3 Wood-remains in constructions dating to the Iron Age and Roman Period

3.1 The sites on Voorne-Putten

Due to high watertables, the organic material, including wood, is very well preserved in most of the excavated sites on Voorne-Putten. The conditions for preservation are comparable to similar situations along lake shores and on dwelling mounds (German: *Wurten*).

Up to now, wood remains of seven pre- and protohistoric excavated sites have been investigated. The results are being published (Brinkkemper/ Vermeeren *in press*). Houseplans with the locations of the different species found have been given in that publication as well. The results will be summarized here. They concern Rotterdam-Hartelkanaal 10-69 and Spijkenisse 17-30 (both Early Iron Age); Spijkenisse 17-35 (Early and Middle Iron Age); Spijkenisse 17-34 (Middle Iron Age) and Nieuwenhoorn 09-89, Simonshaven 17-24 and Rockanje II (all Roman Period). The locations of these sites on Voorne-Putten are indicated in figure 27.

The wood research was conducted to ascertain which species were used for building, whether particular species were selected for special purposes, and if so, whether there is a relation between present-day standards of wood quality and prehistoric application. Finally, the data provided by the wood identifications are compared to those provided by palynological research.

The results obtained from the sites are rather heterogeneous. A summary of these data is presented below.

3.1.1 Rotterdam-Hartelkanaal 10-69

This excavation laid bare the remains of a two-aisled farm, measuring 10 × 4.5-5 m with a N-S orientation (cf. Van Trierum *in press*). Six stalls can be reconstructed in the southern part of the building. A total of 44 specimens were identified by Drs. R. van der Berg. For one post, *Salix* spec. (willow) has been used, it concerns a post of the wickerwork between two stalls. All other timbers belong to *Alnus* spec. (alder). The central posts are the thickest, averaging 13.7 cm. The remaining posts are on average 7.0 cm thick.

3.1.2 Spijkenisse 17-30

On this site, remains of a three-aisled farm were excavated. The plan measures 15 × 5 m and its orientation is SE-NW. In the southeastern part, six stalls are present (cf. Van Trierum *et al.* 1988; Van Trierum *in press*). In all, 195 identifications were conducted by Drs. L.I. Kooistra. In seven cases, the central posts of the farm can be assigned to *Fraxinus excelsior* (ash), four belong to *Acer* spec. (sycamore), two to *Ulmus* spec. (elm) and one to *Alnus* spec. The remaining posts in the wall as well as the ones surrounding the farm all belong to *Fraxinus excelsior*. These last mentioned outer posts probably supported the eaves. Again, the central posts are thicker than the wall posts, the average diameters are 10.9 and 7.4 cm respectively. The wall of the farm is composed of wickerwork. For this wickerwork, ash and *Corylus avellana* (hazel) were used.

3.1.3 Spijkenisse 17-35

The location revealed the remains of a three-aisled farmstead with SE-NW orientation. The building can be dated to the Early Iron Age. Ten to twelve stalls are present in the northwestern part. As a result of a recent disturbance, a ditch, the living-area in the southeastern part was only excavated to a very limited extent. The width of the construction is 5.5 m, its length is probably 17 m (see also Van Trierum *in press*). The total number of wood identifications of the Early Iron Age amounts to 224.

For the central roof supports, eleven elms (*Ulmus* spec.), three ashes (*Fraxinus excelsior*) and one sycamore (*Acer* spec.) were used. For the smaller posts, alder (*Alnus* spec.), oak (*Quercus* spec.) and ash (*Fraxinus excelsior*) could be demonstrated. The thickness of the central posts is on average 15 cm. The wall posts are considerably thinner, except for two half ash posts flanking the entrance in the short wall. These have diameters of 18 and 17 cm. The wickerwork is of ash. The palissade surrounding the farmstead mainly consists of oak and ash. Radially split timber was used, the original diameter of the oaks could be calculated as having been up to 36 cm. Attempts to date these oak-timbers by dendrochronology, in cooperation with Drs. E. Jansma (I.P.P.), were unsuccessfull. The reason for this unsuccessfull attempt may have been that the curve used as reference was the German mean chronology of Hollstein (1980). This curve is based on one single measured tree for a large part of the Early Iron Age. In consequence, individual, non-climatic fluctuations are not suppressed in this average-curve, thus possibly resulting in too low a correlation with the average curve of the oaks from

