

W. VAN ZEIST & R.M. PALFENIER-VEGTER
Vakgroep Archeologie, Groningen, Netherlands

ABSTRACT: In the third report on the archaeobotany of Peelo the floral remains recovered from settlement traces excavated on the parcels designated as Haverland and Kleuvenveld are discussed. The crop plants recorded agree with those from other Iron Age and Roman period settlement sites in Drenthe. One of the Kleuvenveld samples provided evidence for the collecting of acorns, probably for human consumption. In the final section a survey of the total Peelo plant record, covering the period of c. 800 BC to the 17th/18th century AD, is presented.

KEYWORDS: Cultivated plants, field weeds, acorns, survey of Peelo plant record.

1. INTRODUCTION

In previous reports on the palaeobotanical examination of Peelo, plant remains recovered from the Late Iron Age/Roman period occupation on the terrain called 'de Es' and from medieval settlement features on the Hovinge, Derkinge and Bremer parcels are discussed (van Zeist & Palfenier-Vegter, 1991/1992; 1993/1994). The present report deals with Iron Age and Roman period floral remains from the Haverland and the Kleuvenveld (for location of the excavation areas, see fig. 1). The results of the excavations carried out on the Kleuvenveld are presented by Kooi in this volume of *Palaeohistoria*. In the same report the excavations on the terrain of a former manor-house (*burcht*) are discussed. From the latter site no samples for botanical examination were secured. The settlement remains uncovered on the Haverland are treated in a previous report on the Peelo excavations (Kooi, 1993/1994). In conformity with the archaeological periodization at present adopted for the Netherlands, the period AD 0-400 is indicated as Roman period (instead of Roman Iron Age as was done in the previous reports on the Peelo plant remains).

Almost all Iron Age and Roman period samples from the Kleuvenveld and Haverland are dry-soil samples. In only two samples, from the fill of wells, plant remains were preserved in a waterlogged condition (table 5). The complaint in the previous Peelo botanical reports, that most of the dry-soil samples were poor in charred plant remains, applies also to the Kleuvenveld and Haverland samples. Thus, 37 of the 54 soil samples secured from the Kleuvenveld turned out to be without seeds. In only one case, seeds were observed with the naked eye (acorn sample 1093). From the majority of the Haverland samples, charred plant remains could be recovered, but often in small to very small numbers.

The samples which yielded one or more seeds are listed in table 1. Sclerotia of *Cenococcum geophilum* and wood charcoal are left out of consideration.

In contrast to the previous reports on the palaeobotany of Peelo, in this paper the full results of the analyses of the Kleuvenveld and Haverland charred seed samples are presented (tables 2-4). Unidentified seeds are not listed. These tables clearly show the predominantly poor recovery.

2. KLEUVENVELD

The total numbers of cultivated plant remains recorded from Early Iron Age (800-600 BC) Kleuvenveld are only small (table 2), but the crop-plant assemblage (hulled barley, emmer wheat, broomcorn millet, flax and gold-of-pleasure) agrees with that of other Iron Age settlement sites in Drenthe, such as Noordbarge (van Zeist, 1981) and Dalen (van Zeist & Palfenier-Vegter, 1994). Admittedly, the role of *Camelina sativa* is somewhat uncertain, as this species could also have occurred as a weed in flax fields. On the other hand, for Iron Age and Roman period sites in the coastal area of the north of the Netherlands, it may safely be assumed that *Camelina* was grown intentionally (van Zeist, 1974). For that reason it seems justified to take the line that on the sandy soils of Drenthe, too, gold-of-pleasure was cultivated (for its oleaginous seeds).

The scarcity of plant remains finds also expression in the small number of wild species recorded. Moreover, total numbers of weed seeds are usually small. Striking is the relatively good representation of wild millet-type species: *Digitaria ischaemum*, *Echinochloa crus-galli*, *Setaria viridis*. These species are summer annuals which are thought to have occurred under spring-sown (summer) cereals and in root-crop beds.

Table 1. Samples presented in tables 2-5. Post stands for fill of a post-hole.

No.	Context of sample
<i>Haverland, Middle to Late Iron Age</i>	
1657	Pit
1785	Entrance post of farm
1786	Upright of farm
1787	Post
1789	Post
<i>Haverland, Roman period</i>	
1602	Refuse pit
1610	Pit
1620	Post of farm
1632	Pit
1649	Post
1653	Pit
1658a	Fill of well (upper part)
1658b	Fill of well (waterlogged)
1676	Refuse pit
1680	Refuse pit
1683	Refuse pit
1715	Fill of well (upper part)
1716	Pit
1723	Pit
1781	Fill of well (waterlogged)
1792	Fence
1861	Fence
1874	Post of farm
1877	Entrance post of byre
1895	Entrance post of byre
1926	Post of farm (byre)
1927	Post of farm (byre)
1928	Post of farm
<i>Kleuvenveld, Early Iron Age</i>	
1060	Pit
1073	Upright of farm
1076	Upright of farm
1077	Upright of farm
1081	Wall post of farm
1083	Wall post of farm
1090	Post of granary
1093	Upright of farm; 2445±35 BP
1105	Post of granary
1112	Pit
1143	Post
1147	Pit
1163	Post of granary?
1177	Refuse pit
1184	Post of barn
1190	Post of barn
1195	Post of barn
1196	Post of barn

Broomcorn millet is a typical summer crop and barley may, at least partly, have been grown as summer cereal. Of barley, both autumn-sown and spring-sown varieties occur. Other (potential) weeds of summer cereals include *Polygonum lapathifolium*, *Polygonum persicaria* and *Chenopodium album*. *Polygonum convolvulus*, on the

other hand, is a weed under winter cereals, such as emmer wheat.

At present, *Digitaria ischaemum* is a rare species in the north of the Netherlands (Weeda et al., 1994: p. 222), but in ancient times it may have been more common in this part of the country. At least, this is suggested by the more than accidental finds of caryopses of this grass in late prehistoric and early-historical sites on the sandy soils of Drenthe, such as Noordbarge (van Zeist, 1981), Peelo-Kleuvenveld (this paper), Dalen-Thijakkers (van Zeist & Palfenier-Vegter, 1994) and Gasselte (van Zeist & Palfenier-Vegter, 1979).

