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ORIGINAL ARTICLE

‘‘Ontellicke boomen’’ or ‘‘countless trees’’: reconstructing the late medieval vegetation surrounding the 16th century St Margaretha Convent, Leiden, The Netherlands

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Abstract At an excavation of the late medieval St Margaretha Convent in Leiden (The Netherlands), archaeobotanical results could be compared with historical data. Both wood and macroremains were analysed to reconstruct the local vegetation and seek evidence of the cultivation of plants. The historical sources available for this estate are a charter prepared in 1572, which listed all trees present just after the abandonment of the convent, and an illustration from 1574 of the convent and its grounds. The charter mentions *Salix* and *Alnus* as the most numerous trees present, followed by several other taxa. The archaeological evidence from the wood remains, mostly construction timber with a dominance of *Quercus*, shows the use of indigenous taxa and some non-indigenous material, which was partly re-used. It is possible that some of the Coniferae were very early home-grown specimens. The trees represented in the macroremains were most probably growing in the immediate vicinity. They specify some of the taxa found as wood or mentioned in the historical text. The identified cultivated plants could all have been grown locally. The vegetation is in general represented by ruderal taxa and plants growing in wet conditions, which form an assemblage typical of an abandoned rural area.

Keywords Medieval convent · Construction wood · Macroremains · Historical data · Vegetation reconstruction

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Introduction

In advance of building activities, the city archaeologist of Leiden (The Netherlands) had the opportunity to excavate several plots in the Roomburgerpolder in 2003, a rural area southeast of the town of Leiden (Fig. 1). The plots are situated on the natural levées of the Oude Rijn (an old branch of the river Rhine), which form an elevation in the surrounding peat area. Part of the Roomburgerpolder is an archaeological monument, protected by law and containing the remains of the Roman *castellum* of Matilo and the main buildings of the St Margaretha convent (1464–1572). Traces of a Roman vicus and a 14th century farmyard were found in the non-protected (and excavated) area. A part of the grounds of the convent was also excavated, with remains of the 16th century farm buildings and a ditch system surrounding the property.

This study is focussed on the 15th/16th century contexts related to the convent. Archaeobotanical samples were taken from the ditches in order to reconstruct the local vegetation and to find evidence of the presence of cultivated plants. No pollen information was available because of the lack of undisturbed layers in the vicinity. Wood was collected mainly from the revetment of the ditch system and from two bridges. It was checked for its suitability for dating, and a question also asked was whether the wood was brought in from some distance or if it originated from local stands.

A great opportunity presented itself to compare the results from the archaeobotanical research with historical data thanks to the existence of an inventory of the trees on the convent’s estate, made just after the abandonment of the convent in 1572. Also available was an illustration of the convent and the grounds from 1574 (Fig. 2).

Fig. 1 The location of the excavation (Archeologisch Centrum Leiden/Biax *Consult*)

Materials and method

Many archaeobotanical samples were taken during the excavation. Three samples from the 15th/16th century ditches were selected for analysis. From each sample, subsamples of 2 l were sieved on mesh sizes between 0.25 and 5 mm. From the smallest fraction one-eighth was analysed, whilst the larger fractions were analysed completely. The macroremains were identified, using a microscope with magnifications of 6–40×, with the help of the reference collection of the Archaeological Centre of the University of Leiden and the taxa were classified according to Van der Meijden (1996) and Weeda et al. (1985–1994).

A selection of posts and planks of the revetment and all construction elements from the bridge were collected, together with some other worked elements. The wood was carefully washed on site and wrapped in cling film. At the Archaeological Centre of the city of Leiden all wood finds were described, dimensions taken and assessed for dating possibilities. Four samples were taken for dendrochronological research, two from the revetment, one from the bridge and one from a separate post. The research was done by RING (the Centre for Dendrochronology at Lelystad, The Netherlands). Three ^{14}C samples were submitted to the Centre for Isotope Research (Groningen, The Netherlands).

Pictures were taken of most of the toolmarks. Evidence of secondary use of the timber received special attention. Non-functional tenons (or series of tenons, sometimes with mortises), unusual toolmarks (for example on the point of a post, running in the opposite direction to what one would expect), and the presence of holes of woodworm on constructions below water level were used as indications of secondary use. Most of the *Quercus* and *Fraxinus* could be identified with the naked eye, whilst from the remaining wood thin sections were made from the transverse, radial and tangential planes. The slides were identified with the help of Schweingruber (1978, 1990) and the reference