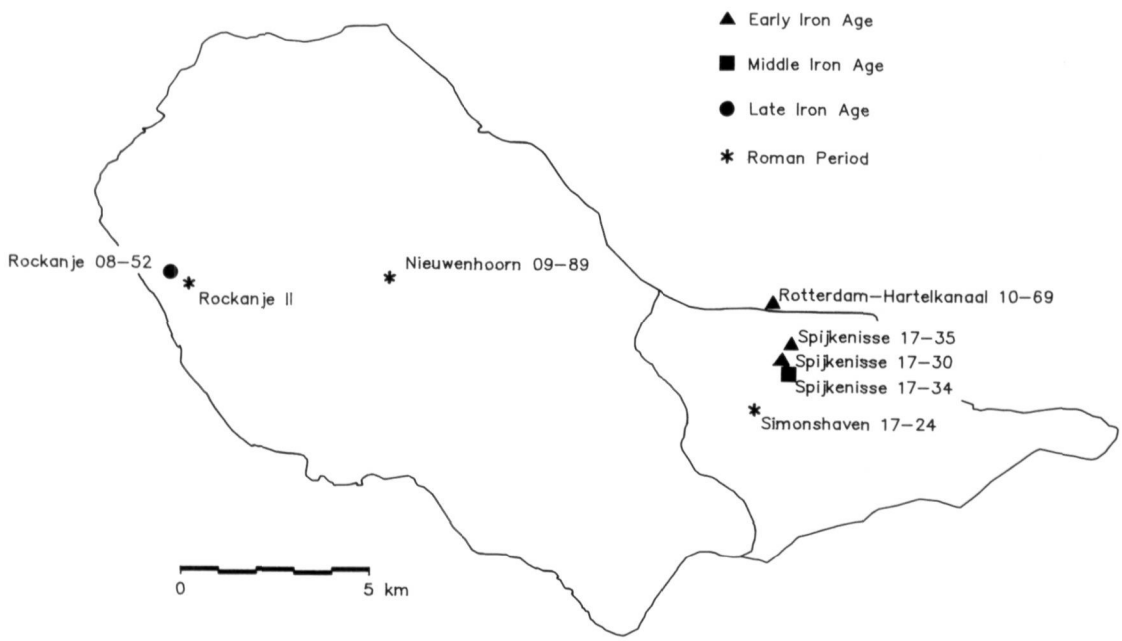

Fig. 27 Location of the sites studied for wood on Voorne-Putten, scale 1:2000.

Spijkenisse 17-35. Different specimens from the site did show high mutual correlations in their ring widths (Student t'-values of 8.88 and 6.133, R-values 0.73 and 0.67, $\alpha < 0.001$).

The Middle Iron Age traces on this site consisted of several posts, without recognizable function. Fourteen specimens were identified with ash as the most common species (6 ×), followed by alder (3 ×), willow (2 ×), buckthorn (*Rhamnus catharticus*: 2 ×) and *Prunus* spec. (1 ×).

3.1.4 Spijkenisse 17-34

This site produced the remains of a Middle Iron Age farm. A recent ditch caused that only a limited part of the original width could be excavated. The length of the construction measured 24 m, the width probably ca. 5.5 m. The number of stalls could not be counted, but amounted at least to six (cf. Van Trierum *in press*). A total of 394 identifications revealed that *Alnus* spec. is the dominant species, while *Fraxinus excelsior* and *Salix* spec. are also occurring commonly. One thick post, a central roof support, is of *Acer*. Other certain roof supports are of alder (3 ×) and ash (1 ×). For wickerwork, mainly alder and willow were used. The five certain roof supports have an average thickness of 11.2 cm, the wall posts are on average 8 cm thick.

3.1.5 Simonshaven 17-24

On this site, two farms dating to the Roman Period were found. Due to a comparatively high position in relation to the water table, the organic remains are preserved rather badly. The traces reveal east-west orientated buildings, which are not contemporaneous. The second building was erected on top of the first one. The older construction measures 17 × 4.5 m, the younger 22 × 6.5 m. A heavily founded granary was also discovered (cf. Van Trierum *et al.* 1988). In total, 141 specimens of this site were identified.

