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Viking Age garden plants from southern Scandinavia – diversity, taphonomy and cultural aspects

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Plant finds recovered from archaeological sites in southern Scandinavia dated to the Viking Age reflect the diversity of useful plants that were cultivated and collected. This review presents the results of 14 investigations of deposits that are dated between AD 775 and 1050. The site types are categorized as agrarian, urban, military and burials. Garden plants are unevenly distributed, as the greatest diversity is recorded in features from urban contexts. We argue that taphonomic processes played an important role in the picture displayed. Archaeobotanical research results from neighbouring regions suggest that Viking Age horticulture has its roots in older traditions, and that the spectrum of garden plants is influenced by central and north-western European horticultural customs, which were to a great extent shaped by Roman occupation.

Keywords: garden plants; archaeobotany; Viking Age; southern Scandinavia; Roman food traditions

Introduction

This article presents the diversity of evidence for garden plants from archaeological contexts in southern Scandinavia dated to the Viking Age (AD 775–1050). Gardens in prehistory have, for centuries, been a rarely discussed topic. In recent years, it has been possible to gain more information by intensifying research in prehistoric settlements (e.g. Heimdahl 2010). In addition, interdisciplinary collaboration between archaeologists and palaeoethnobotanists has become a normal procedure at many excavations, and archaeobotanical investigations have been undertaken increasingly in recent decades. We are now able to date back the evidences for horticultural activities in southern Scandinavia to a time period before Christianization took place. Since information on gardening and garden plants in the written record from the Viking period is very sparse, the plant material, brought to light by archaeological activities, is the main source of knowledge to reconstruct the diversity and significance of gardening. Evidence from research on the layout of prehistoric farms can give hints on the possible locations of gardens, but when it comes to the spectrum of cultivated plants, the finds of remains of plants themselves are the central source of information. Archaeobotanical evidence for garden plants from the Viking Age forms the basis for this article, and the plant macrofossil record from northern Europe as a whole indicates that gardening was a widespread practice during the Viking Age period.

Definition of the term ‘garden’

Generally garden cultivation can take a variety of forms. A garden to one particular culture can be a field to another. Furthermore, the use of the term garden or field can vary between specialists. In some tropical areas the term garden is often used synonymous with a field, because horticulture is the dominant land use practice (Van der Veen 2005, pp. 157). Consequently the definition of the cultivated area in discussion is important. The focus of this article – the kitchen garden – is the garden located close to the settlement and characterized by small-scale cultivation of crops. The kitchen garden is a human construction and it is defined by two fundamental characteristics: it is delimited and cultivated. The same can be said for a field and there is thus no unambiguous division between the two terms. This becomes more apparent if we look at cultures or at areas with other societal and climatic platforms than our own. The term horticulture or gardening defines the use of a garden, including the cultivation methods.

Other concepts to define a garden in general are the scale of cultivation, the cultivation methods and the location of the cultivated area, as well as the diversity and type of crop (Gleason 1994; Jones 2005, pp. 165). Generally the cultivation of a kitchen garden is distinguished from agriculture by the devotion to cultivation of several species together, each species represented by a relatively small number of plants in contrast to the large-scale field cultivation of a single crop. Some of the plants grown in gardens require more intensive cultivation than field crops, as some garden plants are more demanding when it comes to manuring, watering and soil management. Plants

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usually considered to be garden crops are vegetables, herbs and spices, as well as medicinal plants. But fruit trees and bushes can also be regarded as a common garden element in the Viking Age. The pleasure garden is often considered to be a medieval or modern arrangement. However, many useful plants have a decorative expression, and a garden layout with an ornamental composition is possible even in a prehistoric context, although our knowledge is currently not adequate. Interestingly Ann-Marie Hansson mentions the possibility of the cultivation of Jacob's ladder (*Polemonium caeruleum* L.) and common daisy (*Bellis perennis* L.) as ornamental plants in Viking Age Birka (Hansson 2001). It is difficult, however, to find evidence in the archaeological material for the cultivation of plants for their aesthetic expression alone.

The physical detection of a garden area in the archaeological context is often indicated by boundary systems. The boundary around a garden can consist of elements such as wooden fences, hedgerows and stone walls as well as terraces, embankments, roads and buildings (e.g. Petterson 2002, p. 502). The fence around a cultivation plot signals ownership and protects the garden from animals and wind.

When attempting to decide whether a plant is a garden or field crop, harvesting methods and rotation cultivation systems are elements to be considered. Many of the plants denoted as garden plants are inconvenient in the general field rotation systems as they are either perennial or biennial plants. Furthermore, some vegetables are harvested successively over a longer period as opposed to, for instance, cereals. Some useful plants were probably harvested from the wild or managed but never cultivated. This could be the case for sweet gale (*Myrica gale* L.), which is a plant that often grows on heathland and on bogs (Hansen 2005, 137pp.). Some of the oldest written sources mention sweet gale gardens and the ownership of these, which indicates that even plant resources located further away from the settlement could be subject to ownership rights (Jensen 1979, p. 72). Sweet gale was in this period probably not a cultivated plant but rather a managed wild-growing resource (Karg and Günther 2002).

It is thus not simple to define a garden plant in the Viking Age or in prehistory in general, because trying to resolve what was grown in gardens, and what was gathered from wild-growing plant resources is, in the case of many plant species, complicated (Karg and Robinson 2002, p. 137). In addition, many oil and fibre plants thrive in field cultivation, but there are examples pointing at plants, such as gold of pleasure (*Camelina sativa* L.) and flax (*Linum usitatissimum* L.), being cultivated by horticultural methods in Scania (southern Sweden) during the early Iron Age (Regnell 2001). Legumes, such as pea (*Pisum sativum* L.) and bean (*Vicia faba* L.), thrive on large-scale cultivation and are often considered to be field crops, but additional evidence points to pea being cultivated in small urban medieval gardens

(Hansen 2008, p. 107). Legumes have several soil-improving effects to be utilized in garden, as well as in field cultivation (Körber-Grohne 1987).

