and changing social organisation reflect in the agricultural system.

Legitimisation of elites generally necessitates the display of status items or the control of particular rituals, and often this results in the collection of agricultural tribute from those who farm[1].

The early centralised political powers of lower Mesopotamia, based on a "staple finance", depend on the accumulation of surplus agricultural production, thus influence directly the organisation of production, the mobilisation of agricultural labour, the distribution of goods, the processing and management of products[2].

In lower Mesopotamia, agricultural workers were state property[3], or dependent on high status families and their salaries were given in the form of food rations[4]. These rations mostly consisted of barley, oil and wool[5]. The central institutions organised the construction and maintenance of irrigation canals, owned lands and mobilised agricultural labour. Even before the origin of these first state systems, in Ubaid society in the V millennium BC, there are

[1] Friedman 1975; Fuller, Stevens in press.
[2] D'Altroy, Earle 1985; Johnson, Earle 1987; Stein 1994.
[3] Damerow 1996; Englund 1991.
[4] Nissen *et al.* 1993.
[5] Gelb 1965.

testimonies of the distribution of goods by higher status families, possibly as salaries for activities performed by workers[6].

Key elements of agricultural production in analysing these societies are thus the concepts of labour mobilisation, surplus production and accumulation, and the existence of "cash crops".

At Arslantepe, where environmental conditions are completely different from those of lower Mesopotamia and irrigation is not as fundamental for crop cultivation, is the role of the central institution in the organisation of agricultural production as strong as it was at Uruk, in lower Mesopotamia? Did the central institution own the lands? Did it organise the production? Or, did it centralise the products of autonomous farmers, by collecting tribute? Did the smaller dimension of the site, and thus a smaller population in comparison to the southern sites and the more favourable environmental conditions bring to a distinct economic organisation of the Arslantepe proto-state? How much did the presence of the central institution influence the choice of the products, the quantities produced and the organisation of production? And what happens to the economy when the central institutions disappear? We might expect only minor changes if the system had not a total control over production and distribution, but major differences if it had strongly determined modes and choices of agricultural production.

Botanical data can give invaluable help in tackling such issues. In fact, not only the identification of species is important, but the recognition of the different types of processing systems to which products had undergone, and the contexts of distribution of goods, can suggest modes of production, processing and distribution of staples and other products of agriculture.

Whereas charcoal remains from Arslantepe period VI A are abundant, not so are charred seeds[7]. Unfortunately, data from this period is scant. Later, after the collapse of the palatial complex, the situation is completely different; period VI B2 village burnt a short time after the early summer collection of barley and wheat. In that case we have thousands of charred grains and seeds. A comparison between VI A, even though statistically not as meaningful as the VI B2 period and this later burnt village shall here be made in the attempt to tackle some of the questions posed above.

The Contexts with Charred Grains and Seeds

The building complex that has been recognised as being the headquarter of the political institutions at Arslantepe at the end of the IV millennium BC (period VI A) is characterised by a series of functionally distinct areas[8]. Amongst these, three rooms, not too big in dimension, were certainly storerooms (A340, A364, A365)[9]. Administrative activities linked with the storage and distribution of goods within these have been demonstrated by a reconstruction of the contexts, with their jars and *cretulae*[10]. In two cultic buildings (temples A and B) foods and drinks were possibly consumed and/or offered to the gods. The finding of some mortars, even though sparse in various rooms of the complex, suggests some form of food processing must have taken place; the abundance of whole cooking pots too[11].

[6] Pollock 1999: 81-92.
[7] Alvaro present volume; Sadori *et al.* 2008.
[8] Frangipane 1997.
[9] See Alvaro and D'Anna present volume.
[10] Frangipane (ed.) 2007.
[11] D'Anna present volume.

Archaeological finds thus indicate that activities, such as processing and storage of food resulting from agricultural practices, must have taken place in the palatial complex. The absence of kitchens on the one hand and that of particularly large storages on the other indicate, though, that some important parts of the building might still be missing.

Notwithstanding the fact that the whole palatial complex was burnt by what must have been an impressive fire, charred grains and seeds, as stated above, are rare. All samples found throughout the structure, though, mostly lay directly on the floor or were found in the layer of soil immediately covering the floor, thus the attribution to the last moment of use of the room is sure. The majority of samples are composed of single specimens (1 grain/seed from A77, A122, A135, A364; 2 grains from A113), that is to say, that there are rare concentrations of seeds, that might indicate a small heap, or the possible existence of a sack (fig. V.1). There is thus no clear indication of the conservation of relevant quantities of some particular crop.

Frustrating is also the distribution of the few seeds effectively found. Very few caryopses and seeds were found in the store rooms. A certain number of grains and seeds comes from A206, the "administrative dump", the small area in which thousands of *cretulae* were thrown after having been counted. Botanical remains from this context must come from some refuse, and are thus, in this single case, certainly not in their context of use (i.e. area of processing/consumption/storage), even though they refer, as the entire dump, to a short period of time[12].

Hearths or fire installations are present in various rooms of the complex (A113, A127, A134, A162), including the cultic buildings (A42 and A450), but were not necessarily involved in food processing; some might have been used for heating or other purposes. This is certainly true for A113 and A127, which seem to be mainly intended for representative ceremonial purposes. No particular concentrations of seeds are found in these rooms. As we will see further on, though, the variability in the plant species found in some of these rooms might suggest their use as cooking areas.

