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The *Rubetum taxandriae* ass. nov. (*Lonicero-Rubion silvatici*, *Lonicero-Rubetea plicati*), a new bramble association from the Belgian and Dutch Campine

– Rense Haveman, Iris de Ronde & Eddy J. Weeda –

Abstract

Bramble scrubs are among the least known and understood vegetation types in Europe. In the Dutch National Vegetation Overview, three associations belonging to the *Lonicero-Rubion silvatici* were distinguished, viz. the *Rubetum grati*, *Rubetum silvatici*, and *Rubetum pedemontani*. During several vegetation mapping projects and *Rubus* excursions, a distinct type of bramble scrub was recorded repeatedly in the Campine in the province Noord-Brabant in the southern part of the Netherlands. In this paper, this scrub is described as a new association, the *Rubetum taxandriae* Haveman, de Ronde & Weeda, with *R. taxandriae*, *R. campaniensis*, and *R. baronicus* as character species, and *R. insectifolius* as regional character species. Variation, ecology and distribution of this new association are given and discussed, and two subassociations are distinguished. The differences with the *Rubetum silvatici*, to which this community was believed to belong, are discussed. Based on an earlier analysis of the centres of diversity of the genus *Rubus* in the Netherlands, it is supposed that the *Rubetum silvatici* in its circumscription in the Dutch National Vegetation Overview can be divided in more regionally distributed communities, partly as subassociations of the *Rubetum silvatici*, partly as independent associations.

Zusammenfassung: Das *Rubetum taxandriae* ass. nov. (*Lonicero-Rubion silvatici*, *Lonicero-Rubetea plicati*), eine neue Brombeer-Assoziation im Gebiet der belgischen und niederländischen „Kempen“

Brombeergebüsche gehören zu den am wenigsten bekannten Vegetationstypen in Europa. Bisher wurden drei Assoziationen für die Niederlande beschrieben: *Rubetum grati*, *Rubetum silvatici* und *Rubetum pedemontani*. Bei verschiedenen Kartierungsarbeiten und Exkursionen wurde in „De Kempen“ in der Provinz Noord-Brabant im südlichen Teil der Niederlande mehrmals ein abweichendes Gebüsch beobachtet. Dieses Gebüsch wird hier als neue Assoziation: *Rubetum taxandriae* Haveman, de Ronde & Weeda beschrieben, mit *R. taxandriae*, *R. campaniensis* und *R. baronicus* als Kennarten und *R. insectifolius* als regionaler Kennart. Artenverbindung, Ökologie und Verbreitung werden erörtert, und zwei Subassoziationen werden beschrieben. Der Unterschied zum *Rubetum silvatici* wird diskutiert. Aufgrund einer früher publizierten Analyse von Diverzitätszentren der Gattung *Rubus* in den Niederlanden wird angenommen, dass das *Rubetum silvatici* dort in mehrere regional verbreitete Gebüschtypen aufgespalten werden kann, teilweise als Subassoziationen, teilweise vielleicht besser als eigene Assoziation.

Keywords: apomicts, bramble scrub, syntaxonomy, *Rubus*, woodland edge.

1. Introduction

Bramble scrubs are among the least known and understood vegetation types in Europe. In the comprehensive overview of the scrubs in the temperate and boreal parts of Europe given by Weber (1997, 1998b), relevés in which apomictic *Rubus* species were adequately identified had almost only been made in Germany. The bramble scrubs of Northwestern Europe were placed in separate alliances and in two separate classes. The scrubs of relatively nutrient rich and/or base rich soils are united in the *Pruno-Rubion radulae* Weber 1974, an alliance of the *Rhamno-Prunetea* Rivas Goday & Borja Carbonell ex Tüxen 1962, whereas the *Lonicero-Rubion silvatici* Tüxen et Neumann ex Wittig 1977, containing scrubs of nutrient poor and acidic soils, were placed in the *Franguletea* Doing 1962 ex Westhoff in Westhoff & Den Held 1969 (Pott 1995, Weber 1998a, 2003, 1999, 1990). In the Dutch national vegetation overview, this classification scheme was adopted for the greater part, and several *Rubus* associations were documented shortly after Weber published his overview (Haveman et al. 1999a, 1999b). A remarkable difference was the description of a separate class

Lonicero-Rubetea plicati Haveman, Schaminée & Stortelder 1999 for the scrubs on nutrient poor acidic soils, as advocated by HAVEMAN (1997) some years before.