In some of the earliest written sources that deal with gardening and garden crops, the term *kålhave* (kale garden) is mentioned (Hoff 1997). In this context kale is probably to be understood as a variety of leaf vegetables. These could consist of species within the Brassicaceae family. It is often difficult, however, to determine the exact species of *Brassica* on the basis of archaeological plant macrofossils. Wild-growing species of *Brassica* are frequent on disturbed soils and can therefore be considered as a part of the local flora in areas with human activity such as settlements. A range of species of *Chenopodium* and *Polygonum* as well as corn spurrey (*Spergula arvensis* L.) have been discussed as possible cultivated plants (Helbæk 1958; Mikkelsen 1994, p. 96; Karg 2012). The plants are edible and are found at many archaeobotanically investigated sites. The seeds of these plants were also detected in the gut of bog bodies dated to the early Iron Age (Harild *et al.* 2007). However, it is necessary to take into account that these plants are common weeds in field crops, and the presence in the stomach contents of bog bodies could be unintended.

Materials and methods

Records of possible garden plants dated to the Viking Age are summarized in Table 1 and mapped on Figure 1. The geographical area discussed includes 14 excavations at 12 localities from present-day Denmark, Scania (southern Sweden) and Schleswig (northern Germany). The plant finds consist of preserved plant parts like seeds, fruits, stems, roots and flowers, but the majority of the finds are seeds and fruits. Information on the find circumstances of the plant record has been retrieved from available archaeobotanical reports as well as published sources, and the references are given in Table 2. As our focus is on plant finds dated to the period AD 775–1050, the broad dating of several archaeobotanically investigated sites and features has reduced the number of localities available. To counterbalance the effect of the dating restrictions on the material, the spectrum of garden plants is compared with the evidence from northern Europe on a wider timescale (Table 3).

The sites included in this article have been categorized as agrarian or urban settlements, or burial and military sites. The urban sites are defined as settlements in cases where agrarian production is of less importance compared with other occupational activities. The establishment of a regulated marketplace seems to have played a fundamental role in the formation of the majority of the early urban settlements discussed here (Nielsen 2010, p. 232).

Table 1. Finds of garden plants from archaeobotanically investigated sites. The plant species (in a few cases only the identification to genus level was possible) are listed alphabetically in groups according to their presumed use. Nomenclature follows Hansen (2005).

Site (century AD)	Fyrkat (980)	Elisenhof (775–1000)	Archsum (800–1000)	Hedeby settlement (800–1000)	Hedeby harbour (800–1000)	Stengade II (900–1000)	Vorbasse (949–1000)	Viborg Sønderø (1018–1035)	Kalundborg (775–1050)	Kosel (775–1050)	Århus Søndervold (900–1050)	Tinggård (900–1050)	Lund (1020–1050)	Viborg St. Skt. Pederstræde (1025–1050)
Plant species														
Vegetables and legumes														
Angelica (<i>Angelica archangelica</i>)					•									
Bean (<i>Vicia faba</i>)		•	•	•	•					•		•		
Bishop's Weed (<i>Aegopodium podagraria</i>)	•	•												
Cabbage (<i>Brassica oleracea</i>)	•													
Carrot (<i>Daucus carota</i>)		•		•	•									
Chicory (<i>Cichorium intybus</i>)				•										
Onion (<i>Allium</i> spec.)								•						
Pea (<i>Pisum sativum</i>)								•		•	•		•	
Herbs, spices, medicinal plants														
Celery (<i>Apium graveolens</i>)		•		•	•									
Common Butterbur (<i>Petasites hybridus</i>)											•			
Common Soapwort (<i>Saponaria officinalis</i>)			•											
Coriander (<i>Coriandrum sativum</i>)	•													
Henbane (<i>Hyoscyamus niger</i>)	•	•					•			•				•
Hop (<i>Humulus lupulus</i>)		•		•	•			•						
Opium Poppy (<i>Papaver somniferum</i>)								•						
Sage (<i>Salvia</i> spec.)	•													
Fruit and nuts														
Apple (<i>Malus sylvestris</i> /M. domestica)				•	•			•	•	•			•	
Cherry (<i>Prunus avium</i> /P. cerasus)				•	•									
Damson (<i>Prunus domestica</i> ssp. insititia)				•	•	•							•	
Grape (<i>Vitis vinifera</i>)				•										
Peach (<i>Prunus persica</i>)				•										
Walnut (<i>Juglans regia</i>)				•									•	

Results

Vegetables

The plants are grouped according to their presumed utilization. Some of the species may have been used as vegetables, as well as herbs or medicinal plants. The list of vegetable species is not indicative of the actual diversity in cultivated vegetables of this period. The edible parts (e.g. leaves, shoots and roots) of many vegetables are harvested before seed production, and as the seeds are usually the most robust part of a plant and therefore have a greater chance of preservation, the presence of vegetables can be difficult to detect in archaeological deposits (Karg and Robinson 2002). Furthermore, the quantity of vegetable seeds harvested and stored for next year's planting is presumably quite small compared with the quantity of those for cereal crops. Table 1 presents the selection of vegetables found in Viking Age

deposits. Among the detected species, a single find of onion peel from a household waste deposit has been made. Onion (*Allium* sp.) is believed to have been highly appreciated, due to the strong and spicy taste. Additionally onion has a possible inhibitory effect on bacteria in food (Billing and Sherman 1998, p. 17).

