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Environmental archaeological analyses of samples from the site of Holma, L1969:2530, L1969:1933, Herrestad socken, Uddevalla kommun, Bohuslän

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Sample information

Analysis type: Macrofossil analysis of unfloated samples, soil chemical analysis.
Number of samples: 18 macrofossil samples and 40 soil chemical samples

Introduction

The samples come from two settlement localities (L1969:1933 and L1969:2530) which partially coincides with the village plot of Holma, L1969:3527, with the earliest evidence from 17th century. Samples from the pre-investigation of these localities has been studied and reported during 2023 (see Östman et al. 2023).
Settlement site L1969:1933 belongs to the metal period. Samples have been taken mainly from pits and fire related features.

Settlement site L1969:2530 with an uncertain date. During the final investigation one of the features was dated to the Middle Ages. The height above sea level makes Stone Age also possible.

The main purpose of the environmental archaeological analyses is to contribute to the interpretation of the studied structures and help to clarify the function of the different features. Selection of suitable datable material will contribute to the more precise dating of the site.

The samples are provided by Kulturlandskapet and the contact person have been Annika Östlund.

Materials and Methods

Macrofossil analyses

Before the analysis the samples were stored in a drying room (+30°) until the moisture has disappeared. Afterwards they were floated using sieve meshes of 2 mm and 0,5 mm. One sample was kept in the fridge and afterwards wet sieved as it was possible to contain subfossil material. The samples volume before floatation was between 1,4 and 3,2 liters and after it – between 3 to 200 ml. The sieved material was sorted and identified under stereomicroscope. The results from the analyses are presented in Table 2. The amount of woody charcoal was estimated as relative proportion of the floated sample volume as follows: x = up to 25%, xx = up to 50%, xxx = up to 75%, xxxx = up to 100%. Dating material has been selected from four samples and the results are presented in Table 3. The charcoals were identified with the help of reflected light microscope.

The determination of plant species was done using reference literature for seeds (Jacomet 2006; Cappers et al. 2012; Sabato& Peña-Chocarro 2021) and wood (Schweingruber 1978;

Schweingruber 1990) as well as the laboratory reference collections. The names of the identified plant taxa are given according to the Nordens flora (Mossberg and Stenberg 2018). Swedish names of the identified plants are included in Table 2 and 3.

The analysis of the samples was performed by Ivanka Hristova and Sofi Östman.

Soil chemistry

Prior to all analyses the samples were dried at 30°C. Samples were then passed through a 1.25 mm sieve and any presence of material of cultural significance noted (such as bone, charred material, ceramics etc.). The chemical methods employed here are the same as those used in Swedish soil chemical studies following the methodological approach of Engelmark and Linderholm (2008). The parameters analysed and abbreviations used are explained in Table 1.

Table 1. Geoarchaeological methods and abbreviations as used in this report.

Abbreviation	Method	Description
MS_{lf}	Magnetic Susceptibility	Magnetic susceptibility measured on 10g of soil, with a Bartington MS3 system with an MS2B probe (Dearing 1994). Data are reported as SI-units per ten grams of soil, (corresponding to X_{lf}, 10^{-8} m^3 kg^{-1}) (Thompson & Oldfield 1986).
MS550	Magnetic Susceptibility after burning at 550ºC	Magnetic susceptibility after 550° C ignition (units as above)
LOI (%)	Loss On Ignition	Soil organic matter, determined by loss on ignition at 550° C, in percent (Carter, 1993).
Cit-P	Inorganic phosphate content (mg P/kg dry matter, ppm)	Extraction with 2% citric acid (corresponding to the Arrhenius method (Arrhenius 1934))
Cit-POI	Total phosphate (mg P/kg dry matter, ppm) (inorganic & organic)	Extraction with 2% citric acid on ignited soil (Engelmark & Linderholm 2008)
P quota	**Cit-POI /Cit-P**	Ratio of inorganic & organic to inorganic phosphate

These methods have been developed and adapted for soil prospection and the bulk analysis of occupation soils and features. Analysed parameters comprise organic matter (loss on ignition [LOI, and pH], Carter 1993), two fractions of phosphate (inorganic [Cit-P], and sum of organic and inorganic [Cit-POI]) (Engelmark & Linderholm 2008, Linderholm 2007) and magnetic susceptibility (MS-χ_{lf} MS-χ_{hf}) and MS550-χ_{lf} (Clark 2000, Linderholm 2007, Engelmark & Linderholm 2008). These analyses provide information on various aspects concerning phosphate, iron, red-ox potential and other magnetic components and total organic matter in soils and sediments, and their relationship to phosphate.

Results

Macrofossil analysis

Eighteen samples were analyses for macrofossil remains. The number of charcoals varied in the samples from very few to comprising almost the entire floated sample volume. All botanical

remains are preserved in charred state and their preservation is comparatively good. Four samples are very rich in seed/fruits type of remains while the rest contain very limited macrofossils or only charcoal fragments. Cereals were found in eleven samples. Dating material was selected from four samples (23_0044_0010/Prov 36/Anl 65; 23_0044_0012/Prov 49/Anl 92; 23_0044_0013/Prov 58/Anl 104; 23_0044_0014/Prov 54/Anl 106) – two of them contained cereals, which was preferable for dating and the other two lacked seed/fruit remains for which reason a charcoal fragment was selected. The results from the analyses are presented in Table 2 and 3. A short comment on the result from the soil chemical analysis of the samples is added to each entry.

Sample 23_0044_0001/ Prov 4/ Anl 12

The sample volume before floatation was 2,7 litres and after flotation, it was 75 ml. The charcoals concentration in the floated sample comprises 75% of the volume. The botanical remains were presented by two fragments of pinecone scales (*Pinus sylvestris*). The CitP content indicates moderate phosphate accumulation, the MS indicates impact from heat-generating processes.

Sample 23_0044_0002/ Prov 15/ Anl 13

The sample volume before floatation was 2,2 litres and after flotation, it was 13 ml. The number of charcoals represents about half of the floated sample volume. The sample is rich in botanical remains. Most of the cereals are fragmented and unidentifiable, but the identified ones comprise of naked barley (*Hordeum vulgare* var. *nudum*) and emmer/spelt wheat (*Triticum dicoccum/spelta*). Shell fragments of hazelnut (*Corylus avellana*) were also found. The most common among the weeds/ruderals are goosefoot (*Chenopodium* sp.) and chickweed (*Stellaria media*), but also cockspur (*Echinochloa crus-galli*), false cleavers (*Galium spurium*), corn spurry (*Spergula arvensis*) and others were ientified. Apart from the plant remains two fragments of ceramic and slag-like pieces were registered in the sample.

Sample 23_0044_0003/ Prov 17/ Anl 13

The sample volume before floatation was 2,8 litres and after it – 50 ml. The charcoals comprise about 75% of the floated sample volume. The sample contains quite a lot of macrofossil remains. The cultivated plants are presented by unidentified fragmented cereals, but also barley (*Hordeum vulgare*), emmer (*Triticum dicoccum*), and a single find of faba bean (*Vicia faba*). The weeds/ruderals include mainly fat-hen (Chenopodium album), pale persicaria/lady's thumb (*Percicaria lapathifolia/maculosa*), and chickweed (*Stellaria media*). One fragment of burnt bone and ceramic was also registered. The CitP content indicates deposition of refuse with high content of inorganic phosphates, such as household waste. The MS value indicates some deposition of burnt material.