For the older house, mainly *Fraxinus excelsior* and some *Alnus* spec. could be demonstrated. Only eight pieces belonging to the younger building could be identified and another three tentative identifications could be listed. Three timbers are of *Quercus* spec., among which is the only still remaining central roof support. Some certain and some tentative alder- and ash-timbers were present as well. The foundation of the granary was of oak in five cases, while the other post holes did no longer contain any wood.

3.1.6 Nieuwenhoorn 09-89

On this site, four farms dating to the Roman Period were built over each other (cf. Van Trierum *et al.* 1988). All four building phases produced substantial amounts of oak timbers, which made dendrochronological research possible. The dendrochronological investigations were conducted in cooperation with Drs. E. Jansma (I.P.P.). The oldest trees were felled in the calendar year 57 AD, the younger ones at 63 AD, 84 AD and 107 AD respectively (see Vermeeren/Brinkkemper *in prep.*). The archaeological and dendrochronological reconstructions of the three oldest buildings differ

in detail. Secondary use of the timbers cannot always account for these discrepancies. If wood is used secondarily, it is older than the date of the building in which it is applied. In Nieuwenhoorn, however, some oaks that do not fit in with the archaeological reconstruction are too young. Individual houseplans can therefore not yet be reconstructed. Nonetheless some major trends are apparent among the 1161 identified specimens.

The roof supports in the oldest building are made of *Acer* spec. and *Ulmus* spec., whereas in the younger phases *Quercus* spec. predominates strongly, mostly in the form of radially split timbers. The remaining construction wood belongs to a whole range of species. Arranged in declining order of occurrence, the most important are *Alnus* spec., *Fraxinus excelsior*, *Quercus* spec., *Acer* spec., *Ulmus* spec. and *Salix* spec. For wickerwork, mostly alder and willow were used.

The felling dates of the timbers used in the four building phases demonstrate that on this site a house could stand for 20-25 years at most. Bakels (1978) assembled extant data on durability of wood, provided by T.N.O. (*Toegepast Natuurwetenschappelijk Onderzoek*; Applied Scientific Research; see *table 7*). These data also suggest that oak wood under wet circumstances lasts for 10-25 years, which thus corresponds closely to the datings from Nieuwenhoorn. In the farmsteads, the wood was protected against direct weather influence by the roof, which might seem to point to a dry substrate. However, the conservation of waterlogged botanical material on the sites demonstrate that the conditions were all but dry.

3.1.7 Rockanje II

Excavations by the R.O.B. revealed remains of four Roman farms on different parts of the site. Of two of them, wood has been identified. Only one corner of the first house could be excavated. Twelve posts were all of *Fraxinus excelsior*. The second house had a remarkably constructed, A-shaped frame (Brinkkemper *et al. in press*). The most important timbers from a constructional point of view were *Fraxinus excelsior*. Besides, only *Alnus* spec. was demonstrated. The site also yielded a granary, consisting of sixteen very heavy alder posts with diameters of 25-35 cm. These were surrounded by thinner ash posts, which most likely supported the roof.

Table 7. Durability of wood species in permanent contact with a damp subsoil (I) and a dry substrate (II).

	Durability I	Durability II	Susceptibility to damage by insects
Quercus	10-25 yr	25-50 yr	small
Acer, Ulmus	5-10 yr	12-25 yr	moderate
Alnus, Fraxinus, Salix	< 5 yr	6-12 yr	strong

3.1.8 Preference for particular species for certain construction elements

A summary of the results discussed above is presented in table 8. In table 9, the use of species for the different construction elements is presented. In several sites, a selection in favour of more durable wood species for the roof supporting central posts can be observed. During the Iron Age, this selection mainly focussed on elm, ash and sycamore, while alder and willow are more important in the less crucial construction elements and for specific purposes such as wickerwork. An exception is formed by Rotterdam-Hartelkanaal 10-69, where alder strongly dominates. This is also the smallest building and the only two-aisled one. Spijkenisse 17-34 did not yield many central posts. A single sycamore was found and alder dominated among the few central posts present. The only perceptible selection on this site was in favour of thicker trunks for the central posts.