Botanical samples come from the entrance (A162) to the palatial complex. These were on the floor, but, being this a point of passage, it is plausible that they come from fallen sacks or spilt over containers, thus again, do not give suggestions related with the specific context of retrieval.

Comparison between the botanical remains from the palatial context and the private, domestic dwellings would be central in analysing the influence of the central institutions in agricultural practise. Unfortunately, up to now, we only have one botanical sample from a domestic context (A915). It is an elite house furthermore, which might thus not reflect the true difference between farmers or commoners and rulers or officers of the proto-state system. We will see further on, though, that the kind of finds might provide some interesting differences between this private house and the palatial complex.

After the collapse of the centralised system, the beginning of the Early Bronze Age (VI B1) is characterised by a semi-sedentary occupation by transhumant herders. We do not have any seeds and grains from this period. The following VI B2 farmers' village is instead a unique case with nearly 36kg of carbonised seeds and grains. Crops seem to have been in part put to dry on the roofs of houses and on the ground in the courtyards, and in part already put into storage. Very rarely seeds and grains appear to come from refuse in dumps or within hearths. Obviously, during the fire that destroyed the village but preserved this amazing site for us, seeds were thrown around and fell off the roofs and out of their place, but in most

[12] Frangipane 2007b.

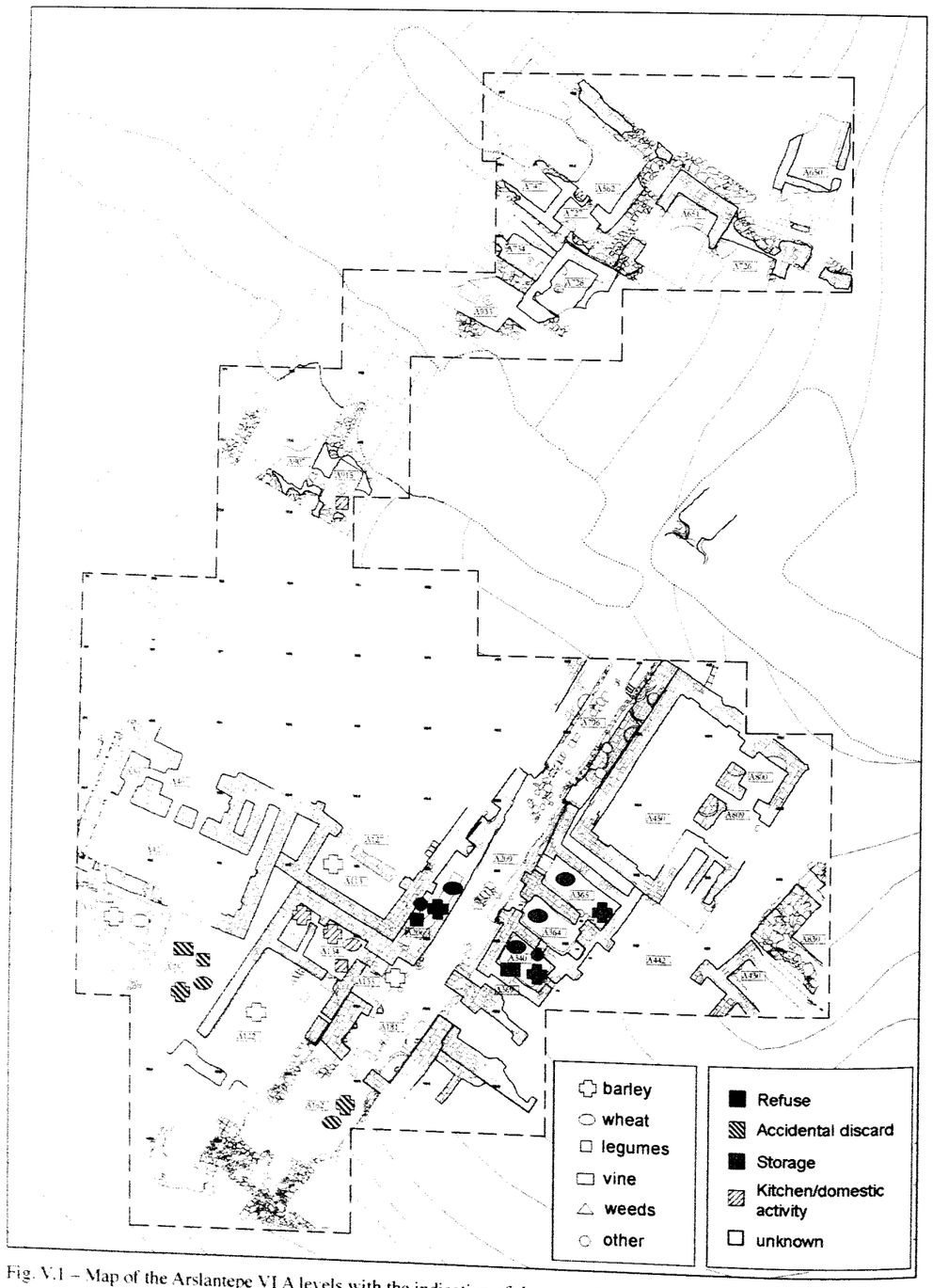

Fig. V.1 – Map of the Arslantepe VI A levels with the indication of the type of "botanical contexts" and the *taxa* found.

cases their original position can be reconstructed. The majority of the seeds found were most evidently in the phase of being processed for conservation or, as the vicinity with jars and the concentration of seeds indicates, had been stocked for storage. The homogeneity in botanical finds throughout the different houses of the village is interesting as it suggests a basically family run agriculture, where each one cultivated and stored the whole variety of food plants needed for the survival of the family unit. This village provides priceless comparisons for the VI A period.