Sample 23_0044_0004/ Prov 23/ Anl 19

The sample volume before floatation was 1,4 litres and after floatation – 30 ml. The charcoals take about half of the floated sample volume. The botanical remains are consist of a cereal fragment and a seed of goosefoot (*Chenopodium* sp.). The soil chemical analysis indicates high CitP content and raised MS, likely related to processing of animal material and heat generation.

Sample 23_0044_0005/ Prov 48/ Anl 24

The sample volume before floatation was 2,6 litres and after it – 3 ml. The charcoals fragments in the sample were very few. No other botanical remains were preserved.
The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulation processes. The MS does not indicate heat impact or deposition of burnt material.

Sample 23_0044_0006/ Prov 52/ Anl 25

The sample volume before floatation was 3 litres and after it – 12 ml. The sample context was questionable if it was from latrine or a pit and for that reason it was kept in the fridge and wet sieved. During the screening afterwards no subfossil and mineralized remains were found but only charcoals. Few insect fragments were registered. The botanical remains represent one unidentified cereal and pine needles (*Pinus sylvestris*). The high CitP content indicates a refuse pit or possibly a latrine. The MS indicate none to low heat impact or little deposition of burnt material.

Sample 23_0044_0007/ Prov 58/ Anl 28

The sample volume before floatation was 1,8 litres and after it – 20 ml. The amount of charcoals is about 25% of the floated sample volume. Only two spruce needle fragments (*Picea abies*) were found in the sample. The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulation processes. The MS indicate none to low heat impact or deposition of burnt material.

Sample 23_0044_0008/ Prov 60/ Anl 29

The sample volume before floatation was 2,8 litres and after floatation – 10 ml. The charcoals comprise about half of the floated sample volume. The plant macro remains consist of one cereal fragment, and fragments of spruce (*Picea abies*) needles and cones. The very high CitP content (>1000ppm) indicates that this is likely a refuse pit or a or another function connected to the deposition of bone material. The MS indicate none to low heat impact or deposition of burnt material.

Sample 23_0044_0009/ Prov 61/ Anl 33

The sample volume before floatation was 3,2 litres and after it – 10 ml. The charcoal fragments in the floated samples were very little. The preserved botanical remains are one cereal fragment and one grain of barley (*Hordeum* sp.). Few slag-like fragments were registered. The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulating processes. This taken into consideration, the CitP content is significantly lower compared to A24, A25, A28 and A29, and indicates less intensive impact. The MS indicate non heat impact or deposition of burnt material.

Sample 23_0044_0010/ Prov 65/ Anl 36

The sample volume before floatation was 2,2 litres and after it – 5 ml. The amount of charcoals was very little. The only preserved botanical remains were 8 seeds of fat-hen (*Chenopodium album*). One charcoal fragment determined as hazel (Corylus avellana) was selected for radiocarbon dating. Its weight was 17,2 mg. The CitP content and MS do not indicate phosphate

accumulation or impact from heat generating processes. The soil chemical analysis is consistent with a buried ground surface.

Sample 23_0044_0011/ Prov 81/ Anl 45

The sample volume before floatation was 2,2 litres and after floatation it was 100 ml. The amount of charcoals was estimated to less than 25% of the floated sample volume. The rest of the floated sample volume contains modern vegetative parts of plants. No other botanical remains were found. The CitP content and MS do not indicate phosphate accumulation or impact from heat generating processes. The soil chemical analysis is consistent with a buried ground surface. The high organic content and raised CitPOI might indicate a period of wetter conditions in the features formation.

Sample 23_0044_0012/ Prov 92/ Anl 49

The sample volume before floatation was 3,2 litres and after floatation – 40 ml. The charcoals were less than 25% of the floated sample volume. No botanical remains different from charcoals were found. One charcoal fragment identified as birch (*Betula* sp.) was weighed – 18,5 mg and send for 14C dating. Flint and slag-like fragments were also found in the sample. The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulating processes. The CitP content is significantly lower compared to A24, A25, A28 and A29. The MS indicates impact from heat generating processes or deposition of burnt material.

Sample 23_0044_0013/ Prov 104/ Anl 58

The sample volume before floatation was 1,8 litres and after it - 20 ml. The amount of charcoals comprises about 75% of the floated sample volume. The sample is extremely rich in macrofossil remains. The number of fragmented unidentifiable cereals is 450 which corresponds to about 3 ml. Other identified cereal species are barley (*Hordeum vulgare*) hulled barley (*Hordeum vulgare var. vulgare*), emmer (*Triticum dicoccum*), emmer/spelt (*Triticum dicoccum/spelta*). Glume bases of emmer and emmer/spelt wheat, and one rachis fragment of barley were also found. Weeds/ruderals and other wild growing plants show great diversity of taxa. Among the most abundant ones are fat-hen (*Chenopodium album*) and pale persicaria/lady's thumb (*Percicaria lapathifolia/maculosa*). Other less common taxa in the sample are ryegrass (*Lolium* sp.), common mugwort (*Artemisia vulgaris*), black-bindweed (*Fallopia convolvulus*), etc. One grain of emmer was weighed and sent for radiocarbon dating. The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulating processes. The CitP content is significantly lower compared to A24, A25, A28 and A29. The MS indicates impact from heat generating processes or deposition of burnt material.

Sample 23_0044_0014/ Prov 106/ Anl 54

The sample volume before floatation was 2,1 liters and after floatation – 7 ml. The whole floated volume comprises of charcoals. Apart from charcoals the botanical remains are represented by four cereal fragments and two grains of hulled barley (*Hordeum vulgare var. vulgare*). One grain of hulled barley was weighed and sent for 14C dating. The high CitP content indicates that this is likely a refuse pit or a feature related to phosphate accumulating processes. The CitP content is significantly lower compared to A24, A25, A28 and A29. The MS indicates impact from heat generating processes or deposition of burnt material.

Sample 23_0044_0015/ Prov 109/ Anl 60
The sample volume before floatation was 1,8 litres and after floatation – 20 ml. The amount of charcoals in the floated sample is less than 25% of its volume. The botanical remains are represented by cereal fragments and grains of barley (*Hordeum vulgare*) and emmer/spelt wheat (*Triticum dicoccum/spela*). One piece of pottery was found. The CitP content indicates cultural impact in the form of phosphate accumulation. The MS indicates impact from heat generating processes or deposition of burnt material.

Sample 23_0044_0016/ Prov 115/ Anl 50
The sample volume before floatation was 2,5 litres and after floatation – 200 ml. The charcoals comprise the whole floated sample volume. No other botanical remains were found. The CitP content is significantly lower compared to A24, A25, A28 and A29. The MS indicates impact from heat generating processes or deposition of burnt material.

Sample 23_0044_0017/ Prov 119/ Anl 56
The sample volume before floatation was 2 litres and after it – 3 ml. Just few charcoal fragments were registered in the sample. No other remains were found. The CitP content and MS indicates a higher impact from phosphate accumulation and heat generation compared to the other sampled hearths. The CitP content is very high and indicates processing of bone material.

Sample 23_0044_0018/ Prov 122/ Anl 66
The sample volume before floatation was 2,8 litres and after it – 40 ml. The charcoals take almost half of the floated sample volume. The sample contains a lot of cereal fragments. The identified cereals are hulled (*Hordeum vulgare* var. *vulgare*) and naked barley (*Hordeum vulgare* var. *nudum*), and emmer/spelt wheat (*Triticum dicoccum/spela*). The weeds/ruderals are represented by goosefoot (*Chenopodium* sp.), club-rush (*Schoenoplectus* sp.) and sorrel (*Rumex* sp.). A piece of ceramic was registered in the sample. The CitP content and MS indicates low cultural impact from phosphate accumulation and heat generation.

