

# QUANTIFYING THE ECONOMIC IMPORTANCE OF LARGE-SEEDED WILD PLANTS IN THE NEOLITHIC LAKESHORE SITE OF ZÜRICH-OPÉRA (CENTRAL SWITZERLAND)

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## INTRODUCTION

It has long been acknowledged that the preservation of archaeobotanical macroremains of wild fruits in dry sites is unrepresentative and that the quantification of the economic importance of these plants in the investigated site is hardly possible. On the other hand, the extraordinary preservation of wetland sites allow a unique approach to the consumption of wild plants in Prehistory. Previous approaches to the role of wild plants in the economy of Neolithic lakeshore sites in Central Europe concluded that wild fruits had a very significant role in the diet of human populations ( $\frac{1}{3}$  or  $\frac{1}{2}$  of the caloric input of plant origin; see e.g. Gross, Jacomet & Schibler 1990; Hosch & Jacomet 2004). Nevertheless, it has been repeatedly remarked that large-seeded wild plants might be underrepresented due to the sampling strategies, which usually focused on a small number of profile columns or cores, small (<3 litres of sediment) surface samples, or localized judgement samples (e.g. Jacomet & Brombacher 2005; Maier 2001). The quantitative techniques used for the evaluation of the data were the calculation of **concentration** values (number of remains per litre of sediment sieved), **ubiquity** (number of samples in which one taxon is present) and **% of weight** or **% of caloric input** (in comparison with cultivars).

### Site: Zürich-Opéra

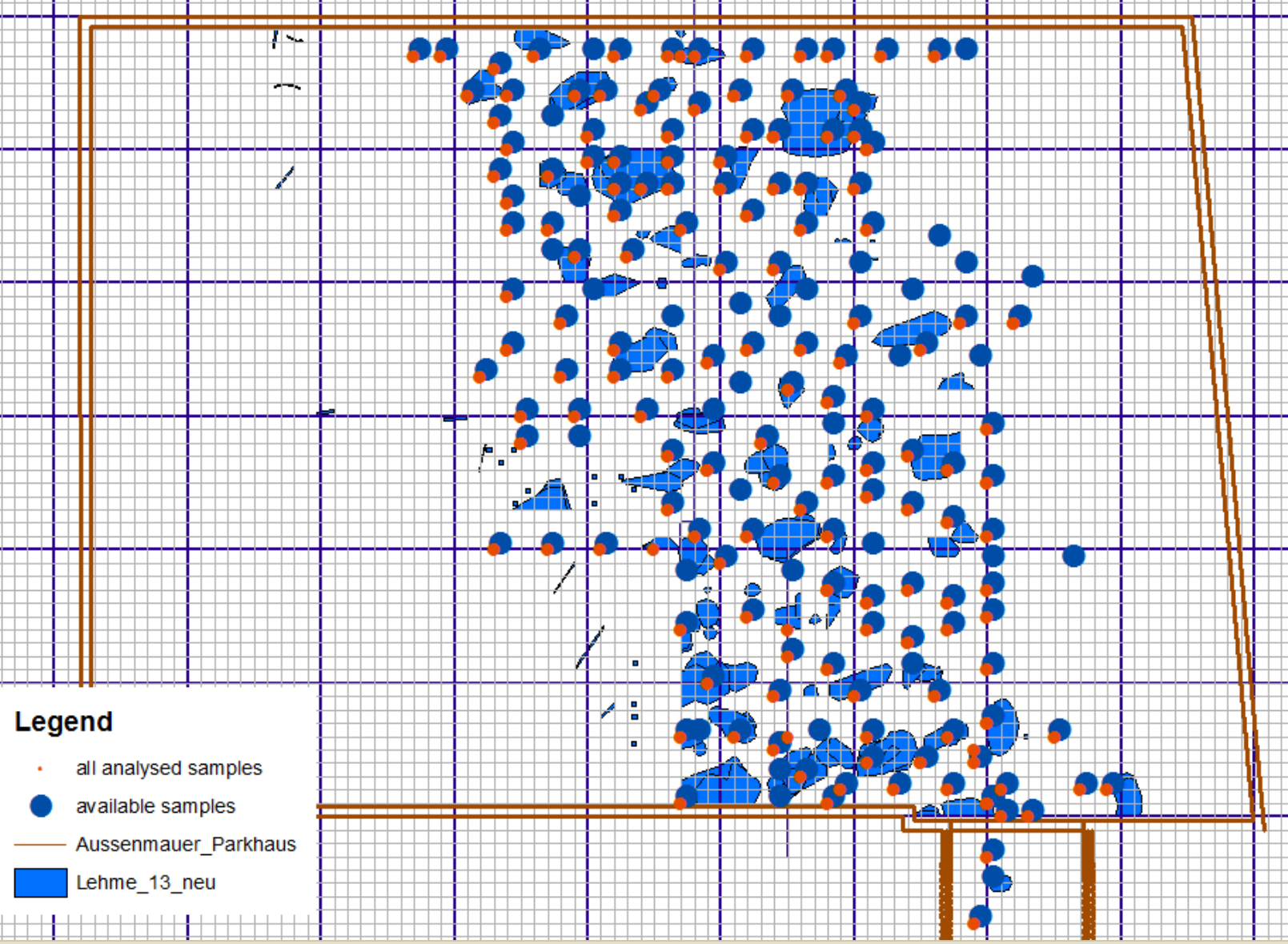
Layer 13: dendrodated c. 3230 BC (Early Horgen Culture, Swiss Late Neolithic)  
Excavated area: c. 3000 m<sup>2</sup>  
Max. thickness of the layer: 32 cm  
Definition of house plans in progress

