

Archaeobotany at Kaman-Kalehöyük 2005

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INTRODUCTION

Archaeobotanical sampling, sample processing and assessment focused mainly on hearth contexts from the Old Hittite (IIIb), Iron Age (IIc and IIa) and Ottoman (I) occupation phases excavated during 2004 and 2005. Hearth samples were targeted as they provide contextually secure samples of plants used in the various site phases and were less likely than pit fill and other deposits to contain re-worked plant remains. Work

aimed to continue assessing sample composition and improve existing knowledge of the plant species utilized during the site's occupation. 29 samples were processed using the site's flotation tank and the botanical composition of 13 samples was assessed. In addition, samples from pit linings were also collected. Of particular interest were samples from the base of Round Structure (RS) 3, which appeared to preserve both the pit lining and its contents.

Table 1 Plant taxa recorded in samples from occupation Phases IIIb and IIc at Kaman-Kalehöyük in 2005 using the following scale of abundance: * = rare; ** = occasional; *** = frequent; **** = abundant; ***** = very abundant

	Area Sector	North VIII	North VIII	North VIII	North VIII	North XXXI	North XX
	Grid	UU	XX	YY	YY	81	27
	Context	PL ⁶⁵ H274	⁸⁹ H269	H260	⁸⁵ P2886	⁵⁰ H273	²⁶ H253
	Sample method	Flotation	Flotation	Flotation	Flotation	Flotation	Flotation
	Sample Size (L.)	6	0.5	2	36	0.5	5
	Flotation no.	2005/019	2005/024	2005/028	2005/012	2005/009	2005/021
Sample composition	Kaman Phase	III b	III b	III b	III b	II c	II c
Wood		**	****	****	***	***	**
Cereal grain		*	*	*	***	**	*
Dung							
Straw etc					*	**	
Silicified/min matter		***	*		***		
Vesicular material							
Cereal crops							
<i>Hordeum vulgare</i>	Grain	*			**	**	
<i>Triticum aestivum/T. durum</i>	Grain	**		*	***		
<i>T. monococcum</i>	Grain				**		
<i>T. monococcum</i>	Spikelet fork				**		
<i>T. dicoccum/T. monococcum</i>	Spikelet fork	**			*		
Cereal indeterminate	Grain		*	*		**	*
Cereal indeterminate	Awns	***					
Legume crops							
<i>Vicia ervilia</i>	Seed			*	**		
Fruits							
<i>Vitis sp.</i>	Charred seed			**			
Wild plants							
<i>Arnebia/Lithospermum</i>	Seed	*			***	**	
<i>Chenopodium/Atriplex sp.</i>	Seed	*		**			
Cruciferae	Seed	***					
Cyperaceae						*	
<i>Galium tricorutum</i> type	Seed				*		
Gramineae (small types)	Seed	***	*	*	**		
Gramineae (large types)	Seed	*			*		
<i>Hordeum</i> wild types	Seed				*		
<i>Lolium sp.</i>	Seed				*		
<i>Potentilla sp.</i>	Seed			*			
<i>Thymelea sp.</i>	Seed	*					
<i>Ziziphora sp.</i>	Seed				*		
Indeterminate	Seed	**	*		***	**	

Table 2 Plant taxa recorded in samples from occupation phases IIa and I at Kaman-Kalehöyük in 2005 using the following scale of abundance: * = rare; ** = occasional; *** = frequent; **** = abundant; ***** = very abundant

