Food production and food procurement in the Bronze Age and Early Iron Age (2000-500 BC)

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8 The general results of the botanical analyses

In this chapter the general results following from the botanical analyses from the previous chapters will be presented. In the first part the Moselle region will be discussed (section 1), in the second part the site of Geldrop will be analysed and placed in its MDS context (section 2).

8.1 Moselle region

In this section, some general aspects of the results of the archaeobotanical investigations of the samples from the locations in Lorraine and Luxemburg (the Moselle region) as described in the former chapters, are presented.
A total of c. 600 samples were investigated of which 336 contained (charred) plant material. From this series, c. 230 samples were accurately dated. In general the numbers of seeds and the seed density of the Moselle samples are very low. In the Lorraine region, especially, more than 50% of the samples demonstrated seed densities between 1 and 5 seeds per liter sediment. Only 23 samples contained larger numbers of macro remains per liter of sediment, but this, in some cases, is caused by high numbers of *Cerealia* (cereal grains which could not be identified to genus or species level) and/or an abundant presence of charred acorns (*Quercus* spec). The remaining samples produced a seed density of an average of 15 seeds per liter of sieved sediment. The three sites in Luxemburg produced reasonably larger numbers, but this probably results from the highly selective (judgement) sampling techniques employed there.
The results, especially with regard to the food crops, will be compared to other available botanical data from this region and the immediately surrounding regions. Therefore, I made use of the surveys by Bakels for Western-Continental Europe (1991), Marinval/Ruas for Northern France (1991), Wiethold for France du Centre-Est (1998) and the additional sites in the study region, mentioned in chapter 4 (see table 4.1).
First, the samples from the Moselle region are grouped chronologically in order to offer an overview. In section 8.1.2 the crop plants are discussed. Section 8.1.3 discusses the arable weeds. In section 8.1.4 the other wild plant species that were collected for human consumption are presented.

8.1.1 CHRONOLOGY AND GROUPING OF THE SAMPLES

As described in chapter 4 the samples are categorised into five chronological groups. Sometimes, the dating evidence for the samples is not available or insecure (see also chapter 4). Sometimes the samples represent a transitional period (e.g. Bronze final IIIb-Hallstatt C or Hallstatt final-La Tène), or an overlapping period (the whole of the Bronze Age and the Early Iron Age, for example). The samples that could not be attributed to one of the chronological groups were, in the first instance, not brought into the chronological scheme.

	1	2	3	4	5
Hordeum vulgare	#	#	#	#	#
Hordeum vulgare var. nudum	-	(#)	#	#	#
Hordeum vulgare var. vulgare	-	#	#	#	#
Triticum dicoccum	#	#	#	#	#
Panicum miliaceum	#	#	#	#	#
Triticum spelta	(#)	#	#	#	#
Triticum monococcum	-	(#)	(#)	#	(#)
Triticum aestivum	-	(#)	-	#	(#)*
Setaria italica	-	-	#	#	#
Pisum sativum	-	#	#	#	#
Vicia faba	-	#	#	#	(#)
Lens culinaris	-	(#)**	#	#	#
Linum usitatissimum	-	-	#	#	-
Secale cereale***	-	(#)	(#)	(#)	-
Camelina sativa	-	-	(#)	#	(#)

* = Weiler zum Turm (Hallstatt D) (Hopf 1980)
* = Budersberg-Dudelingen (Angelsdall) (La Tene A) (Kroll 1997)

** = Leuze-en-Hainaut (Bronze final) (Laurent 1998)
*** = Leuze-en-Hainaut (Bronze final) 2 specimens (Laurent 1998)
*** = Remicourt (Hallstatt D) (Laurent 1998)

1 = Neolithique finale, Chalcolithique, Bronze Ancien (date before 1500 BC)
2 = Bronze Moyen, Bronze final I-IIa (1500-1100 BC)
3 = Bronze final IIb-IIIa, transition Bronze final IIIb-Hallstatt C (1100-750 BC)
4 = Premier Age du Fer (750-450 BC)
5 = Second Age du Fer (450-50 BC)

Table 8.1 Moselle region - presence of crops

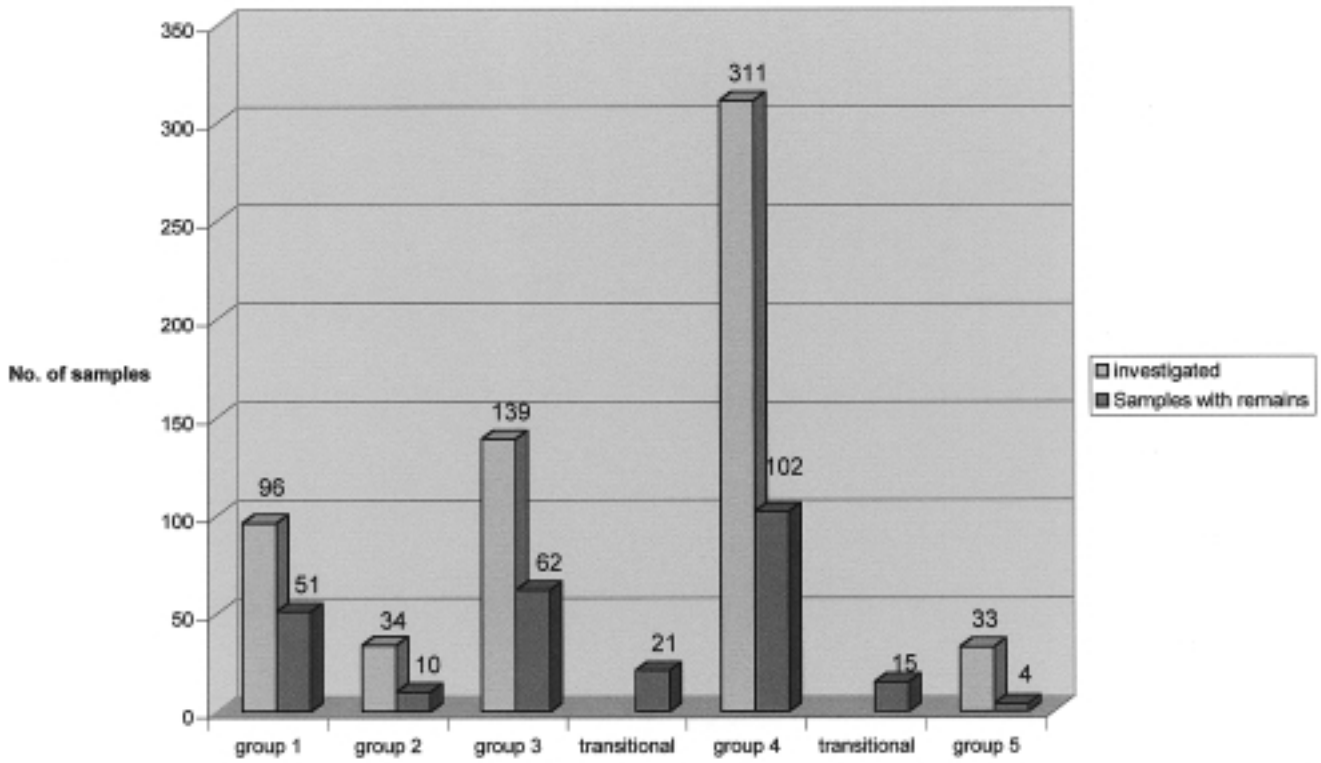

Fig. 8.1 Moselle region - distribution of samples over the five chronological stages

Their results will be considered in later analyses. The chronological grouping where the distribution of samples is concerned, suggest the following overview: figure 8.1.