Soil Chemistry
57 samples were analysed for 4 parameters, complete results are presented in Table 4. Figures 1-3 shows the results for analysed parameters as histograms, the histograms includes both soil chemistry samples and subsampled macrofossil samples. Figures 4-9 only includes the soil chemistry samples. The subsamples are included in the macrofossil results. For a comparison between sample types, see figures 9-10.

The inorganic phosphates content indicates moderate to strong cultural impact in almost every sample. The distribution is close to log-normal, with a median value of 234ppm. The subsampled macrofossil samples are on average higher in CitP than the soil chemistry samples. The MS-values shows a log-normal distribution with a median value of 10. At least half of the analysed samples indicates various degrees of heat generated impact.
The amount of organic content varies between the sample types, the average organic content is significantly higher in the macrofossil subsamples.

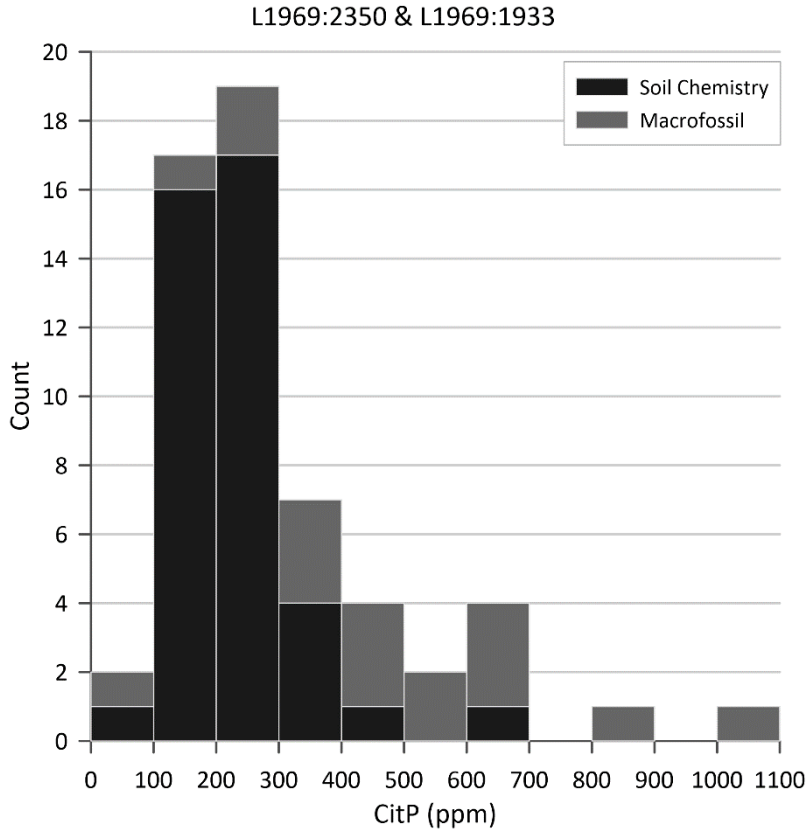

Figure 1: Inorganic phosphate content.