Plant species like angelica (*Angelica archangelica* L.) and chicory (*Cichorium intybus* L.) were probably cultivated for their green parts, but the roots of chicory are also useful, and have in modern times been used as a coffee substitute. It is very likely that these plants were normally harvested before setting seeds. Angelica is traditionally considered to be a Viking Age garden plant (Eggen 1994, p. 45). It is mentioned in the Old Norse Kings' sagas from Iceland (Ramskou 1974, p. 53) and the use of this plant may have its origin in Norway. The

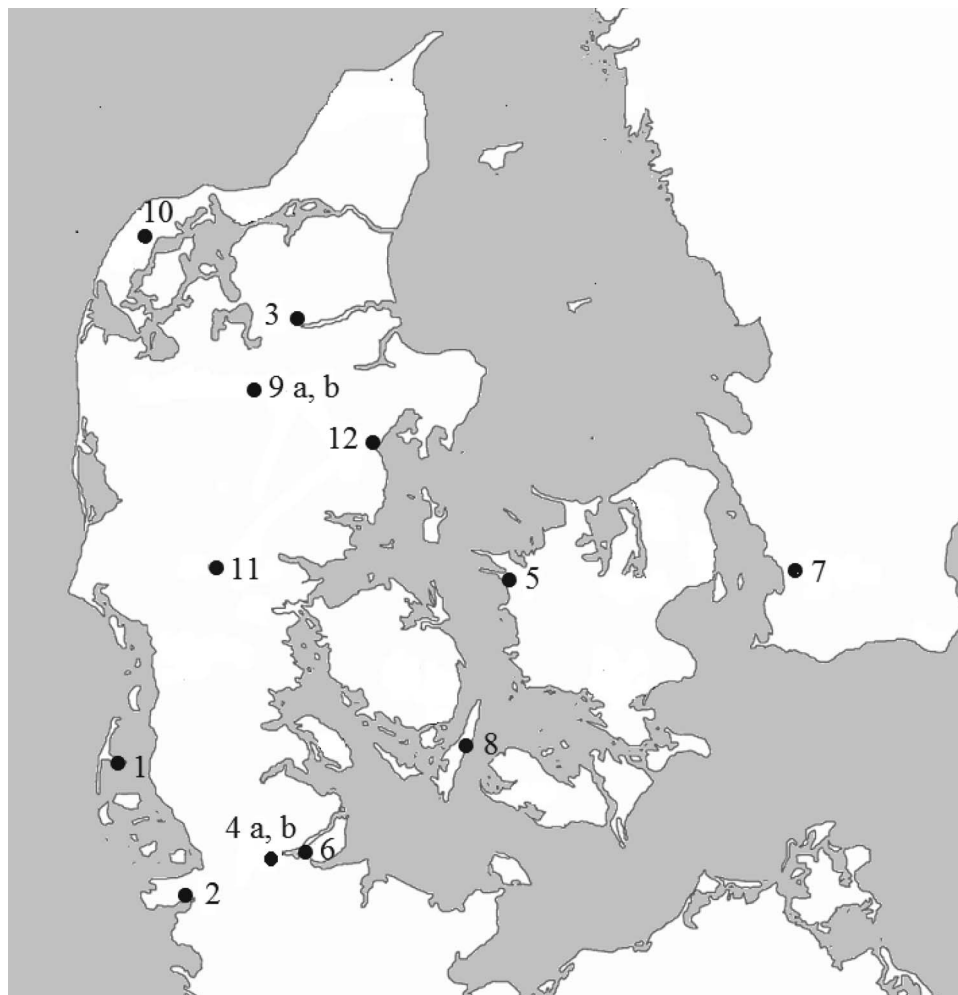


Figure 1. Map showing the locations with plant macro remains of garden plants discussed in this article. 1: Archsum, 2: Elisenhof, 3: Fyrkat, 4a: Hedeby settlement, 4b: Hedeby harbour, 5: Kalundborg, 6: Kosel, 7: Färgaren, Lund, 8: Stengade II, 9a: Viborg, St. Skt. Pederstræde, 9b: Viborg Sønder sø, 10: Tinggård, 11: Vorbasse, 12: Århus Sønder vold.

single find of angelica from Hedeby (Table 1) may have entered the archaeological context from natural habitats, but there is a real possibility that angelica was cultivated during the Viking Age.

Legumes, such as bean and pea, are present at several of the incorporated sites and have been cultivated throughout the Viking Age. Perhaps the introduction of Christianity with its periods of fasting may have led to an increase in the cultivation of pea, because pulses were important as a substitute for meat in the monastery diet (Hansson 2001, p. 211).

Herbs, spices and medicinal plants

As for the vegetables, the green parts of the plants categorized as herbs may have been used as a dietary supplement. Sage (*Salvia* sp.) was probably cultivated for the aromatic leaves and shoots and was most likely often

harvested before setting seeds. This means that there is little chance for sage to be detected in the archaeological record. The seeds of some herbs contain aromatic oils and they were therefore allowed to grow until seed production. Coriander (*Coriandrum sativum* L.) has from this period been observed as a single find from the Viking fortress Fyrkat (Figure 1, no. 3), where its seeds were discovered. Celery (*Apium graveolens* L.) was probably cultivated as a herb in this period and it was the seeds of the plants that were utilized (Greig 1996, pp. 222). The natural habitat for celery is in salt marshes and meadows, but is also found today growing wild in the vicinity of previously cultivated areas (Hansen 2005, p. 372, Behre 1976).