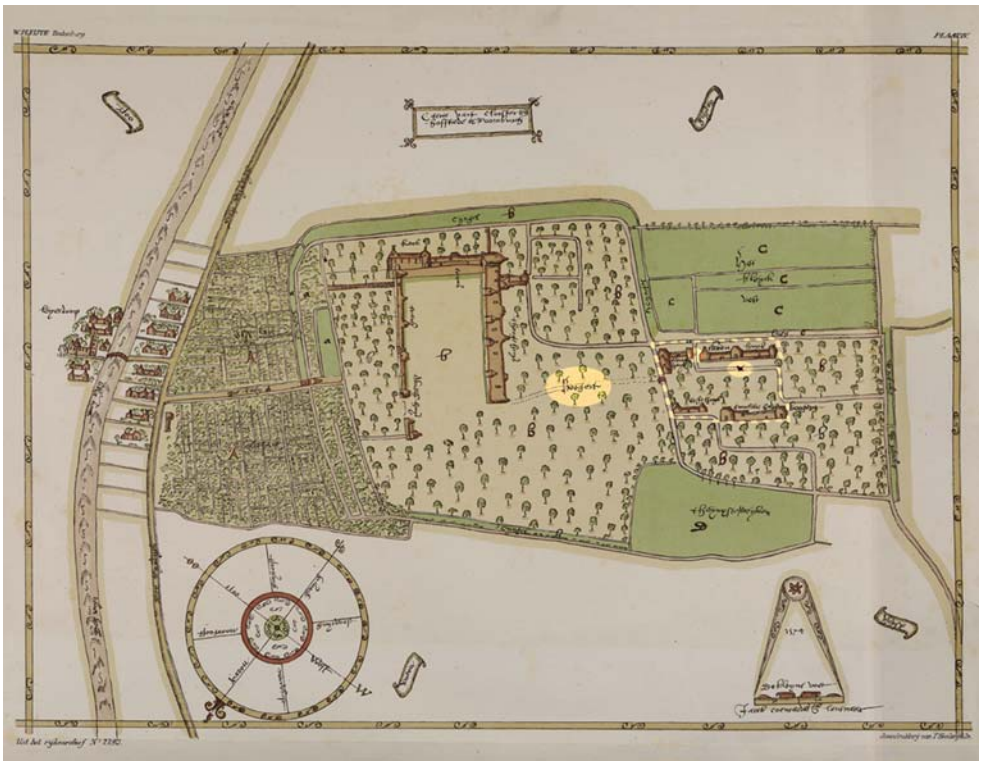


Fig. 2 Illustration from 1574 of the St Margaretha convent by Jacob Coenraedts. Two bridges and the word ''Boogert'' (orchard) have been highlighted. The excavated area is indicated by an interrupted, highlighted line

collection of BIAX *Consult* (Zaandam, The Netherlands). The identifications were made using a transmitted light microscope with 25–100× magnifications.

In order to correctly interpret the charter, it was transcribed into modern Dutch. The names of the trees mentioned were checked with the *Dutch dictionary of vernacular plant names* (Versluys 1907) in order to determine if a tree name could have different meanings. For instance ''*nootenboom*'' (nut-tree) could mean *Castanea*, *Corylus* or *Juglans*, but mainly refers to the last.

In some cases the charter gives the exact number of trees per taxon, whereas for other taxa the quantities are described in more vague terms. The authors categorized the share of the various tree taxa in the vegetation as follows: + (present, approximately ten in total), ++ (dozens), +++ (some hundreds), ++++ (some thousands), >++++ (many thousands).

Results and discussion

The macroremains

The three samples from the ditches contained relatively few seeds from possibly cultivated taxa, *Ficus carica*, *Morus nigra*, *Prunus avium/cerasus*, *Sambucus nigra*, *Vitis vinifera*, *Atriplex hortensis*, *Brassica nigra*, *Cannabis sativa*, and *Humulus lupulus* (Table 1). Such finds are typically interpreted as food waste in archaeological features thought to be cesspits, but in this case they come from a ditch 400 m away from the main building. It is therefore possible that these remains come from plants and trees which grew in the direct vicinity. It must also be taken into account that the cesspits of the main building could have drained into the ditches and the macroremains were distributed to the excavated area in this way. *Ficus carica* and *Vitis vinifera* could also have been brought in as (dried) fruit, but they are both typical of fruits cultivated in convents.

Besides the possibly cultivated tree taxa mentioned above, other trees were found: the samples contained some seeds of *Fraxinus excelsior* and *Crataegus monogyna* and many bud scales of *Salix*. This last genus includes many species growing in various conditions, but the majority grow in relatively wet environments, along ditches or riverbanks (Weeda et al. 1985). The seeds from *Crataegus monogyna* were sometimes used as medicine to stop diarrhoea and menstrual bleeding (Dodoens 1644, p. 1176; Munting 1696; Blankaart 1698). In historical sources there is no evidence of trade in berries on markets and they do not have an important economical role, so the fruits were probably picked from wild trees. The seed finds from the ditch probably do not reflect any medicinal use of the berries; they were probably from a tree growing near by.