The first group, which comprises the earliest periods (Late Neolithic, Chalcolithic and Early Bronze Age) is relatively large. Unfortunately, the second group (Middle Bronze Age and Early Late Bronze Age) consists of only 10 samples that contained charred plant material. Clearly, the emphasis in numbers of samples studied lies on the third and fourth group, which comprises the last part of the Late Bronze Age (Bronze final IIb-IIIb) and the Hallstatt C and D periods: that is, roughly the first half of the first millennium BC (see also chapter 4). In particular, the transitional periods between the Late Bronze Age and the Early Iron Age (Bronze final IIIb and Hallstatt C) and between the Early and Middle/Late Iron Age (Hallstatt final and La Tène) are well represented in the material. The fifth chronological group (La Tène) is represented by 33 samples.

8.1.2 THE CROPS

A range of twelve different crop species was found in the samples from the Moselle locations under study. The cereal species recovered are naked and hulled six-row barley (*Hordeum vulgare: H. vulgare vulgare* and *H. vulgare nudum*), bread wheat (*Triticum aestivum*), emmer wheat (*Triticum dicoccum*), einkorn (*Triticum monococcum*), spelt wheat (*Triticum spelta*) and millet (*Panicum miliaceum*). The identifications of grains of Italian millet (*Setaria italica*) remain tentative. Three different pulses were found: lentil (*Lens culinaris*), pea (*Pisum sativum*) and horse bean *(Vicia faba*) and two other crop species: gold of pleasure (*Camelina sativa*) and flax (*Linum usitatissimum)*. In table 8.1 the presence of the crop species according to chronological stage for the Moselle region is indicated.
The evidence that was available from other sites in this region added one more crop species to the list, rye (*Secale cereale*). This crop was found in two sites in Wallony (southwestern Belgium), respectively in a Bronze final silo/pit (only two specimens attested) and a Hallstatt D pit (Laurent 1998a; 1998b). The presence of the various crops species will be discussed here.
Grains and chaff of six-row barley were found on a very regular basis, during all periods concerned, from the Early Bronze Age (i.e. 1800 BC) onwards. This species is, together with emmer wheat, considered the main cereal during all chronological stages. Whenever the material permitted an accurate identification, a distinction was made

between the grains of the naked variety (*Hordeum vulgare nudum*) and those of the hulled variety of barley (*Hordeum vulgare vulgare*). In general, the vast majority of the grains recovered in the material under study (in frequency as well as in absolute numbers) are of hulled six-row barley. Both varieties are recovered from the Bronze Moyen into the Middle/Late Iron Age.

In several cases assemblages consisting of the combination of relatively large amounts of the hulled and naked varieties of barley were recovered. This is the case for Crévéchamps 2625 (probably Bronze Moyen), Frouard Haute de Penotte 2091 (Hallstatt A2/B1), possibly Gondreville 4219 (Hallstatt D) and Woippy 111 (La Tène C/D). This phenomenon is also known from the Late Bronze Age site Beloeil-Tourpes (Fechner/Laurent 1995).

Emmer wheat can, together with six-row barley, be seen as the principal wheat species in the Moselle region. It is present during all chronological stages, from the Bronze Ancien (1800-1500 BC) to the Hallstatt/La Tène transitional period. Its presence in the later period (La Tène) is not absolutely certain however, as these youngest specimens of emmer wheat grains are found in the site of Trémery "Flévy Massey Fergusson" which is dated in the transitional period Hallstatt C-La Tène.

Both barley and emmer wheat are indeed regarded as the principal crops in Northern France (Marinval/Ruas 1991) and in the whole of Atlantic Europe (Bakels 1991), as they are found in virtually all prehistoric sites from the Neolithic onwards.

Spelt wheat appears in the samples dating from the Bronze Age onwards. Its appearance in the phases before the Late Bronze Age is dubious. The identification of a single specimen of a glume base of spelt wheat in a 17th-16th century context (Frouard Saule Gaillard) remains tentative. Various contexts at the site of Crévéchamps which can only be dated *presumably* in the Middle Bronze Age produced remains of chaff of spelt wheat. Its regular occurence in this region however seems to start from the Bronze final I-IIa period, i.e. 1250-1100 BC (spelt chaff in the Luxemburgian sites of Dudelange and Peppingen) and becomes more evident in the Bronze final IIIa (Frouard Saule Gaillard) and the Hallstatt period (Crévéchamps).

In general, we can assume that from the end of the second millennium BC or the beginning of the first millennium BC spelt wheat was a regularly cultivated species in the Moselle region. Indeed its presence is attested from the Late Bronze Age onwards in the whole of Northern and Eastern France (Marinval/Ruas 1991; Marinval 1989; Wiethold 1998) and Wallony (Laurent 1998a; 1998b). Also, the La Tène site of Budersberg produced rather large numbers of spelt wheat (Kroll 1997).

The occurrence of spelt in the course of the Bronze Age and the Iron Age in this region has recently been a subject of further study (Wiethold 1998; de Hingh/Matterne/Wiethold in prep). It appeared that its distribution seems to be restricted to the north-east part of France; more to the west and the south, it is found less and less frequently. It is assumed that the species was diffused into France from the east, that is, the south and south-east part of Germany (Matterne 2000; Wiethold 1998, 223).

Grains and chaff of einkorn wheat were sometimes found in small numbers, dating from several periods. The earliest find of chaff of this species from a Bronze Moyen context remains insecure, as the date is not absolutely certain (Crévéchamps 2625). The identification of an einkorn grain from Ay-sur-Moselle (Hallstatt B period) remains tentative. Only from the Early Iron Age onwards this crop is found on a more regular basis. Matterne presumes that *T. monococcum* could be interpreted as an arable weed of spelt crops in the Iron Age (Matterne 2000). As with our material, the grains were found mostly in very small quantities, so we may assume that here, also, einkorn should not be seen as a cultivated species but that it occurred as an arable weed in wheat fields. Only once, in the Hallstatt D site of Gondreville, was einkorn retrieved in rather large concentrations associated with even larger barley and spelt wheat assemblages. In chapter 10, these storage finds are analysed somewhat further.

Bread wheat grains were occasionally present in samples from the Early Iron Age (i.e. the period 750-450). A find of the rachis internodes of *T. aestivum* in a Middle Bronze Age context is insecure, because of the uncertain date of the structure (Crévéchamps 2625). The Hallstatt finds of this species at the sites of Crévéchamps and Rémerschen consist of only small numbers of grains. The history of bread wheat in this region is therefore rather difficult to assess. Marinval and Ruas (1991) have indications for the presence of bread wheat (*Triticum aestivo-compactum*) throughout prehistoric times. Luxemburgian bread wheat finds are known from Weiler-zum-Turm dating in the Hallstatt D period and from Budersberg-Angeldall dating in the La Tène A period (Hopf 1980, Kroll 1997). Bread wheat is further known in the Northern France Aisne valley from sites of the Cerny Culture (4600-4300 BC) (see also Marinval 1992b). It is assumed that from this time onwards the cereal was regularly cultivated in the Aisne valley (Bakels 1984; Bakels 1997b; Bakels 1999). Bread wheat is further known from sites in France du Centre-Est from the Bronze final III onwards (Wiethold 1998).