Opium poppy (*Papaver somniferum* L.) seeds have been detected in faecal deposits at the site of Viborg Sønder sø (Figure 1, no. 9b), indicating that the seeds were part of the diet. The plant may have been used for its oil-rich seeds, but the medicinal qualities have probably

Table 2. Information about the archaeobotanically investigated sites. The sites are mapped in Figure 1.

Site name	Dating AD of included features	Site type	Feature type	References
1 Archsum, Sylt	800–1000	Agrarian	Settlement layers, manure, well	Kroll (1987)
2 Elisenhof	775–1000	Agrarian settlement in the marsh		Behre (1976)
3 Fyrkat, Hobro	950–1000 (980 dendro)	Military site, burial ground	House 4 S, grain deposit, floor layer, grave	Helbæk (1977) and Pentz <i>et al.</i> (2009)
4 a. Hedeby settlement	800–1000	Urban, marketplace	Pits, wells, fence holes	Behre (1983), Lange (1997)
b. Hedeby harbour	800–1000	Urban, marketplace	Harbour sediment	Kroll (2007)
5 Kalundborg	775–1050	Agrarian	Wells	Moltsen (2009)
6 Kosej, Svans	775–1050	Agrarian	Longhouse, pit houses, rye deposit	Kroll (1986)
7 Lund, Färgaren	1020–1050	Urban	Culture layer	Hjelmqvist (1963)
8 Stengade II, Langeland	900–1000	Burial ground	Grave	Fredskild (1977, p. 25) and Skaarup (1976, p. 175)
9 a. Viborg St. Skt. Pederstræde	1025–1050	Agrarian	Floor layer in storage building	Jensen (1986)
b. Viborg Sønderø	1019–1035 (latrine), 1018–1025 (workshop)	Urban, workshop site	Floor layer, wells, manure, faeces (human), latrine	Fruergaard and Moltsen (2005) and Moltsen (2005)
10 Tinggård, Thy	900–1050	Agrarian	Culture layers	Henriksen (2006a)
11 Vorbasse	949–1000	Agrarian	Well	Henriksen and Mortensen (2008)
12 Århus Søndervold	900–1050	Urban, marketplace	Pits by the bank surrounding the settlement, pit houses F & U	Fredskild (1971)

also played an important role. Another species known as a medicinal plant is henbane (*Hyoscyamus niger* L.). A concentration of seeds was found in a woman's grave at Fyrkat (Figure 1, no. 3). Henbane is not native to the Scandinavian flora and must therefore have been imported (Heimdahl 2009, Pentz *et al.* 2009). The species may have been introduced to southern Scandinavia as early as in the Neolithic period (Jensen 1991, p. 312). Seeds are recorded from Pre-Roman and Roman Iron Age contexts at the site of Archsum on the Island of Sylt (Figure 1, no. 1) and Helmut Kroll mentions the possibility that henbane was cultivated at Archsum (Kroll 1987, p. 75, p. 137). It is however necessary to take into account the possibility of the plant having entered the archaeological deposits from natural habitats, as henbane quickly establishes itself as a weed around settlements (Heimdahl 2009, p. 123). Common butterbur (*Petasites hybridus* (L.) Gaertner, B. Meyer & Scherb.) is generally thought to have been introduced in Denmark in the fourteenth century as a remedy against the plague (Lundquist 2007, p. 34), but evidence from Århus (Figure 1, no. 12) indicates an earlier presence. Hop (*Humulus lupulus* L.) has been found at two of the investigated sites. For a long time, it was assumed that only beer flavoured with sweet gale was brewed in southern Scandinavia and that hop-flavoured beer did not make its entry until the thirteenth and fourteenth centuries (Karg and Günther 2002). The finds of hop from Viking Age sites show that hop as a beer additive was probably popular earlier than previously assumed. The finds of hop form a part of a regional pattern already originating in the late Iron Age, which, for instance, is seen in the finds of hop from the royal estate of Järrestad in Scania from the seventh century (Lagerås 2003) and from the early eighth-century marketplace of Ribe (Jensen 1986, p. 18; Robinson *et al.* 2006, pp. 110). Several Swedish provincial laws, which include some regulations that are likely to have their origins in the Viking Age, contain information on the layout of and the directives for the hop garden (humlegården; Hoff 1997, p. 117). Here, it is mentioned that the hop garden can be located within as well as outside of the area of a farm.

Fruit and nuts

Apple (*Malus* sp.) remains were detected in a number of features from the Viking Age. Apple has most likely played a significant role as a diet supplement, as the fruits can be stored fresh and dried and can be used for the production of juice and cider. Apples were found in the Oseberg ship burial in Norway, dated to approximately AD 850 (Holmboe 1927), and played an important role in Norse mythology, where the goddess Idun is associated with apples and youth (Steinsland 2005). In Charlemagne's 'Capitulaire de Villis', four varieties of apples are mentioned (Strank and Meurers-Balke 2008,

Table 3. The chronological distribution of a selection of garden plants illustrates the evidence of garden plants occurring in northern and central Europe during a time sequence that covers the Roman occupation, as well as the emerging urban settlements in the subsequent periods (based on Schultze-Motel 1992-94; Kroll 1995-2001; Karg *et al.* 2007; Strank & Meurers-Balke 2008; Alsleben 2009 and Heimdahl 2010). Nomenclature follows Hansen (2005).