THE BOTANICAL REMAINS

Samples containing seeds and fruits, taken either in topographical or stratigraphical order, have been dry sieved directly on site using sieves of 5, 2 and 0.5 mm.

The water separation method was not applied to avoid the complete deterioration of charred plant remains. The charred remains were sorted, examining all the fractions. Particular attention was paid to the soil coming from the storerooms. The soil coming from vessels was separated by hand with the help of a small brush.

Seed and fruit identification was carried out with a reflected light microscope at different magnifications. Botanical nomenclature for crop names follows Flora Europaea (http://rbg-web2.rbge.org.uk/FE/fe.html). Specific texts and the seed reference collection of Palynology and Palaeobotany Laboratory of university "La Sapienza" were consulted[13].

The charred plant remains were generally in a rather poor state of preservation and often fragmented. Part of the following data has already been published elsewhere[14]. A small amount of carpological remains were found in both the public and private areas of Arslantepe VI A. They are mainly ascribed to cereals and legumes (table V.1).

Seeds and fruits were generally preserved by charring, except for a few *Lithospermum* seeds, that are not carbonised.

Barley is the most abundant *taxon* (799 caryopses, 54.2%). The distinction between the multi-row species (*Hordeum vulgare* L.) with caryopses arranged in 4/6 rows and the 2-row species *Hordeum distichon* L. is carried out using the presence/absence of symmetrical caryopses. Symmetrical grains are typical of both the central rows of the multi-row species and of the rows of the 2-row species. Asymmetrical caryopses originate from the lateral rows of the multi-row species. A careful observation of present specimens of the 2-row species evidenced in fact only a very rare occurrence of slightly asymmetrical caryopses.

In VI A period, the identification of large quantities of asymmetrical caryopses indicates the presence of the multi-row species (4/6 row barley) *Hordeum vulgare*. Symmetrical grains were considered as coming from the central rows of *Hordeum vulgare*. It is not possible, though, to rule out the contemporary presence of *Hordeum distichon* (the 2-row species), always showing symmetrical caryopses. Barley is always hulled, as grains present two adherent glumes. This variety of barley is less palatable and valuable for human consumption than the naked one. At present hulled barley is used as fodder and to produce beer.

Triticum caryopses have been ascribed to five *taxa*: *T. dicoccon* Schrank (emmer), *T. monococcum* L. (einkorn), *T. aestivum/durum* (free threshing wheat), *T. spelta* (spelt), and *Triticum* sp.

[13] Renfrew 1973; Van Zeist 1984; Zohary, Hopf 2000; Jacomet 2006.
[14] Coccolini, Follieri 1983; Belisario *et al.* 1994.

Table V.1 – Total number and percentage of seeds and grains from the Arslantepe VI A period.

taxon	common name	type of remain	number of remains	percentage
Hordeum vulgare L.	barley	caryopsis	800	54.3
Triticum dicoccon Schrank	emmer	caryopsis	382	25.9
T. monococcum L.	einkorn	caryopsis	121	8.2
Triticum aestivum / durum	free treshing wheat	caryopsis	23	1.6
Triticum cfr. *spelta*	spelt	caryopsis	1	0.1
Triticum sp.		caryopsis	33	2.2
Lens culinaris Medik.	lentil	seed	83	5.6
Vicia ervilia (L.) Willd.	bitter vetch	seed	8	0.5
Lathyrus sp.	grass pea	seed	2	0.1
Leguminosae		seed	2	0.1
Vitis vinifera L. subsp. *sylvestris* (C.C.Gmel.) Hegi	wild vine	pip	6	0.4
Vitis vinifera L. subsp. *vinifera*	domesticated vine	pip	5	0.3
Prunus cf. *spinosa* L.	blackthorne	endocarp	2	0.1
Bromus sp.	brome	caryopsis	2	0.1
Lithospermum sp.	stoneseed	seed	3	0.2
cf. Rosaceae	rosaceans	bud	1	0.1
TOTAL			1474	100

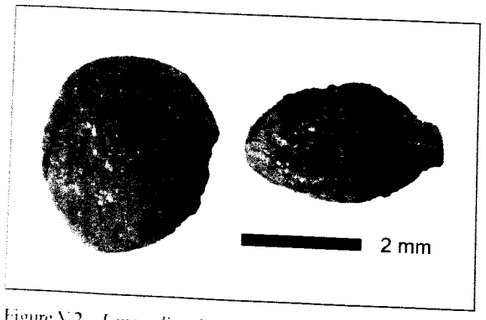

Figure V.2 – *Lens culinaris*: seed (front and lateral positions) from Arslantepe VI A period, room A915.

Emmer (382 caryopses, 25.9%) was always found as single caryopses (380), apart one single find of a pair. Einkorn (121 caryopses, 8.2%) is the second wheat species in abundance, followed by free threshing wheat (23 caryopses, 1.6%). Only one spelt caryopsis was identified (0.1%). The poor degree of preservation of 33 (2.2%) wheat caryopses did not allow a more precise determination than *Triticum* sp.