Some special attention is drawn here to the charred acorns in samples 1093 and 1143. The numbers of acorns listed are calculated ones, based upon the weight of the acorn remains and the weight of a number of half nuts (cotyledons). Particularly from the relatively large acorn sample it may be concluded that at Peelo acorns were collected and stored as food for humans. In western Europe, finds of concentrations of charred acorns are not exceptional and date from the late Neolithic to the Roman period (Knörzer, 1972; Jørgensen, 1977). As for the north of the Netherlands, a large find, corresponding with c. 1800 acorns, is recorded from Iron Age Dalen-Huidbergsveld (van Zeist & Palfenier-Vegter, 1994).

Of 10 cotyledons the dimensions have been determined: length 12.5-17.3 (mean 14.55) mm; breadth 7.1-9.8 (mean 8.60) mm; 100L/B index 146-216 (mean 170). The Peelo acorns are, on average, smaller than those from Dalen, with mean values of 18.79x10.32 mm.

In Europe, written sources report upon the use of acorns as human food in times of shortage. From acorn flour, whether or not mixed with rye flour, bread was made. Prior to food preparation, the bitter and toxic tannin had to be removed, which could have been done by roasting. Roasting has the additional advantage that the acorns become brittle, after which they can more easily be ground. The practice of roasting may largely be held responsible for the archaeological charred acorn finds.

More than once the question is posed (by archaeologists) whether concentrations of charred cereal grains in the fill of post-holes could be the remains of offerings that had been deposited there during the construction of the farm or granary. In that case one must assume that the grains had been deposited in a carbonized condition. Whether or not this has been a practice in ancient times, may for ever remain a matter of speculation. The acorn sample No. 1093 may be adduced in favour of the opinion that charred seeds in post-holes had no ritual meaning, but that they were present in the soil which was shovelled into the pit. At least, it is unlikely that acorns, which were emergency food, would have been offered to the higher powers.

Table 2. Kleuvenveld. Early Iron Age charred seed samples. Numbers of seeds, etc. + = one or a few fragments.

Sample number	1060	1073	1076	1077	1081	1083	1090	1093	1105	1112	1143	1147	1177	1184	1190	1195	1196	Sum
<i>Hordeum vulgare</i>	-	-	-	-	-	-	-	-	-	-	1	-	+	2	-	1	-	4+
<i>Hordeum</i> , rachis internodes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
<i>Triticum dicoccum</i>	1	-	-	-	-	-	-	-	1	-	-	-	1	2	-	-	-	5
<i>T. dicoccum</i> , glume bases	-	-	-	-	-	-	-	-	-	-	-	-	4	1	1	4	-	10
<i>T. dicoccum</i> , spikelet forks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
<i>Panicum miliaceum</i>	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	2
<i>Camelina sativa</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
<i>Linum usitatissimum</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
<i>Corylus avellana</i>	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+
<i>Quercus</i> spec.	-	-	-	-	-	-	-	110	-	-	17	-	-	-	-	-	-	127
<i>Chenopodium album</i>	-	-	-	3	-	1	-	-	-	-	-	2	2	-	-	1	-	9
<i>Digitaria ischaemum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	1	-	19
<i>Echinochloa crus-galli</i>	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	4
<i>Erica tetralix</i> , leaflet cf. <i>Knautia arvensis</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Polygonum convolvulus</i>	-	-	-	-	2	-	-	-	-	-	1	-	-	-	1	-	1	5
<i>Polygonum hydropiper</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
<i>Polygonum</i> <i>lapathifolium</i>	-	-	2	4	-	4	-	-	-	-	3	4	8	1	-	2	-	28
<i>Polygonum persicaria</i>	-	1	-	-	-	-	-	-	-	-	-	2	3	-	1	-	-	7
<i>Polygonum</i> spec.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	6
<i>Rumex acetosella</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Setaria viridis</i>	-	-	-	2	-	3	-	-	-	-	1	-	-	-	4	1	-	11
<i>Solanum nigrum</i>	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	3
<i>Spergula arvensis</i>	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	3
<i>Vicia</i> spec.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Buds	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	5
Droppings mouse/rat	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	9

3. HAVERLAND

3.1. Iron Age samples

Traces of (Middle to Late) Iron Age occupation on the Haverland were scarce (Kooi, 1993/1994), which explains the small number of samples secured for botanical examination. Of these samples, five yielded charred seeds and fruits (table 4). As in the Iron Age samples from 'de Es' (van Zeist & Palfenier-Vegter, 1991/1992: table 4) and the Kleuvenveld (table 2), seeds of field weeds are by far dominant; particularly in samples 1786 and 1787 weed seeds are comparatively numerous. In contrast to the Iron Age samples from 'de Es', no heather (*Calluna vulgaris*) twigs were found in the Iron Age samples from the Haverland (and only one in the Roman period samples: table 3).

One may assume that the crop-plant remains provide an incomplete picture of the plants cultivated by the Iron Age farmers, but at least the data do not contradict other archaeological records of Iron Age crop-plant assemblages in the north of the Netherlands. Thus,

common oat (*Avena sativa*) and rye (*Secale cereale*) are not represented.

3.2. The Roman period

Compared to that of Roman period 'de Es' (van Zeist & Palfenier-Vegter, 1991/1992: table 2), the charred seed record of the Haverland (table 3) is poor. The number of wild plant taxa recorded is less than half of that at 'de Es' and only a few taxa are represented by 10 or more seeds (*Hordeum vulgare*, *Chenopodium album*, *Polygonum lapathifolium*). As for the cultivated plants, there is evidence of *Secale cereale* and probably of *Avena sativa* (the species identity of naked oat grains cannot be determined).

The charred wild plant record is supplemented by the data obtained from two well samples (table 5). The waterlogged remains almost double the number of taxa recorded from Roman period Haverland. No ecological (phytosociological) grouping of the Kleuvenveld and Haverland floral records is presented, because the low numbers of taxa make such an exercise less meaningful.

