The Hinterland of the *Colonia Ulpia Traiana* (Xanten): Supply Basis for the Town?

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The territory of the *Colonia Ulpia Traiana* comprised two *civitates*: the *civitas* of the *Cugerni* in the north and the *civitas* of the *Baetasii* in the south (fig. 1). Their landscapes were very different: While the *Baetasii* lived in the loess-belt with its high quality soils, the *Cugerni* inhabited a landscape of loamy and sandy soils with small scale changes of soil-types. This natural divide is virtually identical with the delimination of the distribution of *villae rusticae* and divides the Rhineland into a southern "villa landscape" and a northern "non-villa landscape". The border between the two lies a little to the north of the modern towns of Mönchengladbach and Neuss.[1]

In this paper, we will focus more on the northern part of the territory of the *Colonia Ulpia Traiana*, i.e. the immediate hinterland of the colony. The archaeological record here is still rather sparse, compared to other parts of the province *Germania inferior*.[2] Only in the last decade sites with Roman-period farms were excavated; accordingly, only a handful is known so far. Concerning our question whether the hinterland was a supply basis for the town, we can refer to settlement layouts, the material culture found in these settlements and archaeobotanical data. Unfortunately, no zooarchaeological data is available due to lack of preservation of bones in these soils.

Excavated settlements show byre-houses constructed of non-permanent materials. At the site Weeze-Vorselaer (fig. 2) the earliest buildings of the Roman period can be dated to Augustan times. These early byre-houses were still relatively small with lengths under 20 m. The younger houses of the site belonging to the 2nd and 3rd centuries and those from the sites Kevelaer-Grotendonk and Wachtendonk-Meerendonkshof were considerably larger with lengths up to 30 m. These settlements consisted of single farms. As the byre-part of the houses demonstrates, cattle seemed to have played an economic role.[3]

The density of settlement and thus also the availability of labour to grow crops and raise cattle is of course important for our question of supplying the town. Counting only the few excavated sites, we would have to negate the possibility. For a better understanding of settlement density, therefore, surface finds and reports of finds made in the 19th and the first half of the 20th century, which are kept in the database of the LVR-State Service for Archaeological Heritage in the Rhineland, have to be drawn upon as settlement indicators. The picture is that of a well settled region, though with gaps and concentrations of findspots (fig. 3). Settlement sites lie on low elevations (so-called Donken) in the Niers-plain – the river Niers being a tributary of the river Meuse – and on the southwestern slopes of the push moraines, which were formed during the Saale-Glaciation. Areas with wet soils and bogs are not settled. Clusters of findspots are located especially on the heights of the Reichswald push moraine. These are likely the result of

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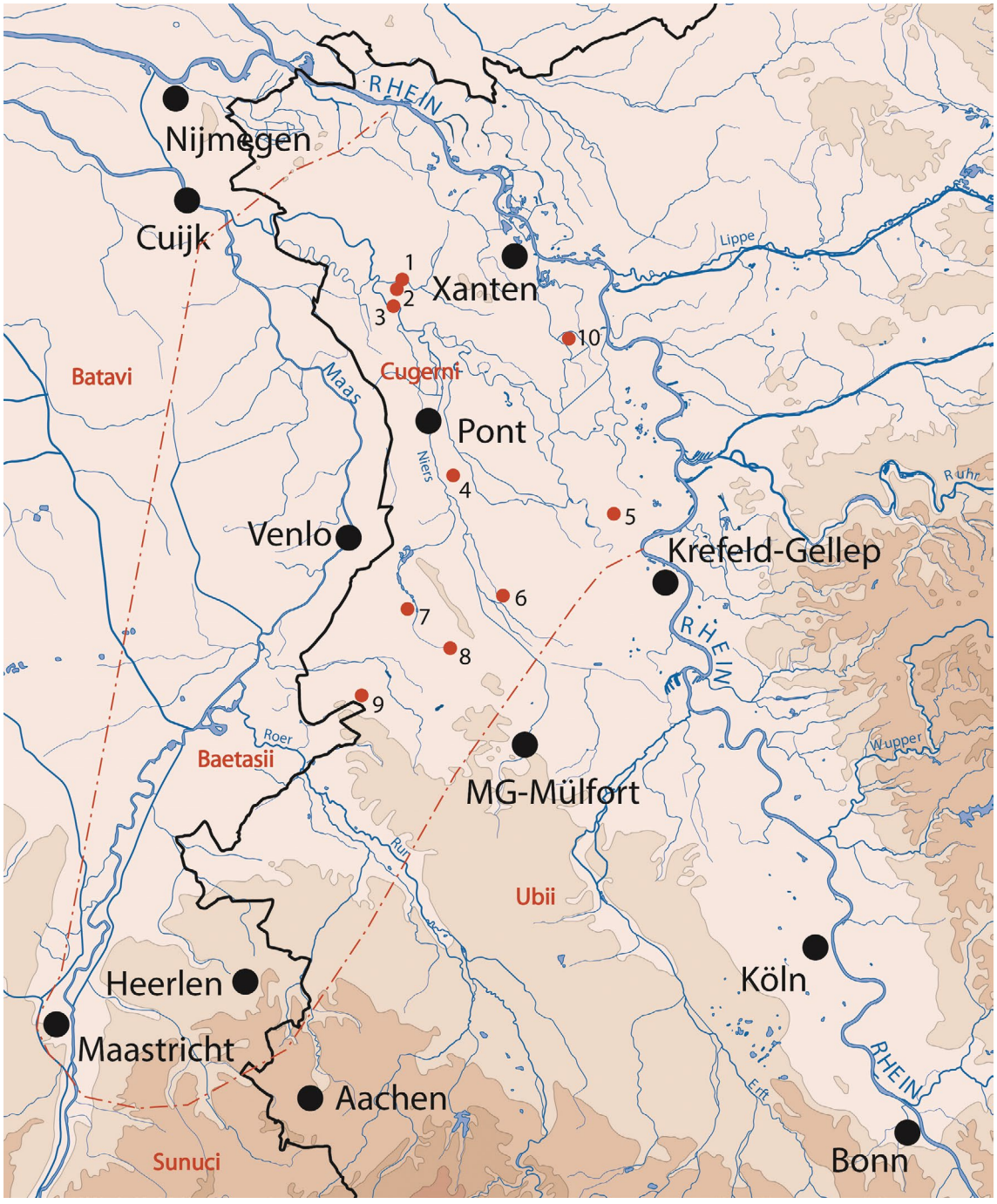