HAVEMAN et al. (1999a) distinguished three associations within the *Lonicero-Rubetea plicati* for the Netherlands: the *Rubetum grati* Tüxen et Neumann ex Weber 1976, the *Rubetum silvatici* Weber in Pott 1995, and the *Rubetum pedemontani* Weber in Pott 1995. According to WEBER (1998a), the character species of the *Rubetum silvatici* are *Rubus silvaticus*, *R. pyramidalis*, *R. flexuosus*, and *R. sprengelii* but HAVEMAN et al. (1999a) and WEEDA et al. (2005) considered many more species as such: *R. adspersus*, *R. campaniensis*, *R. drenthicus*, *R. erinulus*, *R. foliosus R. glandithyrsos*, *R. lasiandrus*, *R. mucronulatus*, *R. rubercadæver*, *R. schlechtendalii* and *R. taxandriae*. However, the authors suggested that when more relevés would become available from the Netherlands, the *Rubetum silvatici* in the given circumscription would probably appear to be a 'composite association', comprising of a number of more clearly defined, regionally distributed vegetation types (HAVEMAN et al. 1999a, p. 96).

During the vegetation mapping projects of military training areas, and a study of the bramble scrubs along three landscape transects (HAVEMAN et al. in prep.) a distinct bramble scrub was repeatedly recorded in the Campine in the province Noord-Brabant, in the southern part of the Netherlands. The two most frequent *Rubus* species in this scrub type are *R. campaniensis* and *R. taxandriae*, which were among the species considered to be character species of the *Rubetum silvatici* by HAVEMAN et al. (1999a). Two other species occurring in these scrubs are *R. baronicus* and *R. insectifolius*. These four species are lacking in the North-German lowlands, which is the distribution centre of the *Rubetum silvatici*. At least the first two are frequently found in the southern part of the Netherlands and the adjacent part of Flanders/Belgium. Reversely, the character species of the *Rubetum silvatici* s.str. are virtually absent in the scrubs formed by *R. campaniensis* and *R. taxandriae*.

In this paper we describe this bramble scrub from the Campine as a new association, belonging to the *Lonicero-Rubion silvatici*.

2. Area

The Campine is the area between the rivers Scheldt and Meuse, roughly situated between Antwerpen and Hasselt in Belgium and Eindhoven in the Netherlands (fig. 1). The area was never covered by the ice caps during the Pleistocene, in contrast with more northern parts of the Netherlands. The area is largely covered by Pleniglacial aeolian cover sands from the Weichselian (116,000–11,500 BP), incised by many rivulets and brooks draining the area towards the two mentioned large rivers. Although the area is slightly undulating, the differences in altitude are small (0–50 m above sea level). The climate is subatlantic, with a precipitation surplus in all months (fig. 2), a total annual precipitation of 707 mm, and an annual average temperature of 9.8° C. (SLUIJTER 2011).

3. Material and methods

3.1 Relevés

For this study 38 relevés were used in which *Rubus taxandriae*, *R. campaniensis*, *R. baronicus*, and *R. insectifolius* reach a combined cover of at least 5%. They were collected between 1998 and 2011 in several mapping projects of military ranges, during several excursions in the region, and in a study of the species composition of bramble scrubs along three landscape transects (HAVEMAN et al. in prep.). The relevés are all stored in the Dutch National Vegetation Database (JANSEN et al. 2011) using TurboVeg (HENNEKENS & SCHAMINÉE 2001).

All phanerogam and cryptogam species were recorded in as many layers as necessary to describe the vegetation structure. Species names are according VAN DE BEEK et al. (in press) for the *Rubus* species, VAN DER MEIJDEN (2005) for the other phanerogams, and SIEBEL & DURING (2006) for the mosses. The abundance of the species was recorded using the modified scale of Braun-Blanquet (BARKMAN et al. 1964). Due to the diverse origin of the data, the area of the used relevés varies considerably (from 15 to 70 m^2), but all relevés are considered to be homogeneous as to the species composition.