Plant species	Before Christ				AD 1-400				AD 400-775				AD 775-1050				AD 1050-1300								
	Denmark	Sweden	Germany	Great Britain	Denmark	Netherlands	Germany	Great Britain	Denmark	Sweden	Netherlands	Germany	Great Britain	Denmark	Poland	Sweden/Norway	Netherlands	Germany	Great Britain	Denmark	Poland	Sweden/Norway	Netherlands	Germany	Great Britain
Apple (<i>Malus domestica/sylvestris</i>)	•		•	•			•	•	•	•		•	•	•		•	•	•	•	•	•	•	•	•	•
Bean (<i>Vicia faba</i>)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•		•	•
Beetroot (<i>Beta vulgaris</i>)	•		•			•	•	•				•						•						•	
Bishop’s Weed (<i>Aegopodium podagraria</i>)	•		•				•	•	•	•				•				•						•	
Black Mustard (<i>Brassica nigra</i>)			•				•	•										•		•	•	•		•	
Cabbage (<i>Brassica oleracea</i>)							•	•				•		•						•		•		•	•
Caraway (<i>Carum carvi</i>)			•			•	•	•										•				•		•	•
Carrot (<i>Daucus carota</i>)	•		•		•	•	•	•				•		•			•	•	•		•	•		•	•
Celery (<i>Apium graveolens</i>)	•	•	•	•	•	•	•	•	•			•		•		•		•	•	•	•		•	•	•
Chicory (<i>Cichorium intybus</i>)			•				•							•				•		•	•	•		•	•
Common Vervain (<i>Verbena officinalis</i>)			•		•		•	•												•				•	•
Coriander (<i>Coriandrum sativum</i>)			•			•	•	•		•	•	•	•	•				•	•	•	•		•	•	•
Damson (<i>Prunus insititia</i>)			•	•			•	•				•		•	•	•		•		•	•	•	•	•	•
Dill (<i>Anethum graveolens</i>)		•	•			•	•	•				•						•	•	•	•	•	•	•	•
Fennel (<i>Foeniculum vulgare</i>)			•			•	•	•										•				•		•	•
Garden Cress (<i>Lepidium sativum</i>)						•	•									•		•						•	•
Garden Orache (<i>Atriplex hortensis</i>)							•													•					
Greater Celandine (<i>Chelidonium majus</i>)							•	•				•								•		•		•	•
Good King Henry (<i>Chenopodium bonus-henricus</i>)							•	•											•	•		•			
Hemp (<i>Cannabis sativa</i>)			•			•	•	•	•	•				•		•		•		•	•	•	•	•	•
Henbane (<i>Hyoscyamus niger</i>)	•	•	•	•	•	•	•	•	•	•				•				•		•	•	•		•	•
Hop (<i>Humulus lupulus</i>)	•		•			•	•	•		•	•	•	•	•	•	•		•	•	•	•	•		•	•
Onion (<i>Allium spec.</i>)	•		•			•	•	•						•					•					•	•
Opium Poppy (<i>Papaver somniferum</i>)	•	•	•	•		•	•	•				•		•				•	•	•	•		•	•	•
Parsley (<i>Petroselinum crispum</i>)			•			•	•	•				•						•			•			•	•
Parsnip (<i>Pastinaca sativa</i>)			•			•	•	•							•				•		•	•		•	•
Pea (<i>Pisum sativum</i>)	•	•	•	•		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Pear (<i>Pyrus communis</i>)						•	•					•		•				•		•	•	•		•	•
Plum (<i>Prunus domestica</i>)			•			•	•	•				•		•				•	•	•	•	•	•	•	•
Radish (<i>Raphanus sativus</i>)						•														•				•	•
Rue (<i>Ruta graveolens</i>)						•	•	•	•															•	•
Sage (<i>Salvia spec.</i>)					•									•								•		•	•
Savory (<i>Satureja hortensis</i>)						•	•	•				•	•					•			•		•	•	•
Sour Cherry (<i>Prunus cerasus</i>)										•				•				•		•	•		•	•	•
Sweet Cherry (<i>Prunus avium</i>)			•	•		•	•	•				•						•		•	•		•	•	•
Thyme (<i>Thymus spec.</i>)							•											•						•	•
Turnip (<i>Brassica rapa</i>)	•		•	•		•	•	•				•						•	•	•	•		•	•	•
White Mustard (<i>Sinapis alba</i>)						•	•	•				•												•	•
Wild Mignonette (<i>Reseda luteola</i>)			•	•		•	•	•				•	•					•							•
Woad (<i>Isatis tinctoria</i>)			•	•	•	•	•	•											•						•

p. 322). Archaeological finds of “damson” (*Prunus domestica* ssp. *insititia*) indicate that this fruit was introduced during the Viking Age – perhaps the finds reflect the pioneer cultivation of plums in southern Scandinavia. At the burial site Stengade II (Figure 1, no. 8), six “damson” fruit stones were found in a female grave. The stones were placed in a small casted bronze box which had been wrapped in fine linen (Fredskild 1977, p. 25). Karl-Ernst Behre has made a thorough examination of the stones of “damson” found at Hedeby (Figure 1, no. 4a) and Old Schleswig (Behre 1978). As a result, the fruit stones were divided into four probable subspecies of which one – *Formenkreis* A – was by far the most common until the thirteenth century. *Formenkreis* A is almost exclusively the only variety of plum detected at Hedeby. This raises the question of whether the art of grafting was known in Viking Age Hedeby. However, the subspecies has the predisposition to produce root suckers, which can be replanted and grow into new plum trees with identical fruits (clones) (Kroll 2007, p. 320). Sweet cherry (*Prunus avium* L.) has been found at military camp sites and urban settlements as well as in rural areas in the Roman provinces. The cultivar appears to have been much appreciated and was probably introduced to the occupied parts of central and northern Europe during the Roman Iron Age (Strank and Meurers-Balke 2008, p. 379). Sour cherry (*Prunus cerasus* L.) does not seem to be part of the Roman food tradition. The species has been found at several slavic castles and settlements in ninth-century deposits, which indicates that sour cherry came to western and northern Europe from the east (Kroll 2007, p. 323; Strank and Meurers-Balke 2008, p. 382).