Fig. 1: Territory of the *Colonia Ulpia Traiana*. Numbers: (partially) excavated agricultural sites: 1) Kevelaer-Grotendonk, 2) Weeze-Vorselaer, 3) Weeze-Seisterather Hof, 4) Wachtendonk-Meerendonkshof, 5) Krefeld-Vennikel, 6) Tönisvorst, 7) Nettetal-Breyell, 8) Viersen-Dülken, 9) Niederkrüchten-Boschershausen, 10) Alpen.

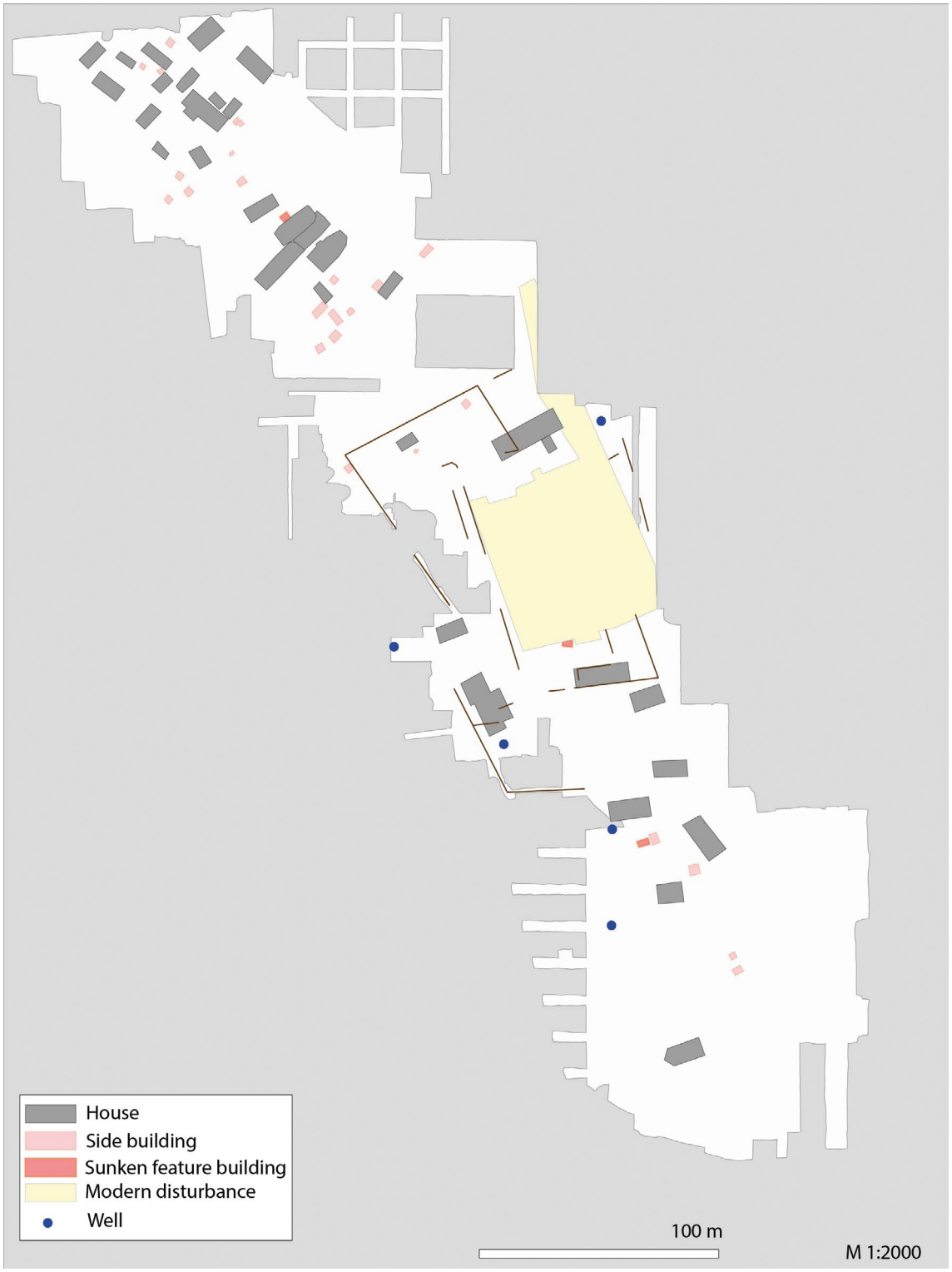

Fig. 2: Plan of the site Weeze-Vorselaer.