For a comparison with the *Rubetum silvatici*, we selected relevés from the Dutch National Vegetation Database (JANSEN et al. 2011, SCHAMINÉE et al. 2006) which met the following three conditions: 1.) the combined abundance of the four character species (*Rubus silvaticus*, *R. pyramidalis*, *R. flexuosus*, and *R. sprengelii*) >5%, 2.) relevé area 10–50 m^2, and 3.) the combined abundance of species of the *Rhamno-Prunetea* (e.g. *Crataegus monogyna*, *Prunus spinosa*) <5%.

3.2 Synthetic phase

Both the subdivision of the new association and the comparison with the *Rubetum silvatici* were performed in JUICE (TICHÝ 2002). For these analyses, we combined high, middle, and low tree layer into one tree layer, and we used two shrub layers (high for the scrubs excl. *Rubus* and lianas, low for the *Rubus* species and lianas), one herb layer (combining herbs, juveniles and saplings of trees and shrubs), and a moss layer.

To detect patterns in the species composition in the used dataset, we used the modified TWINSPAN algorithm as suggested by ROLEK et al. (2009); only one subdivision was recognised and the results given by TWINSPAN were refined subjectively on the basis of expert judgement. To compare differences in species composition, we made a combined synoptic table (in percentages, see the recommendations by DENGLER et al. 2006, p. 84) of the new association and the *Rubetum silvatici*. For the identi-

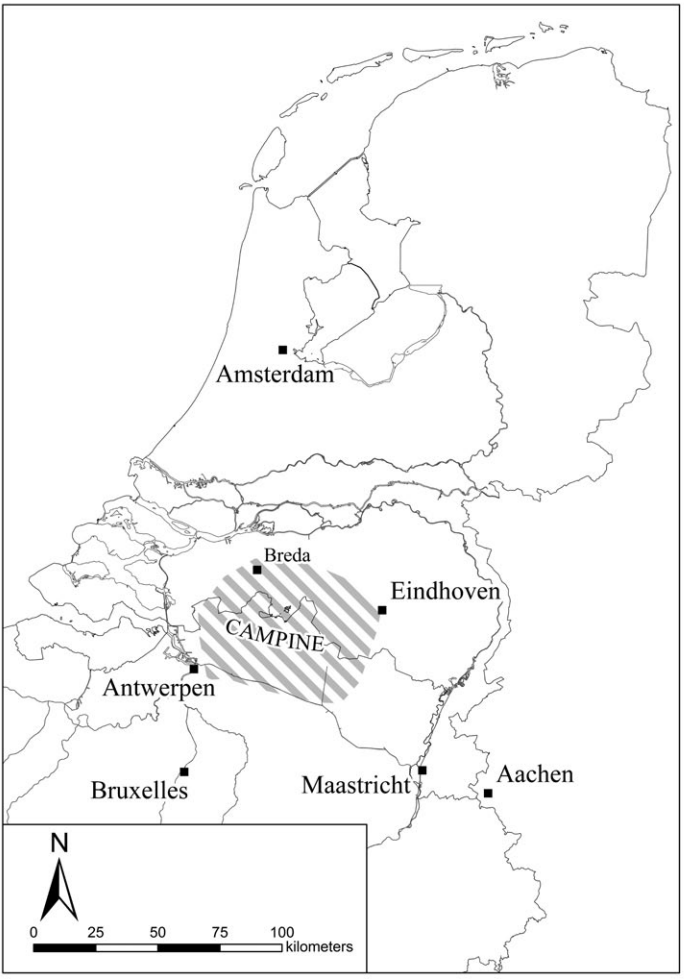

Fig. 1: The Benelux countries with some major towns and an indication of the location of the Campine.
Abb. 1: Die Benelux-Länder mit einigen Größeren Städten und der Lage der „Kempen".