Small quantities of grains of common millet (*Panicum miliaceum*) were very regularly found in samples dating from the whole chronological framework of the Moselle region. Its earliest occurrence is in the latest phase of the Early Bronze Age (Frouard Haut de Penotte, recent phase of the Bronze Ancien). Millet is relatively abundant at the site of

Yutz, where it was found, in particular, in a Hallstatt D1/D2 vase-silo and a Hallstatt D2/D3 granary. Its regular occurrence throughout late prehistory in Northern France was attested several times before (Marinval/Ruas 1991, Bakels 1984, Bakels 1991). Millet was probably introduced in these regions as early as the Late Neolithic, but its importance seems to have increased in the course of the Bronze Age and Iron Age. Its distribution the Bronze Age onwards is once more confirmed by an isolated find of common millet in Namur (Wallony) (Bakels pers. comm.).
Grains of what is probably Italian or foxtail millet (*Setaria italica*) were recovered from our material three times. Its presence could be attested in the Late Bronze Age site of Rettel (*Setaria glauca*/*italica*), in a Hallstatt C-pit at Jouy-aux-Arches (*Setaria* cf. *italica*) and in the La Tène C/D site of Woippy (*Setaria glauca*/*italica*). The presence of Italian millet in this region would be quite exceptional, and so the identification problems with this species should be noted (see above, figure 5.26). Marinval described how the distribution area of *Setaria italica*, coming from the east, extends towards central Europe, Switzerland, Germany and (eastern) France in the course of the second millennium BC. He noted, however, that the culture of *Setaria italica* is principally limited to the Alpine zone and that the species is completely absent after the Late Bronze Age (Marinval 1992a, 264).
Remarkably, the seeds of *Setaria* cf. *italica* in our sites were found, without exception, together with *Panicum miliaceum* on the same location (Rettel) or even in the same features (Jouy 2059 and Woippy 111). As Marinval points out, this is extremely rare and only attested in the Bronze final II site of Ouroux/Marne, in the valley of the Saone (Marinval 1992a, referring to Hopf 1985). He notes that in Switzerland, joint presence of the two species is much more frequent.
Rye was twice attested in two Walloon sites, to the north-west of the Moselle region. Two specimens were found in a Late Bronze Age context and larger quantities in a Hallstatt D context (Laurent 1998a; 1998b). Rye is generally assumed to be a late introduction, appearing in the record from the Late Iron Age and Roman period onwards (see Bakels 1991, 289). Marinval and Ruas do not list certain occurrences of *Secale cereale* in their study of Northern France (Marinval/Ruas 1991). We should consider the possibility that this species belonged to the weed flora present in the Bronze Age and Iron Age arable fields before it was taken into cultivation in the Roman and medieval times (see also Rösch 1992, 98 - on the presence of *Secale cereale* in an urnfield-context).
The pulses lentil, pea and horse bean are present in all chronological periods, except for the earliest phase (Chalcolithique, Bronze Ancien). Their cultivation appears to have become quite important at least from the beginning of the first millenium.
The first occurrences of lentil (*Lens culinaris*) are attested in sites that can be clustered, according to date, in the periods Bronze final IIb and Bronze final IIIa-IIIb, i.e. the period between c. 1100 and 800 BC. It continues to be in cultivation in the Hallstatt period and probably also in the La Tène period. Finds of lentil from other Bronze Age or Iron Age sites are unknown from Northern France according to the data of Marinval/Ruas (1991) and Bakels (1991: see her unpublished reference of the site Peppingen which is under study here). The recent study of botanical material from sites situated in France du Centre-Est attested the presence of lentil in the Late Bronze Age and the Early Iron Age in this region (Wiethold 1998).
The first occurrence of pea (*Pisum sativum*) in our material is in a so-called Polynesian oven (Crévéchamps structure 1064) with an accelerator date of 1300-1100 BC. Its regular presence is nevertheless attested from the Hallstatt period onward, especially in the Hallstatt D period (600-500 BC). Pea is known from other sites in the study region or the adjacent areas in Late Bronze Age Leuze-en-Hainaut and Hallstatt D Weiler-zum-Turm (Laurent 1998b; Hopf 1980).
Horse bean (*Vicia faba*) is found from the Bronze final I period onwards (Dudelange) and further in the Late Bronze Age and Late Hallstatt period. A large concentration of *Vicia faba* from a Hallstatt D-silo in Frouard (2035) demonstrates that the cultivation and consumption of these beans might have been considerably more important than the low numbers of seeds found most often would suggest. According to Marinval and Ruas, both pea and horse bean occur throughout the whole prehistory of Northern France (1991).
Low numbers of remains of two different plants that were probably used for the oil in their seeds were present in our material, i.e. flax (*Linum usitatissimum*) and gold-of-pleasure (*Camelina sativa*). Their presence is quite extraordinary, as it was rarely attested in prehistoric sites from Northern France until now. This can be explained by conservation chances and taphonomic processes. The production of oil for which these plants were probably cultivated implies the complete destruction of the seeds, so that we rarely find any trace of them; besides, the carbonization of the two species is known to wholly destroy the seeds or to make them barely identifiable.
The finds of flax in our material suggest that its introduction in this region can be dated in the latest phase of the Late Bronze Age (Hallstatt B2, c. 900-800 BC). The other finds all date from the Early Iron Age. In other parts of Northern France, only one Late-Neolithic/Chalcolithic find of flax is known (Marinval/Ruas 1991). In the Côte-d'Or (Central-East France) the species was present in a Hallstatt final/La Tène ancienne site (Pluvet/Larrivoux, cited in Wiethold 1998). In general, the presence of flax is rarely attested in this region.
Gold-of-pleasure seems to have been introduced contempo-