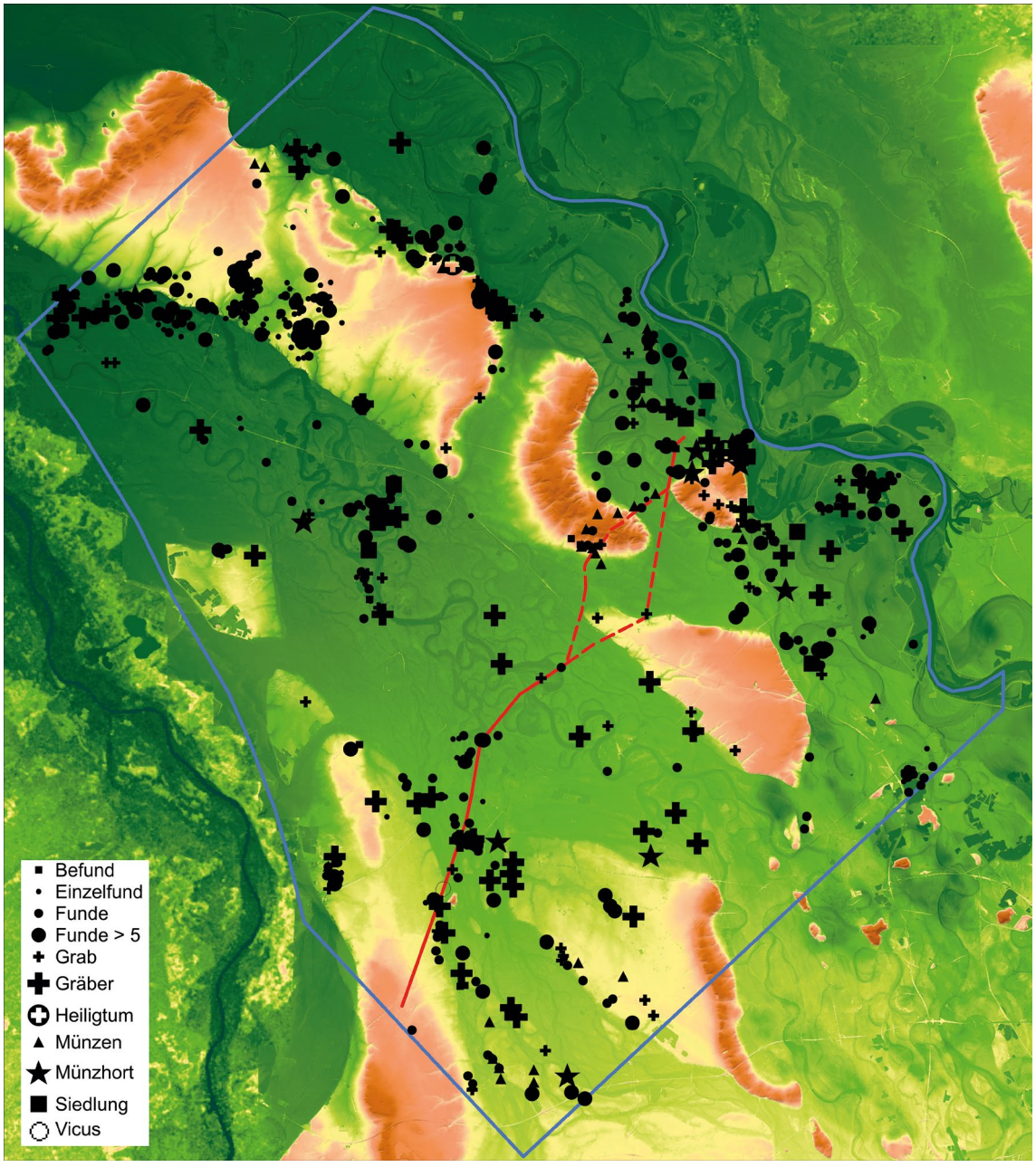

Fig. 3: Potential Roman settlement sites. Data to the east of the Rhine has not been mapped. Elevations are between 15 (green) and 100 m (brown) above sealevel.

research intensity,[4] but may well give an indication of actual site concentrations. On the floodplain of the river Rhine, the meandering of the river has completely reworked large areas in post Roman times, so an evaluation of Roman settlement here is difficult. Along the Limes-road military sites such as forts, watchtowers and numerous training camps