Due to the absence of rachis fragments, the grains of free threshing wheat were ascribed to the *Triticum aestivum/durum* group[15].

Legumes represent a less abundant find (<100 seeds in all). They consist in *Lens culinaris* Medik. (lentil) (83, 5.6%, fig. V.2), some *Vicia ervilia* (bitter vetch) (8, 0.5%), and 2 seeds of *Lathyrus* sp. (grass pea) (0.1%).

A particular find is that of *Vitis vinifera* L. (vine) seeds, named pips (11, 0.7%). Vine has two subspecies, *Vitis vinifera* L. subsp. *vinifera* (the domesticated one) and *Vitis vinifera* L. subsp. *sylvestris* (C.C.Gmel.) Hegi (the wild one). The two plants show many differences, amongst which the most evident is the fact that the cultivated subspecies is monoicous and the second one dioeicous. Pips (fig. V.3) were ascribed to both the subspecies (6 to the wild, 5 to the domesticated form) using morphological characters, while, according to the biometric criteria proposed by Stummer one century ago, only one pip could be surely ascribed to the domestic form and only two to the wild one[16]. In recent years, however, some doubts have arisen on the possibility to disentangle between the two species by using charred seeds[17]. However, recently, Kroll observed that it is only the domesticated type that produces

[15] Jacomet 2006.
[16] Stummer 1911.
[17] Manen *et al.* 2003; Mangafa, Kotsakis 1996.

underdeveloped seeds even when ripe[18]. The finding of these small, narrow seeds at Arslantepe VI A confirms the presence of the cultivated subspecies.

Two broken small and smooth wooden endocarps have been found, probably referable to *Prunus*, surely not ascribable to *P. persica*, *P. insititia* or *P. armeniaca*.

Variability in Farming Practises from Protostate to Village Communities at Arslantepe

The rarity of data from period VI A makes it very difficult to critically discuss the influence of the central institutions in the organization of agriculture.

As has been stated, charred seeds from the palatial context are few and, even more significantly, the contexts in which they are found are not always greatly meaningful as to what concerns the reconstruction of the management system of agricultural products, nor to the organization of agriculture (fig. V.1).

Samples, especially from period VI A, are not representative enough to be able to say which of the staples was preferred to the others. A large number of the VI A period samples, as we have stated above, contain single seeds/fruits, and in most cases the grain is of barley (table V.2). Barley thus appears to be the most ubiquitous crop both in terms of the number of samples and of absolute value in which it is found, but this does not necessarily mean it was the most cultivated (table V.2). We know from other North Mesopotamian sites that towards the end of the IV millennium and throughout the III millennium there is a gradual but constant increase in barley in comparison to wheat[19]. This is most true for the drier regions south of the Taurus range, especially towards the end of the Early Bronze Age, when a period of increased aridity is attested. At Arslantepe, in the later Early Bronze Age I, VI B2 period, which is that with the greatest amount of botanical data, barley sums up about 60% (fig. V.4)

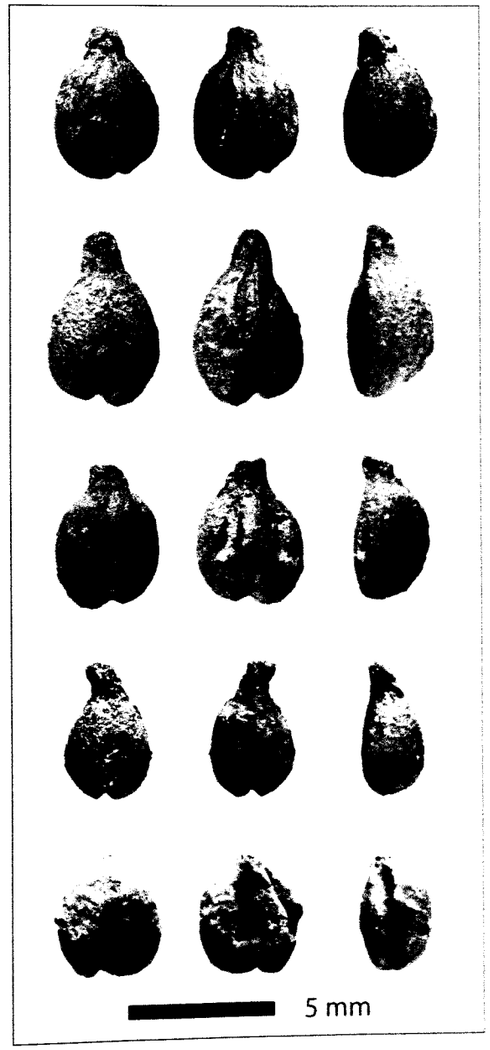

Figure V.3 – *Vitis vinifera*: seeds (dorsal, ventral and lateral positions) from Arslantepe VIA period, storeroom A340.

[18] Kroll 1999.
[19] Miller 1997; McCorriston, Weisberg 2002; Colledge 2004; Hald, Charles 2008.

Table V.2 – Total number of seeds and grains from the Arslantepe VI A period divided by context.