A great diversity of ruderal taxa was found. The most conspicuous of these are *Atriplex patula/prostrata*, *Chenopodium murale*, *Cirsium arvense*, *Lamium maculatum*, *Rumex obtusifolius* and *Stellaria media*. Together they account for a quarter of the total amount of seeds found in the samples, and their share becomes even larger if the number of taxa is considered (Fig. 3). A third of the species found belong to plants growing in wet conditions like marshland and other places near water. Examples from this category are *Alisma plantago-aquatica*, *Chenopodium glaucum/rubrum*, *Eleocharis palustris/uniglumis* and *Urtica dioica*. Several taxa from open water were found with an abundance of seeds of *Lemna*. Some, such as *Hydrocharis morsus-ranae* and *Sagittaria sagittifolia* grow in still, undisturbed water (Weeda et al. 1991, pp. 219, 230). Only a small number of seeds from taxa which grow on dry soils were identified.

It is known from historical evidence that the period between the abandonment of the grounds and the actual demolition of the buildings, when the ditches were filled, lasted 2 years. In this period the area was neglected and the banks of the ditches were overgrown. This explains the dominance of ruderal taxa and plants growing in wet conditions. The presence of several taxa growing in open water, of which some prefer stagnant water, makes it unlikely that the waterways were still used for the transport of goods at that point in time. The whole picture is consistent with an abandoned rural area.

The construction timber

The analyses of the construction timber were limited to those elements that could be easily collected from the site. It is likely that a non-intentional selection was made, where the better-preserved pieces were collected and construction elements with poor preservation were not, because it was difficult to do so. It is therefore possible that less durable taxa are underestimated and some taxa may not have been found at all because they were not preserved. The dominance of *Quercus* may partly be caused by its high durability.

The construction timber derives from three contexts: the revetment of the ditch system, two bridges crossing the ditches, and separate posts that are unconnected to either of those contexts. Two of the dendrochronological samples gave *terminus post quem* dates: one from the revetment (after A.D. 1429 +9/–6, matched with the Baltic reference curve) and one from a post (after A.D. 1426 ± 6, matched with the west German reference curve). The ^{14}C dating resulted in two dates for the revetment (A.D. 1439–1517/1597–1617 and 1522–1569/1628–1659) and one for the bridge (A.D. 1427–1497).

The revetment was constructed of upright posts and horizontal boards (Fig. 4). In some places remains of

Table 1 Results of the macroremain analyses from three samples from the ditches

Macroremains total			
Cultivated plants		Marsh and ditch-sides	
Atriplex cf. *hortensis*	1	*Alisma plantago-aquatica*	4498
Brassica nigra	1324	*Alisma* sp.	49
Cannabis sativa	2	*Arctium lappa*	26
Ficus carica	32	*Bidens* sp.	1
Humulus lupulus	1	*Cerastium fontanum*	32
Morus nigra	4	*Cerastium* sp.	8
Prunus avium/cerasus	9	*Ceratophyllum demersum*	1
Sambucus nigra	16	*Chenopodium glaucum/rubrum*	216
Sambucus cf. *nigra*	18	*Cuscuta* sp.	40
Vitis vinifera	1	*Echinodorus ranunculoides*	8
Ruderal plants		*Eleocharis palustris*	248
Aethusa cynapium	3	*Epilobium* sp.	16
Anagallis arvensis	32	*Fraxinus excelsior*	1
Anthemis arvensis	40	*Glyceria fluitans*	1
Anthemis cotula	32	*Hydrocotyle vulgaris*	8
Atriplex patula/prostrata	224	*Juncus* sp.	8
Capsella bursa-pastoris	24	*Lychnis flos-cuculi*	1
Chenopodium album	2	*Lycopus europaeus*	104
Chenopodium ficifolium	17	*Oenanthe aquatica*	1
Chenopodium murale	1184	*Oenanthe fistulosa*	1
Chenopodium polyspermum	16	*Ranunculus flammula*	32
Cirsium arvense	280	*Ranunculus sceleratus*	136
Conium maculatum	18	*Rumex maritimus*	1
Crataegus monogyna	21	*Salix* sp. (bud)	466
Fallopia convolvulus	16	*Schoenoplectus lacustris*	8
Galeopsis bifida/speciosa/tetrahit	1	*Solanum dulcamara*	80
Galium aparine	1	*Sonchus arvensis/oleraceus*	8
Lamium album/purpurea	8	*Urtica dioica*	>>3200
Lamium maculatum	160	Open water	
Leontodon autumnalis	8	*Callitriche* sp.	16
Malva sylvestris	9	*Hippuris vulgaris*	8
Mentha arvensis	8	*Hydrocharis morsus-ranae*	8
Persicaria lapathifolia	109	*Lemna* sp.	288
Plantago major	120	*Ranunculus aquatica* type	8
Polygonum aviculare	17	*Sagittaria sagittifolia*	1
Prunella vulgaris	9	Dry conditions	
Ranunculus repens	9	*Anthriscus sylvestris*	86
Ranunculus sardous	8	*Daucus carota*	1
Raphanus raphanistrum	11	*Glechoma hederacea*	40
Rumex obtusifolius	440	*Trifolium* sp.	1
Sinapis arvensis	32	Other wild taxa	
Sonchus asper	192	*Atriplex* sp.	104
Sonchus oleraceus	32	*Brassica* sp.	1
Stellaria cf. *media*	73	*Carex* sp.	529
Stellaria media	240	*Mentha arvensis/aquatica*	32
Taraxacum officinale	16	*Poa* sp.	16
Tripleurospermum maritimum	8	*Rumex* sp.	57
Urtica urens	17	*Sinapis* sp.	8