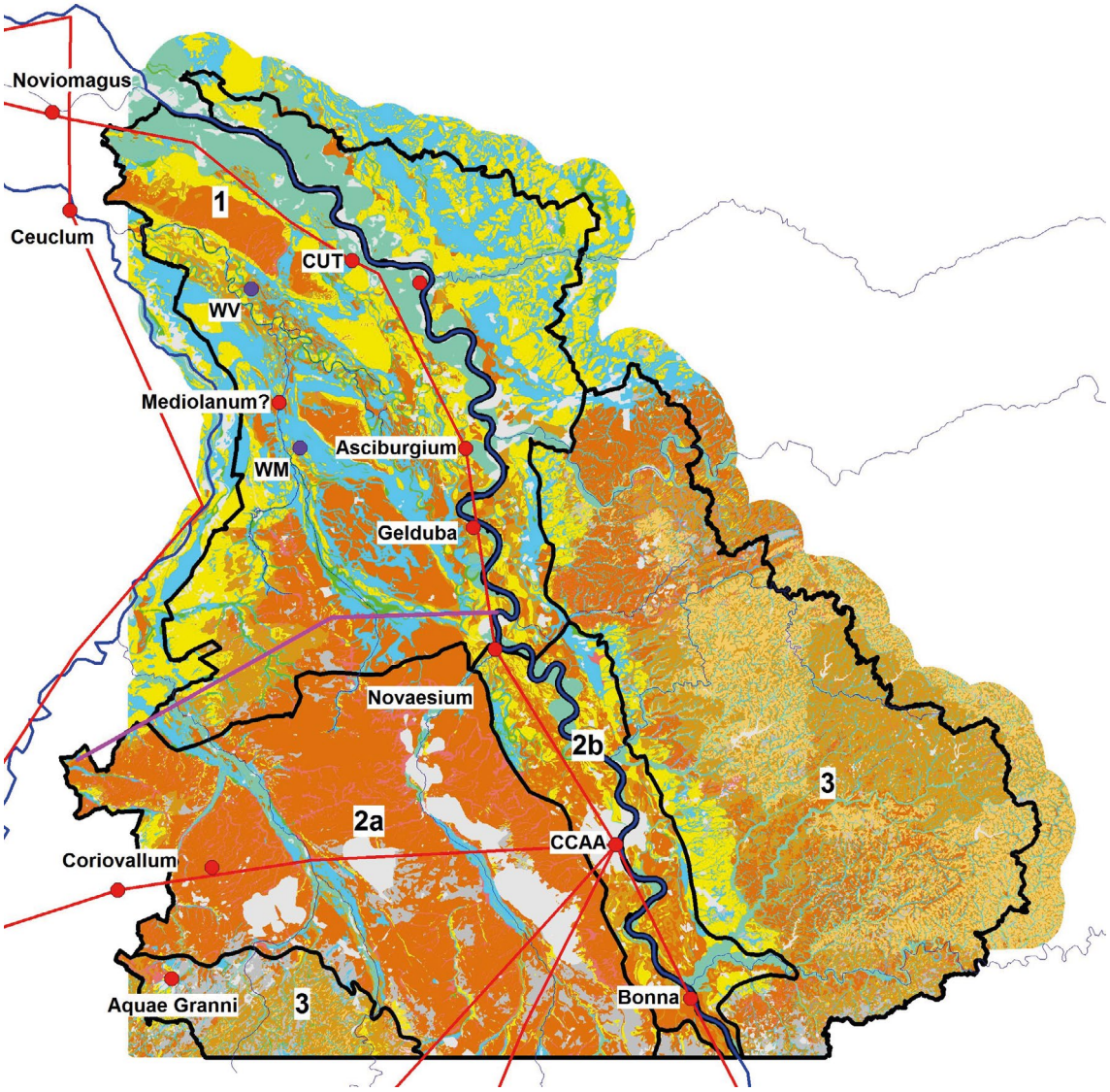

Fig. 4: Soil-type units for the Iron Age and the Roman period. Note that areas east of the River Rhine have been mapped, but not included into the calculation.

dominate the picture. Apart from an area to the southeast of the *Colonia Ulpia Traiana*, deliminated by a large meander of the river Rhine, there are no certain indications of civilian, agricultural settlements in the Limes-road.

Since the dataset allows only a general picture and is heavily biased due to the state of research, we have tried to reason the other way round: we checked the availability of land usable for farming. The digital soil-map of the „Geologische Dienst“ of North Rhine-Westfalia (State Geological Service) was evaluated in this respect. We have analysed the distribution of soil-types (fig. 4) and classified them

into soil-value classes (fig. 5). Though the map is based on the modern soil-map, it is not identical. Certain models have been used to establish a plausible model regarding soil-conditions in Antiquity.[5]

Luvisols possess a high to very high agricultural potential and are therefore used as arable land. They are suitable for the cultivation of demanding crops such as bread wheat (*Triticum aestivum*) and spelt (*Triticum spelta*) and are therefore categorised into the "high" and "very high" soil value classes. These soils make up 25% of the area on the lower Rhine compared to 55% in the loess-area. Cambisols on loamy parent material cover 12% of the northern area compared to 6% in the loess-landscape. They have a high agricultural potential, although not as high as the Luvisols on loess. Even so, these soils are suitable for cultivating demanding cereals. 22% of the soils in the northern area are Podsols and Cambisols on sandy parent material, compared to 5% in the southern area. The latter have middle to low soil values. Arable farming is possible on the more loamy-sandy soils (middle), especially if less demanding crops like barley (*Hordeum vulgare*) and millet (*Panicum miliaceum/Setaria italic*) are cultivated. Gleysols, Histosols and Stagnosols, for which soil wetness is characteristic, comprise 26% of the northern area and only 11% in the southern area. The wet root-zone in these soils reduces their potential for arable farming; they therefore have only limited productivity and are used as meadows and pastures. The Fluvisols of the Rhine floodplain are generally nutrient-rich – because they are regularly fertilised by floods – and therefore possess high agricultural potential. 11% of the northern region are covered by these soils and 4% of the southern region. The constant danger of flooding, however, was a limiting factor before the construction of the dykes along the river Rhine, which started in the 13th century. These soils could therefore rather be used as meadows and pastures and not for crop cultivation.

