Crop processing and storage of surpluses

The importance of cereals in Bronze Age and Iron Age settlements in the Lower Rhine Basin (North Rhine Westphalia, Germany)

Tanja Zerl
Institute of Prehistoric Archaeology,
University of Cologne
tzerl@uni-koeln.de

Introduction

The loess area of the Lower Rhine Basin between Cologne, Aachen and Erkelenz (**Fig. 1**) belongs to the most fertile landscapes in Europe and was used for agriculture since the early Neolithic. The lignite mining and the resulting extensive excavations make this area also one of the best archaeologically investigated regions in Europe.

For this study (Zerl 2014) carbonized plant material (more than 135.000 remains) from 51 sites (**Fig. 2**) with a total of 66 chronologically separable Bronze Age and Iron Age settlements were analysed. The investigated settlements dated to the period from about 1500 BC to 50 BC. To enable a diachronic overview of the archaeobotanical data, five chronological groups (after Simons 1989) have been differentiated: older and late Bronze Age, early, middle and late Iron Age.

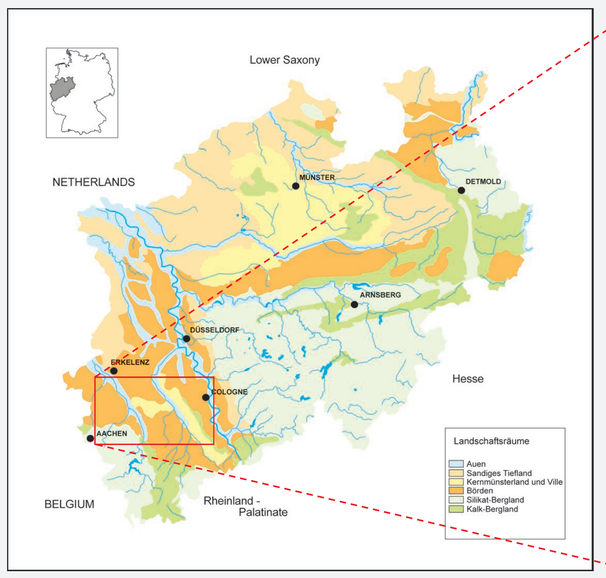

Fig. 1 North Rhine Westphalia with the study area in the Lower Rhine Basin (red square).

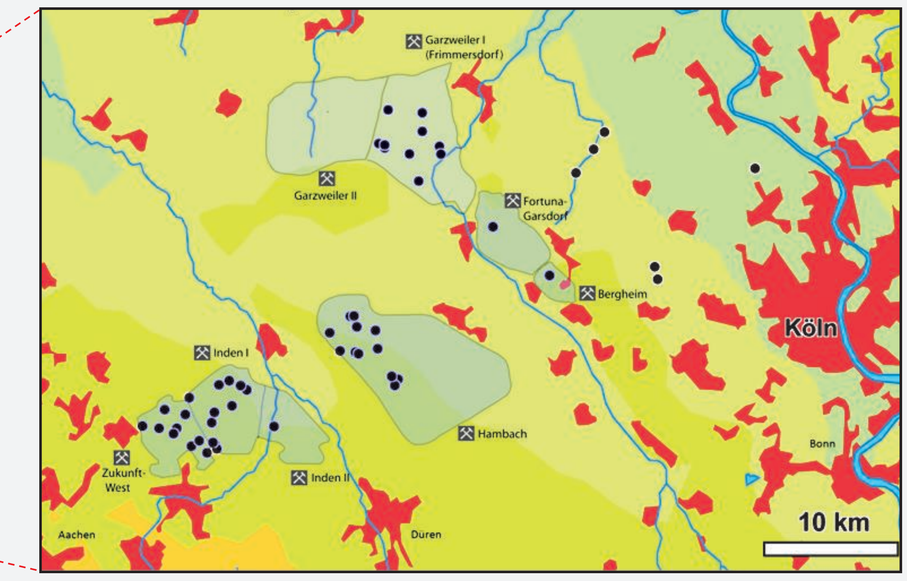

Fig. 2 Study area with the locations of the examined sites (black dots) and the lignite mining areas (in gray).

Aims of the investigation

In the investigation several aspects were studied, as development in the crop spectra, determination of weed assemblages, soil conditions of the agricultural areas, intensity of tillage and harvesting methods. With multivariate statistics it was possible to differentiate sample types of mixed samples with remains of various crops. The results added new aspects to the debate on agricultural development, like the beginning of surplus production, in the study area.

Cereal processing

The analysed samples contained residues of both free-threshing and hulled cereals. Therefore the simplified processing sequence of free-threshing cereals (after Jones 1984) has to be modified (**Fig. 3**); hulled cereals, however, must be treated otherwise.

In the modified sequence some weed seed categories, which are usually associated with specific stages in the processing of nacked cereals, could rather represent other stages. One example is the breaking up of big seed heads [BHH] by mortaring, what may cause their occurence in later processing stages. Other residues (like chaff) must also be considered, as they provide an indication of the processing stage of hulled cereals (e.g. after HILLMAN 1984).