	stage 1 Chalc/BA		stage 2 BM/BfI-IIa		stage 3 BfIIb-IIIb		stage 4 Hallstatt		stage 5 La Tene	
number of samples		n=51		n=10		n=62		n=102		n=4
	presence	freq.	presence	freq.	presence	freq.	presence	freq.	presence	freq.
Adonis spec.	-		-		-		+	1	-	
Agrostemma githago	-		-		-		+	2	-	
Agrostis spec.	-		-		-		+	1	-	
Arenaria serpyllifolia	-		+	1	-		-		-	
Atriplex patula	-		-		-		-		+	1
Atriplex patula/prostrata	-		+	3	+	6	+	3	-	
Atriplex spec.	-		+	1	+	1	+	1	+	1
Avena spec.(base, awn, grain)	-		-		-		+	13	-	
Brassica spec.	+	1	-		-		-		-	
Brassica spec./Sinapis arvensis	-		+	1	-		-		-	
Bromus secalinus-type	-		+	2	+	5	+	6	+	1
Bromus spec.	-		+	2	+	2	+	6	-	
Bromus sterilis/tectorum	-		-		+	3	+	3	-	
Buglossoides arvensis	-		-		-		+	1	-	
Carex spec.	+	1	+	2	-		+	3	-	
Centaurea spec.	-		-		-		+	2	-	
Cerastium spec.	-		+	1	+	1	-		-	
Chenopodiaceae	-		-		+	9	-		-	
Chenopodium album	+	9	+	4	+	23	+	24	+	2
Chenopodium cf polyspermum	-		-		-		-		-	
Chenopodium ficifolium	-		-		-		+	4	-	
Chenopodium hybridum	-		+	1	+	2	+	3	-	
Chenopodium polyspermum	-		+	1	+	1	+	2	-	
Chenopodium spec.	-		+	1	+	2	+	4	-	
Compositae	-		+	1	-		-		-	
Convolvulus arvensis	-		-		-		+	1	-	
Daucus carota	-		+	1	-		-		-	
Echinochloa crus-galli	-		-		+	1	+	3	-	
Eleocharis palustris	-		-		-		+	2	-	
Euphrasia/Odontites spec.	-		-		-		+	1	-	
Fallopia convolvulus	+	3	+	2	+	11	+	11	+	2
Festuca ovina s. lat.	-		-		+	1	-		-	
Festuca rubra	-		+	1	-		-		-	
Festuca/Lolium spec.	-		-		-		+	6	-	
Fumaria spec.	-		-		-		+	1	-	
Galium aparine	+	1	+	2	+	5	+	9	+	2
Galium cf. palustre	-		-		-		+	1	-	
Galium cf. spurium	-		-		-		-		+	1
Galium cf. verum	-		+	1	-		-		-	
Galium mollugo	-		-		-		+	1	-	
Galium mollugo/verum	-		+	2	-		-		-	
Galium palustre	-		-		+	2	-		-	
Galium palustre spp. palustre	-		+	1	-		-		-	
Galium spec.	+	2	-		+	2	+	3	-	
Galium spurium	-		+	2	+	1	+	10	-	
Galium spurium/aparine	-		-		-		+	1	-	
Galium verum	-		-		+	1	-		-	
Gramineae	-		+	1	+	4	+	2	+	1
Hieracium spec.	-		-		+	1	+	1	-	

Table 8.2 Moselle region - presence and frequency of arable weeds

Iris pseudacorus	+	1	-		-		-		-	
Juncus spec.	-		+	1	-		-		+	1
Lamium purpureum	-		+	1	-		-		-	
Lapsana communis	-		+	3	+	2	+	5	+	1
Leucanthemum vulgare	-		+	1	+	1	+	2	-	
Linum catharticum	-		-		-		+	1	-	
Lotus/Trifolium spec.	-		-		-		+	6	-	
Malva sylvestris	-		-		-		+	1	-	
Matricaria maritima	-		+	1	+	1	+	1	-	
Medicago lupulina	-		+	1	+	1	-		-	
Mentha aquatica/arvensis	-		-		+	1	-		-	
Myosotis spec.	-		-		-		+	1	-	
Odontites spec.	+	1	-		+	1	-		-	
Orlaya grandiflora/Pastinaca sativa	-		-		-		+	1	-	
Papaver setigerum	-		-		-		+	3	-	
Papaver spec.	-		-		-		+	1	-	
Papilionaceae	+	2	-		+	8	+	5	-	
Persicaria lapathifolia	+	1	+	1	+	1	+	2	+	1
Persicaria lapathifolia/maculosa	-		-		-		+	2	-	
Persicaria maculosa	-		+	1	-		-		+	1
Persicaria spec.	-		-		-		+	1	-	
Phleum spec.	-		+	2	-		-		-	
Plantago lanceolata	+	2	+	1	+	2	+	1	-	
Plantago major	-		+	1	+	1	-		-	
Poa annua	-		-		+	1	+	1	-	
Poa annua/Phleum spec.	-		-		+	1	+	8	-	
Poa spec.	+	2	+	1	+	3	+	3	-	
Poa trivialis/pratensis	-		+	1	-		+	1	-	
Polygonum aviculare	-		-		+	2	+	2	-	
Polygonum spec.	-		-		+	1	+	3	-	
Prunella vulgaris	-		-		+	1	-		-	
Raphanus raphanistrum	-		-		-		+	1	-	
Rhinanthus spec.	-		+	2	-		-		-	
Rumex acetosella	+	1	-		+	3	+	6	-	
Rumex cf. sanguineus	-		+	1	-		-		-	
Rumex crispus-type	-		-		+	1	-		-	
Rumex spec.	+	5	-		+	3	+	9	+	2
Sambucus ebulus	+	1	-		+	1	+	6	+	1
Sambucus spec.	+	3	-		-		+	4	-	
Scirpus setaceus	-		-		+	1	-		-	
Scleranthus annuus	-		-		+	1	+	4	-	
Setaria spec.	-		-		-		+	1	-	
Silene spec.	-		-		+	1	-		-	
Sisymbrium officinale	-		+	1	-		-		-	
Solanum dulcamara	-		-		+	1	-		-	
Solanum nigrum	-		-		+	1	+	1	-	
Solanum nigrum/dulcamara	-		-		-		+	1	-	
Solanum spec.	-		-		-		+	1	-	
Stachys arvensis	-		-		+	1	-		-	
Stellaria graminea	-		+	1	-		-		-	
Stellaria spec.	-		+	1	-		+	1	-	
Teucrium scorodonia	-		+	1	-		-		-	
Thlaspi arvense	-		-		+	1	-		-	
Tilia cordata	-		-		+	1	-		-	
Trifolium dubium-type	-		+	1	-		-		-	

Table 8.2 continued

Trifolium repens-type	-		+	1	-		-		-	
Trifolium-type	-		-		+	1	+	6	-	
Umbelliferae	-		-		+	1	-		-	
Urtica dioica	-		+	1	+	1	-		-	
Urtica urens	-		-		+	1	-		-	
Valerianella dentata	-		+	1	-		-		-	
Verbena officinalis	-		-		+	1	-		-	
Veronica arvensis-type	-		+	1	-		-		-	
Veronica chamaedrys	-		+	1	-		-		-	
Veronica hederifolia	-		-		+	1	+	3	-	
Veronica serpyllifolia	-		+	1	-		-		-	
Vicia cf. hirsuta	-		-		-		+	1	-	
Vicia cracca	-		+	1	-		-		-	
Vicia hirsuta	+	4	+	2	+	3	+	7	-	
Vicia hirsuta/tetrasperma	+	2	+	2	+	1	+	7	+	1
Vicia lathyroides	-		-		+	1	-		-	
Vicia sativa	-		-		-		+	1	-	
Vicia spec.	-		+	1	+	7	+	12	-	
Vicia tetrasperma	-		-		+	1	+	3	-	
Vicia/Lathyrus spec.	-		-		-		+	1	-	
total number of taxa	18		52		60		73		15	
ratio taxa:samples	0,36		5,2		1		0,7		3,75	

Table 8.2 continued

raneously or somewhat later than flax. It appears in the botanical record of the Moselle region in the Bronze final IIIb/Hallstatt C period, i.e. around 800 BC (Aéroport Régional de Lorraine, Jouy-aux-Arches) and is further present in the transitional period Hallstatt final/La Tène ancienne (Rémerschen-Schengerwis) and in the Hallstatt D2/D3 period (Yutz) (both c. 500 BC). It was only attested before in the Middle/Late Iron Age in Northern France (Bakels 1984, 13; Marinval/Ruas 1991; Wiethold 1998). We should note that gold-of-pleasure can be interpreted as a weed of flax fields. However, the fact that the species was sometimes found in relatively large numbers and never associated with *Linum*, justifies its interpretation as a cultivated species.