Table 3. Haverland. Roman period charred seed samples. See caption table 2.

Sample number	1602	1610	1620	1632	1649	1653	1658a	1676	1680	1683	1715
<i>Avena spec.</i>	1	-	-	-	-	-	1	-	-	-	-
<i>Hordeum vulgare</i>	-	-	1	4	3	-	1	-	-	-	-
<i>Hordeum</i> , rachis internodes	-	-	-	-	-	-	-	1	-	-	-
<i>Secale cereale</i>	-	-	-	1	-	-	-	-	-	-	-
<i>T. dicoccum</i> , spikelet forks	-	-	-	-	-	-	1	-	-	-	-
Cereal grain fragments	-	-	-	-	-	-	-	+	-	-	-
Culm nodes	-	-	-	-	-	-	-	1	-	-	-
<i>Panicum miliaceum</i>	-	-	1	-	-	-	1	-	-	-	-
<i>Vicia faba var. minor</i>	-	-	-	-	-	-	1	-	-	-	-
<i>Corylus avellana</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Quercus spec.</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Bromus hordeaceus/secalinus</i>	1	-	1	-	-	-	-	-	-	-	-
<i>Carex spec.</i>	-	-	-	-	-	-	1	-	-	-	-
<i>Chenopodium album</i>	2	-	1	11	5	-	-	-	-	-	-
<i>Chenopodium ficifolium</i>	-	-	-	1	-	-	-	-	-	-	-
<i>Echinochloa crus-galli</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Eleocharis multicaulis</i>	-	-	-	-	-	-	-	1	-	-	-
<i>Montia fontana</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Polygonum aviculare</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Polygonum convolvulus</i>	-	-	-	1	1	-	-	-	-	-	-
<i>Polygonum hydropiper</i>	-	-	-	1	-	-	-	-	-	-	-
<i>Polygonum lapathifolium</i>	1	-	-	14	3	1	-	-	2	-	1
<i>Polygonum spec.</i>	-	-	-	-	-	-	-	-	-	1	-
<i>Potentilla erecta</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunculus repens</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Raphanus raphanistrum</i> , pod segments	-	-	-	-	+	-	+	-	-	-	-
<i>Rumex acetosella</i>	-	-	-	3	-	-	-	2	-	-	-
<i>Rumex conglomeratus</i>	-	-	-	-	1	-	4	-	-	-	-
<i>Setaria viridis</i>	-	-	-	-	-	-	-	-	-	-	-
<i>Spergula arvensis</i>	-	-	-	-	-	-	1	-	-	-	-
<i>Stachys arvensis/sylvatica</i>	-	-	-	-	-	-	-	1	-	-	-
<i>Vicia spec.</i>	-	1	-	-	-	-	-	-	-	-	-
Twigs, <i>Calluna vulgaris</i>	-	-	-	-	-	-	-	-	-	-	-
Buds	-	-	-	-	-	-	5	-	-	-	-

However, the data are included in table 6 to be discussed in section 4.

4. CONCLUDING REMARKS

The Peelo floral record covers the period of c. 800 BC (beginning of the Iron Age) to the 17th/18th century AD. This fact should allow us to reconstruct, for this particular area, the history of plant cultivation and the development of the vegetation in response to the impact of man during a period of about 2500 years. All taxa recorded from prehistoric and (early-)historical Peelo are listed in table 7.

The history of plant cultivation at Peelo conforms to the picture obtained from other Iron Age and younger sites on the sandy soils in the north of the Netherlands. Crop plants at Iron Age Peelo included emmer wheat (*Triticum dicoccum*), hulled barley (*Hordeum vulgare*), broomcorn millet (*Panicum miliaceum*), flax (*Linum*

usitatissimum) and gold-of-pleasure (*Camelina sativa*). The Roman period witnessed the decline of emmer wheat and broomcorn millet, and the introduction of rye (*Secale cereale*) and common oat (*Avena sativa*). Hulled barley continued to be a predominant crop. There is evidence of flax, but not of gold-of-pleasure. Celtic bean (*Vicia faba var. minor*) is recorded from Roman period Peelo. Cereal crops of medieval Peelo were rye, hulled barley and common oat. Other cultivated plants of that period included flax, field pea (*Pisum sativum*) and Celtic bean. Two 17th/18th century waterlogged well samples provide evidence of buckwheat (*Fagopyrum esculentum*) cultivation. Indications of fruit growing are few and confined to the Middle Ages: bullace (*Prunus domestica* ssp. *insititia*) and probably cherry (*Prunus avium/cerasus*) and apple (*Pyrus malus*).

With the aim of tracing possible changes in the vegetation, the representation of the various vegetation types in the floral record of each of the three main occupation phases has been determined. Table 6 shows