		Hordeum vulgare L.	*Triticum dicoccon* Schrank		*T. monococcum* L.	*T. aestivum / durum*	*Triticum* cfr. *spelta*	*Triticum* sp.	*Lens culinaris* Medik.	*Vicia ervilia* (L.) Willd.	Leguminosae	*Lathyrus* sp.	*Vitis vinifera* L. subsp. *sylvestris* (C.C.Gmel.) Hegi	*Vitis vinifera* L. subsp. *vinifera*	*Prunus* cfr. *spinosa* L.	*Bromus* sp.	*Lithospermum* sp.	Rosaceae
		hulled caryopsis	caryopsis	paired caryopses	caryopsis	caryopsis	caryopsis	caryopsis	seed	seed	seed	seed	pip	pip	endocarp	caryopsis	seed	bud
A51	undetermined	21	1		1				2							2	3	
A75	open passage/area	16	2		1		1						1					
A77	dump of administrative material																	
A113	cerimonial room	2																
A122	cerimonial room	1																
A132	room with cooking facilities	4																
A134	room with cooking facilities	2			1			1	7	7	1							
A135	corridor	1																
A162	entrance	148	1			1												
A206	dump of administrative material	601	376	1	118	22		16	1	1		2	5	5	1			1
A340	strore room	2						11			1				1			
A364	store room entrance							1										
A365	store room	2						4	7				5					
A915	elite dwelling								1									
Total		800	380	1	121	23	1	33	83	8	2	2	6	5	2	2	3	1

of the crops and in the following period VI C, at least in the only sampled house A607, it increases to 77%[20]. It might be that north of the Taurus too we assist to a preference in barley, which could, here, also have to do with the production of animal fodder, in a period in which the herding of sheep and goat is of great importance[21], as well as with the production of beer.

Turning back to the VI A period, amongst the rare charred seeds and fruits, the distribution of barley, emmer (*Triticum dicoccon* Schrank), einkorn (*T. monococcum* L.), and rare free-threshing wheat caryopses (*T. aestivum/durum*) might provide some interesting observation (table V.2)[22]. Rare small concentrations of seeds have been identified. In two of these, from the entrance of the complex (A162) and from A206 (table V.2), the main *cretulae* dump barley grains have been identified. These are clearly not indicative of the storage of barley in the palace, rather one must have fallen to someone that was leaving or entering the palace with a bag of barley and the other must be some residue or discard from an area of activity whose characteristics and function we do not know (fig. V.1). Whether the bag possibly entering or exiting the building had been taken from the storage rooms, maybe as payment for a work that had been carried out, is impossible for us to tell, but the absence of barley from the storage rooms (only 4 charred grains in total were found in A340 and A365), where the activity of distribution of goods is testified by the presence of hundreds of *cretulae*[23], would bring to hypothesise that barley was not kept as such in the palatial storage rooms.

Another interesting concentration of charred grains comes from A134, a small room with a hearth, communicating with another small space (A132), interpreted as a cooking area (fig. V.1). Here particularly meaningful might be the variability in *taxa* identified: legumes (*Vicia ervilia*, *Lens culinaris*) and cereals (*Triticum* sp. and *Hordeum* sp.) together. It is in fact rare that single rooms and samples have both cereals and legumes. Could this have to do with the possible use as a kitchen and thus indicate the expected diet variability of meals, with an equilibrium between carbohydrates and proteins?

A75 too has a certain variability in species found, but is a rather large open area, where passage must have been frequent; we would thus imagine that the seeds from this area were accidental residues.

Unexpectedly rare are seeds and grains from the storage rooms (A340, A364 and A365). Only A340 has a somewhat meaningful number of remains. Notwithstanding this scarcity, interesting from the three storage rooms are *Triticum* sp. caryopses. Could this indicate a preference in storing *Triticum* over *Hordeum*?

Concerning the cultivated species of the Late Chalcolithic 5 (period VI A), interesting is the fact that barley appears to be of the four/six-row species[24]. Four/six-row barley has higher water requirements than two-row[25]. Six-row barley is common in Eastern Anatolia, thus in the upper course of the Euphrates, with a more humid and moist climate, whilst in Mesopotamia, even in its more northern regions, two-row barely is the rule. Because of this difference, some scholars have considered the adoption of two-row barley during the Late Uruk period (LC5) in northern sites, as indicative of the presence of southerners, which had imported their own crops[26]. Whilst we believe this might have more to do with the changing environmental

[20] Susanna 2007.
[21] Bartosiewicz present volume.
[22] Follieri, Coccolini 1983; Sadori *et al.* 2006a.
[23] Frangipane 2007b.
[24] Follieri Coccolini 1983; Sadori *et al.* 2006a.
[25] McCorriston 1992: 324-25.
[26] McCorriston, Weisberg 2002.