Natural vegetation during Late Neolithic (Heitz-Weniger 1978):  
Different forest communities; rich in oak, elm, lime, beech, silver fir and hazel, near the lakeshore rich in alder, willow and ash

### Samples:

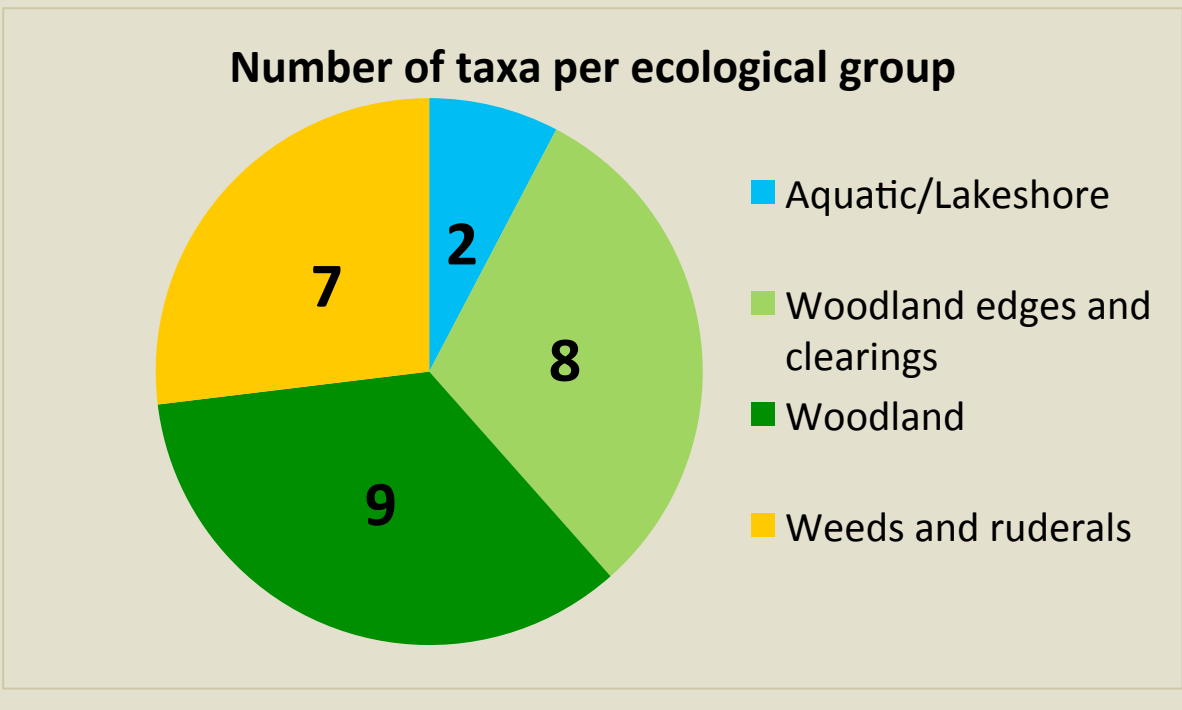
Large-volume samples extending over the whole area of the excavation allow for the first time to estimate the representation of large-seeded taxa. We defined the units of observation according to Hosch & Jacomet 2004.