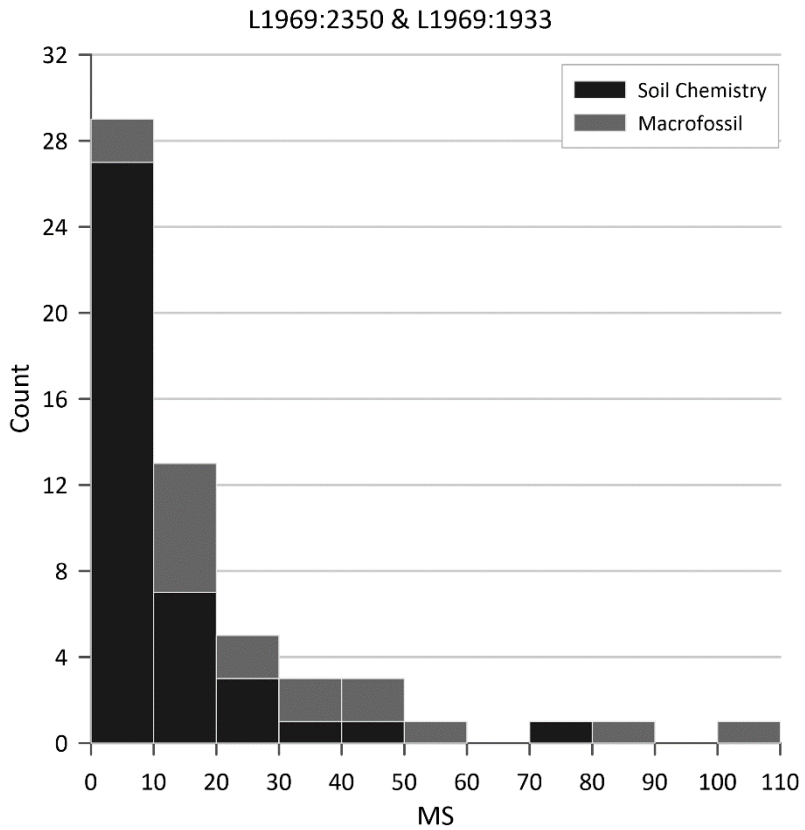

Figure 2: MS

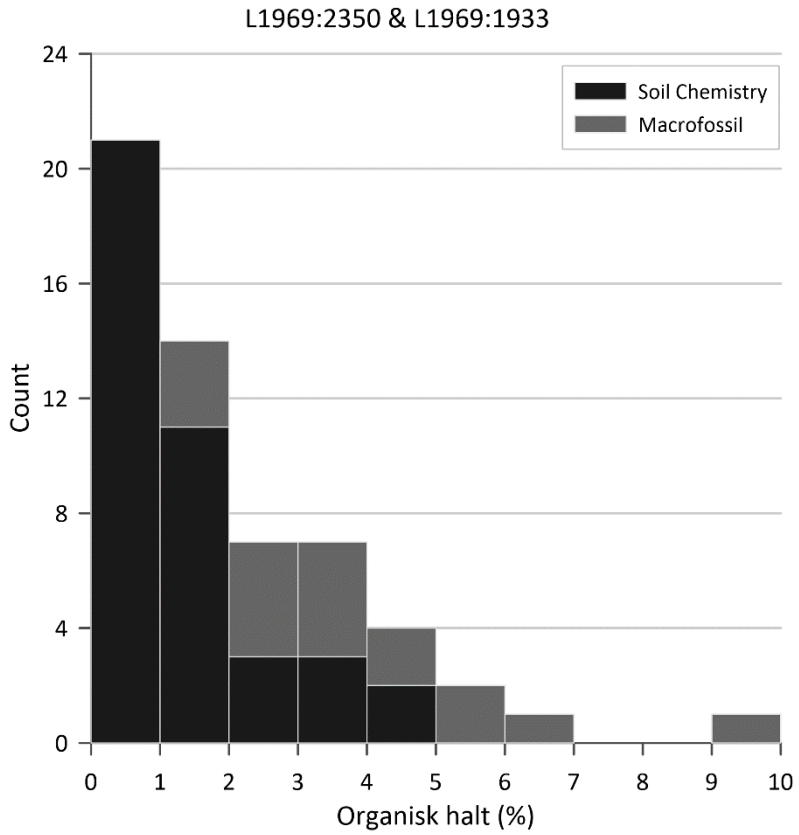

Figure 3: Organic content

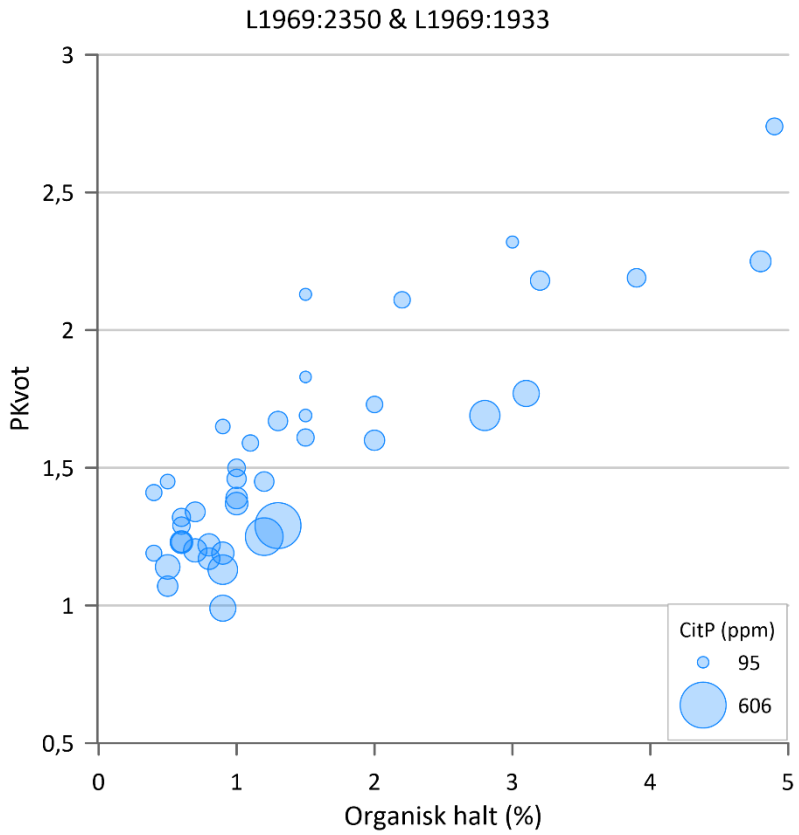

Figure 4: PQuota as a function of organic content, symbol size represents CitP.

Figure 4 shows the relationship between PQuota (the quota of total amount of phosphates and inorganic phosphates), organic content and CitP in the soil chemistry samples. The low organic content related to the PQuota indicates low impact of agricultural fertiliser and animal dung in most samples.

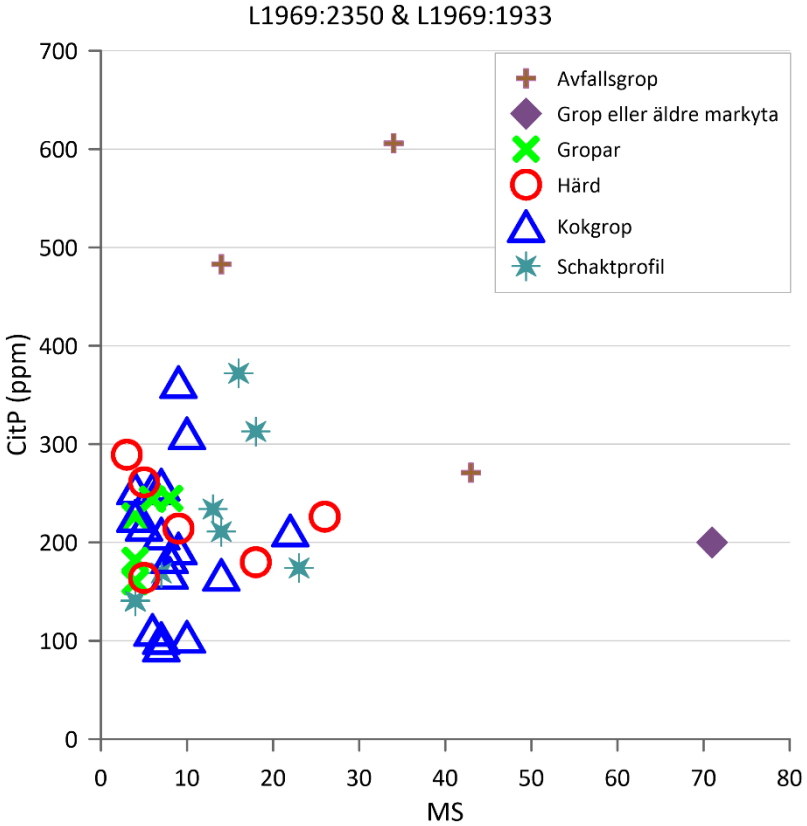

Figure 5: CitP content and MS for different types of features.

Figure 5 illustrates the cultural impact as CitP accumulation and MS in the different feature types. The highest CitP content is from the refuse pit (A13). The cooking pits shows varying degrees of cultural impact from CitP accumulation and heat generating processes. The sample from A57 (classified as a pit or buried ground surface) has the highest response in MS.

Figure 6 illustrates the cultural impact as CitP accumulation and MS in the different areas, in most cases one area consists of one or two features.

Figures 7 and 8 shows the spatial distribution of CitP and MS in the sampled features.

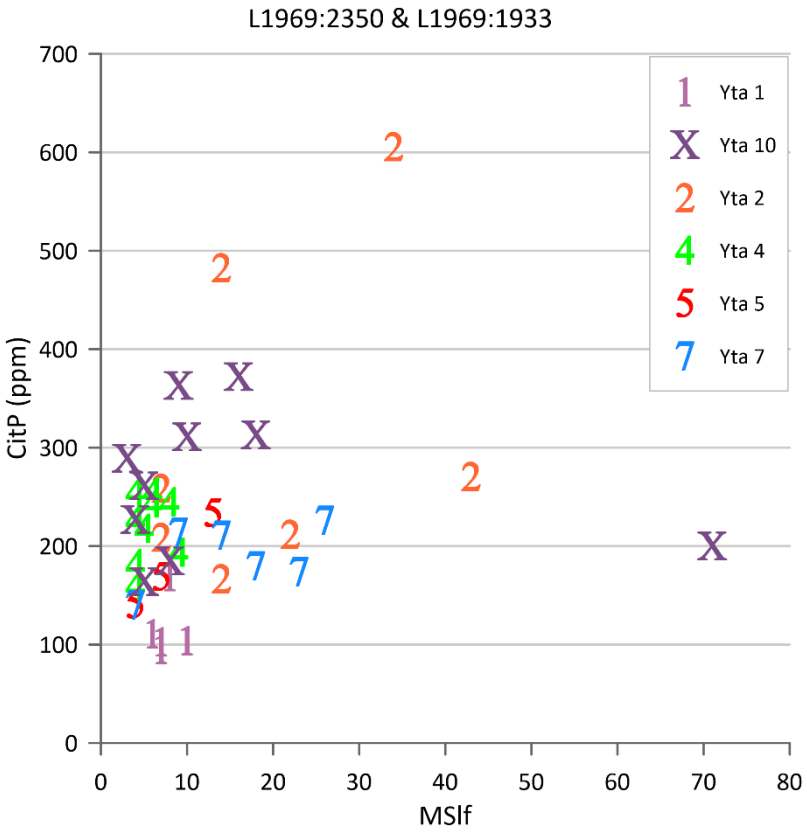

Figure 6: CitP content and MS for different types of features.