conditions or changing use of barley (food, fodder or beer?), the presence of four/six-row barley in period VI A at Arslantepe is an important indicator of the modes of agricultural production. Hillman and Harlan have demonstrated that, where both six-row and two-row barley are grown, the former is always irrigated, whilst the latter is not[27]. Six-row hulled barley at Arslantepe must thus have been irrigated, fact this which in itself might not be so exciting since irrigation was by then a well known technique, but, if we compare the evidence with the fact that the barley found in later Early Bronze Age I (VI B2), when the proto-state had collapsed, seems to be in overwhelming majority or exclusively of the two-row species, it may suggest a centralised management of at least part of the agriculture or, at any rate, a strong interference by the central institutions resulting in an impulse to technological development such as the employment of irrigation in an area well watered by its own by natural rainfall and springs. Why change then, in period VI B2, from six-row to two-row? The six-row barley surely gave a higher yield[28]. Six-row furthermore, has a higher protein content relative to starch, that makes it more suitable for food and fodder. In contrast, the higher starch content on the two-row barley makes it well suited for malting[29]. A shift from the use of barley for food to that for drink is testified in the Sargonid and Ur III periods in southern Mesopotamia by a shift from six-row to two-row barley. We have no indication nor any reason to believe that in the Early Bronze Age Arslantepe VI B2 village the production of beer had such a greater importance than in VI A, such that the cultivation of six-row barley should be reduced so strongly. VI B2 is a stable and sedentary, but small and simple village, with clear testimony of a mixed agricultural and herding primary economy. In this village, amongst the thousands of seeds, very rarely has the presence of six-row barley been hypothesised. Sadori and colleagues have suggested that this may be related to the arrival of new people at Arslantepe since period VI B1, as testified by the archaeological data, which might have had no knowledge of the cultivation of six-row barley[30]. We would add now, with the perspective of analysing the influence of the central institution in the organisation of the primary economy in period VI A (LC5), that the sure presence of six-row barley in period VI A does indeed strongly suggest that the choice of this crop with a potentially higher yield and the organisation for its cultivation was determined by the central institution. The abandonment of four/six-row barley in period VI B2 could indicate the collapse of the system of centrally directed or influenced agriculture, aimed at the production of increasing surplus, which was requested by the palace in the late IV millennium BC.

If the institutions intervened so strongly in the management of agriculture, by preferring four/six-row barley to two-row and stimulating the adoption of an irrigation system for its fields, then we are taken to imagine that they must have either owned parts of such fields, or collected as tribute part of their products. We have no testimony though of the places where such products were kept, and thus no indication of what they were and in what quantities they were collected. Further excavation, however, would be needed to know with some certainty whether crops were collected within the public buildings or if they were kept somewhere else, or even if no such concentration of staples existed.

Other cultivated plants from period VI A, as legumes, are even rarer than barley and wheat; the most abundant find of legumes is that of lentils (*Lens culinaris*, fig. V.2), with some sparse

[27] Hillman 1973; Harlan 1968.
[28] Sadori *et al.* 2006a; Hillman 1973.
[29] Miller 1982.
[30] Sadori *et al.* 2006a.

seeds from different rooms of the palatial complex, but the greatest quantity is from a private dwelling, possibly that of an elite family (A915)[31]. Legumes are never reported, in the archaic cuneiform texts, as being used in the exchange of goods, nor redistributed, as instead are barley, oil or wool. Seemingly many Mesopotamian sites demonstrate that these are generally not found in central storage rooms or buildings, but mainly in houses, and our find at Arslantepe appears to be in line with this[32].

No other botanical remains were found in these elite domestic structures (fig. V.1). This absence too is interesting as it suggests that in domestic residences, even though belonging to elites or officers, there was no large accumulation of "cash crops", somehow similarly to what observed in the palatial complex.

Another important find from the VI A public complex is that of grape pips. One single pip, ascribed to the wild form, was found from A75 (open area), and the others from the smallest of the three store rooms with testimony of redistribution activities, A340. The pips were inside a bowl, but there is no evidence they represent a bunch of grapes, as neither skins nor stems were found. Interesting is the fact that half of the grape-pips found showed the morphology of domestic vine[33]. Being Arslantepe outside the region of present distribution of the wild form of grapes, we are taken to imagine that vine had been imported from elsewhere before putting it to cultivation in the Malatya plain[34].

The first evidence for grape wine production in the region of natural distribution of wild grapes, that is south of Arslantepe, passing through northern Syria, dates to the mid-sixth millennium BC, but the testimony of cultivation of grapes is much later[35]. What is interesting at Arslantepe, again, as for the 4/6-row barley, is the rarity of grapes in the post-palatial period. Could it be that wine production was managed by and/or addressed to the elites and central institution?

A last observation should be added, which only indirectly concerns the proto-state period of Arslantepe VI A. *Triticum monococcum* and *T. dicoccum*, present at the end of the IV millennium, appear to gradually decrease towards the end of the III millennium BC; in periods VI C[36] and VI D (D. Sabato, under current study) these are very rare (fig. V.4). The same is clearly testified by many other sites in Northern Mesopotamia[37]. Nesbitt and Samuel have argued that it was economic pressure for increased productivity to be blamed for a selection in favour of free-threshing wheat[38].

In the Malatya plain, where several species of wheat (hulled and free-threshing) coexist since period VI A, the disappearance of the hulled wheat may be linked to the increase of occupation in the plain towards the end of the III millennium and the consequent increased pressure on cultivable and herding land, that would lead to an intensification of production to which free-threshing wheat responded better than hulled grains[39]. Such a variation in the choice of the different species of wheat had not started earlier possibly because of the peculiar

[31] D'Anna 2010.
[32] McCorriston, Weisberg 2002; Charles, Hald 2008.
[33] Sadori *et al.* 1990; Follieri *et al.* 1992; Belisario *et al.* 1994.
[34] Zohary, Hopf 2000.
[35] Miller 2008.
[36] Sadori *et al.* 2006b.
[37] Riehl *et al.* 2008; 2009; Colledge 2004; McCorriston, Weisberg 2002; Nesbitt 1995; Van Zeist, Bakker-Heeres 1975.
[38] Nesbitt, Samuel 1996.
[39] Di Nocera 2008.