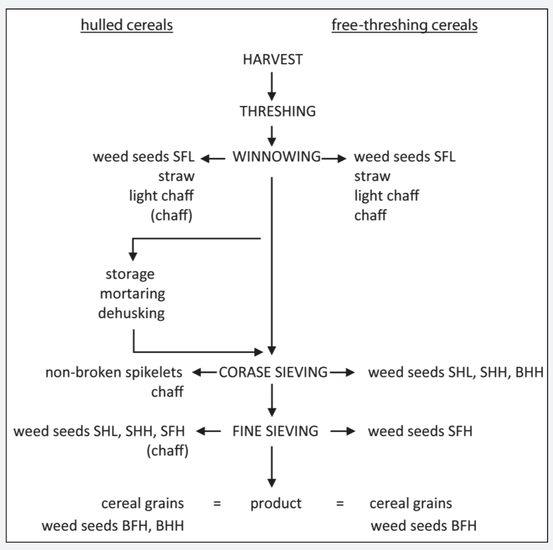

Fig. 3 Modified processing sequence for free-threshing and hulled cereals. Listed are the (assumable) stage-specific by-products and the final product. Weed seed categories (after Jones 1984): SHH small-headed-heavy, BHH big-headed-heavy, SFH small-free-heavy, BFH big-free-heavy, SHL small-headed-light, SFL small-free-light.

Differentiation of sample types I

For the first assessment triangular scatterplots were used, showing the proportions of grain, chaff and weeds as well as the density of the samples (**Fig 4**). On this basis, a rough classification of the samples is already possible: the samples of the older phases contain a lot of arable weed seeds and chaff, whereas the late Iron Age samples consist almost exclusively of cereal grains and have very high densities.

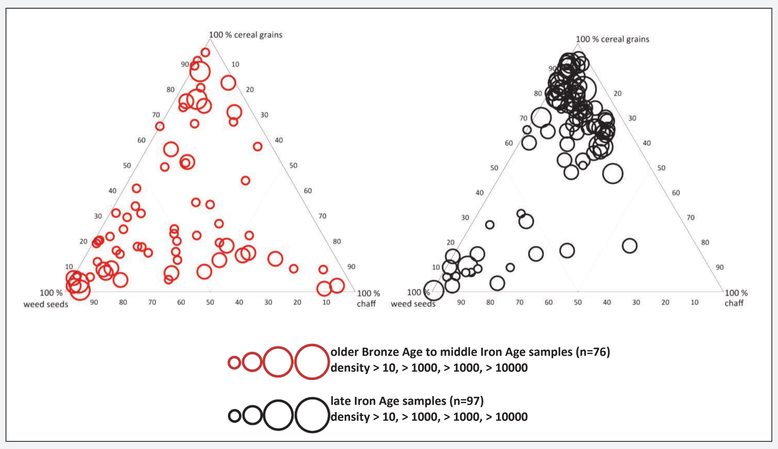

Fig. 4 Triangular scatterplots.

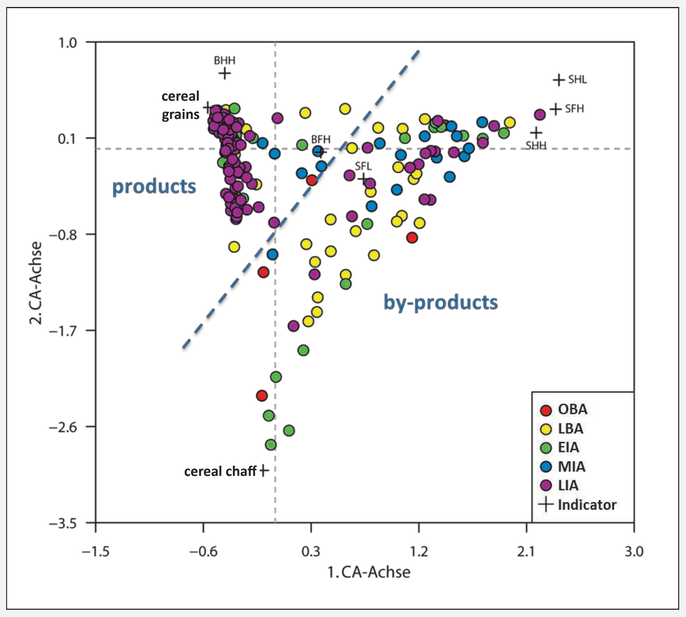

Fig. 5 Correspondence analysis (CA) of all representative samples (n=171) on basis of eight processing indicators: cereal grains, cereal chaff and six weed seed categories (see Fig. 3).

Differentiation of sample types II

A correspondence analysis (CA) was carried out for a clearer distinction of samples from different cereal processing stages. For this purpose the weed seed categories (after Jones 1984, see **Fig. 3**) as well as chaff and grains were used as indicators.

As the triangular scatterplots already have suggested (**Fig 4**), the CA result (**Fig. 5**) shows likewise that the four earlier phases (older Bronze Age to middle Iron Age) differ considerably from the late Iron Age. In the early stages by-products are most frequent; the late Iron Age, however, is dominated by (semi) cleaned products.