Some of the fruits listed in Table 1 are, in all probability, imported goods. Species such as peach (*Prunus persica* (L.) Batsch) and grape (*Vitis vinifera* L.), found at Hedeby, are garden plants, but it is very unlikely that these species were cultivated in southern Scandinavia due to climatic conditions (Behre 1983; Kroll 2007, p. 317). However, little is known about the garden techniques and garden equipment available in the Viking Age period. Cultivation of plants in a specularium (a kind of greenhouse or hotbed) and grafting were techniques known in Roman Italy (Farrar 1998, p. 160). Although it is difficult to confirm the use of horticultural methods such as a form of greenhouse cultivation in the present archaeological evidence, it is definitely a thought that needs consideration in a Viking Age perspective. Perhaps some of the gardening techniques used by the Romans followed the exotic plants on their way into central and north-western Europe.

A great number of nutshells of walnut (*Juglans regia* L.) were found at Hedeby. Today walnut is cultivated in Denmark, but the evidence from Hedeby points towards importation of the nuts, since neither walnut wood nor pollen of the species were detected in any of the samples

(Behre 1983, p. 50). New evidence of walnut pollen discovered in Scania from the period of approximately AD 600–800 indicates that the cultivation of walnut trees in southern Scandinavia is a possible scenario already in the Viking Age (Björkman 2007, p. 205).

Horticulture in southern Scandinavia in a western and central European perspective

At the beginning of the period in question, horticulture seems to have involved species that probably had a native origin in southern Scandinavia or had been introduced as cultivars in earlier periods. Plant remains of opium poppy, bishop’s weed (*Aegopodium podagraria* L.), henbane, dill (*Anethum graveolens* L.), common vervain (*Verbena officinalis* L.) and hop are found in features from Iron Age settlements in Scandinavia (Behre 1976, p. 26; Jensen 1986, p. 90; Kroll 1987, p. 75, pp. 137; Nielsen 1990, Heimdahl 2010). Species of kale or mustard are present in pollen spectra from the late Iron Age (Kolstrup 2009) and legumes have been cultivated since the Bronze Age (Lange 1997, p. 19). Celery is a native plant growing along the European coastlines and was probably already in use before the birth of Christ at sites located along the shores of the North Sea (Strank and Meurers-Balke 2008, p. 176). In addition, many species such as common elder and hazel, generally considered to be collected plants, may have been incorporated into gardens. It is apparent, however, that the Roman occupation had a marked effect on the cultivation of a wide spectrum of plants in central and north-western Europe. During a relatively short time span, a great variety of cultivated plants spreads over a quite large geographical area, as shown in Table 3. Some species with a Mediterranean origin found in Switzerland and south-west Germany, such as parsley (*Petroselinum crispum* (Mill.) Nym.), dill, celery and rue (*Ruta graveolens* L.) even predate the Roman occupation (Jacomet 1988, Strank and Meurers-Balke 2008, pp. 171, p. 189). Only rarely are remains of onion and its relatives encountered in archaeological features, although both onion (*Allium cepa* L. var. *cepa*) and garlic (*Allium sativum* L.) have been found in Roman Iron Age deposits in Germany (Knörzer and Gerlach 1999). In the southern Scandinavian Iron Age, onion was clearly important in the diet as well as symbolically, however. This is apparent from runic inscriptions of the word *laukaR* on gold bracteates (Hansson 2001, p. 221). Onion is definitely heavily under-represented in prehistoric samples, which is probably also the case in samples from medieval and modern times (Karg *et al.* 2007, p. 183, table 1). Throughout the Viking Age the spectrum of garden plants widens in southern Scandinavia and many of the cultivated species seem to be rooted in a garden culture originating in south and central Europe, where these species had been cultivated at least since the Roman Iron Age. Some vegetables,

herbs and fruit species such as parsnip (*Pastinaca sativa* L.), parsley, pear (*Pyrus communis* L.) and sour cherry (*P. cerasus* L.) were not detected in southern Scandinavian Viking Age samples but are present in Viking Age urban deposits along the shores of the Baltic Sea (Kroll 2007; Alsleben 2009; p. 68; Heimdahl 2010, p. 271).

Discussion

The spectrum of garden plant species included in this article contains plants that are generally considered to have been collected from nature. A wide range of species has obviously been used by the Vikings and many of them still today have a natural distribution in southern Scandinavia. For example, hazel (*Corylus avellana* L.) and common elder (*Sambucus nigra* L.) are repeatedly found in archaeological features and could have been deliberately grown in gardens. The nuts and berries from these plants could also have been harvested from wild-growing species around settlements, however. The numerous finds of hazel nuts show that they played a significant role in the diet. In addition, hazel populations may have been affected by anthropogenic influences on the environment around settlements, for instance, in the form of forest clearing, which may have encouraged the propagation of the species (Kirleis *et al.* 2011, p. 32). Some of the wild-growing plants were probably introduced as already cultivated species from elsewhere during earlier periods (Heimdahl 2010, p. 270). In the surroundings of most Viking Age settlements, a wide spectrum of berries was accessible, such as bramble (*Rubus fruticosus* L.), raspberry (*Rubus idaeus* L.), European dewberry (*Rubus caesius* L.) and strawberry (*Fragaria vesca* L.). Rose hips (*Rosa* sp.), rich in vitamin C, may have been an important fruit, and the flowers could have been used for decorative purposes (Henriksen 2006b). Several records from fruit trees reflect the significance of wild-growing species as a dietary supplement, e.g. berries of rowan (*Sorbus aucuparia* L.) and common hawthorn (*Crataegus laevigata* (Poir.) DC.; Behre 1983, pp. 45). Furthermore, a number of species that could have been used as dye plants are native to the southern Scandinavian flora. Evidence for the cultivation of plants used for dyeing, dated to the Roman occupation, is available from the Rhineland (Knörzer and Gerlach 1999). In archaeological samples with Viking Age features found in York, England, a number of possible dye plants were detected (Kenward and Hall 1995, Hall and Kenward 2004).