1716	1723	1792	1861	1874	1877	1895	1926	1927	1928	Sum	Sample number
-	-	-	-	-	-	-	-	-	-	2	<i>Avena spec.</i>
-	-	-	-	-	1	-	-	-	-	10	<i>Hordeum vulgare</i>
-	-	-	-	-	-	1	-	-	-	2	<i>Hordeum</i> , rachis internodes
-	-	1	-	-	1	-	-	-	-	3	<i>Secale cereale</i>
-	-	-	-	-	-	-	-	-	-	1	<i>T. dicoccum</i> , spikelet forks
-	-	-	-	-	-	-	-	-	-	+	Cereal grain fragments
6	-	-	-	-	-	-	-	-	-	7	Culm nodes
-	-	-	-	-	-	-	-	1	-	3	<i>Panicum miliaceum</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Vicia faba var. minor</i>
-	-	-	-	-	-	+	-	-	-	+	<i>Corylus avellana</i>
+	-	-	-	-	-	-	-	-	-	+	<i>Quercus spec.</i>
-	-	-	-	-	-	-	-	-	-	2	<i>Bromus hordaceus/secalinus</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Carex spec.</i>
-	2	-	1	20	10	-	1	4	-	57	<i>Chenopodium album</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Chenopodium ficifolium</i>
-	-	-	-	2	1	-	2	-	-	5	<i>Echinochloa crus-galli</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Eleocharis multicaulis</i>
-	-	-	-	1	-	-	-	-	-	1	<i>Montia fontana</i>
1	-	-	-	-	-	-	-	-	-	1	<i>Polygonum aviculare</i>
-	-	-	-	-	-	-	1	-	-	3	<i>Polygonum convolvulus</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Polygonum hydropiper</i>
-	1	-	5	10	7	-	8	2	2	57	<i>Polygonum lapathifolium</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Polygonum spec.</i>
-	-	-	-	-	-	-	1	-	-	1	<i>Potentilla erecta</i>
1	-	-	-	-	-	-	-	-	-	1	<i>Ranunculus repens</i>
-	-	-	-	+	1	-	2	-	-	3+	<i>Raphanus raphanistrum</i> , pod segments
-	-	-	1	-	-	-	-	-	-	6	<i>Rumex acetosella</i>
-	-	-	-	-	-	-	-	-	-	5	<i>Rumex conglomeratus</i>
-	-	-	-	-	1	-	-	-	-	1	<i>Setaria viridis</i>
1	-	-	-	-	1	1	1	-	-	5	<i>Spergula arvensis</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Stachys arvensis/sylvatica</i>
-	-	-	-	-	-	-	-	-	-	1	<i>Vicia spec.</i>
1	-	-	-	-	-	-	-	-	-	1	Twigs, <i>Calluna vulgaris</i>
4	-	-	-	-	-	-	-	-	-	9	Buds

the numbers of taxa characteristic of and/or common in the groups of vegetation postulated for Peelo. These groups correspond with those presented in van Zeist & Palfenier-Vegter (1993/1994: table 6), but for practical reasons some of the vegetation units of the latter table have been lumped together here. Taxa of indistinct ecological affinity, such as Gramineae indet. and *Carex spec.*, are left out.

From table 6 it is evident that the three periods are very unequally covered archaeobotanically. The Iron Age is poorly represented with 28 taxa only, and includes data from three areas, viz. 'de Es', Haverland and Kleuvenveld. The Roman period is already much better represented, due to the comparatively rich charred seed record from 'de Es' and the two waterlogged well samples from the Haverland. The well samples contribute greatly to the large number of taxa identified from medieval Peelo.

From the above it is clear that the numbers of taxa per period and vegetation type are first and foremost a

function of the chances of seeds being preserved. Although one may assume that in the course of time the number of species of arable fields and other synanthropic habitats increased, it is most unlikely that there was such a dramatic increase in species as is suggested by the floral record obtained from Peelo. Thus, it is difficult to imagine that in the Middle Ages, marshes and woodland were of much greater extent than in the Iron Age. On the other hand, due to the efforts of man, the grassland acreage may have increased considerably in the course of time. One is left with the disappointing conclusion that the Peelo archaeobotanical record hardly allows any suggestions as to changes in the vegetation (cover) of the area.

One can only speculate on the question why the Peelo charred seed record is generally poor. Only some of the samples from Roman period 'de Es' yielded satisfactory numbers of seeds and fruits (van Zeist & Palfenier-Vegter, 1991/1992: table 2). One may wonder to what extent the density of charred plant remains