8.1.3 THE ARABLE WEEDS

The botanical assemblages from the Moselle region produced c. 120 different weed taxa. A total number of c. 70 weeds could be identified up to species level. In general, the absolute numbers of weed seeds found in the samples of the 23 locations in the Moselle region are very low. A general overview of the present arable weed species is listed in table 8.2.
Some first results with regard to the arable weeds for the Moselle region as a whole are presented here. In chapter 9, the analysis of the weeds with regard to the study of long-term developments of agriculture will be further elaborated upon.
The majority of the weeds are common species that are regularly found in prehistoric seed assemblages. The species that occur most frequently are regular arable weeds of which also the modern find spots are in arable fields. Examples are *Agrostemma githago, Chenopodium album, Bromus secalinus, Fallopia convolvulus, Persicaria lapathifolia, P. maculosa, Galium aparine, Plantago major, Gramineae,* and *Avena* spec. There are several species, though, that are listed here as arable weeds but are not regularly found in (modern) arable fields, like *Galium palustre, Carex* spec, *Eleocharis palustris, Juncus* spec. and *Scirpus setaceus*. Even though these species are regarded nowadays as plants of damp ground or wetlands, here they are considered to be arable weeds. In chapter 9, the motives for this approach are explained in detail. It suffices to say here that several of these species have been found before in archaeological contexts, such as (closed) crop storages and granary deposits associated with stored cereals. The strong association of these species with crops suggests that they can be interpreted as weeds in the arable fields.
Both annual and perennial weeds are present in the botanical material. In general, the ratio between the annuals and perennials is practically 5:3 (calculated by presence in the region as a whole). That is, c. 50 annuals were identified and c. 30 perennials.

8.1.4 THE FRUITS AND NUTS COLLECTED FROM THE WILD

The species that were not cultivated and which almost certainly did not have their habitats in the arable fields are grouped under this category (table 8.3). They are associated

	1	2	3	4	5
Corylus avellana	#	#	#	#	-
Quercus spec.	#	#	#	#	#
Prunus spinosa	#	-	#	#	-
Prunus spec.	#	-	#	-	-
Crataegus laevigata	-	-	(#)	(#)	-
Malus spec.	-	-	(#)	-	-
Rubus fruticosus*	-	-	-	-	(#)
Rubus idaeus*	-	-	-	-	(#)
Fragaria vesca*	-	-	-	-	(#)
Sambucus nigra*	-	-	-	-	(#)

* = Budersberg-Dudelingen (Angelsdall) (La Tene A) (Kroll 1997)

1 = Neolithique finale, Chalcolithique, Bronze Ancien (date before 1500 BC)
2 = Bronze Moyen, Bronze final I-IIa (1500-1100 BC)
3 = Bronze final IIb-IIIa, transition Bronze final IIIb-Hallstatt C (1100-750 BC)
4 = Premier Age du Fer (750-450 BC)
5 = Second Age du Fer (450-50 BC)

Table 8.3 Moselle region - presence of collected species

with forests, woodland edges and hedgerows and consist of fruits and nuts that may have been collected from the wild and are fit for human consumption. Some of the species will (also) have served other goals, such as having had a medical use.
The group of collected species includes hazelnut (*Corylus avellana*), (wild) apple (*Malus* spec.), hawthorn (*Crataegus laevigata*), sloe (*Prunus spinosa* and *Prunus* spec.) and fruits of the oak (*Quercus* spec.). The remains of most of the wild species that were found in the Moselle region are the inedible parts, i.e. (fragments of) pips, stones or nutshells. From the oak, by contrast, only the edible kernels of acorns were found.
In general, small quantities of collected fruits and nuts were recovered from the seed assemblages. Often, only single specimens or fragments of wild collected plant species were recorded. Numerically they appear to be of limited importance as the group forms a virtually negligible percentage of the total number of seeds. However, expressed in frequencies, their presence appears to be relatively important, as for example, 15 samples contained charred fragments of hazelnut shells.
The acorn, in particular, forms an exception to the apparent underrepresentation of wild fruits in the Moselle samples. In 17 samples dating from the Early Bronze Age to the Middle/Late Iron Age, charred kernels of acorn were recovered, sometimes in large numbers (in the sites of Frouard "Z.A.C. du Saule Gaillard", Woippy and Yutz). Concentrations of large quantities of charred acorns are common finds in prehistoric sites all over North-West Europe. This phenomenon is described more extensively in chapter 11.
In general, the range of collected species found in other parts of Northern France is more extensive. Marinval and Ruas noted the presence of 19 different collected species retrieved from prehistoric sites in this area, among which are *Pirus pyraster, Juglans regia, Vitis sylvestris, Rubus idaeus* and *Rubus fruticosus* (Marinval/Ruas 1991). Remains of *Rubus fruticosus, Rubus idaeus, Fragaria vesca and Sambucus nigra* were presented for the La Tène A-site of Budersberg-Dudelange (Kroll 1997).

8.1.5 SUMMARY OF THE RESULTS OF THE BOTANICAL ANALYSES OF THE MOSELLE MATERIAL

- Emmer wheat and six-row barley are the dominant species in this region, during all chronological stages. Of six-row barley, the naked and hulled varieties were both present in the material, sometimes in combination.
- Spelt wheat was probably introduced in the Moselle region from the Late Bronze Age onward.
- Einkorn and bread wheat seem to play a minor role in cereal cultivation in the Moselle region. Einkorn may be interpreted as an arable weed in cereal crops.
- Common millet is attested for all periods in the Moselle region. Italian millet occurs sporadically from the Late Bronze Age onwards. Its identifications are tentative.
- Pulses, i.e. pea, lentil and horse bean, are present in the Moselle region from the Late Bronze Age-Early Iron Age onwards.
- A relatively large number of weeds were found which are interpreted as arable weeds. Most of the species occurring in the Moselle material are indeed common arable weeds known from (modern) arable fields. In all, 49 annuals and 37 perennials were attested.
- The evidence for the collection of wild fruits during the Bronze Age and Iron Age in the Moselle region is scarce, except for hazelnut and acorns particularly.

8.2 The site of Geldrop and the MDS region

In the following sections the results of the botanical analysis of the Middle Bronze Age and the (Middle) Iron Age samples from Geldrop are analysed. The amount of data (samples and macro remains) from this site is relatively low. Therefore, the Geldrop data will be compared to botanical evidence from other prehistoric sites in the MDS region, which forms its geographical and chronological context (the Pleistocene area of North-Brabant and Flanders) (see also chapter 4).

At the beginning of this study an inventory was made only of Bronze Age and Early Iron Age samples. This selection was based on the starting point of this study: tracing developments in agriculture in this particular period. As the data for this chronological framework were not abundant, we added the species lists of Middle Iron Age sites to the inventory. As described in chapter 2, it appeared useful sometimes to widen the chronological perspective as it enabled us to make relevant comparisons.
In this way, 19 (period) sites, including Geldrop, with a total of more than 80 samples are available for analysis (see table 4.2). The results of the food crops of Geldrop in particular will be compared with these additional data, and sometimes with other botanical evidence from the surrounding regions. Therefore, I made use of the survey by Bakels on Western Continental Europe (1991), and various published data from the Netherlands (see also chapter 4).