It is remarkable that pollen diagrams concerning the Iron Age (see *ch. 2*) did reveal declines of oak correlated with the Iron Age inhabitation. Apparently, the trees were not applied in the constructions.

During the Roman Period, oak is more prominently used. This difference cannot exclusively be attributed to a higher level in technology during the Roman Period, since in one Iron Age site (Spijkenisse 17-35) very thick oaks were used for the palissade.

3.2 The origin of the wood.

The Early and Middle Iron Age sites are located in a peaty landscape (see *1.3*). From the recorded tree species, *Alnus* spec. and *Salix* spec. may have grown in the wet surroundings of the sites. *Fraxinus excelsior* can grow on mineralized peaty soil, a soil which may have resulted from drainage of peat. The main distribution of ash, however, most probably was on mineral soils. *Acer* spec., *Ulmus* spec. and *Quercus* spec. cannot have occurred in the peaty ecosystems around the settlements. These trees should be sought on drier, mostly mineral soils, with low water tables during the growing season. The levees along the Meuse, reconstructed on palynological data (see *2.5.3*) offer ideal conditions for the growth of these trees, at least within the reach of the freshwater tidal area. These levees were situated at a distance of ca. 3 km from the settlements, which distance apparently did not exclude the use of trees growing there. To overcome difficulties in the transport of the massive trunks, the wood supply probably took place over water. All Iron Age settlements are situated in the close proximity of creeks (Van Trierum 1986). In view of this, the absence of oak wood in the Iron Age farms is relevant. According to Pryor and Taylor (*pers. comm.*), fresh oak wood sinks in water. Roughly about a year after felling, this species will float and can be transported over water. This sinking does not occur in other native tree species. If this

Table 8. Relative occurrence of different wood species in the sites studied.

Site Dating	RH.10-69 EIA	Sp.17-30 EIA	Sp.17-35 EIA	Sp.17-34 MIA	Si.17-24 RP	Nh.09-89 RP	Ro.II RP
Quercus spec.	—	0.5%	33.5%	—	10.6%	20.0%	—
Ulmus spec.	—	2.1%	6.3%	—	—	8.9%	—
Acer spec.	—	3.1%	0.4%	0.5%	—	6.2%	—
Prunus spec.	—	—	—	0.5%	—	0.1%	—
Fraxinus excelsior	—	70.2%	40.2%	20.6%	29.8%	30.9%	59%
Alnus spec.	98%	20.0%	13.8%	60.7%	23.4%	26.8%	41%
Salix spec.	2%	—	3.6%	16.0%	0.7%	4.1%	—
Rhamnus catharticus	—	—	—	1.0%	—	—	—
Betula spec.	—	—	—	—	—	0.1%	—
Corylus avellana	—	1.5%	—	—	—	0.7%	—
Viburnum opulus	—	—	—	—	—	0.1%	—
cf *Ligustrum vulgare*	—	—	—	—	—	0.1%	—
Indeterminatae	—	—	2.2%	0.9%	26.2%	1.4%	—
# Identified	44	196	224	394	141	1161	86

Table 9. The use of wood for central posts and other elements per site, arranged in decreasing importance.

		Central posts	**Other elements**
Rotterdam-Hartelk. 10-69	EIA	*Alnus*	*Alnus, Salix*
Spijkenisse 17-30	EIA	*Fraxinus, Acer, Ulmus, Alnus*	*Fraxinus, Corylus, Alnus, (Quercus)*
Spijkenisse 17-35	EIA	*Ulmus, Fraxinus, Acer*	*Fraxinus, Quercus, Alnus, (Ulmus)*
Spijkenisse 17-34	MIA	*Alnus, Fraxinus, Acer*	*Alnus, Fraxinus, Salix, (Prunus, Rhamnus)*
Simonshaven 17-24	RP	*Quercus*	*Fraxinus, Alnus, (Quercus)*
Nieuwenhoorn 09-89 (1)	RP	*Acer, Ulmus, (Alnus)*	*Alnus, Fraxinus, Acer, Quercus, (Ulmus, Salix)*
Nieuwenhoorn 09-89 (2-4)	RP	*Quercus*, (others)	*Alnus, Fraxinus, Quercus, Ulmus, Salix*, (others)
Rockanje	RP	*Fraxinus*	*Fraxinus, Alnus*