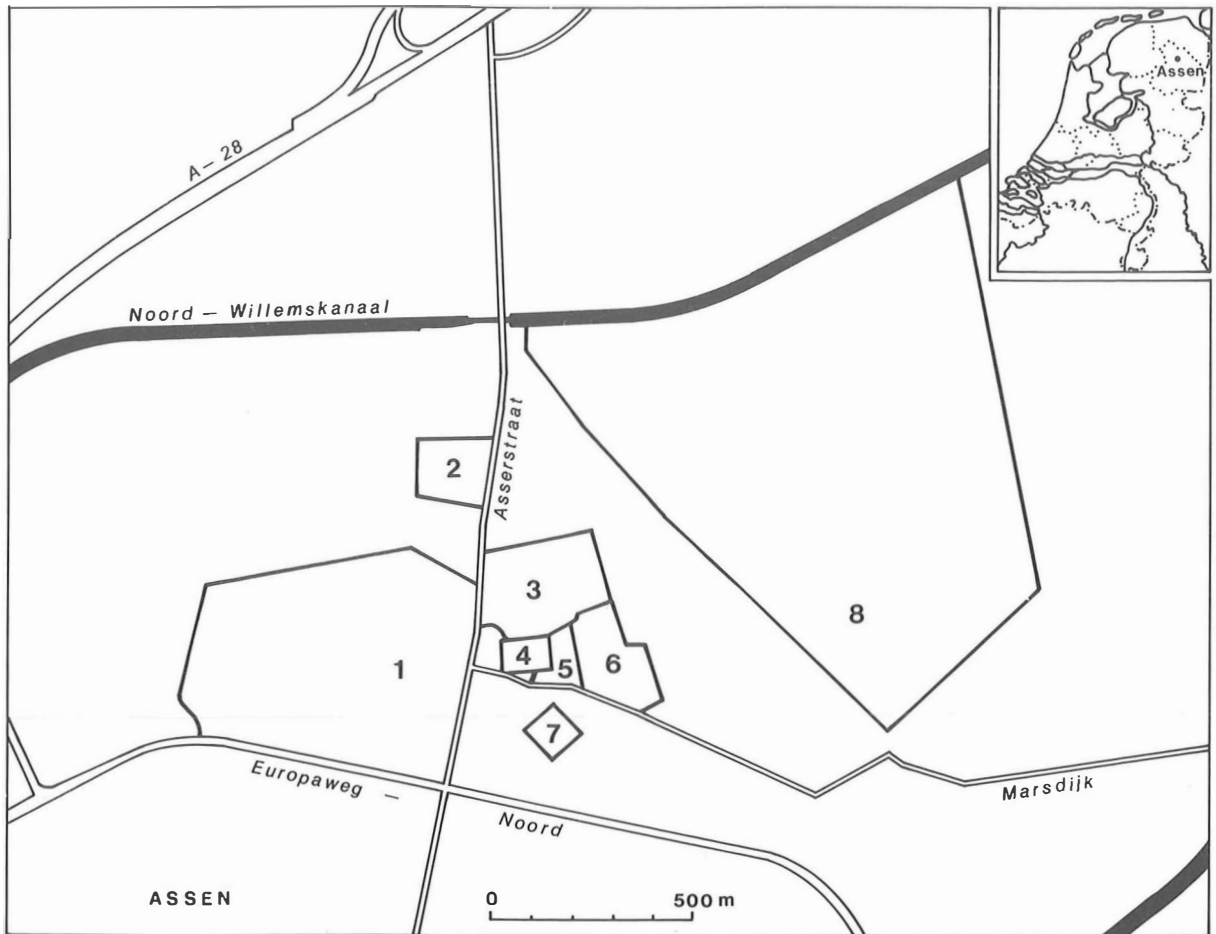


Fig. 1. Peelo. Areas excavated entirely or in part. 1. De Es; 2. Nieuwland; 3. Haverland; 4. Hovinge; 5. Bremer; 6. Derkinge; 7. De Burcht; 8. Kleuvenveld.

Table 4. Haverland. Middle to Late Iron Age charred seed samples. See caption table 2.

Sample number	1657	1785	1786	1787	1789	Sum
<i>Hordeum vulgare</i>	-	1	-	1	-	2
<i>Triticum dicoccum</i>	-	1	-	-	-	1
<i>T. dicoccum</i> , glume base	-	-	-	1	-	1
Cereal grain fragments	-	-	+	-	-	+
<i>Linum usitatissimum</i>	-	-	1	-	-	1
<i>Carex panicea</i>	-	-	-	1	-	1
<i>Chenopodium album</i>	-	-	2	3	-	5
<i>Echinichloa crus-galli</i>	-	-	2	2	-	4
<i>Festuca (rubra)</i>	-	1	-	-	-	1
<i>Plantago lanceolata</i>	-	-	-	1	-	1
<i>Polygonum convolvulus</i>	-	1	-	3	1	5
<i>Polygonum hydropiper</i>	-	2	2	1	-	5
<i>Polygonum lapathifolium</i>	1	1	60	90	5	157
<i>Polygonum persicaria</i>	-	-	-	2	-	2
<i>Ranunculus repens</i>	-	-	-	-	1	1
<i>Rumex acetosella</i>	-	1	12	7	-	20
<i>Solanum nigrum</i>	-	-	4	8	1	13
<i>Spergula arvensis</i>	1	3	19	8	2	33
<i>Stellaria media</i>	-	1	5	5	1	12
<i>Trifolium repens</i>	-	-	1	-	-	1
<i>Vicia spec.</i>	-	-	1	-	-	1

Table 5. Haverland. Numbers of seeds, etc. in two waterlogged well samples (2nd-3rd century AD).

Sample number	1658b	1781
Well number	29	28
Part of sample examined	1/10	1/1
<i>Atriplex patula/prostrata</i>	9	-
<i>Bidens tripartita</i>	3	-
<i>Capsella bursa-pastoris</i>	6	-
<i>Carex paniculata</i>	1	-
<i>Chenopodium album</i>	213	10
<i>Chenopodium ficifolium</i>	7	-
<i>Echinochloa crus-galli</i>	1	-
<i>Juncus bufonius</i>	3	-
<i>Mentha aquatica/arvensis</i>	2	-
<i>Poa annua</i>	5	-
<i>Poa pratensis/trivialis</i>	5	-
<i>Plantago major</i>	5	-
<i>Polygonum aviculare</i>	5	-
<i>Polygonum hydropiper</i>	18	-
<i>Polygonum lapathifolium</i>	37	3
<i>Polygonum persicaria</i>	33	-
<i>Pteridium aquilinum</i> , frond fragment	1	-
<i>Ranunculus repens</i>	1	-
<i>Ranunculus sardous</i>	1	-
<i>Raphanus raphanistrum</i> , pod segment	1	-
<i>Rubus idaeus</i>	1	-
<i>Rumex acetosella</i>	2	2
<i>Rumex obtusifolius</i>	251	6
<i>Sambucus nigra</i>	10	-
<i>Scirpus setaceus</i>	1	-
<i>Scleranthus annuus</i> , calyx	-	1
<i>Solanum nigrum</i>	26	-
<i>Sonchus asper</i>	11	1
<i>Spergula arvensis</i>	15	-
<i>Stachys arvensis/sylvatica</i>	2	-
<i>Stellaria media</i>	15	2
<i>Stellaria spec.</i>	1	-
<i>Urtica dioica</i>	142	12
<i>Urtica urens</i>	4	-
<i>Viola spec.</i>	-	1

is connected with the intensity and duration of occupation. On the other hand, one should also consider the effect of domestic practices: (charred) waste may not have been left lying around the houses, but may have been dumped somewhere outside the farmsteads.

The co-operation of Dr. A.L. Brindley, Mr. G. Delger and Dr. P.B. Kooi in the preparation of the publication is gratefully acknowledged.