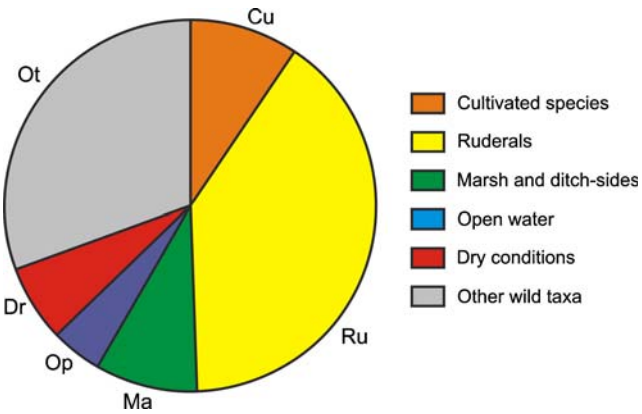


Fig. 3 Share of ecological groups of the macroremains from three samples from the ditches based on the number of taxa

Fig. 4 The revetment during the excavation (photo Archeologisch Centrum Leiden)

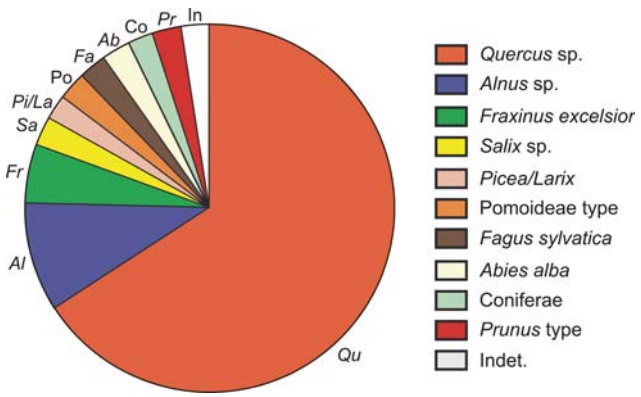


Fig. 5 The construction wood and other stray finds from the revetment

Table 2 Construction wood and other stray finds from the revetment

	Posts	Boards	Other stray finds	Total
Abies alba		1		1
Alnus sp.	4			4
Coniferae	1			1
Fagus sylvatica		1		1
Fraxinus excelsior	1		1	2
Picea abies/Larix decidua	1			1
Pomoideae type (*Malus/Pyrus/Crataegus*)		1		1
Prunus type (*P. armeniaca/dulcis/persica*)			1	1
Quercus sp.	9	7	11	27
Salix sp.			1	1
Indet.			1	1
Total	16	10	15	41

wattle work were present, but they were not collected. In total 16 posts were described, along with ten boards and several other worked elements. The results are presented in Fig. 5 and Table 2. Of the posts, nine were made of *Quercus*, four of *Alnus*, and the remaining three were of *Picea abies/Larix decidua*, *Fraxinus excelsior* and Coniferae. The latter could not be identified further because of poor preservation. Of the boards, seven were made of *Quercus* wood, and for the remaining three, *Abies alba*, *Fagus sylvatica* and Pomoideae type (*Malus/Pyrus/Crataegus*) were used. In the ditch fill near the revetment 11 worked elements of *Quercus* and one of *Fraxinus excelsior* were found, together with two small branches of *Salix* and *Prunus* type (*P. armeniaca/dulcis/persica*). This *Prunus* type can be distinguished from other *Prunus* taxa by the broader rays and a ring porous configuration of the pores.

Some of the construction pieces showed characters of secondary use (Fig. 6). These indications of previous use were only found on timber of *Quercus* and *Fagus sylvatica.* Timber without obvious characters of secondary use often had knots, and in some cases bark or sapwood were still present, characters that are seen as indications of inferior quality. These elements are probably from primary uses.