The range of Viking Age garden plant species is likely to be much more diverse than is reflected by the present state of the art. So far, the spectrum can only tell us to a limited extent about geographical variations in garden traditions in southern Scandinavia, although it is to be expected that there were variations between the regions. The limitations are essentially of taphonomic character

(Heimdahl 2005). Figure 2 shows that a greater number of plant species were found in towns (urban sites) than in agrarian sites. One of the main reasons is that the plant finds in towns are mainly preserved in waterlogged conditions. By contrast, the plant finds in agrarian sites are mainly preserved in carbonized (charred) conditions, with the exception of the site at Elisenhof (Figure 1, no. 2).

Figure 3 shows all the factors influencing the presence of a plant species in an archaeological context. Various natural and cultural factors affect the diversity of garden plants in the plant macrofossil record. Biological aspects such as the frequency and quantity of seed production, as well as the robustness of the seeds and other kinds of plant tissue, have to be considered too. Many garden crops are harvested before seed production and the handling of the plants, e.g. cooking and drying, will have an effect on the spectrum of plants that enter the archaeological context. Depositional processes probably constitute one of the main sources of differences in the record between urban and agrarian sites. In the urbanized environment, there is a quicker accumulation of cultural layers and the cultural layers are more rapidly sealed. At agrarian sites the organic waste is presumably utilized as manure, and the accumulation of layers is therefore limited. Organic material is usually preserved either by waterlogging or by carbonization, where the decomposition of the organic compounds is reduced or stopped (Andréasson and Hansson 2010, pp. 328). Carbonized seeds are resistant even in oxidized layers. Uncarbonized plant parts, however, are usually preserved in biologically inactive layers. Waterlogged features and sediments which are deficient in oxygen, such as wells, latrines and bogs, contain ideal conditions for preservation of uncarbonized organic material. As a result, conditions for preservation by waterlogging are generally more frequently present in urban layers, although features with good preservation conditions by waterlogging also exist in agrarian settlements, e.g. in wells and pits. Waterlogging generally preserves a more extensive and complete range of plant species and fragile plant material such as bran, kitchen refuse and faeces (Heimdahl 2005, p. 29; Moffett 2006, p. 42). Finally, processes such as reworking of soil layers and farming activity, as well as vagaries of sampling and analysis procedures, will influence the fossil record from archaeological contexts.

A greater number of plant species have been found at urban sites than at agrarian settlements. Early urban settlements or marketplaces were increasingly dependent on the production of food and textiles from the agrarian settlements, and in return, commodities traded over long distances were distributed from the marketplaces to the surrounding agrarian settlements (Steuer 2007, p. 150). Interaction and trade between urbanized settlements and the surrounding agrarian sites are thus reflected in the general archaeological material, but so far this is very sparingly displayed in the fossil record

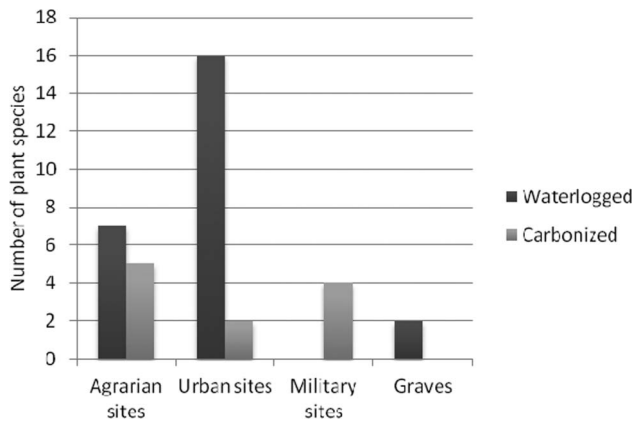


Figure 2. Number of plant species detected at different site types, preserved either by waterlogging or carbonization.

of garden plants. The reason for this could be due to the taphonomic processes outlined above. Future sampling from agrarian settlements – especially from waterlogged layers – will most probably change the picture of garden plant diversity for this type of site. During the centuries that followed the Viking Age the first towns were established in southern

Scandinavia and thereby the spectrum of garden plants increased (Karg 2007, 2010). It has been suggested, on the basis of the written record, that the medieval towns functioned as horticultural innovation and distribution centres (Tollin 2005). Again, these distribution channels do not seem to involve the surrounding agrarian settlements to a very high degree. More research into the garden plant spectrum for agrarian sites is essential in order to address this topic, using the archaeological record of garden plants.