5. REFERENCES

- JØRGENSEN, G., 1977. Acorns as a food-source in the Later Stone Age. *Acta Archaeologica* 48, pp. 233-238.
- KNÖRZER, K.-H., 1972. Eine bronzezeitliche Grube mit gerösteten Eicheln von Moers-Hülsdonk. *Bonner Jahrbücher* 172, pp. 404-412.
- KOOI, P.B., 1993/1994. Project Peelo: Het onderzoek in de jaren 1981, 1982, 1986, 1987 en 1988. *Palaeohistoria* 35/36, pp. 169-306.
- KOOI, P.B., 1995/1996. Het project Peelo. Het onderzoek van het Kleuvenveld (1983, 1984), het Burchtterrein (1980) en het Nijland (1980). *Palaeohistoria*, this volume.
- WEEDA, E.J., R. WESTRA, Ch. WESTRA & T. WESTRA, 1994. *Nederlandse oecologische flora: wilde planten en hun relaties*, vol. 5. Amsterdam, IVN/VARA/Vewin.
- ZEIST, W. VAN, 1974. Palaeobotanical studies of settlement sites in the coastal area of the Netherlands. *Palaeohistoria* 16, pp. 223-383.
- ZEIST, W. VAN, 1981. Plant remains from Iron Age Noordbarge, province of Drenthe, the Netherlands. *Palaeohistoria* 23, pp. 169-193.
- ZEIST, W. VAN & R.M. PALFENIER-VEGTER, 1979. Agriculture in medieval Gasselte. *Palaeohistoria* 21, pp. 267-299.
- ZEIST, W. VAN & R.M. PALFENIER-VEGTER, 1991/1992. Roman Iron Age plant husbandry at Peelo, The Netherlands. *Palaeohistoria* 33/34, pp. 287-297.
- ZEIST, W. VAN & R.M. PALFENIER-VEGTER, 1993/1994. Medieval plant remains from Peelo, The Netherlands. *Palaeohistoria* 35/36, pp. 307-321.
- ZEIST, W. VAN & R.M. PALFENIER-VEGTER, 1994. Zaden en vruchten uit prehistorisch en vroeg-historisch Dalen: een archeobotanisch onderzoek. *Nieuwe Drense Volksalmanak* 111, pp. 146-160.

Table 6. Numbers of taxa characteristic of and/or common in the groups of vegetation postulated for Peelo. Starting point is the ecological groups presented in van Zeist & Palfenier-Vegter (1993/1994: table 6), but here some of these groups have been lumped. Numbers in parentheses are of taxa which occur in more than one of the groups distinguished.

Period	Iron Age	Roman period	Middle Ages
Number of taxa included	28	73	116
Weeds of winter cereals	4(1)	11(4)	16(8)
Weeds of summer cereals, root crops and vegetable gardens	10(6)	19(15)	26(17)
Ruderal vegetations	4(4)	15(11)	17(12)
Trodden places and ditches	2(1)	9(3)	17(8)
Wet and dry heathland	4(2)	5(3)	8(3)
Grassland	9(3)	26(8)	44(17)
Marshes and alder carr	2(1)	5(3)	15(8)
Woods, wood edges and hedges	2(0)	9(2)	13(3)

Table 7. English and Dutch names of plant taxa identified from Peelo. I. Iron Age; II. Roman period; III. Middle Ages (and post-medieval period); +. Present; -. Absent.

			I	II	III
<i>Achillea millefolium</i>	Yarrow	Gewoon duizendblad	-	-	+
<i>Agrostis spec.</i>	Bent-grass	Struisgras	-	+	+
<i>Alnus glutinosa</i>	Alder	Zwarte els	-	-	+
<i>Alopecurus geniculatus</i>	Marsh foxtail	Geknikte vossestaart	-	-	+
<i>Anagallis arvensis</i>	Scarlet pimpernel	Gewoon guichelheil	-	+	+
<i>Anthemis arvensis</i>	Corn chamomile	Valse kamille	-	-	+
<i>Apera spica-venti</i>	Loose silky-bent	Windhalm	-	+	-
<i>Aphanes arvensis</i>	Parsley piert	Grote leeuwklauw	-	-	+
<i>Apium graveolens</i>	Celery	Selderij	-	-	+
<i>Arctium (pubens)</i>	Burdock	(Middelste) klit	-	-	+
<i>Arnoseris minima</i>	Lamb's succory	Korensla	-	+	-
<i>Atriplex patula/prostrata</i>	Common/spear-leaved orache	Uitstaande melde/spiesmelde	-	+	+
<i>Avena (sativa)</i>	(Common) oat	Haver	-	+	+
<i>Betula pubescens</i>	Downy birch	Zachte berk	-	-	+
<i>Betula spec.</i>	Birch	Berk	-	-	+
<i>Bidens tripartita</i>	Trifid bur-marigold	Veerdelig tandzaad	-	+	+
<i>Brassica nigra</i>	Black mustard	Zwarte mosterd	-	-	+
cf. <i>Brassica</i>	Cabbage/mustard	Kool/mosterd	+	-	-
<i>Bromus hordeaceus/secalinus</i>	Soft brome/chess	Zachte dravik/dreps	-	+	+
<i>Callitriche spec.</i>	Water-starwort	Sterekreos	-	-	+
<i>Calluna vulgaris</i>	Heather	Struikhei	+	+	+
<i>Camelina sativa</i>	Gold-o-f-pleasure	Dederzaad	+	-	-
<i>Capsella bursa-pastoris</i>	Shepherd's purse	Herderstasje	-	+	+
<i>Carex cuprina</i>	False fox-sedge	Valse voszegge	-	+	+
<i>Carex disticha</i>	Brown sedge	Tweerijge zegge	-	-	+
<i>Carex flacca</i>	Glaucous sedge	Zeegroene zegge	-	+	-
<i>Carex hirta (type)</i>	Hairy sedge	Ruige zegge	-	-	+
<i>Carex nigra (type)</i>	Common sedge	Zwarte zegge	-	+	+
<i>Carex oederi</i>	Yellow sedge (<i>Carex flava</i> agg.)	Dwergzegge/geelgroene zegge	+	+	+
<i>Carex panicea</i>	Carnation sedge	Blauwe zegge	+	+	+
<i>Carex paniculata</i>	Greater tussock-sedge	Pluimzegge	-	+	+
<i>Carex pilulifera</i>	Pill sedge	Pilzegge	-	-	+
<i>Carex pseudocyperus</i>	Cyperus sedge	Cyperzegge	+	-	-
<i>Carex rostrata/vesicaria</i>	Bottle sedge/bladder sedge	Snavelzegge/blaauszegge	+	+	+
<i>Carex spec.</i>	Sedge	Zegge	-	+	+
<i>Cerastium fontanum</i>	Common mouse-ear	Gewone hoombloem	-	-	+
Chenopodiaceae indet.	Goosefoot family	Ganzevoetfamilie	+	+	-
<i>Chenopodium album</i>	Fat hen	Melganzevoet	+	+	+
<i>Chenopodium ficifolium</i>	Fig-leaved goosefoot	Stippelganzevoet	-	+	-
<i>Chenopodium polyspermum</i>	Many-seeded goosefoot	Korrelganzevoet	-	-	+
<i>Chrysanthemum segetum</i>	Corn marigold	Gele ganzebloem	-	-	+
<i>Cirsium arvense</i>	Creeping thistle	Akkerdistel	-	-	+
<i>Cirsium vulgare</i>	Spear thistle	Speerdistel	-	-	+
<i>Claviceps spec.</i>	Ergot	Moederkoren	-	+	-
Compositae indet.	Daisy family	Composietenfamilie	-	-	+
<i>Conium maculatum</i>	Hemlock	Gevlekte scheerling	-	+	+
<i>Corylus avellana</i>	Hazel	Hazelaar	+	+	+
<i>Cuscuta spec.</i>	Dodder	Warkruid	-	+	-
<i>Digitaria ischaemum</i>	Smooth finger-grass	Glad vingergras	+	-	-
<i>Echinochloa crus-galli</i>	Cockspur grass	Hanepoot	+	+	+
<i>Eleocharis multicaulis</i>	Many-stemmed spike-rush	Veelstengelige waterbies	-	+	-
<i>Eleocharis palustris</i>	Common spike-rush	Gewone waterbies	-	+	+
<i>Epilobium palustre</i>	Marsh willowherb	Moerasbastaardwederik	-	-	+
<i>Erica tetralix</i>	Cross-leaved heath	Dophei	+	-	+
<i>Euphorbia helioscopia</i>	Sun spurge	Kroontjeskruid	-	-	+
<i>Euphrasia spec.</i>	Eyebright	Ogentroost	-	+	+
<i>Fagopyrum esculentum</i>	Buckwheat	Boekweit	-	-	+
<i>Festuca pratensis</i>	Meadow fescue	Beemdlangbloem	-	+	+
<i>Festuca (rubra)</i>	Red fescue	Rood zwenkgras	+	-	-