The timber showed traces of having been worked with a saw, plane and a variety of axes with straight blades, sometimes with burrs (Fig. 7). In two pieces, holes were found with traces of a drill. On one plank, marks of an inscription were vaguely visible. Several nails and pegs were found and holes of woodworm were present in some of the pieces. The carpentry was sometimes very rough, and in some instances clearly carefully executed.

Of the bridges, only the foundations were recovered. A total of 43 elements were described, comprising posts, boards and other construction elements. Of these, 38 were made of *Quercus*, two of *Salix*, and the remainder were of *Picea abies/Larix decidua* and Pomoideae type (*Malus/Pyrus/Crataegus)*. One piece could not be identified due to poor preservation (Fig. 8; Table 3).

Only one side of the support of the first bridge was excavated. It consisted of two large upright posts shored up by smaller posts, attached with iron nails. In front of these

Fig. 6 Indications for secondary use on an element of the revetment; two non-functional tenon and mortise joints and sawmarks (photo Archeologisch Centrum Leiden/BIAX *Consult*)

Fig. 7 An example of toolmarks from a plane on an element of the revetment (photo Archeologisch Centrum Leiden/BIAX *Consult*)

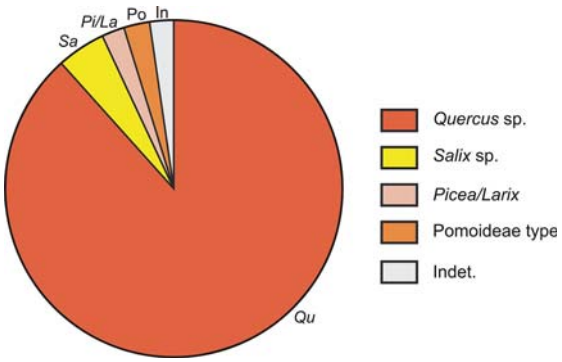


Fig. 8 The construction wood and other stray finds from the bridges

Fig. 9 The posts with crossbeams of bridge one (photo Archeologisch Centrum Leiden)

Table 3 Construction wood and other stray finds from the bridges

	Posts	Boards	Other stray finds	Total
Picea abies/Larix decidua		1		1
Pomoideae type (*Malus/Pyrus/Crataegus)*			1	1
Quercus sp.	12	18	8	38
Salix sp.			2	2
Indet	1			1
Total	13	19	11	43

posts were three smaller upright posts, with crossbeams that may have been used to stabilize the construction (Fig. 9). The various construction elements were all of *Quercus*. It is unclear if the trunk of *Salix* which was found on the bottom of the ditch formed part of the construction. Most of the bridge parts were made of knotty wood and bent trunks. None of the parts showed obvious indications of previous use.

The remains of the second bridge were excavated on both sides of the ditch. On either side a construction was built of two parallel rows of posts, protruding approximately 1.5 m into the ditch. On the outside of the posts several horizontal boards were fitted. In the ditch a layer of horizontal planks fitted together with tongues and grooves connected the two rows. Some upright boards were nailed onto this layer. Two slightly curved posts of *Quercus* were made from split half trunks. When fitted together it became clear that these were two halves of the same trunk (Fig. 10).

Most of the parts were of *Quercus.* One board had a corner missing, in which a piece of *Picea abies/Larix decidua* had been inserted, possibly a repair piece. Several of the parts show indications of previous use (Fig. 11). In several of the tenons, mortises were still present. One of these pegs was made of Pomoideae type wood (*Malus/Pyrus/Crataegus*). The parts without indications of sec-

Fig. 10 Two split *Quercus* posts of bridge two, that are halves of the same trunk (photo Archeologisch Centrum Leiden/BIAX *Consult*)

Fig. 11 Indications for secondary use on a bridge element; non-functional cross connection and part of a tenon and mortise joint (photo Archeologisch Centrum Leiden/BIAX *Consult*)

ondary use were mostly made from bent and knotty wood, as was the case with the first bridge.

The toolmarks on elements of this bridge showed traces of working with saw, plane, drill, gouge and various axes, of which several blades had large burrs (Fig. 12). Many nails were found and both traces from woodworm and infestation from an unknown, but probably aquatic invertebrate were noted (Fig. 13).

Apart from the timber of the revetment and the bridges, a total of nine posts were described. Five of these were of *Quercus*, two of *Salix* and two of *Alnus*. Several of the posts showed knots or remains of branches. All of the posts had been worked with axes with straight or slightly curved blades. In one case a saw had been used.