It seems likely, however, that the urbanized settlements and marketplaces in the Viking Age functioned as gates, through which new cultivated species were introduced, and it has been suggested that the introduction of some new garden plants was initiated through connections between royal seats and marketplaces in Scandinavia and central European elite culture in the Viking Age (Heimdahl 2010, p. 271). The connection between Scandinavian sites linked to the royal sphere and European elitist customs is further emphasized if the finds from the ring fortress Fyrkat are taken into account, as the ring fortresses are generally considered to be constructed by a royal power. The Fyrkat plant finds include coriander, cabbage (*Brassica oleracea* L.) and sage and

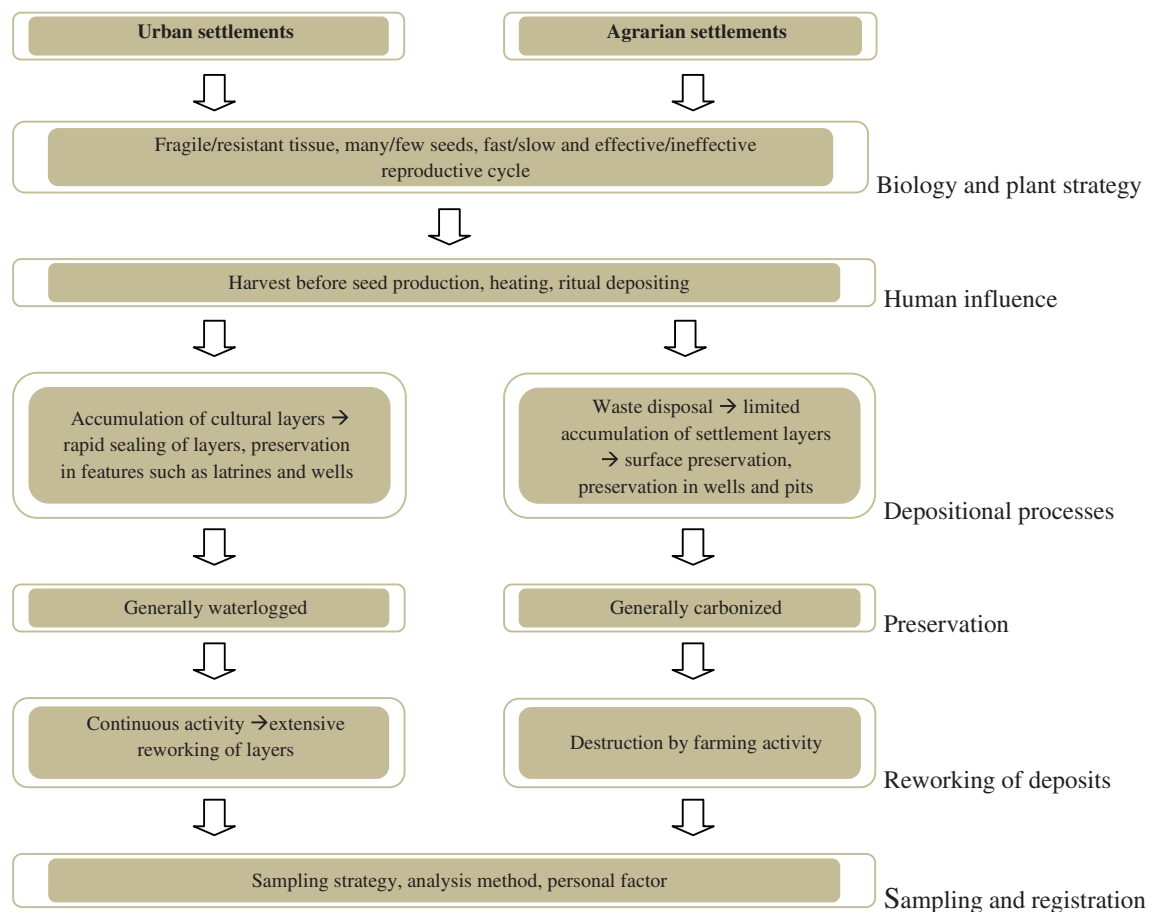


Figure 3. Model of the taphonomic aspects concerning plant macro remains from urban and agrarian settlements.

were originally interpreted as imports with an eastern or central European origin (Helbæk 1977, pp. 38). Recent strontium analyses have, however, indicated local cultivation (Karg *et al* in preparation).

Conclusions

In general prehistoric gardens and horticultural history in Scandinavia have been overshadowed by agricultural research, although the histories of garden and field cultivation methods are intertwined. Horticulture, in a variety of forms, has probably played a very important role for subsistence since the Stone Age. Cultivation of vegetables, herbs, spices and fruits in gardens was a widespread activity in the Viking Age, and inspection of the fossil record from archaeological samples makes it possible to visualize the cultivated garden in this period. Taphonomic restrictions may, however, limit the spectrum of plants detected. Furthermore, preservation conditions may obscure the picture of garden cultivation in agrarian settlements and lead to the idea that garden history is linked to a particular social class or environment. It seems likely that the early urban centres in the Viking Age functioned as gateways for new cultivated plants, which was probably also the case with the emerging towns in medieval Scandinavia. It remains elusive, however, to what extent new plants were distributed in the agrarian hinterland. The apparent under-representation of the range of cultivated garden plants may be compensated for by glancing at the plant remains of horticultural crop plants from neighbouring regions. The Roman occupation of large parts of Europe seems to have functioned as an impetus in the introduction of numerous garden plant species in the subjugated regions. The Romans brought along their food traditions and garden culture and it appears that many of the species incorporated into central and north-western Europe during the Roman Iron Age were gradually introduced into southern Scandinavia during the Viking Age, where the rulers of that time practised an expansive foreign policy. Evidence from northern Europe indicates that a wide range of garden plants was grown, and that more are waiting to be discovered in future excavations.

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