Table 7 (continued).

			I	II	III
<i>Galeopsis tetrahit/speciosa</i>	Common/large-flowered hemp-nettle	Bleekgele hennepnetel/ dauwnetel	-	+	+
<i>Galium aparine</i>	Common cleavers	Kleefkruid	-	-	+
<i>Galium palustre</i>	Common marsh-bedstraw	Moeraswalstro	-	+	-
<i>Galium spec.</i>	Bedstraw	Walstro	-	+	-
<i>Glyceria fluitans</i>	Floating sweet-grass	Mannagras	-	-	+
Gramineae indet.	Grass family	Grassenfamilie	-	+	+
<i>Hordeum vulgare</i>	Hulled barley	Bedekte gerst	+	+	+
<i>Hydrocotyle vulgaris</i>	Marsh pennywort	Watermavel	-	-	+
<i>Hypochaeris radicata</i>	Common catsear	Gewoon biggekruid	-	-	+
<i>Juncus articulatus</i>	Jointed rush	Zomprus	-	-	+
<i>Juncus bufonius</i>	Toad rush	Greppelrus	-	+	+
<i>Juncus effusus</i> (type)	Soft rush	Pitrus	-	-	+
<i>Juncus squarrosus</i>	Heath rush	Trekrus	-	-	+
<i>Juncus spec.</i>	Rush	Rus	-	-	+
<i>Knautia arvensis</i>	Field scabious	Beemdkroon	+	+	+
<i>Lamium album</i>	White dead-nettle	Witte dovenetel	-	-	+
<i>Lamium purpureum</i>	Red dead-nettle	Paarse dovenetel	-	-	+
<i>Leontodon autumnalis</i>	Autumn hawkbit	Vertakte leeuwetand	-	-	+
<i>Linum usitatissimum</i>	Flax, linseed	Vlas	+	+	+
<i>Lolium perenne</i>	Perennial rye-grass	Engels raaigras	-	-	+
<i>Lychnis flos-cuculi</i>	Ragged robin	Echte koekoeksbloem	-	-	+
<i>Lycopus europaeus</i>	Gipsywort	Wolfspoot	-	-	+
<i>Lythrum salicaria</i>	Purple loosestrife	Grote kattedaart	-	-	+
<i>Malus sylvestris/Pyrus malus</i>	(Crab) apple	(Wilde) appel	-	-	+
<i>Matricaria maritima</i>	Scentless mayweed	Reukeloze kamille	-	+	+
<i>Matricaria recutita</i>	Scented mayweed	Echte kamille	-	-	+
<i>Malva spec.</i>	Mallow	Kaasjeskruid	-	+	-
<i>Mentha aquatica/arvensis</i>	Water/corn mint	Akker-/watermunt	-	+	+
<i>Moehringia trinervia</i>	Three-veined sandwort	Drienerfmuur	-	-	+
<i>Montia fontana</i>	Blinks	Bronkruid	-	+	+
<i>Myosotis arvensis/palustris</i>	Field/water forgetmenot	Akker-/moerasvergeet-mij-nietje	-	-	+
<i>Myria gale</i>	Bog myrtle	Gagel	-	-	+
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort	Watertorkruid	-	-	+
<i>Panicum miliaceum</i>	Broomcorn millet	Pluimgierst	+	+	-
<i>Pedicularis palustris</i>	Marsh lousewort	Moeraskartelblad	-	-	+
<i>Phleum pratense</i>	Timothy grass	Timoteegras	-	+	-
<i>Pisum sativum</i>	Field pea	Erwt	-	-	+
<i>Plantago lanceolata</i>	Ribwort plantain	Smalle Weegbree	+	+	+
<i>Plantago major</i>	Greater plantain	Grote weegbree	-	+	+
<i>Poa annua</i>	Annual meadow-grass	Straatgras	-	+	+
<i>Poa pratensis/trivialis</i>	Meadow grass/rough meadow-grass	Veldbeemdgras/ruw beemdgras	+	+	+
<i>Polygonum aviculare</i>	Knotgrass	Varkensgras	+	+	+
<i>Polygonum convolvulus</i>	Black bindweed	Zwaluw tong	+	+	+
<i>Polygonum hydropiper</i>	Water-pepper	Waterpeper	+	+	+
<i>Polygonum lapathifolium</i>	Pale persicaria	Knopige/viltige duizendknoop	+	+	+
<i>Polygonum minus</i>	Small water-pepper	Kleine duizendknoop	-	-	+
<i>Polygonum persicaria</i>	Redshank	Perzikkruid	+	+	+
<i>Polygonum spec.</i>	Knotweed	Duizendknoop	+	+	+
<i>Potentilla anserina</i>	Silverweed	Zilverschoon	-	-	+
<i>Potentilla erecta</i>	Common tormentil	Tormentil	-	+	+
<i>Prunella vulgaris</i>	Self-heal	Brunel	-	+	+
<i>Prunus avium/cerasus</i>	Sweet cherry/sour cherry	Zoete kers/zure kers	-	-	+
<i>Prunus domestica ssp. insititia</i>	Bullace	Kriekpruim	-	-	+
<i>Pteridium aquilinum</i>	Bracken	Adelaarsvaren	-	+	-
<i>Quercus spec.</i>	Oak	Eik	+	+	+
<i>Ranunculus acris</i>	Meadow buttercup	Scherpe boterbloem	-	-	+
<i>Ranunculus flammula</i>	Lesser spearwort	Egelboterbloem	-	+	+
<i>Ranunculus repens</i>	Creeping buttercup	Kruipende boterbloem	+	+	+
<i>Ranunculus sardous</i>	Hairy buttercup	Behaarde boterbloem	-	+	+