So far, the 2mm fraction of **178 samples** was analysed (total volume: 1'002.3 l; average vol. per sample: 5.63 l; total nr. of analysed remains: 91'269).



## RESULTS

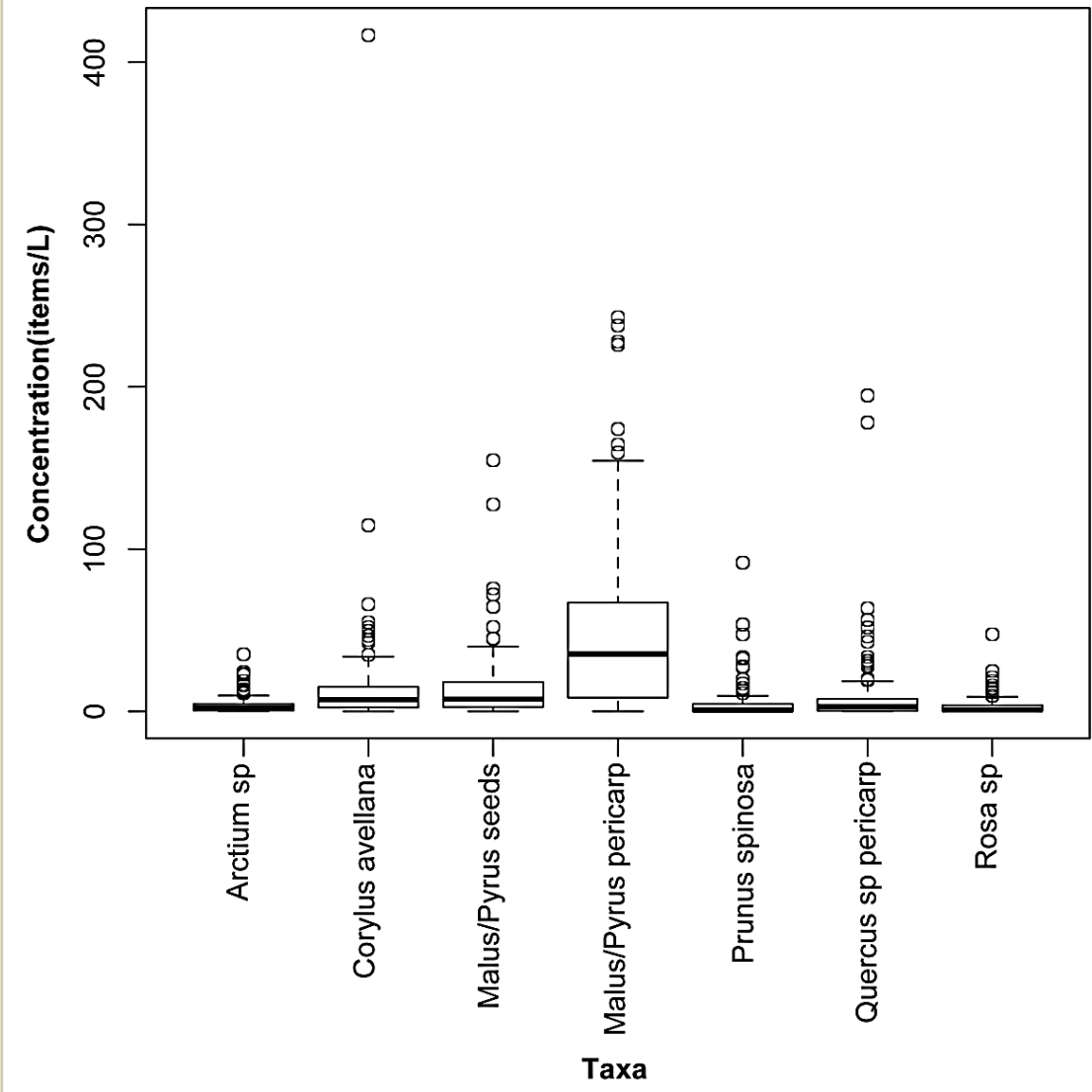
- 27 large-seeded taxa with economic use
- Better representation of uncharred remains
- 9 taxa in uncharred state with high ubiquity values (>40% samples)
- 4 taxa in uncharred state with particularly high maximum concentration