8.2.1 CHRONOLOGY AND GROUPING OF THE SAMPLES

As described in chapter 4, five chronological stages have been distinguished to facilitate the comparative analysis of the samples deriving from the sites in the MDS region. The chronological grouping where the distribution of samples is concerned, suggest the following overview: figure 8.2.
It appears that the sites and samples are unevenly distributed over the chronological periods. Clearly, evidence for the earliest period (Late Neolithic and Early Bronze Age) is lacking from the MDS record. Also, the Late Bronze Age is scarcely represented. The principal emphasis is on the Middle Iron Age.

8.2.2 THE CROPS

A range of twelve crop species was retrieved from the botanical samples from the sites in the MDS region (table 8.4). The cereals attested are six-row barley (*Hordeum vulgare*) and its hulled and naked varieties (*Hordeum vulgare vulgare* and *Hordeum vulgare nudum*), common millet (*Panicum miliaceum*), bread wheat (*Triticum aestivum*), emmer wheat (*Triticum dicoccum*), einkorn (*Triticum monococcum*), spelt wheat (*Triticum spelta*) and oats (*Avena sativa*). Three pulses, pea (*Pisum sativum*), lentil (*Lens culinaris*) and horse bean (*Vicia faba*) were present and finally the oil-containing species gold-of-pleasure (*Camelina sativa*) and flax (*Linum usitatissimum).*
The cereals six-row barley (*Hordeum vulgare)* and emmer wheat *(Triticum dicoccum*) appear to form the two dominant

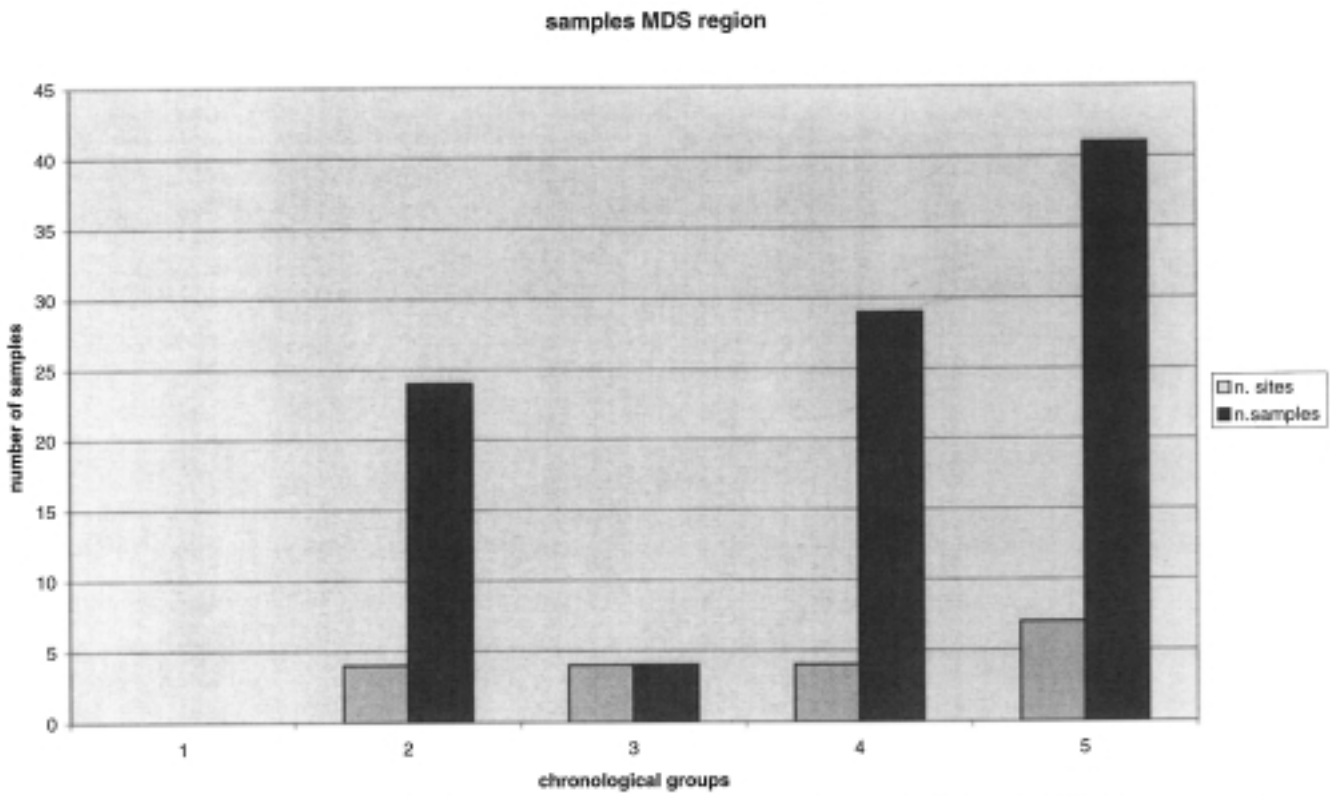

Fig. 8.2 MDS region - distribution of samples over the five chronological stages

	1	2	3	4	5
Hordeum vulgare	-	#	#	#	#
Hordeum vulgare var. nudum	-	#	#	-	
Hordeum vulgare var. vulgare	-	#	#	#	#
Panicum miliaceum	-	#	#	#	#
Triticum dicoccum	-	#	#	#	#
Triticum spelta	-	#	#	#	#
Triticum monococcum	-	#	-	(#)	(#)
Triticum aestivum	-	#	-	(#)	(#)
Avena sativa	-	-	-	#	#
Lens culinaris	-	-	-	#	-
Pisum sativum	-	-	-	#	#
Vicia faba	-	-	-	(#)	#
Camelina sativa	-	-	-	#	#
Linum usitatissimum	-	-	-	(#)	#

1 = Late Neolithic, Early Bronze Age (date before 1750 BC)
2 = Middle Bronze Age (1750-1100 BC)
3 = Late Bronze Age (1100-750 BC)
4 = Early Iron Age (750-500 BC)
5 = Middle and Late Iron Age (500-50 BC)