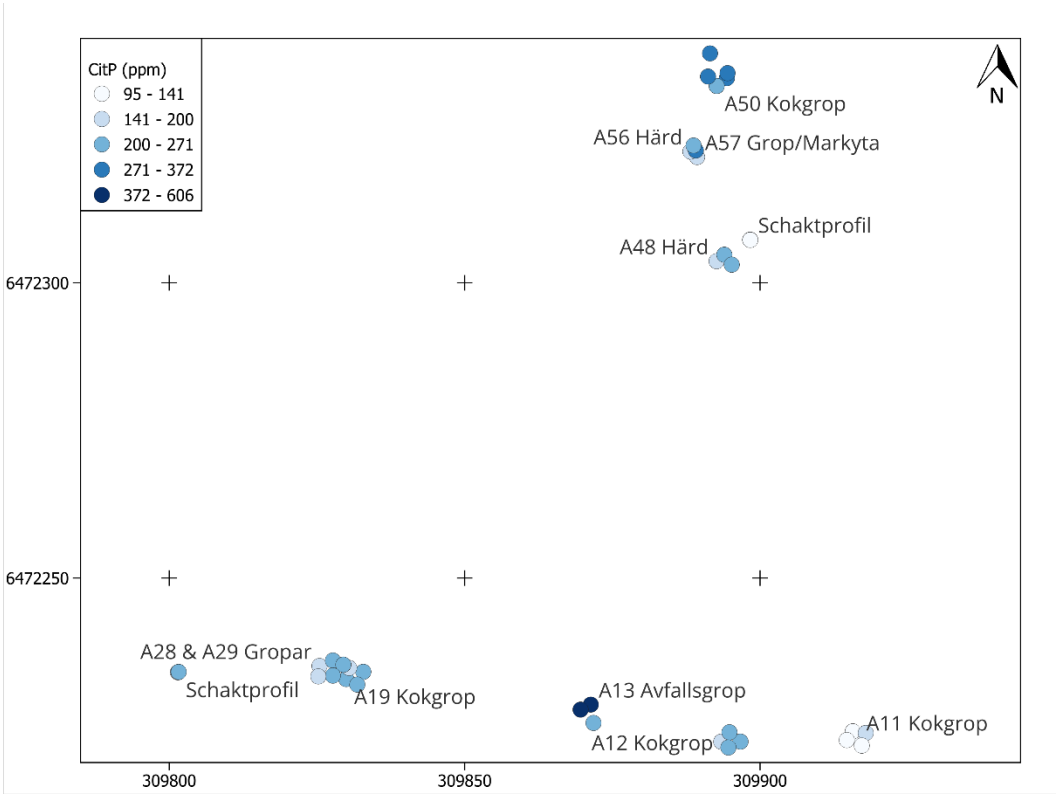

Figure 7. Spatial distribution of CitP content in samples.

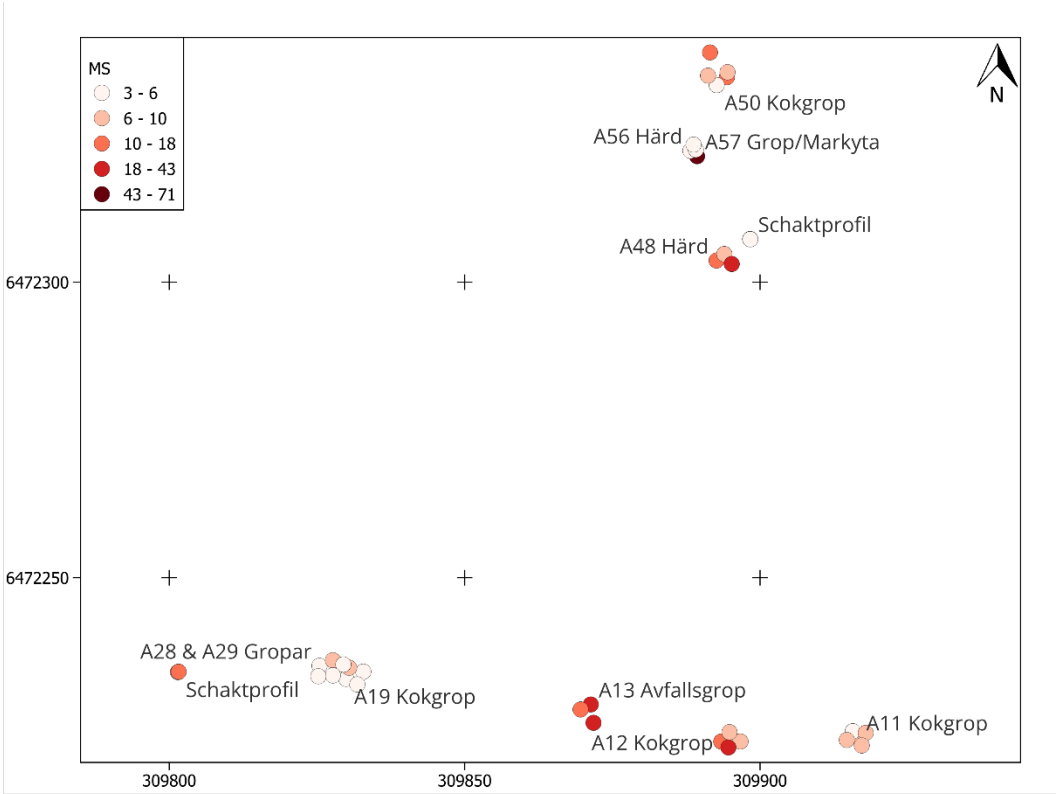

Figure 8. Spatial distribution of MS in samples.

Figure 7 indicates that the features most strongly associated with accumulation of inorganic phosphates are the refuse pit A13, the cooking pit A56 and the area around cooking pit A50(not the samples from the feature itself). Features A12, A19, A28, A29, A48 and A56 indicates moderate accumulation of inorganic phosphates, A11 indicates low accumulation of inorganic phosphates.

As shown in figure 8, the strongest impact of heat generation is related to A57, A13, A12 and A48. Likely this indicates heat generating processes connected to the features och the deposition of burnt material.

The analysis results for the samples collected specifically for soil chemical analysis and the subsampled archaeobotanical samples are presented separately since they represent slightly different processes. The soil chemistry samples represents activity around the sampled feature whereas the subsamples more specifically represents the fill of the feature. These processes are connected but not the same, e.g. a cooking pit can be cleaned out and infilled with material that has not been heated or a refuse pit can have infill from processes that have taken place elsewhere(see figures 9-10).