phenomenon was important, the species used in the farms must all have been felled within one year, the year of building the farms. This implies that it was not considered necessary to anticipate the building of farms one year beforehand, as far as the selection of wood is concerned. Alternatively, for constructional purposes, oak wood possibly was not preferred to the same extent in the Iron Age as in the Roman Period. The presence of oaks in the palissade of Spijkenisse 17-35, and not in the house itself, is striking. This palissade may have been erected later than the building itself, thus allowing for water transport of oak trunks. The construction of a dendrochronological curve for ash, at the moment in progress (E. Jansma *pers. comm.*), may in the future provide additional data concerning this hypothesis, since ash is present in both the house-construction and the palissade.

The landscape during the Roman Period is considerably less well known than its Iron Age counterpart. This is due to the rarity of peat formation during Roman times (see *2.6*). The preceding Dunkirk I transgression phase resulted in large-scale sedimentation of clay. These deposits dominated the inhabited landscapes during the Roman Period. The mineral soils probably enlarged the areals of trees like *Quercus* spec., *Ulmus* spec. and *Acer* spec. However, to what extent these trees could expand remains unknown. The freshly deposited, clayey sediments will certainly not have been as favourable for these trees as the levees were.

It seems probable that the oaks applied in the native Roman farms in Nieuwenhoorn were obtained from nearby the settlement or from the dune area. As the palynological investigations demonstrated (see *2.5*), the levees along the Meuse will have been within the sphere of influence of brackish water in this western part of Voorne-Putten, thereby preventing the development of a riverbank forest with oaks.

Dendrochronological investigations revealed that the oaks of Nieuwenhoorn show a high correlation with the middle-curve of the Rhein-Main area. Jansma obtained dendrochronological data from oaks that had grown in a peaty environment near Abcoude (prov. of Utrecht, the Netherlands). It appears that these oaks show a curve contrary to the curve of the Rhein-Main area. Probably, dry conditions were suitable to the "peat-oaks" near Abcoude, whereas wet conditions stimulated the ring width in the German oaks (Jansma *in prep.*). The fact that the oaks from Nieuwenhoorn follow the German curve means that these oaks grew on mineral soils and not on peat. Furthermore, the oaks of the subsequent building phases all showed high mutual correlations in their ring widths. This indicates that they originate from one and the same area. The greater fluctuations in ring

patterns of the trees of the last building phase and the occurrence of extremely small rings (down to 0.013 mm!) can be seen as evidence that more marginal developing trees were selected. This might be attributed to exhaustion of the stands of oaks in the surroundings of the site (see also Vermeeren/ Brinkkemper *in press*). This lack probably accounts for the absence of *Quercus* spec. in Rockanje, which can be dated to the second century AD, i.e. later than Nieuwenhoorn (cf. Brinkkemper *et al. in press*).

3.3 Comparison with investigations concerning wood on other sites

As far as the Iron Age is concerned, only a few excavated wetland sites in the Netherlands have been subjected to wood-research. The most important one is site Q in the Assendelver Polders (Therkorn *et al.* 1984). This three-aisled Early Iron Age farm measured 18.5 × 6-6.5 m and contained eight stalls. It is located on a raised bog cushion surrounded by extensive reed marshes. The roof posts in the living area of the farmstead were in three cases made of quarters of the same oak (*Quercus* spec.), the fourth roof post was missing, but probably was the remaining quarter. The roof supports in the byre area are all of ash (*Fraxinus excelsior*). The wall had been constructed with wood of alder, ash, birch (*Betula* spec.) and willow (*Salix* spec.). Willow was almost exclusively used in the living area. Therkorn *et al.* (1984: 362) in this respect point to the medieval belief that cows would become dry after contact with willow. The fact that willow does occur regularly in the byre parts of the farms on Voorne-Putten and in those in the northern German Ems-area (see below) indicates that the avoidance of willow in byres was not widespread during the Iron Age and the Roman Period.

Another Early Iron Age farm near Assendelft has been documented by Hallewas (1971). He mentions the use of *Quercus* spec. (3 ×), *Fraxinus excelsior* (18 ×) and *Alnus* spec. (47 ×). Although the function of the different species in the construction was not indicated, these results agree well with those of Assendelft site Q.