Most of the wood used in the bridges and revetment on the property of the St Margaretha Convent was *Quercus*. Other taxa recorded were *Alnus*, *Salix*, *Fraxinus excelsior*, Pomoideae type (*Malus/Pyrus/Crataegus*), *Prunus* type

Fig. 12 An example of toolmarks from a saw on a bridge element (photo Archeologisch Centrum Leiden/BIAX *Consult*)

Fig. 13 Infestation with aquatic invertebrate on non-archaeological material, identical to the traces found on the elements of the bridges (photo BIAX *Consult*)

(*P. armeniaca/dulcis/persica*), *Fagus sylvatica*, *Abies alba*, *Picea abies/Larix* and unspecified Coniferae (Fig. 14). Secondary use could only be positively identified for elements made of *Fagus sylvatica* and *Quercus.* These seem to be of a higher quality timber than the elements that were in primary use.

In Table 4 and Fig. 15 the distribution of the primary and secondary use is combined with the estimated diameters of the original trees used for the construction elements.

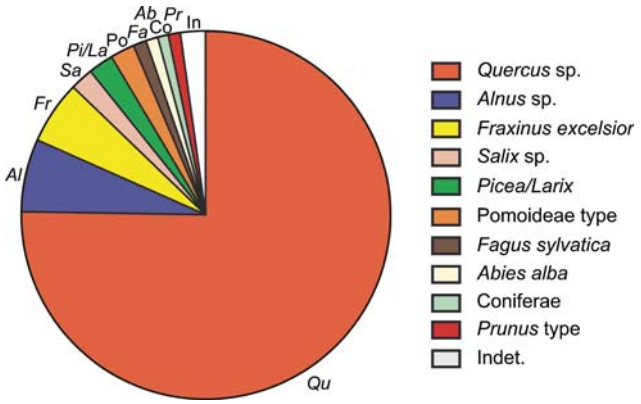


Fig. 14 The proportions of the different wood taxa found

The relatively large diameters of the original trees of which the secondarily used elements from *Quercus* and *Fagus sylvatica* were made, is one of the arguments for high quality.

Quercus is generally regarded as providing good timber, but with the exception of the re-used elements, most of the construction elements found here were of an inferior quality, as is shown by the many knots, the frequent occurrence of side branches, the presence of sapwood and bark (which is often removed from good timber) and the limited diameters. These elements all seem to have had only primary use and probably came from local stands. The same is true for the parts made from *Alnus*, *Salix* and *Fraxinus excelsior*. Remarkable is the extremely small diameter and inferior quality of two elements of Coniferae wood. In general *Abies*, *Larix* and *Picea* are assumed to be non-indigenous in this period in The Netherlands, and had therefore been imported. One would not expect small diameters and inferior quality in material that was imported. Cultivation of *Picea abies* is first mentioned in 1788, in the accounts of the ''Neder Rijkswald'' (Lower State Forest). The gardener Hendrik Roelofs, working in the estates of the Prince of Oranje Nassau, wrote an essay on tree cultivation after his retirement in 1794, in which he discussed the use of *Abies alba* seeds. Information on the cultivation of *Larix decidua* was first published by an unknown writer in 1780 (Buis 1985). The historical information that Buis collected was all on relatively large-scale cultivation. It is possible that these tree taxa were already being grown on a smaller, experimental scale, especially in convent or monastic gardens. At least a century before the above-mentioned sources, another gardener of the royal Oranje Nassau family, Jan van der Groen, wrote how to treat the seeds and small plants of *Larix decidua*, *Picea abies* and many other tree species which were used in planting schemes for (often monastic) gardens (Van der Groen 1687). It may be conjectured that some of these conifers grew in the gardens of the St Margaretha convent, too, but this would be a century before the earliest written source of Groen. Importation of the wood therefore cannot be ruled out. Two *Quercus* posts are certainly imported and originate from the Baltic and west Germany, as can be concluded from the strongest dendrochronological correlations.

The historical evidence

On 18 November 1572, a precise inventory of the abandoned grounds of the convent was made by a notary (Klooster Archieven 1572). In this document, all trees are listed that grew on the grounds shortly after the nuns had abandoned their convent and fled to the city of Leiden, in the dangerous times of the uprising of the Dutch against the Spanish king. Figure 16 shows an example of one phrase from the original text, the transcription, and the translation in English. Although the document is very clear on the various tree taxa growing on the grounds, the methods of counting them differ greatly in accuracy, which makes it difficult to compare quantities. Therefore an estimate has been made and the taxa divided in categories of quantity.