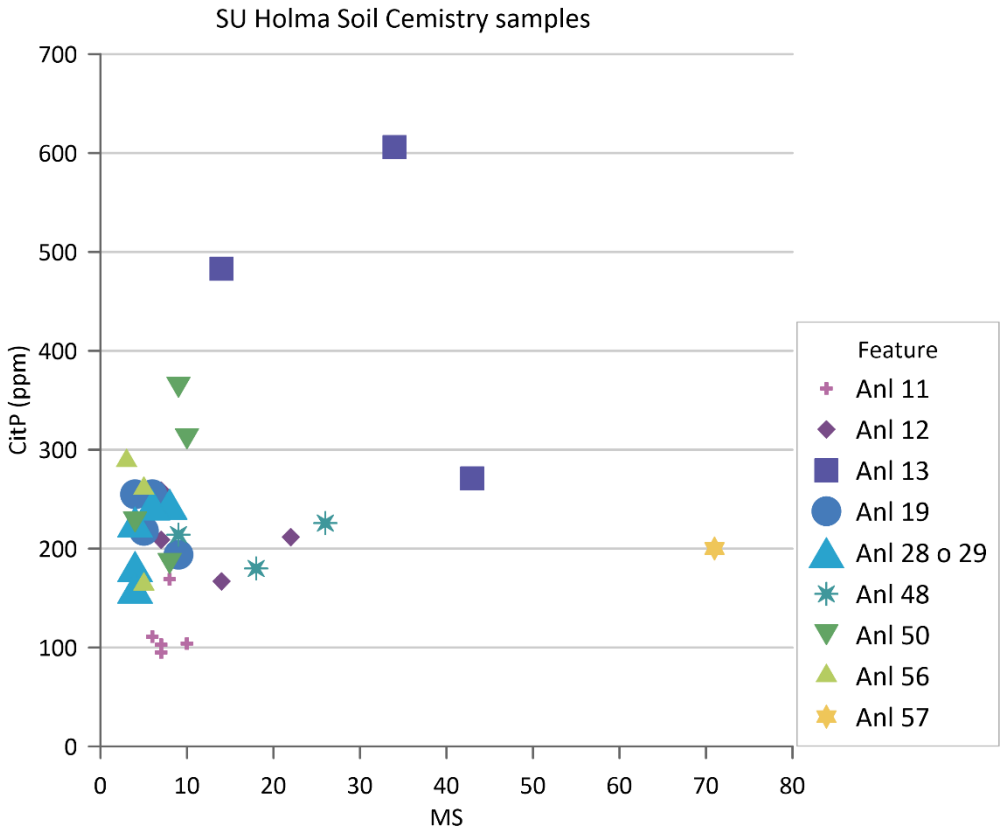

Figure 9. Analysis result for soil chemistry samples.

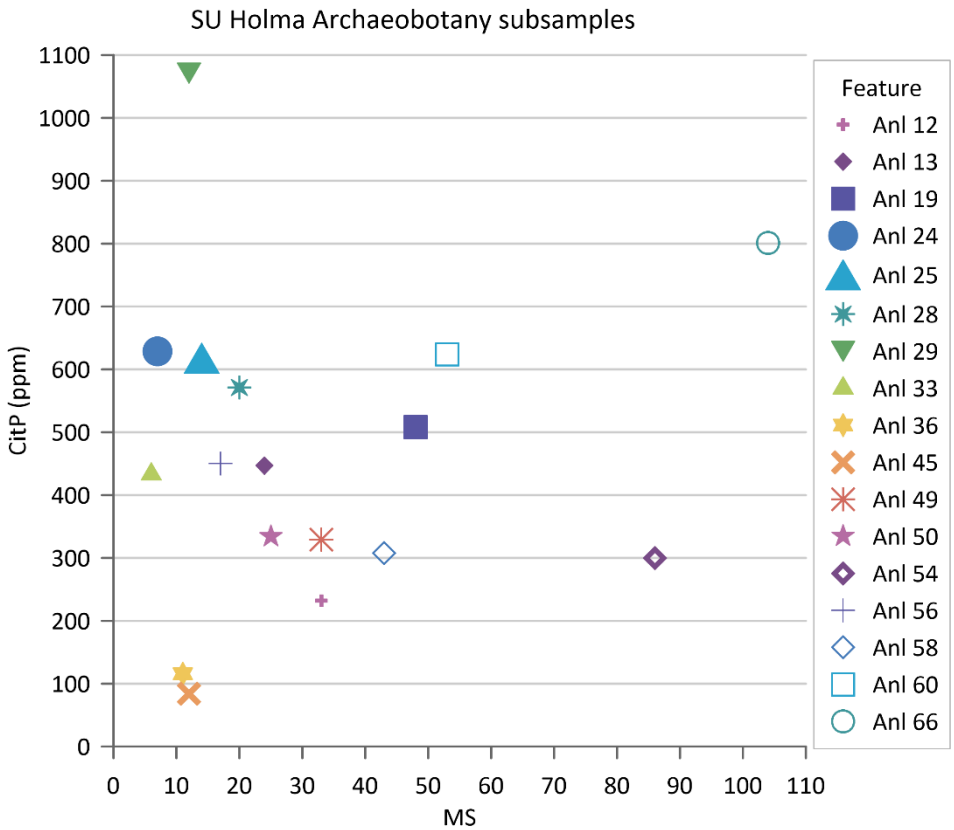

Figure 10. Analysis result for subsampled archaeobotanical samples.

Discussion and Conclusions

The studied archaeobotanical samples are characterized with great diversity in terms of preservation of botanical remains. Some of the samples do not contain any botanical remains, others - just very few and some stand out with comparatively rich assemblages (Table 2). The amount of charcoals in the different samples differs a lot - from just very few fragments to almost entire floated sample volume comprised of charcoals, which gives a hint to the variable intensity of the fire in the different structures.

Eleven samples contain cultivated plants. Most of the preserved cereals are badly preserved and fragmented. Hulled and naked barley are almost equally represented, and in some cases barley grains were not preserved good enough for subspecies identification, which makes it very difficult to assess which of the two subspecies was more common. Apart from barley samples contain hulled wheats – emmer/spelta wheat. The most common weeds/ruderal/ wild growing plants are fat-hen (*Chenopodium album*) and pale persicaria/lady's thumb (*Percicaria lapathifolia/maculosa*), chickweed (*Stellaria media*), sorrel (*Rumex* sp.), corn spurry (*Spergula arvensis*) but also club-rush (*Schoenoplectus* sp.), cockspur (*Echinochloa crus-galli*), false cleavers (*Galium spurium*).

The diversity of the taxa from the two studied localities (L1969:2530, L1969:1933) does not differ much, two samples (23_0044_0002/Prov 15/Anl 13; 23_0044_0003/Prov 17/Anl 13) from L1969:1933 and three (23_0044_0013/Prov 104/Anl 58; 23_0044_0015/Prov 109/Anl 60; 23_0044_0018/ Prov122/ Anl 66) from L1969:2530 are rich in macrofossil remains. The samples from L1969:1933 come from refuse pits, and those from L1969:2530 – one from a pit or older ground surface, and two from postholes. All of them contain a lot of cereal fragments. The identified cereals are hulled and naked barley and emmer/spelt wheat. One sample (23_0044_0002/Prov 15/Anl 13) contained hazelnut shell fragments and another one (23_0044_0003/Prov 17/Anl 13) a single find of faba bean (*Vicia faba*). Looking at the fragmented cereals and the amount of the accompanying weeds/ruderals in the samples from pits it very well coincides with the archaeological interpretation of the structures as refuse pits or concentration of unprocessed crops, especially in the case of sample 23_0044_0013/Prov 104/Anl 58 where chaff/rachis remains were also found. What is also noticeable is that the two samples from postholes contain no or very little remains of weed/ruderal plants, which could be interpreted as remains of household/cooking activities rather than refuse.

Hulled wheats (*Triticum monococcum/dicoccum/spelta)*, together with naked barley (*Hordeum vulgare* var. *nudum*), are more typical for earlier periods from the Neolithic up to the Late Bronze Age/ Early Iron Age, after which they are slowly replaced by hulled barley (Viklund 1998; Engelmark and Viklund 2008). The single find of faba bean (*Vicia faba*) proof its use and cultivation at the site. Faba bean finds are typical for the Iron Age Southern Scandinavia, although always in very small quantities but still possibly indicating limited garden cultivation (Grabowski 2011).