The main differences between the two natural units are soil properties and quality. While the southern Rhineland to the west of the river Rhine is dominated by a closed loess layer with very good soil properties, the Lower Rhine Plain in the northern lowlands exhibits more diversity. There is a small-scale alternation between different soil-types and in total the values of the different soil-types were less suitable for a more demanding cereal-based agriculture. Even though this landscape is less fertile than the loess-region, the soils in the hinterland of the *Colonia Ulpia Traiana* cannot be called infertile and poor, the potential was there. As a simplification, one can speak of a loess landscape and a less-loess landscape, because there are some loess islands also in the northern part.

To sum up: in the northern region, 70% of the land can be used for agriculture with 27% having „spelt quality" and 42% "barley quality". 27% are usable as meadows and pastures. The southern region has 83% arable land, with 68% of "spelt quality", 15% "barley quality" and 7% usable only for meadows and pastures.

	Lower Rhine Plain (I) 2705 km²		suitable for		
Soil value classes (GD NRW)	km²	%	demanding cereals	less demanding crops	livestock
very high	23,50	0,87	+	+	+
high	716,10	26,47	+	+	+
middle (incl. Fluvisols)	1437,60	53,15		+	+
low and very low	442,10	16,34			+
Disturbances	85,10	3,15			
Total:	2705,00	100,00	-	-	-

	Cologne Bay (II) 3060 km²		suitable for		
Soil value classes (GD NRW)	km²	%	demanding cereals	less demanding crops	livestock
very high	1185,00	38,73	+	+	+
high	890,58	29,10	+	+	+
middle (incl. Fluvisols)	587,52	19,20		+	+
low and very low	77,35	2,53			+
Disturbances	319,70	10,45			
Total:	3060,00	100,00	-	-	-

In the last paragraphs, we considered the potential of the soils in the Roman period. But what kind of vegetation actually grew there? Here, we can refer to the pollen diagram from Kleefsche Beek (fig. 6).[6] It encompasses the period from the Neolithic to the Early Modern period. This diagram comes from a site located on the floodplain of the river Meuse near Gennep (NL) and can be taken as representing the vegetation history of the whole of the Lower Rhine-Meuse region. The Iron Age pollen spectrum already reveals a high proportion of herbaceous plants and grasses. We have to surmise that vast woodland no longer existed by the Iron Age,[7] rather, some copses, groups of trees and bushes were scattered among the fields and pastures. Pollen proportions of 20–40% of herbaceous plants point to a largely open, cultivated landscape, a development that had started in the late Bronze Age. Development of heather as an indicator of overexploitation can already be seen at the start of the Iron Age. Obviously, with the Iron Age, animal husbandry had