Table 4 Taxa classified in diameter groups. Numbers within brackets represent elements that were secondarily used

Diameter of original trees (cm)	0–10	11–20	21–40	>40	Unknown	Total
Quercus sp.	4	21(3)	26(8)	12(4)	7	70
Alnus sp.	2	4				6
Salix sp.	2		2		1	5
Picea abies/Larix decidua	1		1			2
Fraxinus excelsior	1	1				2
Pomoideae type (*Malus/Pyrus/Crataegus*)	1		1			2
Fagus sylvatica				1(1)		1
Abies alba					1	1
Coniferae	1					1
Prunus type (*P. armeniaca/dulcis/persica*)	1					1
Indet.	1	1(1)				2
Total	14	27	30	13	9	93

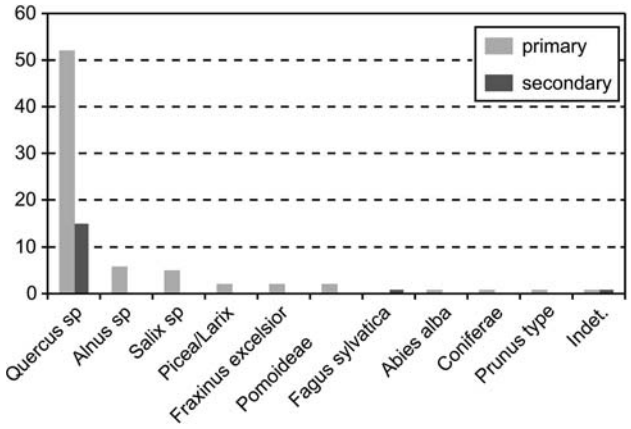
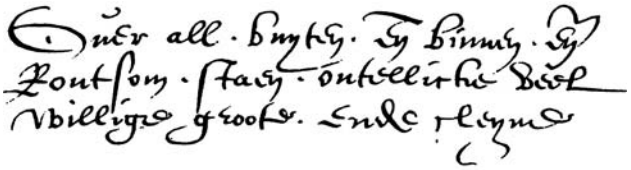


Fig. 15 The different wood taxa divided into primary and secondary use



Over all - buyten ende binnen - ende
Rontsom - staen - ontellicke veel
willige groote - ende cleyne

Everywhere, outside and inside, and around, there are growing countless willows (*Salix*), big and small

Fig. 16 Sentence from the original charter from 1572 with Dutch transcription and English translation (RAL/BIAX *Consult*)

It was obviously easy to count trees present in small numbers (+), so the data for this group are clear: *Populus alba* was counted eight times and *Juglans regia* 11 times. In increasing numbers, the next in line is *Quercus*, of which approximately 160 trees were present (+++), followed by *Fraxinus excelsior* with approximately 1,090 trees (++++). There are some curious differences in the counts of these two taxa: almost all these trees were accurately counted, for instance ''*from the stone gate to the priests gate 77 ash trees and three oaks on one side and on the other 145 ash trees*'', but sometimes an estimate was made: ''*from the priests gate to the dam, 315 ash trees and eight or ten oak trees*'', or even a guess: ''*…116 ash trees of which some are oak trees*''. For the last group (>++++) it is not surprising that the individual trees were rarely counted but were mentioned as ''many'' or ''*ontellicke''*, which means ''countless''. *Alnus* trees were ''*growing in many fields that were rented out''* (probably as coppiced woodland stands or ''*grienden*''*). Salix* in the form of trees or ''*thick old short stools*'' (''*stouen''*) were sometimes counted, but if they become ''*countless, big and small, everywhere outside and inside and around''* it is clear that the writer was no longer being so precise. It may also be imagined that no time was wasted on counting trees or shrubs that were present, but of no economic value, as for instance *Sambucus*.

Several orchards are mentioned, incorporating different kinds of fruit trees. Although it is made clear that there was a variety of fruit trees, none is specified.

In an illustration from 1574 by Jacob Coenraedts, the convent and its grounds are shown as they were before the abandonment (Fig. 2). The main building, the farm area, the ditches and the bridges that were excavated are clearly visible. Trees are drawn as two symbols: either as individual large trees or as very small shrub-like stands. An interpretation of the symbols used is difficult. They do not represent the different taxa, and there is no connection with the actual number of trees. They seem to symbolize the way the stands of wood were exploited: the smaller ones are probably the stands of coppiced *Alnus* and *Salix*. At least some of the large tree symbols represent the orchards, because these are clearly marked on the drawing.

Conclusions

Combining the results from the different data sets presented some difficulties, but it also created the possibility of indicating (with more precision than the separate results could) whether or not certain taxa grew locally. The vegetation reconstruction of the property could have been more complete if data from pollen analyses had been available, but no suitable samples could be taken.

From the historical evidence it is known that *Salix*, in various manifestations, was the dominant taxon, closely followed by *Alnus.* This is confirmed by the wood finds, which suggest primary use from local stands, although the frequency does not seem to get anywhere near the dominance suggested by the historical data. This can be explained by the lesser durability of these timbers, which makes it more difficult to find and collect them, but even more so it may show that these trees were not preferred as construction wood. The finds of macroremains (other than wood) of *Salix* clearly confirm the local status of this taxon. Seeds or other macroremains of *Alnus* are absent, though they might well have been expected.