The most common weeds/ruderals at the site fat-hen (*Chenopodium album*), pale persicaria (*Persicaria lapathifolia*), chickweed (*Stellaria media*), corn spurry (*Spergula arvensis*), cockspur (*Echinochloa crus-galli*) are common in the Iron Age sites from the region. *Chenopodium* sp. and *Stellaria media* indicate manuring, while *Persicaria* sp. and *Spergula arvensis* reflect the sandy and slightly acid soils in the area. *Echinochloa crus-galli*, while rare in most parts of the country, cockspur appears frequently in Iron Age sites in western Sweden. Its presence may be linked to specific agricultural practices or environmental conditions. It grows in spring-sown crops and prefers warm, fine-grained and nutrient rich soils (Viklund 1998). Some of those common weeds found in big quantities like fat-hen (*Chenopodium album*) and pale persicaria (*Persicaria lapathifolia*) could have been used as fodder or even for human consumption (Behre 2008; Mueller-Bieniek et al. 2020).

The soil chemical analysis indicates a variety of anthropogenically driven processes in the sampled features. The CitP content indicates that some of the results represents intensive or long-lasting activity. The impact is mainly related to the accumulation of inorganic phosphates and impact from heat generating processes. Some of this impact is likely the result of deposition of burnt material and household waste, such as in refuse pits and post holes. Other impact is likely the result of processes connected to the sampled features such as the hearths and cooking pits.

From a soil chemical perspective, the phosphate accumulation in the pits and refuse pits is likely to indicate a medieval dating. The high CitP content is common in iron age/medieval environments. While some stone age sites can show high phosphate accumulation, this is generally tied to very specific processes and features.

Four features were classified as pits or buried ground surfaces. A36 is likely a buried ground surface. The CitP content in A24 indicates a process connected to high phosphate accumulation. A57 is likely a feature connected to heat generating processes or deposition of burnt material. The combination of MS CitP and organic content indicates that A58 could be a refuse pit with deposition of burnt material.

The sampling strategy for soil chemistry, small samples from parts of the features instead of big bulk samples, is preferable in this context. Several small samples are more likely to represent the specific processes connected to the features.

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Table 2. Archaeoboatnical results.

Plant name	type of remain/ MAL number	23_0044_0001	23_0044_0002	23_0044_0003	23_0044_0004	23_0044_0005	23_0044_0006	23_0044_0007	23_0044_0008	23_0044_0009	23_0044_0010	23_0044_0011	23_0044_0012	23_0044_0013	23_0044_0014	23_0044_0015	23_0044_0016	23_0044_0017	23_0044_0018
	Prov nr	4	15	17	23	48	52	58	60	61	65	81	92	104	106	109	115	119	122
	Anläggning nr	12	13	13	19	24	25	28	29	33	36	45	49	58	54	60	50	56	66
Cultivated plants																			
Cerealia (sädeskorn/unidentified cereals)	seed/fruit		2	5			1							28					4
Cerealia (sädeskorn/unidentified cereals)	fragment		34	43	1				1	1			2	450	4	26			83
Hordeum vulgare var. *nudum* (naket korn/naked barley)	seed/fruit		3																3
Hordeum vulgare var. *vulgare* (skalkorn/ hulled barley)	seed/fruit													3	2				4
Hordeum vulgare (korn/ barley)	seed/fruit			3										1		3			3
Hordeum vulgare (korn/ barley)	rachis													1					
Triticum dicoccum/spelta (emmer/speltvete/spelt wheat)	seeds/fruit		5											3		1			2
Triticum dicoccum/spelta (emmer/speltvete/spelt wheat)	glume base													2					
Triticum dococcum (emmer)	seeds/fruit			7										42					
Triticum dococcum (emmer)	glume base													18					
Vicia faba (favaböna/faba bean)	seeds/fruit			1															
Gathered plants																			
Corylus avellana (Hasselnötskal/hazelnut shells)	shell fragments		13																
Arable weeds and other plants																			
Apiaceae	seed/fruit													13					
Arrhenatherum elatius ssp. b*ulbosum* (knylhavre/false oat-grass)	seed/fruit		1																
cf. *Artemisia vulgaris* (gråbo/common mugwort)	seed/fruit													13					
Avena sp. (havre/oat)	seed/fruit													2					2
Chenopodium album (svinmålla/fat-hen)	seed/fruit			4							8			200					
Chenopodium sp. (ogräsmållor/goosefoot)	seed/fruit		13		1														2
Echinochloa crus-galli (hönshirs/cockspur)	seed/fruit		6	1															
Fallopia convolvulus (åkerbinda/ black-bindweed)	seed/fruit													2					
Galium spurium (småsnärjmåra/false cleavers)	seed/fruit		3	1															
Hordeum sp. (korn/barley)	seed/fruit									1				2					6
Lolium sp. (repen/ryegrass)	seed/fruit													6					
Percicaria lapathifolia/maculosa (pilört/åkerpilört/pale persicaria/lady's thumb)	seed/fruit		3	6										150					
Picea abies (gran/ European spruce)	needle							2	x										
Picea abies (gran/ European spruce)	cone fragment								x										
Pinus sylvestris (tall/ Scots pine)	cone scale	2																	
Pinus sylvestris (tall/ Scots pine)	needle						x												
Plantago lanceolata (svartkämpar/ ribwort plantain)	seed/fruit													1					
Plantago major (gårdsgroblad/broadleaf plantain)	seed/fruit		1																
Rumex sp. (Skräppsläktet/sorrel)	seed/fruit		1											1					2
Schoenoplectus sp. (säv/club-rush)	seed/fruit													1					4
Spergula arvensis (åkerspärgel/corn spurry)	seed/fruit		5	1															
Stellaria media (våtarv/chickweed)	seed/fruit		8	8															
Stellaria sp. (stjärnblommor/starwort)	seed/fruit																		1
Trifolium sp. (klöversläktet/clover)	seed/fruit			2															
Viola sp. (violväxter)	seeds/fruit		1																
Indet														10					
charcoals		xxx	xx	xxx	xx	x	x	x	xx	x	x	x	x	xxx	xxxx	x	xxxx	x	xx
Sample Volume before floatation (l)		2,7	2,2	2,8	1,4	2,6	3	1,8	2,8	3,2	2,2	2,2	3,2	1,8	2,1	1,8	2,5	2	2,8
Sample Volume after floatation (ml)		75	13	50	30	3	12	20	10	10	5	100	40	20	7	20	200	3	40

Table 3. Material selected for dating.

14C material - Holma, L1969:1933 och L1969:2530, Herrestad socken					
MAL nummer	Anläggning	Prov nr	Material	Vikt	Kommentar
23_0044_0010	36	65	*Corylus avellana* (hassel)	17,2 mg	1 fragment, trekol
23_0044_0012	49	92	*Betula* sp. (björk)	18,5 mg	1 fragment, trekol
23_0044_0013	58	104	*Triticum dicoccum* (emmer)	9,5 mg	sädeskorn
23_0044_0014	54	106	*Hordeum vulgare* (korn)	7,3 mg	sädeskorn

Table 4. Soil chemistry results.