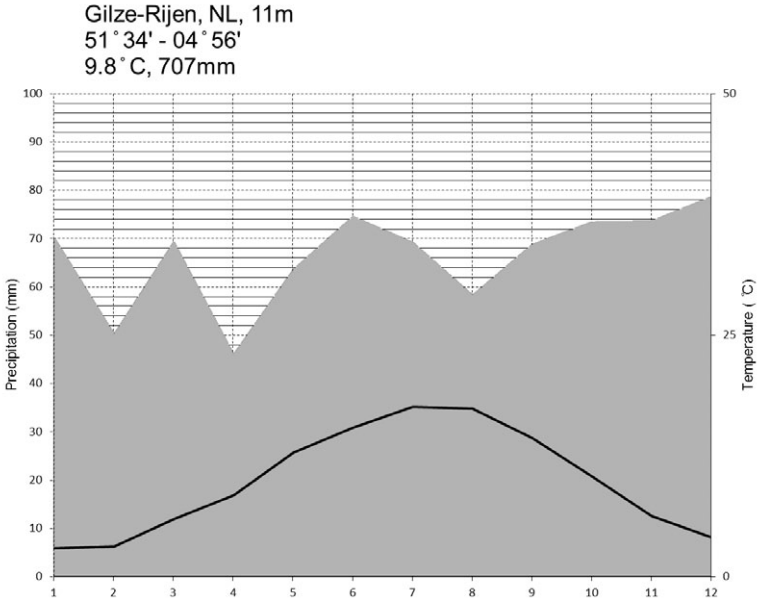

Fig. 2: Walter & Lieth climate diagram Gilze-Rijen (SLUIJTER 2011). Given in the title are the name and location of the station, height above sea level (m), mean annual temperature (°C), and annual precipitation (mm) for the 30 yrs normal period 1981–2010.

Abb. 2: Klimadiagramm nach Walter & Lieth von Gilze-Rijen (SLUIJTER 2011). Angegeben sind Name und Lage der Station, Höhenlage, mittlere Jahrestemperatur (°C), jährlicher Niederschlag (mm) für die 30-Jahresperiode 1981–2010.

fication of differential species of the *Rubetum taxandriae* and the *Rubetum silvatici* frequency classes (DIERSCHKE 1994) were used: species are considered to be differential if they differ at least two classes between the columns.

4. *Rubetum taxandriae* Haveman, de Ronde & Weeda ass. nova

Holotypus: relevé 31 (September 8th 2009, western border Ulvenhoutse Bos, authors R. Haveman 09-515 and J.H.J. Schaminée 09-120), table 1 of this publication.

4.1 Species composition, structure, and variation

Table 1 shows the species composition of the newly described *Rubetum taxandriae*. *Rubus taxandriae* and *R. campaniensis* are the character species, and most probably the same holds for the rare *R. baronicus*. *Rubus insectifolius* can only be considered as regional character species, since it has a much wider distribution than the aforementioned three species. Character species of the *Rubetum silvatici* rarely occur together with those of the *Rubetum taxandriae*, and *vice versa* (table 2); until now only *R. pyramidalis* has sometimes been recorded in the *Rubetum taxandriae*.

Frequent companions among other *Rubus* species are *R. gratus*, *R. plicatus*, *R. integribasis*, *R. nessensis*, *R. frederici*, *R. calotemnus*, and *R. macrophyllus*. As is clear from table 2, *R. frederici*, *R. integribasis*, *R. macrophyllus*, *R. calotemnus*, *R. geniculatus*, *R. bertramii*, and *R. planus* have a higher frequency in the *Rubetum taxandriae* than in the *Rubetum silvatici*, and can be regarded as differential species of the new association. They either have their optimum in *Pruno-Rubion radulae* communites (*R. macrophyllus*, *R. geniculatus*) (HAVEMAN et al. 1999b, WEBER 2003, 1999, 1995), or have a broad sociological amplitude and may be regarded as character species of the *Lonicero-Rubion silvatici* occurring in the southern part of the area of this alliance (HAVEMAN et al. in prep., 1999a, WEBER 1998a,

2003, 1995). On the other hand, *R. drenthicus*, *R. glandithyrsos*, *R. erinulus*, *R. discors*, *R. idaeus*, *R. ammobius*, and *R. schlechtendalii* are more frequent in the *Rubetum silvatici*. While *R. ammobius*, *R. discors*, and *R. drenthicus* can probably be regarded as character species of the *Lonicero-Rubion silvatici*, the sociological optimum of the other species is not yet clear. Probably they have their optimum in the *Rubetum silvatici*, characterising regional subassociations (see also the last section of this paper).