Uncharred remains	Ubiquity	Concentration (mean)	Concentration (max)
<i>Arctium</i> sp.	93.26	3.71	35.2
<i>Polygonum convolvulus</i>	57.30	0.55	18.67
<i>Corylus avellana</i>	97.19	13.81	416.67
<i>Fagus sylvestris</i>	48.31	0.52	22.17
<i>Malus/Pirus</i> (seed)	94.94	13.87	154.71
<i>Malus/Pirus</i> (pericarp)	94.38	48.00	242.86
<i>Malus/Pirus</i> (pedicel)	44.38	0.70	22.67
<i>Prunus spinosa</i>	82.58	4.23	91.67
<i>Quercus</i> sp. (base)	51.69	0.46	9.87
<i>Quercus</i> sp. (pericarp)	88.76	8.45	194.67
<i>Rosa</i> sp.	89.33	2.99	47.5
<i>Viburnum lantana</i>	78.09	1.02	11.2

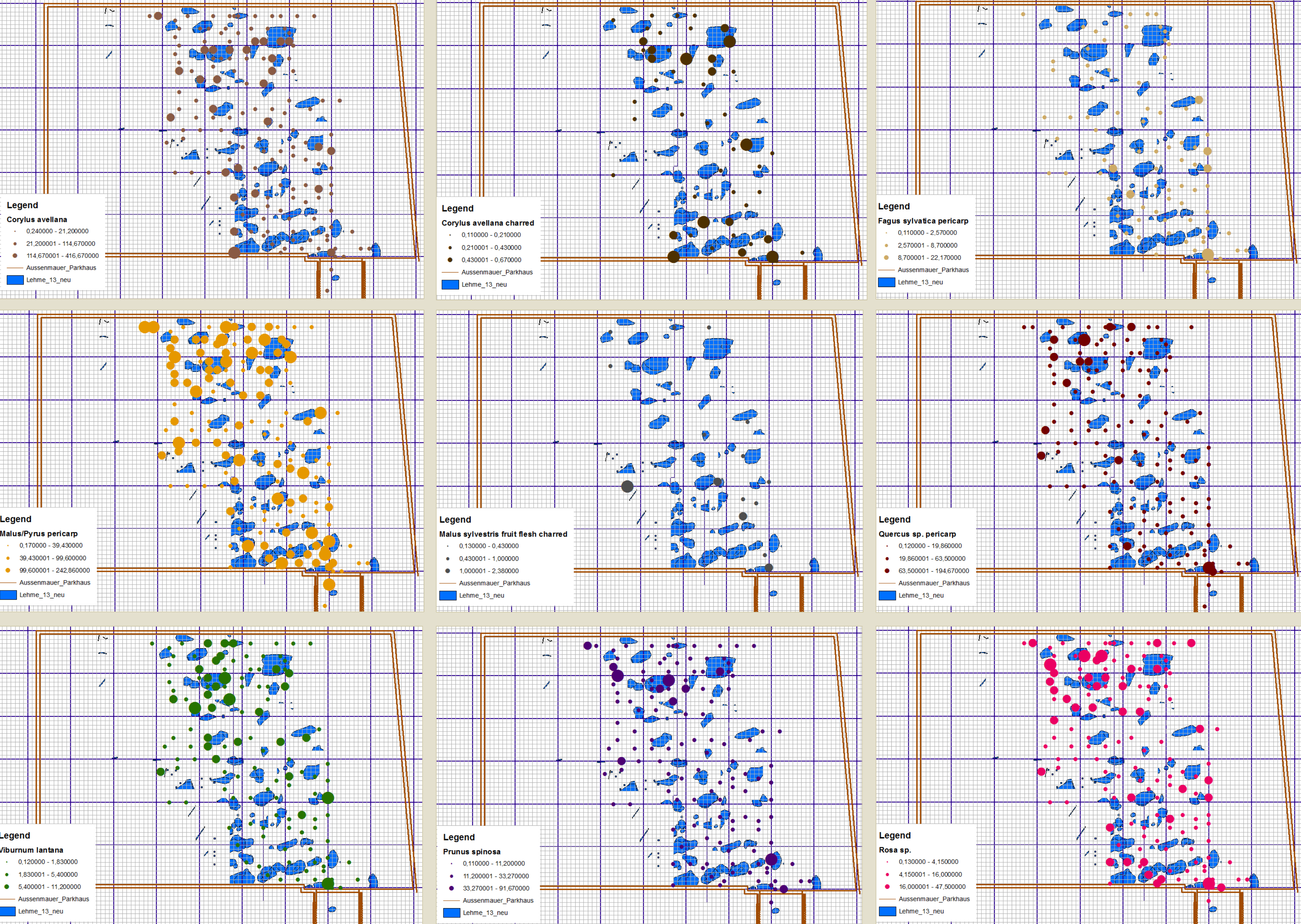
Charred remains	Ubiquity
<i>Polygonum convolvulus</i>	1.12
<i>Vicia hirsuta</i>	0.56
<i>Vicia tetrasperma</i>	0.56
<i>Corylus avellana</i>	28.09
<i>Malus sylvestris</i> (fruit flesh)	10.11
<i>Malus/Pirus</i> (seed)	8.99
<i>Prunus spinosa</i>	0.56
<i>Quercus</i> sp. (base)	1.69
<i>Quercus</i> sp. (acorn)	0.56
<i>Rosa</i> sp.	1.69