Indication of surplus production

This detected disparity in the presence of by-products and products can be explained by an intensification of cereal cultivation along with an increased storage of cleaned products in the late Iron Age. Most likely these products were even surpluses. This assumption is supported by the fact, that 90 % of the samples were found in postholes (mainly) of storage buildings (**Fig. 6, 7**) and that they derive mostly from the two biggest late Iron Age settlements ('central places', one with fortification).

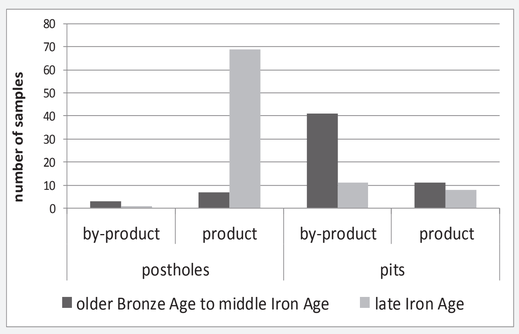

Fig. 6 The occurrence of by-products and products in different features (postholes/pits) of Bronze Age and Iron Age settlements in the Lower Rhine Basin.

Fig. 7 Reconstruction of an Iron Age storage building (Rheinland Department for the Preservation and Care of Field Monuments, Titz-Höllen).

Within the archaeological context

In combination with the archaeological results (Simons 1989) can be stated: For the Bronze Age to the middle Iron Age only individual self-sufficient farmsteads are documented (**Fig. 8a**). In the late Iron Age a change from dispersed to nucleated settlements as well as a shift to larger-scale cereal production has taken place, where in addition to the individual farmsteads village-like settlements existed (**Fig. 8b**). The larger of these village-like settlements apparently played an important role in storage of cereal surpluses.

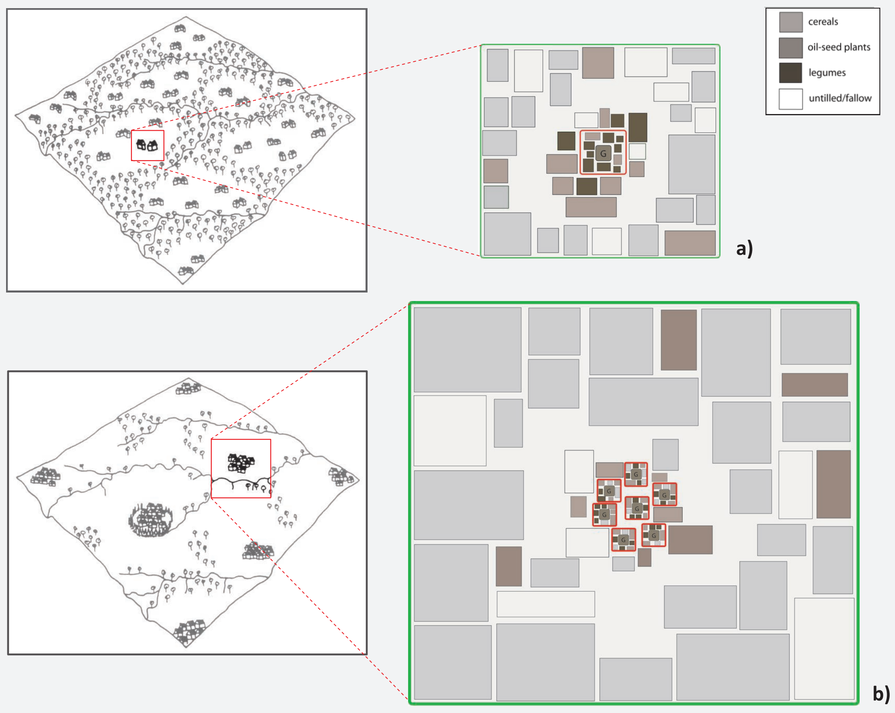

Fig. 8 Models of settlement structure after Simons 1989 for the Bronze Age and Iron Age in the Lower Rhine Basin (left) with models of the settlement types and associated farming land: **(a)** an individual farmstead [G] from the late Bronze Age to middle Iron Age **(b)** a village-like settlement with multiple farmsteads [G] from the late Iron Age.

References

Hillman 1984: G. Hillman, Interpretation of archaeological plant remains: The application of ethnographic models from Turkey. In: W. van Zeist/W.A. Casparie (eds.), Plants and Ancient Man (Rotterdam/Boston 1984), 1–41.

Jones 1984: G. Jones, Interpretation of archaeological plant remains: Ethnographic models from Greece. In: W. van Zeist/W.A. Casparie (eds.), Plants and Ancient Man (Rotterdam/Boston 1984) 43–61.

Simons 1989: A. Simons, Bronze- und eisenzeitliche Besiedlung in den Rheinischen Lößbörden. Archäologische Siedlungsmuster im Braunkohlengebiet. BAR Int. Ser. 467 (Oxford 1989).

Zerl 2014: T. Zerl, Archäobotanische Untersuchungen zur Landwirtschaft und Ernährung während der Bronze- und Eisenzeit in der Niederrheinischen Bucht (unpubl. PhD-Thesis, Goethe University, Frankfurt/Main).