The same is true of *Quercus*, which had grown abundantly on the grounds of the convent, as is shown in the historical data and supported by the wood finds, but not by any finds of macroremains. It is possible that the acorns were collected as animal (pig) fodder, but more probably the *Quercus* and *Alnus* trees mentioned in the inventory

were situated in another part of the grounds than the area where the excavation took place. The illustration shows no distinct row of trees near the farm buildings or the ditches that were excavated.

Another tree that was abundantly present was *Fraxinus excelsior*, as is shown in the historical data and supported by both wood finds and macroremains.

The historical records mention small numbers of *Populus alba* and *Juglans regia*, but these species were missing both in the wood and macroremains. An explanation could be that *Populus* fruits are seldom preserved in archaeobotanical material because they are small and not very decay resistant. Nutshells from *Juglans* on the other hand are always well preserved and could have been expected, but were not found. This might be because they were carefully collected and consumed elsewhere (in the main building) or sold on a market, or that the trees were growing elsewhere in the grounds. Wood identification is certainly possible for both taxa, but they were not found in the wood records.

Finds of branches of fruit trees are rather convincing evidence of local cultivation, so the branch from *Prunus* type (*P. armeniaca/dulcis/persica*) makes it most probably of local origin, although no macroremains were found. In the historical data this tree would have been one of the ''various fruit trees'' in the orchards.

Among the macroremains, seeds of plants likely to have been cultivated such as *Ficus carica*, *Vitis vinifera*, *Morus nigra*, *Prunus avium/cerasus*, *Sambucus nigra*, *Atriplex hortensis*, *Brassica nigra*, *Cannabis sativa*, and *Humulus lupulus* were found. Because they were from a ditch 400 m away from the main buildings, it is less likely they originate from food waste and possible that they were growing in the direct vicinity. *Ficus carica*, *Vitis vinifera*, *Morus nigra* and *Prunus avium/cerasus* could have been bought, but they are typical of fruits cultivated in convents and could have grown in the orchards mentioned in the charter and visible on the illustration. No wood or stem remains were found from any of these possibly cultivated species to confirm that they grew locally.

The seeds of *Crataegus monogyna* were probably from a tree growing near the ditch. Wood finds do not give a decisive answer for locality, as the wood of *Crataegus* cannot be distinguished from those of *Malus* and *Pyrus.* From this (Pomoideae-) type a wooden peg was recovered, probably locally cut, but it could have been from any of the three taxa. *Crataegus* wood does not have any economical value, so its presence was probably not mentioned in the charter or on the illustration. The same is true for any shrubs of *Sambucus*.

Fagus sylvatica is not mentioned in the inventory. The wood was clearly re-used material of higher quality, possibly brought in from elsewhere. No macroremains were found. Therefore we conclude that there is no indication that it grew locally.

The last taxa to be discussed here are the Coniferae. Some of the wood finds are secondarily used material of good quality, which was probably imported. In at least two cases the elements were of inferior quality and the possibility of home-grown conifers must be taken into account, although no macroremains were found to support such an early experiment.

Although the St Margaretha Convent is known from historical evidence as a wealthy estate, the study of the construction timber combined with the results of the analysis of the macroremains do not give any evidence of such wealth. In general it seems that for the bridge and revetment constructions mostly local wood was used, supplemented by re-used elements of higher quality and possibly some imported *Quercus*, *Fagus* and Coniferae wood. This indicates an economical use of wood. Also in the macroremains, no large quantities of cultivated plants or exotic imported taxa were recovered. The wild plants show that in a period of 2 years the banks of the ditches were overgrown with ruderal plants and the water became stagnant, consistent with an abandoned (rural) area. It is probable that the wealth of the convent would have been more apparent if samples had been collected near the main buildings. The sampled area lies at a distance of at least 400 m from the main buildings where no excavations could take place. Therefore the conclusions are only valid for a small part of the convent's estate.

Combining the different datasets has made it possible to come to better conclusion as to which (tree) taxa grew locally and has therefore contributed to a more accurate vegetation reconstruction around the convent.

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Cruydt-beschrijvers: Item, in 't laetste een Beschrijvinghe vande Indiaensche ghewassen, meest ghetrocken uyt de schriften van Carolus Clusius. Nu wederom van nieuws oversien ende verbetert [Herbal, according to its last improvements…]. Antwerpen

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Munting A (1696) Naauwkeurige beschryving der aardgewassen, waar in de veelerley aart en byzondere eigenschappen der boomen, heesters, kruyden, bloemen, met haare vrugten, wortelen en bollen, nevens derzelver waare voortteling, gelukkige aanwinning, en heylzaame geneeskrachten, na een veel-jarige oeffening en eigen ondervinding, in drie onderscheiden boeken, naauwkeuriglijk beschreven worden [Detailed description of earth growths …]. Leiden

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