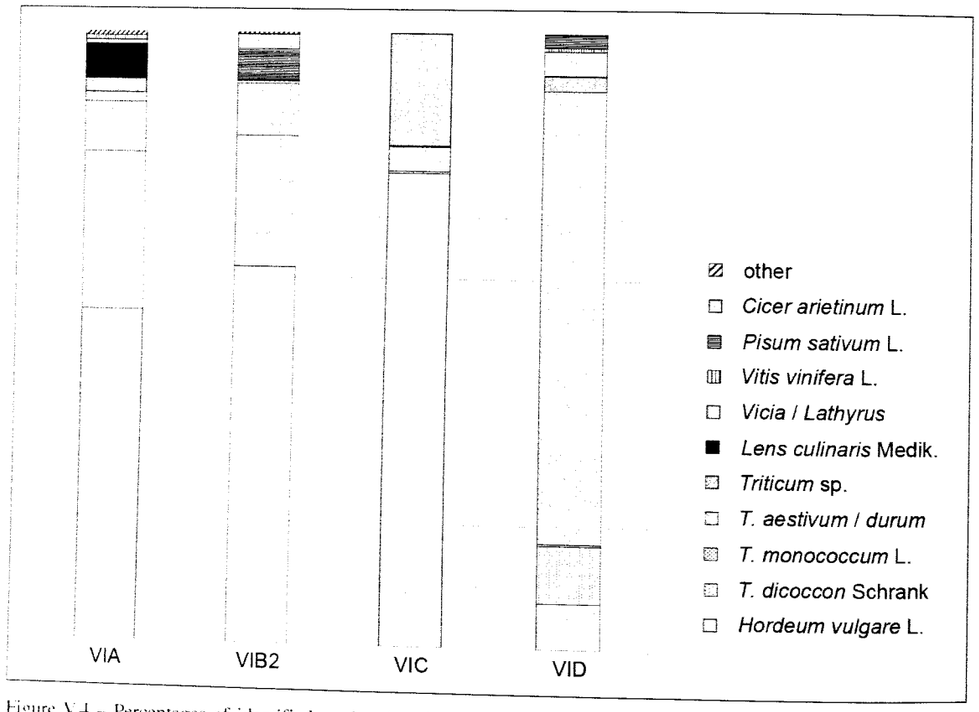

Figure V.4 – Percentages of identified seed and grain *taxa* from Arslantepe periods VI A, VI B2, VI C, and VI D.

character of the Arslantepe proto-state, that is the absence of any process of urbanisation and thus the probable absence of any strong pressure on cultivable lands.

We have thus seen that in the more than 2000 m² of the excavated complex, that comprises storages, temples, representative rooms and possibly areas for the processing of food, there are no particular concentrations of charred seeds. Yet the building was full of *in situ* materials left behind when escaping from the fire. It is thus impossible to imagine that food reserves had been taken away; rather it would appear that there was no storage of unprocessed staples in this area of the public building. What was thus kept in the palace? What was distributed to workers, officers or other people of the community if it was not unprocessed staples? Barley, oil and wool were the products accumulated by south Mesopotamian elites. These were also those most distributed and thus somehow those with "monetary" value. Containers in the storerooms only partly suggest liquids, but solid goods must have been kept too[40]. Some sacks could have been used for goods other than foodstuffs, but the abundant large jars and pithoi are more difficult to interpret. Two necked jars from A365 also have an incised ear of what has been interpreted as barley on the shoulder, but no barley has been found inside it[41]. The rarity of charred grains at Arslantepe during VI A period could suggest the cereals had been processed and were kept

[40] Ferioli *et al.* 2007; D'Anna present volume.

[41] Other similar *pithoi* are found in different contexts of the palatial building and in the private houses. See D'Anna present volume.

under the form of flour. In favour of this hypothesis is the fact that most of the caryopses of *Triticum* sp. found in the storerooms are fragmented (reason for which they were not ascribable to a specific *taxon*), possibly suggesting they were residues of grinding. The grinding might have taken place in these same rooms, as the finding of three grinding stones could suggest. The relative majority of *Triticum* sp. grains might indicate a preference for wheat flour over barley flour[42]. Even in present life time this is not a surprising choice, because wheat flour is more palatable than that obtained by hulled barley, which is wholewheat; getting free of the two glumes which adhere to every single caryopsis is not an easy task even today.

If they did store wheat flour, we cannot imagine a long term conservation, since it is more difficult to preserve than unprocessed or partly processed grains. Furthermore, the conservation of staples in the form of flour implies a great mobilisation of labour ahead, that can be imagined in larger groups, possibly with a central institution that controlled at least some of the production process. In fact, as the harvest period is normally one of labour bottleneck[43], larger groups of people mobilised together will be able to get more of the crop processed and stored, whereas the seasonal demands on smaller groups will make it more efficient to store the crop less processed and carry out the full processing sequence on a day-to-day basis[44]. The institution, in this case, thus, could mobilise labour to process the cultivated cereals, at least in the quantities needed for the distribution of rations of the resulting product.