Table 8.4 MDS region - presence of crops

crop species in this region. They are present on (virtually) all sites and in all chronological stages, from the Middle Bronze Age to the Middle Iron Age. As mentioned before, these two cereals are indeed regarded as the principal species throughout Northwestern Europe in prehistory.
At times the hulled and naked varieties of six-row barley could be distinguished. The hulled form of this species was found in the Middle Bronze Age sites of Geldrop and Boxmeer, and it remains the dominant variety from this time onwards in the MDS region. Small numbers of grains of the naked variety of six-row barley were retrieved on some sites. An impression of naked barley was found in the Late Bronze Age pottery of Hilvarenbeek-Laag Spul (Bakels 1975). Moreover, they occur combined with large amounts of grains of hulled barley in the Middle Bronze Age silo of Boxmeer (26-1-648).
Instances of a similar co-occurrence of naked and hulled barley are known from various Dutch Bronze Age and Iron Age sites, for example in Early Iron Age Noordwijk (van Heeringen/van der Velde/van Amen 1998), in the Middle and Late Bronze Age West-Friesland sites of Twisk and Westwoud (Buurman 1996), Middle Bronze Age Dalen (van Zeist/Palfenier 1994), Bronze Age Elp (van Zeist 1968/1970) and Early Iron Age Deventer-Colmschate (Buurman 1986).
In addition to emmer and barley, common millet (*Panicum miliaceum*) is also found frequently throughout all chronological stages from the Middle Bronze Age onwards (Geldrop and Son-en-Breugel) up until the Middle Iron Age, when it is present on all investigated sites. As was mentioned earlier, it is generally assumed that the cultivation of millet was completely introduced in the course of the Bronze Age. Its occurrence however seems to be restricted to the upland sites (see section 8.3; see Bakels 1991, 287).
Grains of the free-threshing bread wheat (*Triticum aestivum*) were found only once in a Middle Bronze Age pit in Geldrop (112). In my view, identification problems with the grains of bread wheat could account for the general quasi-absence of this cereal species here (see also section 8.1.2). In many instances there can be problems keeping bread wheat grains apart from its spelt or emmer wheat counterparts. This was the case in the La Tène site of Evergem where *T. dicoccum* grains could hardly be distinguished from spelt or bread wheat (De Ceunynck et al 1984, 15) and in Oss-Ussen (impression of wheat in pottery, identified as *T. aestivum*/*spelta* (Bakels 1994; also in Schinkel 1998). Finally, in an Early or Middle Iron Age well in Boxmeer, charred grains of bread wheat are known to have been found. The perfect conservation of the material here enabled the investigator to establish the presence of *T. aestivum* as well as of *T. aestivo-compactum* (Buurman 1987, 111).
With regard to identification, other problems also apply to einkorn (*Triticum monococcum*), of which only two possible grains were recovered in Bronze Age Geldrop (pit 112). Problems with respect to the identification of so-called two-seeded einkorn are often described in the archaeobotanical literature (e.g. Kroll 1992). In some cases einkorn grains are known to appear as two seeded einkorn which makes them virtually indistinguishable from emmer grains. Only the presence of spikelet forks and glume bases of the cereal can guarantee a certain determination. *T. monococcum*-type is known from Oss-Ussen, where it was found as a grain impression in Early and Middle Iron Age shards (Bakels 1994; also in Schinkel 1998). Einkorn is known to have been cultivated in the neolithic, it disappears from the Bronze Age record, and seems to re-occur sporadically in later periods, possibly as an arable weed (see also section 8.1.2).
The introduction of spelt wheat (*Triticum spelta*) in the MDS region is relatively difficult to assess. Boxmeer is the only site where the presence of spelt wheat in a Middle Bronze Age silo (26-1-648; probably mixed with emmer wheat) and a Late Bronze Age pit (10-2-545) is confirmed. The wheat material from this site was reported to be difficult to identify. It doubtlessly concerned one or more hulled wheat species, but large numbers of grain were too flat for emmer wheat, and too slender for spelt wheat. The investigators assumed that it concerned a mixed assemblage of spelt and emmer wheat, with a large “intermediate group”.

The chaff remains could certainly be ascribed to spelt wheat (van Beurden, pers comm).
Other Bronze Age records for *T. spelta* in the MDS region are uncertain: the Middle Bronze Age samples from Geldrop (features 106 and 145) and Son-en-Breugel only produced tentative identifications of spelt wheat grains resp. chaff remains. Here again, identification problems arose, as spelt wheat grain and chaff could not be clearly discerned from its emmer wheat counterparts.
In Early Iron Age Someren small quantities of chaff and grains of spelt were found (in features 11-22-4 and 23-67-4), and also in the Middle Iron Age its presence is attested in Son-en-Breugel and Oss-Ussen (Bakels/van der Ham 1981, Bakels 1994). Other Dutch sites where spelt wheat was found, are Early Iron Age Deventer-Colmschate (Buurman 1986) and the Iron Age sites of Sittard-Haagsittard and Stein (Buurman/de Man 1991; de Man 1998).
Evidence of the cultivation of oats (*Avena sativa*) is found in the sites of Neerharen (Early Iron Age, pit 61) and Bladel (Middle Iron Age, feature 27) where some specimens of the chaff remains enabled the investigators to distinguish the cultivated species from wild oats. Buurman identified *Avena sativa* in the crop assemblage from a Early/Middle Iron Age well in Boxmeer (Buurman 1987). Bakels presents more examples of oats for the Iron Age in her survey, but does not draw the distinction between the cultivated and the wild species (Bakels 1991, 289).
The earliest indications for the cultivation of pulses in the MDS region appear in the Early Iron Age. From the Early Iron Age onwards the presence of pea (Neerharen-58 and 61, and Riethoven-22) and lentil (Someren, 3-18-0) are attested. We may assume that in this period the cultivation of these two pulses had been completely introduced. Horse bean is not regularly found in this region until the Middle Iron Age (Evergem, Oss-Ussen, Oss-Mettegeupel; de Ceuninck et al 1984, Bakels 1987, Witmond no date), although the horse beans from a well in Boxmeer dated in the Early or Middle Iron Age could be the oldest find known to the author (Buurman 1987, 111).
Finally, three Early Iron Age sites produced single specimens of the seeds of gold-of-pleasure (Someren, Neerharen and Riethoven). It also appears in the Middle Iron Age contexts of Son-en-Breugel and Oss-Mettegeupel (Bakels/van der Ham 1981; Witmond n.d.). Conspiciously quasi-absent from the MDS complex in Bronze Age and Early Iron Age contexts is flax (*Linum usitatissimum*). This species is found in our regions from the Neolithic onwards and is known from amongst others Bronze Age Friesland and Early Iron Age Colmschate (Buurman/Pals 1974; Buurman 1999; Buurman 1996). Normally flax, together with gold-of-pleasure, is regarded as a typical Iron Age introduction in our region. The earliest context in the MDS region where this species was found is Early/Middle Iron Age Boxmeer (Buurman 1987). The records of this species of a more certain date in our region are present in Middle Iron Age Son-en-Breugel, Dommelen and Oss-Mettegeupel (Bakels/van der Ham 1981, Roymans 1985b, Witmond n.d.).

8.2.3 THE ARABLE WEEDS

In general the absolute numbers of weed seeds in the MDS samples are low to moderately low. An overview of the arable weed species from the Bronze Age and Early Iron Age samples is listed in table 8.5. A total number of 65 different taxa of weed species were identified in the material dating to the Middle Bronze Age to the Early Iron Age. A total of 38 weeds could be identified up to species level. Obviously, the resemblances between the weed assemblages of Geldrop (as key site for the MDS region) and the Moselle sites are striking. The occurrence of only some species was restricted to the site of Geldrop. The arable weeds that were absent from the Moselle sites are*: Anagallis arvensis, Capsella bursa-pastoris, Galeopsis segetum*, *Glyceria/Molinia* spec., *Lolium perenne*, *Persicaria hydropiper* and *Spergula arvensis*.
The species which occur most frequently in the MDS samples are common arable weeds for which the modern find spots are also in arable fields (see also section 8.1.3).
More sporadically, we find species like *Carex demissa*, *Carex* spec., *Eleocharis palustris, Montia chondrosperma*, *Prunella vulgaris*, *Potentilla erecta*, *Ranunculus flammula* and *Trifolium pratense*, some of which are known today to grow in damp places. The weed assemblage of Early Iron Age Riethoven especially seems to be dominated by similar species (Vanderhoeven 1991).
In chapter 9, the analyses of the weeds with regards to the study of long-term developments of agriculture will be further elaborated upon.