	Area Sector	North XVI	South LVI	North XVI	North XIV	North XXXI	North XXXI	North LVI
	Grid	12	88	11	1	81	81	88
	Context	H256	Ⓒ H83	H250	H271	Ⓓ P2860	Ⓔ H264	Ⓙ H62
	Sample method	Flotation	Flotation	Flotation	Flotation	Flotation	Flotation	Flotation
	Sample Size (l.)	7	86	7	12	36	10	2.5
	Flotation no.	2005/001	2005/002	2005/003	2005/005	2005//014	2005/020	-
Sample composition	Kaman Phase	II a	II a	I				
Wood		***	**	***	**	*****	***	*****
Cereal grain		**	**	**	*	****	**	**
Dung								*
Straw etc			*	**		*		
Silicified/min matter						****	***	
Vesicular material				**				
Cereal crops								
<i>Hordeum vulgare</i>	Grain	*	**	***	**	****	**	*
<i>Secale cereale</i>	Grain							**
<i>S. cereale</i>	Rachis segments							*
<i>Triticum aestivum/T. durum</i>	Grain	**	**	**	**	****	***	**
<i>Triticum aestivum</i>	Rachis segments							*
<i>Triticum</i> spp.	Grain				*			
<i>T. dicoccum/T monococcum</i>	Spikelet fork					**		
Cereal indeterminate	Grain	**	**	**	**	**		
Legume crops								
<i>Vicia ervilia</i>	Seed	**	**				*	*
Other crops								
<i>Linum usitatissimum</i>	Seed	*			*			
Fruits								
<i>Ficus carica</i>	Seed			*				
<i>Vitis</i> sp.	Charred seed	**						
<i>Punica granatum</i>	Seed						**	
Indeterminate	Nutshell	*						
Wild plants								
<i>Adonis</i> sp.	Seed			*				
<i>Aegilops</i> sp.	Seed							*
Asteraceae	Seed	*	*	**				
<i>Astragalus/Trigonella</i> type	Seed	**		**		**	**	
<i>Bolboschoenus maritimus</i>	Seed	*		*				
<i>Arnebia/Lithospermum</i>	Seed	**	**	**	**	*****	**	
Caryophyllaceae	Seed	*		**				
<i>Cephalaria</i> sp.	Seed	***						*
<i>Centaurea</i> sp.	Seed			**				
<i>Chenopodium/Atriplex</i> sp.	Seed			*			**	
Convolvulaceae	Seed							*
Cruciferae	Seed		*	***				
Cyperaceae	Seed	*		*	*			
<i>Eleocharis</i> sp.	Seed	*		*				
<i>Galium tricornutum</i> type	Seed	**		*				
<i>Galium</i> type	Seed			*				
Gramineae (small types)	Seed	***		**		**	*	
Gramineae (large types)	Seed	**					**	
<i>Heliotropium</i> sp.	Seed						**	
<i>Hordeum</i> wild types	Seed			**				
Leguminosae	Seed	*		*			*	
<i>Matricaria</i> sp.	Seed	*						
<i>Plantago</i> sp.	Seed			*				
<i>Polygonum</i> (trigonous form)	Seed	*	*					
Primulaceae	Seed	**						
Salsola type	Seed	*						
<i>Stipa</i> sp.	Seed	**						
<i>Taeniatherum caput-medusae</i>	Seed	**						
Trifolium type	Seed	**				*		
Umbelliferae	Seed	*	*	*				
<i>Vaccaria pyramidata</i>	Seed	*		**		***		
<i>Ziziphora</i> sp.	Seed					*		
Indeterminate	Seed	**		***				

CHARRED MACROFOSSILS

Plants macrofossil identified in the samples during rapid sample assessment are shown in Tables 1 and 2. A familiar range of species was present, with crop plant remains dominated by grains of hulled six-row barley (*Hordeum vulgare*) and free-threshing wheat (*Triticum aestivum* or *T. durum* type), in only one case confirmed as the hexaploid bread wheat (*Triticum aestivum*) on the basis of chaff characteristics. In addition, glume wheat remains were found, chief among them einkorn (*Triticum monococcum*). Rye (*Secale cereale*) was present in the Ottoman Period sample. The only legume found was (*Vicia ervilia*), which with flax (*Linum usitatissimum*) completed the list of seed crops. Relatively few other economic crops were visible, with seeds of grape (*Vitis vinifera*), fig (*Ficus carica*) and pomegranate (*Punica granatum*) found. The pomegranate seeds from level IIa (Figure 1) were the first to be found at the site and their addition to the site species list shows the value of continued sampling and analysis. In addition to economic plant species, a long list of wild plant seeds was recorded from probable crop weeds and plants used as tinder. Dung was present only in the Ottoman sample and wood remained an important fuel throughout the occupation levels sampled here.

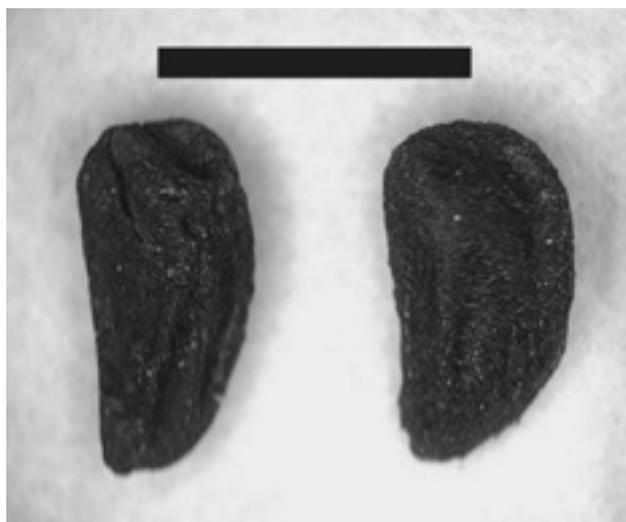


Fig. 1 Seeds of *Punica granatum* from hearth 264, Kaman-Kalehöyük Phase IIa, sample 2005/020 (scale bar = 5mm)