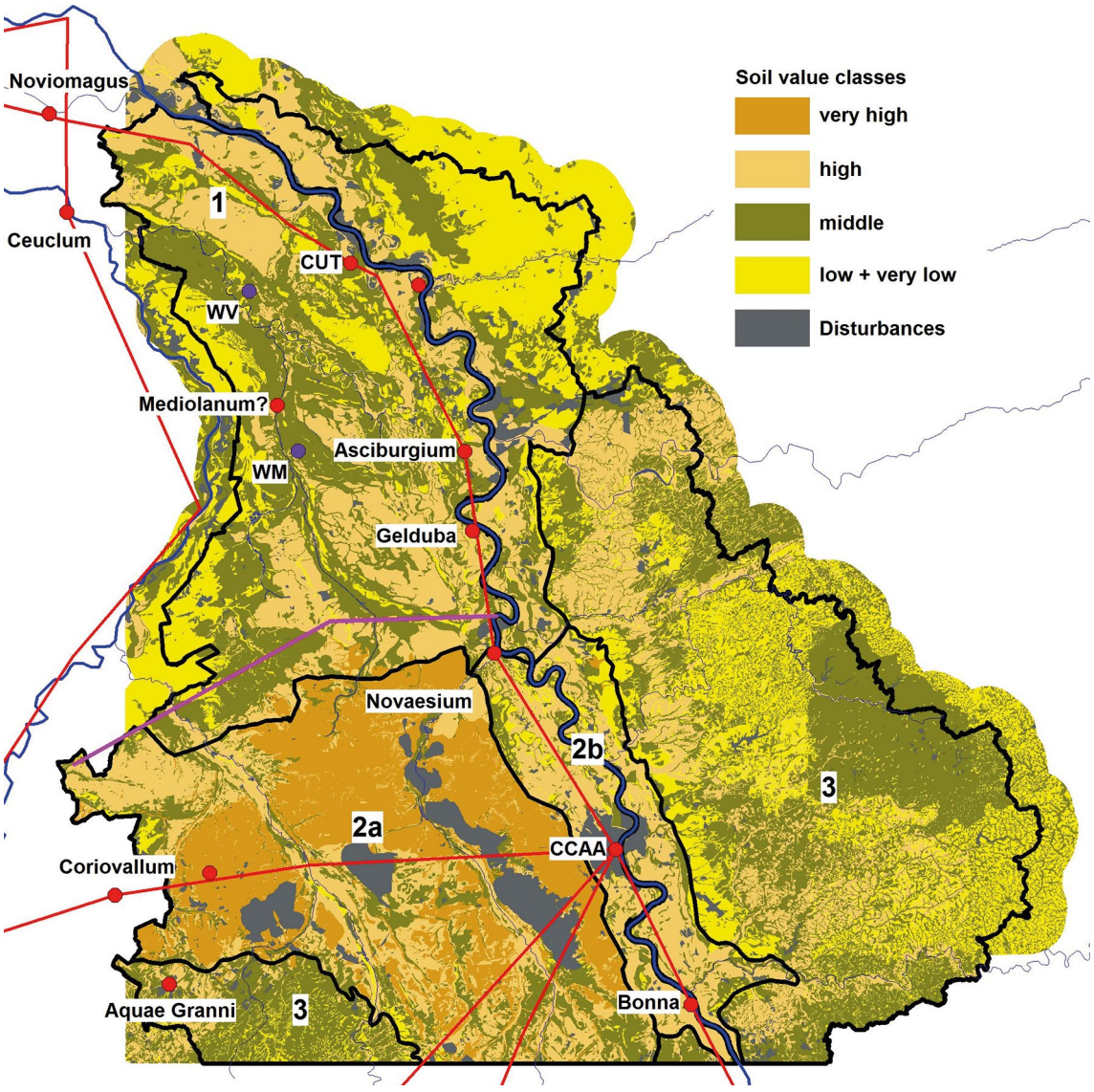

Fig. 5: Soil value classes.

changed significantly. It was no longer predominantly based on wood pasture and leaf-foddering, but on grazing on meadows. This led to the development of grass vegetation and – on nutrient-poor sandy soils – to the development of heathland. At the same time the area used for arable farming was probably expanded; this can be seen by the rise in cereal pollen in the diagram. Less woodland already in the Iron Age means less retention capability with the rise of the ground water level and as a result more wet soils and spreading of gleysols.[8] Furthermore, wet areas with alder forests get cleared. There seems to be pressure on the land, otherwise these low quality lands would not have been used.

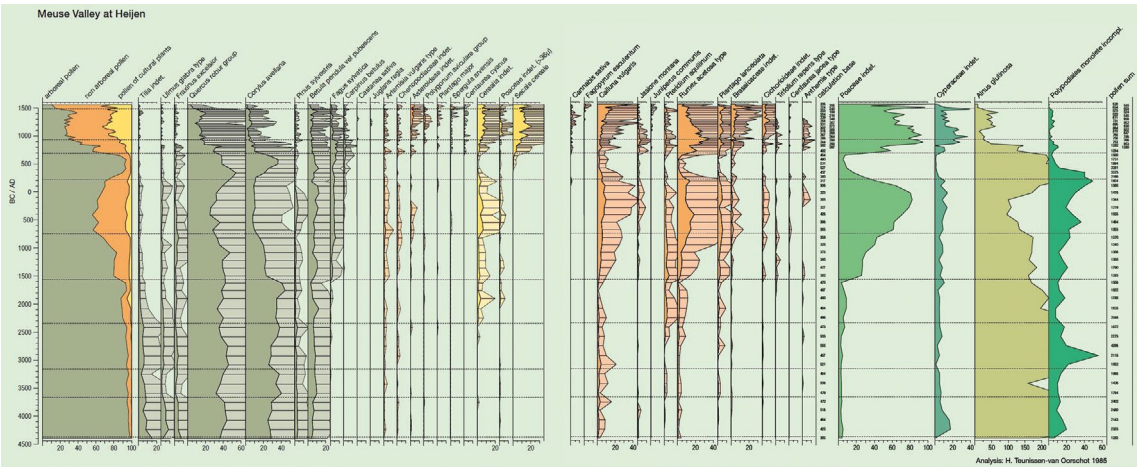

Fig. 6: Pollendiagram Kleefsche Beek.

Pollen indicating agriculture and also heather recede in Roman times. This is, however, not a result of population decline. In the opposite: Population density seems to increase and, at least in the southern parts of the Rhineland, a surplus in production is reached. How do these findings fit? It is a result of marginal soils being taken out of use and the regrowth of riverside forests. In the northern region, agriculture is still practised in Iron Age tradition, but it seems to be more efficient now. So, the farmers must have made something different than before. There might have been innovations, which we are unable to grasp at the moment. One explanation might be a decrease of sheep- and goat-husbandry in favour of cattle and horse, now on the higher quality soils.