Frequently accompanying species are *Quercus robur* and *Betula pendula* in the tree and shrub layers, and *Sorbus aucuparia*, *Lonicera periclymenum*, *Rhamnus frangula*, and *Amelanchier lamarckii* in the shrub layer. Typically, the herb and moss layer are not well developed because of the dense bramble layer. *Agrostis capillaris*, *Molinia caerulea*, and *Holcus mollis* are the most frequent species in the herb layer, while *Kindbergia praelonga*, *Brachythecium rutabulum*, *Hypnum cupressiforme*, and *Pseudoscleropodium purum* can be found more or less frequently in the moss layer. *Betula pendula* is a weak differential species of the *Rubetum taxandriae* in comparison to the *Rubetum silvatici*. The opposite holds for *Sorbus aucuparia* and *Holcus mollis*, which occur more often in the *Rubetum silvatici* (table 2).

Typically, the *Rubetum taxandriae* is a dense thicket of about 1 m height in which two or more *Rubus* species grow together under an open tree layer and higher shrub layer. Coenoses with only one of the character species without accompanying *Rubus* species are considered as association fragments. Such fragments can be found throughout the distribution area of the association, and also beyond the border of the main distribution area in the Campine, for instance in the Peel region (see under "Distribution").

Two subassociations can be distinguished:

***Rubetum taxandriae typicum* subass. nova**

Holotypus: as association.

The *Rubetum taxandriae typicum* is negatively characterised by the absence of the species of the *deschampsietosum* subassociation. Besides this, it has several rather weak differential species: *Lonicera periclymenum*, *Urtica dioica*, *Dactylis glomerata*, *Holcus lanatus*, *Calamagrostis epigejos*, and *Hedera helix*. Among the brambles, *Rubus idaeus*, *R. macrophyllus*, and *R. poliothyrsus* show a clear preference for this subassociation (table 1).

***Rubetum taxandriae deschampsietosum flexuosae* subass. nova**

Holotypus: relevé 12 (May 30th 2011, military air field Woensdrecht, author R. Haveman 11-019 and I. de Ronde 11-015), table 1 of this publication.

The *Rubetum taxandriae deschampsietosum flexuosae* is characterised by the occurrence of *Deschampsia flexuosa*, *Molinia caerulea*, *Dryopteris dilatata*, *Vaccinium myrtillus*, *Brachythecium rutabulum*, and *Dicranum scoparium*. *Rubus campaniensis* is more frequent in this subassociation than in the *Rubetum taxandriae typicum* (table 1).

4.2 Ecology

The *Rubetum taxandriae* is a mesophilous and silvicolous (i.e. confined to the direct influence of woodlands) bramble scrub in woodland edges and forest clearings on loamy to loam-poor, rather nutrient poor, sandy soils. Far less often it is found in hedges, wooded banks or between agricultural tracts. The *Rubetum taxandriae deschampsietosum* is confined to heathland afforestations from the late 19th and early 20th century, and is mainly found along woodland paths and in woodland clearings ("Innensäume"). The *Rubetum taxandriae typicum* grows on sites with a slightly better nutrient availability, especially at the outer borders of forests, and in old forest remnants. Under a dense canopy the brambles die back, since the light demands of characteristic *Rubus* species are no longer met. Only in woodlands with an open canopy, especially in *Pinus sylvestris* and *Quercus robur* forests, both *Rubus campaniensis* and *R. taxandriae* can form a dense, species poor knee-high bramble layer in the undergrowth (cf. BIJLSMA 2004); the synsystematic position of such *Rubus*-rich

Table 2: Shortened frequency table of the *Rubetum taxandriae* (column 1) and the *Rubetum silvatici* (column 2). Frequencies are given in percentages. Except for the *Rubus* species, species with a frequency < 20% in both columns are omitted. Character and differential species (with a frequency class difference of at least two classes) are boxed.

Tabelle 2: Gekürzte Stetigkeitstabelle des *Rubetum taxandriae* (Spalte 1) und des *Rubetum sylvatici* (Spalte 2). Stetigkeitswerte in Prozent. Außer *Rubus*-Arten sind alle Arten mit < 20 % weggelassen. Charakter- und Differentialarten (mit Prozentunterschieden von wenigstens zwei Klassen) sind eingerahmt.