Closer to Voorne-Putten lies the Early Iron Age site Vlaardingen-Holy. Havelaar (1970) published this excavation. It concerns a farm, measuring 17.6 × 8.1 m, which was probably three-aisled and contained eight stalls. The wood has been studied superficially and is mostly alder, while some oak planks were also found. Havelaar suggests import for these oaks. Vlaardingen is situated some kilometres north of the Meuse. The levees along the Meuse probably provided a suitable location for these "imported" oaks.

An area very similar to Iron Age Voorne-Putten, regarding both environmental conditions and preservation by waterlogging, is present in the estuaries in northern Germany. Especially the Ems estuary has been studied in great detail and Haarnagel (1984) provided an extensive review. Boomborg-Hatzum is the Iron Age site that produced most data concerning wood in this area. No fewer than 37 more or less complete houseplans were unearthed here. Most farms are three-aisled and have stalls. The roof supporting posts are predominantly made of alder, ash and elm, while in later phases split oak is exceedingly important. The wickerwork is mostly of willow, also in the byre parts of the buildings. Behre (1969) published a sector diagram of the wood in Boomborg-Hatzum (excluding wood of wickerwork), where *Alnus* spec. scores 58.1%, *Fraxinus excelsior* 14.5%, *Ulmus* spec. 12.3% and *Quercus* spec. 10.3%.

All these investigations have produced results quite similar to those of Voorne-Putten. The scarcity of oak on Voorne-Putten, however, contrasts with the other sites. The German sites are located on levees, so that transportation of trunks over water was not necessary. However, it is questionable whether the sites in Assendelft and Vlaardingen had such close access to oak wood.

Data concerning wood in native Roman settlements in the Netherlands are as scarcely published as those concerning the Iron Age. Groenman-van Waateringe *et al.* (1961) described a three-aisled farm found near Krommenie, dating to the 1st century AD. The most common wood species are ash and alder, while willow, *Rhamnus catharticus* (buckthorn) and *Betula* spec. (birch) were also found. A preference for certain species for the different construction elements is not indicated. Casparie (1970) mentioned wood remains found in Roman Paddepoel (phase I-III); *Quercus* spec. (12 ×), *Acer* spec. (8 ×), *Alnus* spec. (6 ×), *Betula* spec. (1 ×), *Ulmus* spec. (1 ×) and *Salix* spec. (1 ×). More data on wood in this dwelling mound are not available. From a farm near Spijkenisse (2nd century AD), Trimpe Burger (1973) only mentions a thick central roof support of *Quercus* spec.

These data are still in favourable contrast with other Dutch sites, where not a single wood identification has been published, despite house-plans full of wood.

For the northwest German coastal area during the Roman Period, the famous Feddersen Wierde offers the best comparison. Haarnagel (1984) reviews the results. On this site, dating from the 1st century BC to the beginning of the 5th century AD, eight habitation-phases were distinguished, with in total 205 house-plans. Three-aisled farms predominate again. The roof supports are mostly of (split) oak. Behre (1969) gave a sector diagram for this site (again without wickerwork). The dominant species is *Quercus* spec. (55.1%), followed by *Salix* spec. (23.2%), *Fraxinus excelsior* (14.4%) and only 7% *Alnus* spec.

The selection of oak during Roman times, observed on Voorne-Putten, is clearly supported by the above data, with the exception of Krommenie. Several reasons may explain the difference between the Iron Age and the Roman Period.

Firstly, it can be a technological matter. However, as has been observed already, the occurrence of thick oaks in the palissade of the Early Iron Age site Spijkenisse 17-35 does seem to plead against this explanation. Secondly, the quality of oak wood may have been rated higher during the Roman Period. Thirdly, the availability may be of influence. To allow for statements concerning the availability of the different tree species, palynological data will be used in the following paragraph.

3.4 Comparison of the wood and pollen data

Groenman-van Waateringe (1988b) compared wood and pollen data from sites in the province of Noord-Holland. She constructed rank lists of the importance of the different taxa, both for the palynological data and for those concerning wood. The pollen data were corrected for differential pollen production using Andersen's R-values (see further *2.3*). Similar corrections were made in an article on the wood remains found on Voorne-Putten by Vermeeren *et al.* (*in prep.*). Below only the results are presented.