Could the population of the CUT-hinterland IN THEORY supply the town (and the closest forts at the Limes)? The same question had been asked by Laura Kooistra, Marieke van Dinter and others for the Rhine estuary and answered through a model calculation.[9] Their assumptions were adapted for our working area (roughly the area between Nijmegen and Gellep).[10] We have looked at cereals and cattle demand on the one hand and possible production on the other hand. We had to estimate the inhabitants of the towns and forts, and also of the hinterland and their daily demand in cereals and cattle. According to this calculation, the rural population should have been able to create a surplus in cereal to supply the town. As we have shown above, the limiting factor was obviously not the land availability. Enough land was available for growing cereals, even demanding cereals such as spelt. Concerning cattle, land for meadows pastures was abundant. However, the number of farms seems – according to our knowledge of the settlement density and the assumptions underlying this model – not to have been high enough to create a surplus in cattle.

Which crops were grown in the hinterland of the *Colonia Ulpia Traiana*? Recently, the Weeze-Vorselaer and Wachtendonk-Meerendonkshof sites have provided new archaeobotanical evidence (fig. 7). Both settlements exhibit a spectrum of cultivated plants

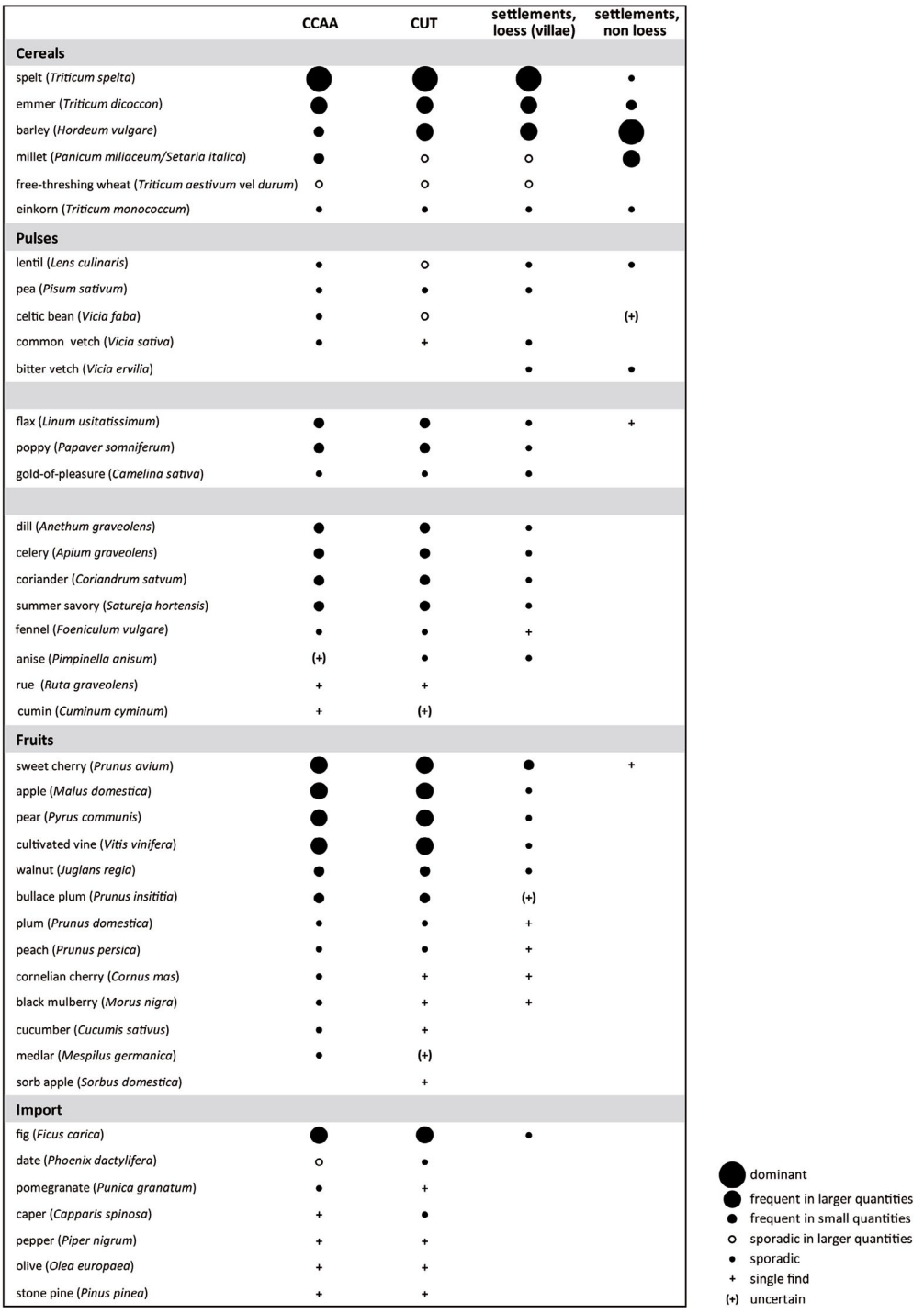

Fig. 7: Crop plants in the *Colonia Claudia Ara Agrippinensium* (CCAA), the *Colonia Ulpia Traiana* (CUT), in rural settlements in the Cologne bay (loess) and the Lower Rhine Plain (less-loess).