8.2.4 THE FRUITS AND NUTS COLLECTED FROM THE WILD

A small range of collected fruits and nuts of wild plants is retrieved from the botanical samples of the MDS region, consisting of hazelnut (*Corylus avellana*), acorns (*Quercus* spec.) and sloe (*Prunus spinosa* only in Early Iron Age Someren) (see table 8.6). *Prunus insititia* is known from a Middle Bronze Age well in Oss (Bakels 1981), *Sambucus nigra* was collected by the inhabitants of Early Iron Age Oss-Ussen and Middle Iron Age Son-en-Breugel (Bakels 1994; Bakels/van der Ham 1981). The Early and Middle Iron Age wells of Oss-Ussen produced some more species: *Rubus idaeus* and *Rubus fruticosus* (Bakels 1994).
Charred kernels of acorn (*Quercus* spec.*)* were recovered in large numbers in Middle Bronze Age Geldrop (pit 262). In

	stage 2 MBA		stage 3 LBA		stage 4 EIA		stage 5 MIA (Geldrop)	
number of samples		n=24		n=1		n=24		n=9
	presence	freq.	presence	freq.	presence	freq.	presence	freq.
Agrostis spec.	+	1	-		-		-	
Anagallis arvensis	+	1	-		-		-	
Atriplex spec.	-		-		+	1	-	
Avena spec.	+	2	+	1	-		-	
Brassica spec	+	1	-		+	1	-	
Bromus cf. secalinus	-		-		+	3	-	
Bromus spec.	+	1	-		-		-	
Capsella bursa-pastoris	+	1	-		+	2	-	
Carex demissa-type	-		-		+	1	-	
Carex spec.	-		-		+	3	-	
Chenopodium album	+	10	+	1	+	6	+	4
Chenopodium ficifolium	+	4	-		-		+	1
Chenopodium spec.	+	4	-		-		-	
Chenopodiaceae	-		-		+	1	-	
Digitaria ischaemum	-		+	1	-		-	
Digitaria spec.	-		-		+	3	-	
Echinochloa crus-galli	+	3	+	1	+	5	-	
Eleocharis palustris	+	1	-		+	1	-	
Festuca/Lolium spec.	+	4	-		-		-	
Galeopsis segetum	+	1	-		-		-	
Galeopsis spec.	+	1	-		+	2	+	1
Galium aparine	+	2	-		+	8	-	
Galium spurium	+	2	-		-		-	
Galium spec.	+	2	-		+	4	-	
Glyceria/Molinia spec.	+	1	-		-		-	
Gramineae	+	3	-		+	4	+	1
Lolium perenne	+	1	-		-		-	
Mentha aquatica/arvensis	-		+	1	-		-	
Mentha arvensis	-		-		+	1	-	
Papilionaceae	-		+	1	-		+	1
Plantago lanceolata	+	1	+	1	+	2	-	
Polygonum aviculare	-		-		+	2	+	1
Polygonum convolvulus	+	13	+	1	+	11	+	1
Polygonum hydropiper	+	1	-		+	7	+	1
Polygonum lapathifolium	+	15	-		+	12	+	5
Polygonum persicaria	+	5	-		+	5	-	
Pol.lapathifolium/persicaria	+	2	-		+	5	+	2
Polygonum spec.	+	1	-		+	4	-	
Potentilla erecta	-		-		+	1	-	
Potentilla spec.	-		-		+	1	-	
Prunella vulgaris	-		-		+	2	-	
Ranunculus flammula	-		-		+	1	-	
Rumex acetosella	+	5	-		+	6	+	1
Rumex spec.	+	2	-		+	1	+	1
Scleranthus annuus	-		-		+	1	-	
cf. Setaria spec.	-		-		+	1	-	
Setaria/Echinochloa spec.	+	1	-		-		-	
Solanum dulcamara	+	1	-		-		-	
Solanum nigrum	+	3	-		+	3	-	

Table 8.5 MDS region - presence and frequency of arable weeds

Solanum spec.	+	2	-		-		-
Spergula arvensis	+	3	+	1	+	7	-
Stachys arvensis	-		-		+	3	-
Stellaria media	-		-		+	1	-
Trifolium cf. pratense	-		-		+	1	-
Trifolium spec.	-		+	1	-		-
Umbelliferae	-		-		+	1	-
Veronica cf. arvensis	-		-		+	1	-
Vicia cf. cracca	-		-		+	1	-
Vicia hirsuta	+	4	-		-		-
Vicia tetrasperma	+	1	-		-		-
Vicia hirsuta/tetrasperma	+	4	-		-		-
Vicia sativa angustifolia	-		-		+	1	-
Vicia sativa nigra	-		-		+	5	-
Vicia spec.	+	2	-		+	1	-
Viola arvensis	-		-		+	1	-
total number of taxa	38		10		44		12
ratio taxa-samples	1,6		10		1,8		1,3

Table 8.5 continued

	1	2	3	4	5
Corylus avellana	-	#	#	#	#
Prunus insititia	-	#	-	-	-
Quercus spec.	-	#	-	-	#
Prunus spinosa	-	-	-	#	-
Rubus idaeus*	-	-	-	#	-
Sambucus nigra*	-	-	-	#	#
Rubus fruticosus*	-	-	-	#	#

* = water wells Oss-Ussen (Bakels 1994)

1 = Late Neolithic, Early Bronze Age (date before 1750 BC)
2 = Middle Bronze Age (1750-1100 BC)
3 = Late Bronze Age (1100-750 BC)
4 = Early Iron Age (750-500 BC)
5 = Middle and Late Iron Age (500-50 BC)

Table 8.6 MDS region - presence of collected species

section 8.1.4, it was mentioned that concentrations of charred acorns are a common phenomenon on prehistoric sites. For a more elaborate discussion on the collection of acorns in particular, see chapter 11.

8.2.5 SUMMARY OF THE RESULTS OF THE BOTANICAL ANALYSES OF THE MDS MATERIAL

The results can be summarised as follows:

- Emmer wheat and barley are the dominant species in this region throughout the Bronze Age and the Iron Age. Naked and hulled barley are both present in the Bronze Age, but not in later contexts. In the MDS region it appears that the hulled variety seems to have gradually taken over the naked variety by then. A Middle Bronze Age silo in Boxmeer shows a combination of small numbers of naked and large numbers of hulled barley.
- Millet is found extremely frequently, through all present chronological stages. Its cultivation seems to be generally introduced from the (Middle) Bronze Age onwards.
- The introduction of spelt wheat in the MDS region is difficult to assess; it can probably be placed in the Late Bronze Age, perhaps even in the Middle Bronze Age.
- The grains of bread wheat, though found only in limited numbers in Middle Bronze Age Geldrop, appear to be an exceptional find, as they were attested nowhere else.
- Absent species in the overall table for the MDS region, in comparison to the loess region are *Setaria italica* and *Secale cereale*. Vice versa, *Avena sativa* was found on the sandy soils but not in the Moselle region.
- The role of collected fruits and nuts seems to be restricted, with the exception of acorns which are found more frequently in large numbers.
- The weed plants present in the samples from the MDS region are primarily common arable weeds, the majority of which are (summer) annuals.

In the following three chapters the results on the botanical finds from the Moselle region and the MDS region will be discussed in more detail.