The Early and Middle Iron Age sites on Voorne-Putten figuring in this chapter are all situated near the Bernisse. The palynological sections Spijkenisse 17-30 and Spijkenisse 17-34 have been sampled at close distance from these sites. The diagrams both include the Early Iron Age, whereas the Middle Iron Age is only represented in the 17-30 diagram.

In the spectra corresponding to the Early Iron Age, *Quercus* (oak), *Alnus* (alder) and *Corylus* (hazel) are dominant among the tree pollen. After correction for differential production, *Fraxinus* (ash) is next in importance, followed by *Fagus* (beech). These data clearly indicate that the virtual absence of oak (except in the palissade of Spijkenisse 17-35) in the Early Iron Age wood spectra cannot be explained by a low availability. The dominance of *Alnus* in the wood of Rotterdam-Hartelkanaal, notably the site closest to the levees, is particularly striking.

The Middle Iron Age pollen spectrum shows a dominance of *Corylus*, followed by *Alnus*, *Quercus* and *Fraxinus*. *Alnus* strongly dominates among the wood of the excavated Middle Iron Age site Spijkenisse 17-34.

The Roman Period is hardly represented in the pollen diagrams from Voorne-Putten. Only the R.G.D. diagram from Heenvliet showed peat formation during the start of the Roman Period. The other diagrams only provided information on the vegetation after interference by man during the Roman inhabitation. Heenvliet is at a considerable distance from Nieuwenhoorn, the most important site for wood research. Thus it was decided to obtain a pollen spectrum from the basal part of the anthropogenic deposit at Nieuwenhoorn. Behre (1970: 33-34) observed a great similarity between a similar spectrum from organic settlement layers of the Iron Age site Boomborg-Hatzum in Northern Germany and a contemporaneous natural peat deposit. Only *Corylus* scored a much higher percentage in the settlement layers. In view of this observation, the pollen spectrum from the anthropogenic deposit at Nieuwenhoorn may also provide reliable data concerning the tree growth at the start of the Roman Period. In this spectrum, *Alnus* is the dominating species, followed by *Corylus*, *Betula*, *Fraxinus* and *Quercus* (in declining order). When these data are considered as reliable, the conclusion must be that the upland trees on Voorne did not show an appreciable expansion on the Dunkirk I deposits on Voorne. It seems more likely that the oaks found in Nieuwenhoorn were obtained from the dune area or the levees. An origin on the Pleistocene sandy soils east of Voorne-Putten seems unlikely. The dendrochronological study revealed that the ring widths of all trees used in the different building phases showed such high correlations that they must have derived from the same area. The further the distance of this area to the site, the less likely that this area was persistently exploited for trees during several generations of inhabitation on the site of Nieuwenhoorn.

3.5 Conclusions

The identifications of wood have demonstrated the preference for certain species for roof support construction elements. The selection of tree species mainly focussed on elm, ash and sycamore during the Iron Age. Alder is very commonly applied in all parts of the construction. In the Roman Period, oak was selected more generally. This selection is consistent with the present-day standards of wood quality, which rates oak highest, followed by elm and sycamore. Pollen diagrams seem to indicate that the increased preference for oak during the Roman Period cannot be attributed to a more common occurrence of this tree. Furthermore, the palynological data do not indicate that oak trees were purposefully spared during the Iron Age, since their relative and absolute abundance decreases drastically at the beginning of the Iron Age habitation on Voorne-Putten. Transport of oak trees over water was probably problematic. An increase in the use of oak has also been observed in settlement sites in northern Germany and is apparent in the scarce data provided by other Dutch wetland sites as well.

Through dendrochronological research it has been made plausible that the oaks applied in the native Roman settlement near Nieuwenhoorn were obtained from mineral soils. Most probably, these trees were felled in the dunes of Voorne or on the levees along the Meuse north of Putten. An origin on Pleistocene sandy soils is less likely, as the trunks of all four building phases of the site show high mutual correlations in their ring width. This indicates that they most probably derived from the same area. It is not very likely that one single area was exploited consistently when it was not relatively close to the settlement.