PIT LININGS

Eight pit linings were sampled for future phytolith analysis. Of particular interest was the lining of Pit (P) 1846, RS 3 dating from the Old Hittite period IIIb. It was visible on a stone excavated from the pit base and also in remaining pit lining deposits visible in the baulk. Excavation of block samples with the conservation team allowed collection of undisturbed samples for laboratory analysis. Samples showed the soil and stone pit base to be lined with stems from a species of grass, as shown by the distinctive epidermal cell pattern, perhaps cereal straw or reeds (Figure 2 A). Overlying this was a red-brown deposit containing clear yellow casts of cereal grains (Figure 2 B). The white basal layer varied in composition, being regularly aligned on the stone samples and less regularly aligned in the other samples. Also, it was clear that the red layer contained small fragments of stem and leaf material, perhaps representing chopped straw or chaff. The species of cereal has yet to be confirmed, but several grains were similar in shape to barley. The contents suggest the pit held either grain or chaff and only further study will be able to determine exactly which. Interestingly, P 2905, a large period IIc pit in Sector XVI, contained an almost identical lining and the remains of its contents. This was one of several period IIc pits to be sampled from Sectors XVI and XV.

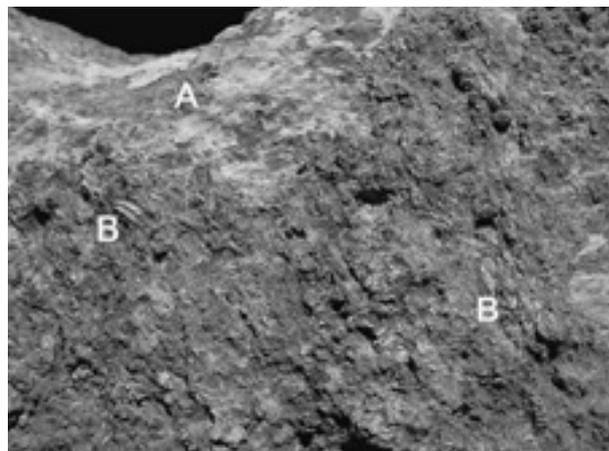


Fig. 2 Pit 1846 (Round Structure 3) lining showing remains of reed/straw lining (A) and contents including visible cereal grains (B)

DISCUSSION

Archaeobotany during the 2005 season at Kaman-Kalehöyük was limited in scale and continued very much in the vein of earlier seasons (see AAS XI-XIV), focusing on training site workers, collecting and processing samples and assessing sample composition. The sample archive, including samples collected by Mark Nesbitt, is now large enough to furnish comparative studies between different site phases. Full post-excavation analysis of the archaeobotanical archive will begin during 2006/2007. The 2005 campaign did produce some interesting results, adding a new economic plant to the site's roster and shedding firm light on the function of the Old Hittite Phase Round Structures.

Pomegranate is a well-known and popular fruit in modern Turkey, and has an archaeobotanical record going back to the Early Bronze Age in the eastern Mediterranean (Zohary and Hopf 2000; <http://www.archaeobotany.de/>). Its appearance in the first millennium in Kaman-Kalehöyük is unsurprising, indeed pomegranate is well established across the region by the Late Iron Age, though its record in Turkey is scant, being recorded only in Iron Age deposits from Miletos and the Late

Bronze Age Ulu Burun shipwreck (Reihl and Nesbitt 2003). Identification of pomegranate increases the total economic plant types used at the site to 17 (Table 3). A brief analysis of trends in both the number of economic plants utilised and presence/ubiquity data for each occupation phase shows a number of patterns (Table 3, Figure 3). Firstly, there is relatively little change in the economic plants used over time, with the exception of an increase in diversity seen during the Ottoman period. It is uncertain whether the peaks in plant types during Phases IIIb and IIa reflect a real increase in plant types used or simply sample size. It remains for future research to evaluate whether the appearance of fig and pomegranate in IIa reflects sample size or is due to a change in local trade or cultivation practices in the latter First Millennium. A presence analysis of the main cereal crops (Figure 4) shows a remarkable similarity in crop appearance between occupation phases, with hulled barley and free-threshing wheat dominant throughout, each present in approx 40% of samples and glume wheat species present in approx. 20% of samples. This data confirms continuity in agricultural practices in the First and Second Millennia BC, as suggested elsewhere (see AAS XIII) and in the faunal record (Hongo 1998). Further research, especially analysis of

Table 3 Presence and ubiquity scores for economic plant types found at Kaman-Kalehöyük for the whole site (All) and by site occupation phase; Σ = number of samples in which plant present; Ub = Ubiquity (% presence) for each site phase