MALNo	Field No	FeaturNo	Northing	Easting	Area	Type	Provtyp	MSlf	CitP)	CitPOI	PQuota	LOI
23_0044_011	81	Anl 45	6472305	309902,6	Yta 7	Äldre markyta, ev medeltid, ev förhistorisk	Makrofossil	12	84	537	6,38	9,4
23_0043_010	34	Anl 13	6472229	309871,3	Yta 2	Avfallsgrop	Markkemi	34	606	782	1,29	1,3
23_0043_011	35	Anl 13	6472228	309869,6	Yta 2	Avfallsgrop	Markkemi	14	483	606	1,25	1,2
23_0043_012	36	Anl 13	6472225	309871,8	Yta 2	Avfallsgrop	Markkemi	43	271	325	1,2	0,7
23_0044_003	17	Anl 13	6472227	309871	Yta 2	Avfallsgrop	Makrofossil	24	447	623	1,39	2,5
23_0044_007	58	Anl 28	6472234	309826,7	Yta 4	Grop	Makrofossil	20	571	804	1,41	2,7
23_0044_008	60	Anl 29	6472235	309827,8	Yta 4	Grop	Makrofossil	12	1071	1526	1,42	4,1
23_0044_009	61	Anl 33	6472232	309821,8	Yta 5	Grop	Makrofossil	6	433	653	1,51	2,5
23_0044_012	92	Anl 49	6472306	309890	Yta 7	Grop	Makrofossil	33	329	678	2,06	3,1
23_0043_037	105	Anl 57	6472321	309889,3	Yta 10	Grop eller äldre markyta	Markkemi	71	200	436	2,19	3,9
23_0044_005	48	Anl 24	6472236	309845,6	Yta 3	Grop eller äldre markyta	Makrofossil	7	629	774	1,23	2
23_0044_010	65	Anl 36	6472231	309812,5	Yta 5	Grop eller äldre markyta	Makrofossil	11	116	257	2,22	2,4
23_0044_013	104	Anl 58	6472307	309886,3	Yta 10	Grop eller äldre markyta	Makrofossil	43	308	565	1,83	3,6
23_0044_006	52	Anl 25	6472228	309833	Yta 4	Grop, ev latrin?	Makrofossil	14	618	1084	1,75	5,7
23_0043_022	69	Anl 28 o 29	6472235	309825,4	Yta 4	Gropar	Markkemi	4	182	234	1,29	0,6
23_0043_023	70	Anl 28 o 29	6472236	309827,7	Yta 4	Gropar	Markkemi	8	245	286	1,17	0,8
23_0043_024	71	Anl 28 o 29	6472235	309829,5	Yta 4	Gropar	Markkemi	4	227	279	1,23	0,6
23_0043_025	72	Anl 28 o 29	6472233	309827,7	Yta 4	Gropar	Markkemi	6	244	339	1,39	1
23_0043_026	73	Anl 28 o 29	6472233	309825,2	Yta 4	Gropar	Markkemi	4	160	191	1,19	0,4
23_0043_027	89	Anl 48	6472304	309892,6	Yta 7	Härd	Markkemi	18	180	290	1,61	1,5
23_0043_028	90	Anl 48	6472305	309893,9	Yta 7	Härd	Markkemi	9	214	310	1,45	1,2
23_0043_029	91	Anl 48	6472303	309895,2	Yta 7	Härd	Markkemi	26	226	363	1,6	2
23_0043_038	116	Anl 56	6472322	309888,2	Yta 10	Härd	Markkemi	5	164	231	1,41	0,4
23_0043_039	117	Anl 56	6472322	309889,1	Yta 10	Härd	Markkemi	3	289	329	1,14	0,5
23_0043_040	118	Anl 56	6472323	309888,7	Yta 10	Härd	Markkemi	5	261	322	1,23	0,6
23_0044_017	119	Anl 56	6472323	309888,5	Yta 10	Härd	Makrofossil	17	450	627	1,4	2
23_0043_001	1	Anl 11	6472223	309916,6	Yta 1	Kokgrop	Markkemi	10	104	241	2,32	3
23_0043_002	26	Anl 11	6472224	309915,7	Yta 1	Kokgrop	Markkemi	6	111	187	1,69	1,5
23_0043_003	27	Anl 11	6472224	309917,9	Yta 1	Kokgrop	Markkemi	8	169	293	1,73	2
23_0043_004	28	Anl 11	6472222	309917,2	Yta 1	Kokgrop	Markkemi	7	103	219	2,13	1,5
23_0043_005	29	Anl 11	6472223	309914,7	Yta 1	Kokgrop	Markkemi	7	95	174	1,83	1,5
23_0043_006	30	Anl 12	6472222	309893,4	Yta 2	Kokgrop	Markkemi	14	167	266	1,59	1,1
23_0043_007	31	Anl 12	6472222	309896,7	Yta 2	Kokgrop	Markkemi	7	209	306	1,46	1
23_0043_008	32	Anl 12	6472224	309894,8	Yta 2	Kokgrop	Markkemi	7	259	355	1,37	1
23_0043_009	33	Anl 12	6472221	309894,6	Yta 2	Kokgrop	Markkemi	22	212	354	1,67	1,3
23_0043_013	38	Anl 19	6472233	309830	Yta 4	Kokgrop	Markkemi	4	255	311	1,22	0,8
23_0043_014	39	Anl 19	6472234	309832,8	Yta 4	Kokgrop	Markkemi	6	255	304	1,19	0,9

23_0043_015	40	Anl 19	6472235	309830,4	Yta 4	Kokgrop	Markkemi	9	194	257	1,32	0,6
23_0043_016	41	Anl 19	6472232	309831,8	Yta 4	Kokgrop	Markkemi	5	218	292	1,34	0,7
23_0043_020	94	Anl 50	6472333	309892,7	Yta 10	Kokgrop	Markkemi	8	185	278	1,5	1
23_0043_030	95	Anl 50	6472336	309894,5	Yta 10	Kokgrop	Markkemi	10	311	308	0,99	0,9
23_0043_031	96	Anl 50	6472333	309892,7	Yta 10	Kokgrop	Markkemi	4	227	243	1,07	0,5
23_0043_032	97	Anl 50	6472335	309891,2	Yta 10	Kokgrop	Markkemi	9	363	412	1,13	0,9
23_0044_001	4	Anl 12	6472222	309894,7	Yta 2	Kokgrop	Makrofossil	33	232	412	1,78	4,6
23_0044_004	23	Anl 19	6472233	309831,2	Yta 4	Kokgrop	Makrofossil	48	508	794	1,56	5,5
23_0044_016	115	Anl 50	6472335	309893,5	Yta 10	Kokgrop	Makrofossil	25	334	502	1,5	6,4
23_0044_014	106	Anl 54	6472320	309889,4	Yta 10	Möjligt stolphål	Makrofossil	86	300	457	1,52	2
23_0043_017	42		6472234	309801,5	Yta 5	Schaktprofil	Markkemi	4	141	204	1,45	0,5
23_0043_018	43		6472234	309801,5	Yta 5	Schaktprofil	Markkemi	7	169	356	2,11	2,2
23_0043_019	44		6472234	309801,6	Yta 5	Schaktprofil	Markkemi	13	234	528	2,25	4,8
23_0043_021	102		6472335	309894,4	Yta 10	Schaktprofil	Markkemi	18	313	553	1,77	3,1
23_0043_033	99		6472307	309898,3	Yta 7	Schaktprofil	Markkemi	23	174	476	2,74	4,9
23_0043_034	100		6472307	309898,3	Yta 7	Schaktprofil	Markkemi	14	211	459	2,18	3,2
23_0043_035	101		6472307	309898,3	Yta 7	Schaktprofil	Markkemi	4	140	232	1,65	0,9
23_0043_036	103		6472339	309891,5	Yta 10	Schaktprofil	Markkemi	16	372	629	1,69	2,8
23_0044_015	109	Anl 60	6472310	309886,4	Yta 10	Stolphål	Makrofossil	53	624	952	1,53	3,7
23_0044_018	122	Anl 66	6472315	309887,2	Yta 10	Stolphål	Makrofossil	104	801	1148	1,43	4

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