Column	1	2
Number of relevés	39	67
ca *Rubetum taxandriae*		
Rubus taxandriae	73	.
Rubus campaniensis	45	.
Rubus baronicus	18	.
Rubus insectifolius	15	.
ca *Rubetum silvatici*		
Rubus flexuosus	.	51
Rubus pyramidalis	5	39
Rubus silvaticus	.	33
Rubus sprengelii	.	31
optimum in *Rubetum taxandriae* (partly da)		
Rubus integribasis	33	3
Rubus frederici	33	.
Rubus calotemnus	18	1
Rubus macrophyllus	18	4
Rubus geniculatus	8	.
Rubus planus	8	.
Rubus bertramii	8	.
optimum in *Rubetum silvatici* (partly da)		
Rubus drenthicus	.	21
Rubus idaeus	10	36
Rubus glandithyrsos	.	15
Rubus erinulus	.	10
Rubus discors	.	10
Rubus ammobius	.	4
Rubus schlechtendalii	.	4
da associations		
Betula pendula	60	19
Sorbus aucuparia	50	81
Holcus mollis	35	61
bramble layer		
Rubus gratus	68	79
Rubus plicatus	30	24
Rubus nessensis	23	16
Rubus calvus	3	6
Rubus scissus	3	4
Rubus poliothyrsus	5	1
Rubus vigorosus	.	4
Rubus ferocior	3	1
Rubus laevicaulis	.	3
Rubus nemoralis	.	3
Rubus guestphalicus	3	.
Rubus glareosus	3	.
Rubus x pseudoidaeus	3	.
Rubus subsectio Subidaeus	3	.
Rubus contritidens	.	1

Column	1	2
Number of relevés	39	67
Rubus arrhenii	.	1
Rubus adspersus	.	1
Rubus trichanthus	.	1
Rubus camptostachys	.	1
Rubus calviformis	.	1
Rubus speculans	.	1
other species		
tree and scrub layer		
Quercus robur	83	75
Lonicera periclymenum	28	52
Rhamnus frangula	33	30
Betula pubescens	25	19
Quercus rubra	25	4
Pinus sylvestris	20	3
herb layer		
grasses		
Agrostis capillaris	65	69
Molinia caerulea	30	18
Deschampsia flexuosa	25	21
Elytrigia repens	5	22
herbs		
Urtica dioica	30	49
Galeopsis tetrahit	3	24
Ceratocapnos claviculata	3	19
Cirsium arvense	10	1
Teucrium scorodonia	10	.
ferns		
Dryopteris dilatata	25	42
Pteridium aquilinum	13	4
Dryopteris carthusiana	18	1
moss layer		
Hypnum cupressiforme	13	27
Eurhynchium praelongum	20	6
Pseudoscleropodium purum	20	3

forests still has to be settled. On very nutrient-poor soils the *Rubetum taxandriae* is replaced by the *Rubetum grati*.

4.3 Distribution

The distribution area of the *Rubetum taxandriae* includes the Dutch part of the Campine and the Baronie (Western Noord-Brabant, eastwards to the Eindhoven area) and at least parts of the Belgian Campine; the latter area has not yet been explored extensively. Fig. 5 gives the distribution of the relevés used in this paper. Association fragments can also be found in the "Peel" region, northeast of the Campine, where *Rubus campaniensis* is the only character species of the association. Distribution maps of the character species of the association (KURTTO et al. 2010) suggest that it can be found south of the Campine, but relevés are lacking.

According to our observations, the *Rubetum taxandriae* is much more common in the western part of the Campine, between the towns of Antwerpen and Breda, than in the eastern part, around Turnhout and Eindhoven. Probably this has its background in the landscape history of the region. The western part was developed much earlier than the eastern part. This is obvious from the military topographical map of around 1850 (ANONYMUS 1995): the development of the western part of the Campine has led to a small scale landscape pattern with fields, meadows, woodlands and hedgerows, whereas the region of Eindhoven

Fig. 3: The *Rubetum taxandriae* is usually found along forest edges. Here with *Rubus taxandriae* and *R. gratus*. (Photo R. Haveman)

Abb. 3: Das *Rubetum taxandriae* wird gewöhnlich an Waldrändern gefunden, hier mit *Rubus taxandriae* und *R. gratus*.

Fig. 4: Primocane with leafs of *Rubus campaniensis*, one of the character species of the *Rubetum taxandriae*. (Photo R. Haveman)

Abb. 4: Schössling mit Blättern von *Rubus campaniensis*, einer der Charakterarten des *Rubetum taxandriae*.