Concerning the processing of grains, interesting too is the absence of spikelets amongst the glume wheat (*Triticum dicoccum* and *T. monococcum*.) from the palatial complex. Generally, glume wheat is stored as whole spikelets, whilst the free-threshing wheat is stored as cleaned grain[45]. Again thus, it might appear that the grains had been cleaned before entering this area of the complex and were thus not those stored for long periods, but those used for distributing rations. The same appears to be indicated by the almost total absence of weeds, apart from two *Bromus* caryopses and three *Lithospermum* seeds.

The above observations would bring us to suggest that, in the excavated portion of the VI A headquarters of political control, there was no accumulation of staples; rather in the palace storerooms only small quantities of processed foods, that were used for internal consumption and/or for the distribution of rations to more or less dependent workers, were kept, as is also indicated by the presence of hundreds of mass-produced bowls in A340.

Whom the cereals were cultivated from and who owned the lands is as yet not possible to say on the basis of these few data. We can only confirm that there does not seem to be accumulation of unprocessed staples. If it is true that the goods kept were processed in the form of flour, we could imagine a system in continuous movement, where goods did not station for too long in the hands of the institutions, but circulated rather rapidly and continuously.

Where were these cereals processed we do not know. Store room A340 has three grinding stones, but next to these only ten broken and fragmented caryopses of wheat have been found. It was furthermore never possible to ascribe any of these to a specific species, due to the poor state of preservation. We thus have to imagine either an unexcavated area of the palace used for cereal processing, or that staples were processed somewhere else, in the neighbouring rural areas, where storages might have been also built, right next to the fields.

[42] It should be stated though that neither phytoliths nor starch, which should still be present with the flour, have been identified in samples from vessels from the store room A340.

[43] Stone *et al.* 1990.

[44] Fuller, Stevens in press.

[45] Hald 2008.

Conclusions

The rarity and at times accidental distribution of botanical data from the VI A period at Arslantepe strongly biases our possibility of answering all the questions posed at the beginning of this chapter. Some interesting observations and lines of research have been however pointed out and provide in our view an important base for future research and sampling at the site.

Did the central institution organise the agricultural production? How much did the presence of the central institution influence the choice of the products and the organisation of production?

The preference of 4/6-row barley over two-row during the Late Chalcolithic 5 and its abandonment in the following Early Bronze Age I has brought us to hypothesise a major intervention of the central institution in the choice of products as well as in the organisation of production. The construction of canals for the irrigation of fields could have been managed or simply stimulated by the central institution. A crop with higher yield might have been preferred to that with minor yield. This choice might also be linked to the role that the central authorities appear to have had in the management of herds of goat and sheep in period VI A[46], since the 4/6-row hulled barley is certainly more adapt for animal than for human food. The cultivation of 4/6-row barley might thus also be linked to the increase and specialisation in ovo-caprine breeding noticed in period VI A. The construction of canals in this period might furthermore also be linked to a dry phase, evidenced by isotope lacustrine records in a period between 5400 and 5000 cal. years BP, which should correspond to period VI A at Arslantepe[47]. The driest event of the Soreq cave (Israel) Holocene speleotheme record is dated to 5200 years BP, a dry period with high climate instability[48]. Independent data is necessary though to verify whether this environmental change occurred also as north as Arslantepe. Carbon stable isotope analysis is being carried out to help classical archaeobotanical studies discriminate between cultural and environmental changes and influences: wood and seed trends of $^{13}C/^{12}C$ ratio are being compared to give information on the irrigation of crops (Masi current research).

The presence of domestic vines in the palatial context too might suggest a wine production promoted by the central authorities; in later Early Bronze Age I, even though some vine pips have been found too, beer might have been the most common alcoholic drink, obtained from the starch rich two-row barley. It would be interesting to know whether in non elite domestic dwellings of the VI A period too, beer was more common than wine. For an answer to this question though, further excavations would be needed.

What happens then when the central institutions disappear? The abandonment of the 6-row barley is certainly the most meaningful change and it importantly indicates, in our view, the collapse of a system of organisation of labour, able to build and maintain irrigation canals and possibly seeking a higher productivity.

What the botanical data cannot tell us is whether the fields were owned by autonomous farmers, or whether the lands were under direct control of the central institution, with dependent farmers working for it. In the first case tribute was probably due to the central institution, as a form of "payment" for its ideological and material help, maybe even for its intervention in the irrigation of the fields. In the second case, more common in southern Mesopotamia, as attested by early cuneiform texts, the yield would have been owned by the political institutions. In both cases we would expect to see in the archaeological record large storages for the

[46] Bartosiewicz present volume.
[47] Roberts *et al.* 2008.
[48] Bar-Matthews *et al.* 1998.

conservation of such staples. At the moment though such storages are missing from the large building complex interpreted as the seat of political and administrative power. Was this not the place in which goods were accumulated? Large quantities of crops were possibly not stored there, but elsewhere, and what arrived at the palace were foodstuffs that had to be reinvested in redistribution. What is kept in the "palace" storages are processed goods, possibly flour amongst these, thus goods for daily distribution and not for long term storage. We are thus seeing in this building the traces of a system of labour management, with clear data showing the repetitive payment of workers, but no trace at all of forms of "accumulation of goods" by the elites. Elite dwellings near the central complex neither have indication of major accumulation of goods. Only further excavation of this level can reveal to us the existence or not of major, supra-household, storage facilities.