Table 7 (continued).

			I	II	III
<i>Ranunculus spec.</i>	Buttercup	Boterbloem	-	-	+
<i>Raphanus raphanistrum</i>	Wild radish	Knopherik	-	+	+
<i>Rhinanthus spec.</i>	Yellow-rattle	Ratelaar	-	+	+
<i>Rorippa palustris</i>	Marsh yellowcress	Moeraskers	-	-	+
<i>Rubus fruticosus</i>	Blackberry	Gewone braam	-	-	+
<i>Rubus idaeus</i>	Raspberry	Framboos	-	+	+
<i>Rubus spec.</i>	Bramble	Braam	-	+	+
<i>Rumex acetosella</i>	Sheep's sorrel	Schapezuring	+	+	+
<i>Rumex conglomeratus</i>	Clustered dock	Kluwenzuring	-	+	-
<i>Rumex crispus</i>	Curled dock	Krulzuring	-	+	+
<i>Rumex obtusifolius</i>	Broad-leaved dock	Ridderzuring	-	+	+
<i>Rumex spec.</i>	Dock	Zuring	-	-	+
<i>Sagina (procumbens)</i>	(Procumbent) pearlwort	(Liggend) vetmuur	-	-	+
<i>Sambucus nigra</i>	Elder	Vlier	-	+	+
<i>Scirpus maritimus</i>	Sea club-rush	Heen	-	-	+
<i>Scirpus setaceus</i>	Bristle club-rush	Borstelbies	-	+	+
<i>Scleranthus annuus</i>	Annual knawel	Eenjarige hardbloem	-	+	+
<i>Secale cereale</i>	Rye	Rogge	-	+	+
<i>Senecio aquaticus</i>	Marsh ragwort	Waterkruid	-	+	+
<i>Setaria viridis</i>	Green bristle-grass	Groene naalbaar	+	+	+
<i>Sherardia arvensis</i>	Field madder	Blauw walstro	-	-	+
<i>Sinapis arvensis</i>	Charlock	Herik	-	-	+
<i>Solanum dulcamara</i>	Bittersweet	Bitterzoet	-	-	+
<i>Solanum nigrum</i>	Black nightshade	Zwarte nachtschade	+	+	+
<i>Sonchus asper</i>	Prickly sow-thistle	Gekroesde melkdistel	-	+	+
<i>Sparganium erectum</i>	Branched bur-reed	Grote egelskop	-	-	+
<i>Spergula arvensis</i>	Corn spurrie	Gewone spurrie	+	+	+
<i>Stachys arvensis/sylvatica</i>	Field/hedge woundwort	Akker-/bosandoorn	-	+	+
<i>Stachys palustris</i>	Marsh woundwort	Moerasandoorn	-	-	+
<i>Stellaria graminea/palustris</i>	Lesser/marsh stitchwort	Grasmuur/zeegroene muur	-	-	+
<i>Stellaria media</i>	Common chickweed	Vogelmuur	+	+	+
<i>Stellaria spec.</i>	Stitchwort	Muur	-	+	-
<i>Taraxacum spec.</i>	Dandelion	Paardebloem	-	-	+
<i>Thelypteris palustris</i>	Marsh fern	Moerasvaren	-	-	+
<i>Thlaspi arvense</i>	Field pennycress	Witte krodde	-	-	+
<i>Trifolium repens</i>	White clover	Witte klaver	+	-	-
<i>Trifolium spec.</i>	Clover	Klaver	-	+	-
<i>Triglochin maritima</i>	Sea arrow-grass	Schorrezoutgras	-	-	+
<i>Triticum aestivum</i>	Bread wheat	Broodtarwe	-	+	-
<i>Triticum dicoccum</i>	Emmer wheat	Emmertarwe	+	+	-
Umbelliferae indet.	Carrot family	Schermbloemenfamilie	-	+	-
<i>Urtica dioica</i>	Nettle	Grote brandnetel	-	+	+
<i>Urtica urens</i>	Annual nettle	Kleine brandnetel	-	+	+
<i>Vaccinium myrtillus</i>	Bilberry	Blauwe bosbes	-	+	+
<i>Valeriana officinalis</i>	Common valerian	Echte valeriaan	-	-	+
<i>Vicia faba var. minor</i>	Celtic bean	Duiveboon	-	+	+
<i>Vicia spec.</i>	Vetch	Wikke	+	+	+
<i>Viola spec.</i>	Violet	Viooltje	-	+	+