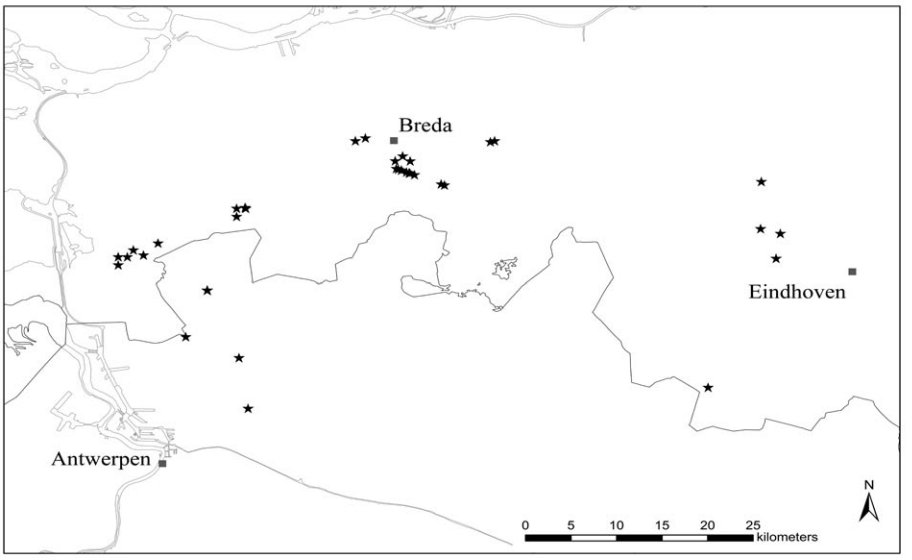

Fig. 5: Location of vegetation relevés of the *Rubetum taxandriae* used in this study.
Abb. 5: Lage der Vegetationsaufnahmen des *Rubetum taxandriae* für diese Arbeit.

is characterised mainly by large scale heathlands which are devoid of brambles to a large extent, with agricultural activity only along the brooks and rivulets. Heathland reclamation took place between 1875 and 1950 mainly, after which bramble species spread into the reclaimed area. Although both *Rubus taxandriae* and *R. campaniensis* have a wide distribution in the eastern part of the Campine, they are much more abundant in the western part, which might lead to the conclusion that the colonisation of the eastern part of the Campine by these species has not yet come to an end: the distribution area seems to be unsaturated, as might be expected for most species in this agamic complex (WEBER 1987).

5. Some considerations on the classification of the *Lonicero-Rubion silvatici*

The syntaxonomic place of the bramble scrubs united in the *Lonicero-Rubion silvatici* is subject to discussion. After its publication it was placed in the *Epiolobietea* Tüxen & Preising in Tüxen 1950, but as WEBER (1977) argued there are strong objections concerning the vegetation structure: the *Epilobietea* are dominated by herbs and grasses, and the *Lonicero-Rubion* by scrub species. On the basis of the frequent occurrence of *Rhamnus frangula* and the occurrence of *Salix cinerea* and *S. aurita* on somewhat moister soils, WEBER (1998a, 2003) places this alliance in the *Franguletea.* As mentioned in the introduction, HAVEMAN et al. (1999a) placed the alliance in a new class, the *Lonicero-Rubetea plicati*. In the more (sub-) atlantic parts of Northwestern Europe, both mentioned *Salix* species play hardly any role in the bramble scrubs, and their occurrence in the German examples of the *Lonicero-Rubion* communities could be a first indication that the *Rubus* species tend to grow in more tempered, humid conditions in less atlantic climates, retracting in woodlands completely further to the east. This stresses the fact that the bramble scrubs of the *Lonicero-Rubion* have their optimum in the (sub-)atlantic parts of Northwestern Europe, and that alliance is less typical developed in Northern Germany, thereby intermingling with the *Franguletea.* Therefore, we prefer to place the bramble scrubs of the *Lonicero-Rubion silvatici* in a separate class, the *Lonicero-Rubetea plicati*.