that very much resembles that of Iron Age sites: barley (*Hordeum vulgare*) predominates, broomcorn and foxtail millet (*Panicum miliaceum, Setaria italica*) were also important; emmer (*Triticum dicoccon*) and sporadically spelt (*Triticum spelta*) have been found. A few pulses occur, such as lentil (*Lens culinaris*), bitter vetch (*Vicia ervilia*) and probably also celtic bean (*Vicia faba*); flax (*Linum usitatissimum*), too, is found. Likewise, the weed flora correlates to that of the Iron Age; taxa typical for Roman farming on the loess are absent. This is true for the cultivated crops as well. There are no indications of vegetables, spices and cultivated fruit, apart from two stones of sweet cherry (*Prunus avium*) from a well in Wachtendonk-Meerendonkshof.[11] Although they lived close to the Roman town, the farmers of the hinterland kept to a traditional (Iron Age) food pattern. If we compare the kinds of crops grown in the hinterland and consumed in the towns, the following picture emerges. The provincial capital *Colonia Claudia Ara Agrippinensium* (CCAA) and the *Colonia Ulpia Traiana* (CUT) are alike in their consumption pattern. The same pattern is evident in the loess-area, i.e. the hinterland of the CCAA, but the hinterland of the CUT differs. According to this evidence, it is obvious that the immediate hinterland did not grow cereals like spelt for provisioning the CUT. Furthermore, charred spelt-massfinds from the CUT contain typical weeds from calcareous soils, which cannot be found in the hinterland of the CUT.[12] The grain therefore has been brought in from suitable soils.

To sum up: Spelt is the dominant bread crop in Roman towns and forts on the Lower Rhine. Its cultivation in the Rhineland takes place in the villa-system in the loess-landscape, where people built, cultivated and consumed in Roman style. There is enough land of sufficient quality available also on the lower Rhine to cultivate crops and supply for the CUT, but spelt is not cultivated on a larger scale and the villa-system is not introduced here. A possible reason is that the small scale change of soils against the uniformity of the soil in the south did not allow the same use of more efficient farming techniques. Other reasons for not introducing a villa-system could also have been different structures of societies.

Even though obviously no fruit, no herbs, no spelt for the CUT were cultivated in its hinterland, some kind of economic interaction must have taken place, as the occurrence of Roman-made pottery in the vernacular farmsteads shows. The local population must have acquired it – and certainly other goods we are unable to grasp archaeologically. The growth of the farm buildings and an increase in the number of settlements during middle Roman period even indicate economic growth. So, what was the basis for this exchange?

Animal husbandry is often cited for the landscapes of the Lower Rhine,[13] only: no bones survived in the hinterland due to the sandy soils so no direct comparison can be made. According to the model explained above, the surplus in cattle would not be high enough. Of course, the model may be wrong (there were more producers and less consumption than surmised for the model calculation).

Research into the hinterland of the *Colonia Ulpia Traiana* is still at the beginning, compared to the neighbouring regions to the west of the Meuse, where development led-

archaeology has resulted in the excavation and publication of many more agricultural settlements of the Roman era. The evaluation of the recent excavations and comparison with other, better researched areas in *Germania inferior*, are promising further insights into economic and social developments, which will lead to a better understanding of town-country relations of the *Colonia Ulpia Traiana*. Concerning the immediate question of the provenience of cattle, isotopic analysis of cattle-bones from the *Colonia Ulpia Traiana*, where there were better preservation conditions than in the hinterland, might help to establish knowledge on trade networks for this commodity.

Notes

[1] Heimberg 2002/2003; Cott 2017.

[2] cf. Jeneson 2017, 31–40.

[3] cf. Brüggler 2017, 40–53 for a more detailed description of the sites and Langenhoff 2018 for an evaluation of the Wachtendonk-site.

[4] The area to the east of the confluence of Niers and Meuse was researched by Riedmeier-Fischer (1998) and an amateur-archaeologist, who conducted intensive and systematic field walking.

[5] cf. Gerlach et al. 2017, 73 f. for a more detailed description.

[6] Kalis et al. 2008; cf. also Gerlach et al. 2017, 80–86.

[7] The apparent predominance of arboreal pollen in the diagram is due to the fact that this derives from wind-pollinating trees and shrubs which have high pollen productivity and pollen which is dispersed by wind across a wide area.

[8] Gerlach – Meurers-Balke 2015.

[9] Kooistra et al. 2013; van Dinter et al. 2014.

[10] cf. Brüggler et al. 2017, 65–70 for details on the calculation.

[11] Gerlach et al. 2017, 82.

[12] Herchenbach – Meurers-Balke – Zerl in prep.

[13] Nolde (2018) implies that cattle was produced locally. Cf. also Roymans et al. 2015 for the neighbouring Meuse-Demer-Schelde area.

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Fig. 1: Territorial borders after Bridger 2008. Map: Chr. Duntze, LVR-Landesmuseum Bonn. Layout: M. Brüggler, LVR-Amt für Bodendenkmalpflege im Rheinland. – Fig. 2: Layout: M. Brüggler, LVR-Amt für Bodendenkmalpflege im Rheinland. – Fig. 3: M. Brüggler, LVR-Amt für Bodendenkmalpflege im Rheinland, on the basis of DGM25, © Geobasis NRW. – Fig. 4–5: R. Lubberich, LVR-Amt für Bodendenkmalpflege im Rheinland, on the basis of Bodenübersichtskarte 1:50,000 Geologischer Dienst NRW. – Fig. 6: Kalis et al. 2008, analysis H. Teunissen-van Oorschot 1985. – Fig. 7: T. Zerl, Labor für Archäobotanik, University of Cologne.

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