Site Phase/No. economic plants	All	17	IV	7	IIIc	7	IIIb	9	II d	5	II c	5	II a	9	I	14
Sample sum (Σ)	65		7		11		18		2		4		14		9	
Economic plants	Σ	Ub	Σ	Ub	Σ	Ub	Σ	Ub	Σ	Ub	Σ	Ub	Σ	Ub	Σ	Ub
Hulled barley (<i>Hordeum vulgare</i>)	55	84.6	7	100	9	81.8	13	72.2	2	100	2	50	14	100	8	88.9
Free-threshing wheat (<i>Triticum aestivum</i> or <i>T. durum</i>)	58	89.2	6	85.7	11	100	15	83.3	2	100	2	50	13	92.9	9	100
Glume wheat (<i>T. monococcum</i> or <i>T. dicoccum</i>)	28	43.1	3	42.9	8	72.7	9	50.0	1	50	1	25	2	14.3	4	44.4
Rye (<i>Secale cereale</i>)	6	9.2													6	66.7
Millet (<i>Panicum miliaceum</i>)	2	3.1													2	22.2
Bitter vetch (<i>Vicia ervilia</i>)	25	38.5	1	14.3	4	36.4	9	50.0	1	50	1	25	4	28.6	6	66.7
Lentil (<i>Lens culinaris</i>)	10	15.4	1	14.3	3	27.3	1	5.6					2	14.3	3	33.3
Chickpea (<i>Cicer arietinum</i>)	5	7.7	1	14.3	1	9.1	1	5.6							2	22.2
Pea (<i>Pisum sativum</i>)	1	1.5					1	5.6								
Flax (<i>Linum usitatissimum</i>)	7	10.8					2	11.1			1	25	4	28.6		
Grape (<i>Vitis vinifera</i>)	14	21.5	2	28.6	2	18.2	5	27.8	1	50			1	7.1	3	33.3
Fig (<i>Ficus carica</i>)	3	4.6											1	7.1	2	22.2
Apple/Pear (<i>Malus/Pyrus</i> sp.)	2	3.1													2	22.2
Pomegranate (<i>Punica granatum</i>)	1	1.5											1	7.1		
Coriander (<i>Coriandrum sativum</i>)	1	1.5													1	11.1
Melon or squash (Cucurbitaceae various)	2	3.1													2	22.2
Sunflower (<i>Helianthemum annuus</i>)	1	1.5													1	11.1

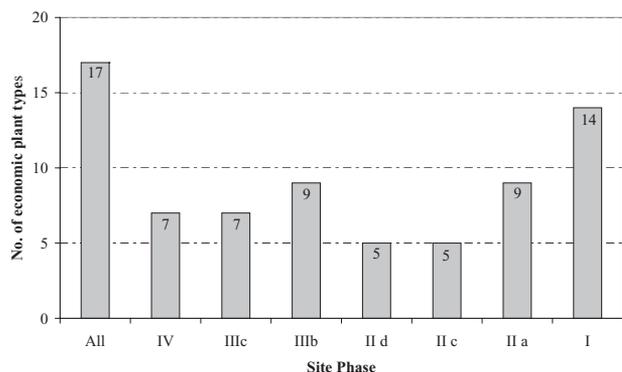


Fig. 3 Number of economic plant types by occupation phase at Kaman-Kalehöyük (based on Table 2); All = sum of all phases combined; number indicates number of samples for each phase

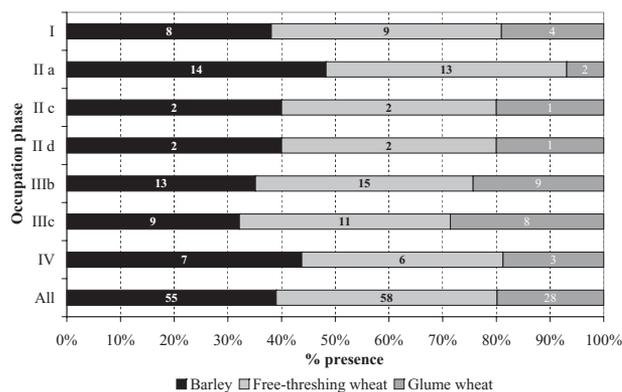


Fig. 4 Ubiquity (% presence) of the main cereal crop types per occupation phase at Kaman-Kalehöyük (numbers in chart show number of samples per phase; All = all phases combined)

abundance figures, will help evaluate if these provisional interpretations have any value.

2005 also produced evidence to finally prove that at least one of the Hittite period large pits was used to store cereal products, either grain or chaff. A crop storage function has been forwarded for the large pits at the site (see Fairbairn and Omura 2005), but the 2005 evidence provides conclusive proof. This confirms Kaman-Kalehöyük as a storage depot for agricultural

products during the Old Hittite period and suggests a key economic and strategic importance for the site during the period.

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