Very high concentration values were observed in a lower number of samples for some taxa. Hazelnuts, wild apple/pear, sloe and acorns are the most clear cases.



The plotting of the results with GIS per sample shows two trends. *Corylus*, *Malus*, *Prunus spinosa*, *Rosa* and *Viburnum lantana* are better represented in the northern and southern sectors but present all over the analysed surface

of the site. *Fagus* and charred remains of apple fruits are less (or not only) well-represented in these sectors. Instead they are found in the central area of the site.



## DISCUSSION

- The **concentrations** observed for edible taxa can be interpreted as resulting from their **consumption**.
- The high **ubiquity** in which some of these taxa appear indicates this consumption was **frequent**.
- The finding of particularly **high concentrations** of remains could respond to large accumulations produced over a short period of time, that is to say, from a moment when these fruits would be **gathered and processed in bulk**.
- The distribution of the most important taxa along the analysed surface of the site indicates that wild plants were part of the household economy, and **most probably gathered by each household unit**.
- The **environment** surrounding the settlement would have been **highly anthropized**. With our studies, this impact has been possible to be quantified with a higher accuracy than in previous approaches.
- These data confirm previous studies, concentrations of the most important taxa are very similar to the ones from Horgen culture layers of other sites from Zürich (Zürich-Mozartstrasse, Zürich-KanSan) and to other Horgen culture layers from Switzerland (Hosch & Jacomet 2004). **Ubiquity** is in some cases **significantly higher**, which can be explained by the **adequate sampling strategy**.

## CONCLUSIONS

The application of new techniques (GIS) for the identification of spatial patterns of distribution proves an important tool for a quantitative approach to human-environment interaction. The results obtained show that the role of large-seeded wild plants at the site was of major significance and that its impact on the surrounding environment might have been underestimated. Some kind of tending for a better yield of fruit trees as crab apples, acorns, hazelnuts, sloe etc. must have existed, leading to a very humanly-modified environment around the settlement. For this reason it is necessary to develop new models for the relationship between Neolithic societies and their environment.

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