The lowland sand areas in Northwest-Europe form a centre of diversity of *Rubus* subgen. *Rubus* (cf. KURTTO et al. 2010, pp. 42, MATZKE-HAJEK 1997). In an analysis of the centres of diversity of *Rubus* in the Netherlands (VEEKEN & HAVEMAN 2008), three regions could be distinguished in the major Dutch sand landscapes, which fall apart in seven sub -

regions. The distribution area of the *Rubetum taxandriae* in the Netherlands corresponds remarkably well with the subregion of western Noord-Brabant. This raises the question about a probable further subdivision of the *Rubetum silvatici* in the Netherlands: is it possible to distinguish further communities within the *Rubetum silvatici*, characteristic for the various regions and/or subregions? There are indications that this is indeed the case. In the northern region, lying on the Drenthian bolder-clay plateau, a bramble community occurs for which the combination of *Rubus glandithyrsos*, *R. erinulus* and *R. flexuosus* is very characteristic. In the central subregion, the first two species are practically absent in the *Rubetum silvatici*, and their place is taken by *R. lasiandrus* instead, while *R. pyramidalis* is much more prominently present. Unlike the *Rubetum taxandriae*, these communities show a rather high frequency of character species of the *Rubetum silvatici*, so that they can therefore probably better be distinguished as regional subassociations of this association. Further investigations must make clear whether more *Rubus* scrub types can be distinguished in the Northwest-European sand landscapes, and what the underlying mechanisms and causes of the regional variation are.

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Rense Haveman, Iris de Ronde
Dienst Vastgoed Defensie directie Noord
P.O. Box 47, 6700 AA Wageningen, The Netherlands

Eddy Weeda
Alterra-Wageningen University and Research
P.O. Box 47, 6700 AA Wageningen, The Netherlands

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Table 1. Relevés of the *Rubetum taxandriae* ass. nov.
Country: NL = the Netherlands, B = Belgium; cs = character species; ds = differential species

Table number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Year	2009	2009	2006	2009	2010	2009	2009	1999	1999	1999	2006	2011	2010	2010	1999	1998	1998	2008	2009	2009	2011	1999	2010	2010	2011	2011	2009	2010	2010	2008	2009	2011	2011	2011	2011	2010	2010	2009
Area relevé (m²)	30	30	21	30	3	30	30	70	50	40	40	30	30	30	24	22.5	12	15	30	30	36	21	30	30	30	30	30	30	30	15	30	30	36	30	30	30	30	30
Exposition		S		W		E	W	N			N	S				N				SE		NW				N	W	E	NE		W	NE						
Inclination (degrees)		3		2		2	2	5				10								30						3	1	80	10		3	5						
Cover total (%)	90	99	95	99	95	99	80	95	100	100	96	96	96	96	100	100	100	96	99	99	99	100	96	96	99	96	99	96	96	96	95	99	95	96	96	96	96	99
Cover tree layer (%)	20	20	0	30	40	40	10	25	20	4	50	50	40	0	20	60	50	60	95	30	10	50	20	20	20	80	20	96	95	5	50	90	0	96	96	1	80	90
Cover shrub layer (%)	70	85	90	80	95	99	80	5	10	1	96	75	90	90	20	100	0	96	30	85	99	20	96	96	99	95	90	96	70	96	70	80	95	80	96	96	70	60
Cover herb layer (%)	20	20	5	30	1	5	5	90	95	100	0	30	10	5	90	1	95	1	80	20	2	90	5	5	5	2	5	10	10	5	30	1	2	5	1	5	100	5
Cover moss layer (%)	0	0	5	99	70	0	0	4	20	0	0	1	0	10	10	0	0	1	0	0	1	0	0	0	0	5	5	2	10	0	0	0	5	0	1	0	0	0
Height tree layer (m)	15	.	.	20	12	15	22	25	16	25	20	15	10	.	10	20	12	.	18	20	30	22	15	25	25	20	10	20	10	.	15	22	.	18	25	30	20	10
Height high shrub layer (m)	2.5	2	1.5	2.5	4	.	2	2.5	4	2.5	.	3	4	4	4	4	.	.	4	6	4	3	4	2	4	4	5	3	.	4.5	6	2.5	4	3	4	.	2	3.5
Height low shrub layer (m)	0.8	0.8	.	1	1.5	1.5	1	.	.	.	2	1	1	0.8	.	1.5	.	1	0.8	1.5	1.2	.	1.5	1	1.2	1.2	2	1.5	0.6	1	1	0.8	1.2	0.8	1	1.5	0.8	1
Height herb layer (cm)	60	60	30	50	30	50	60	100	150	120	20	30	50	50	120	50	70	20	20	20	40	80	30	30	40	40	30	30	30	50	30	100	40	40	40	30	30	30
Country	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	B	NL	NL	NL	B	B	NL	NL	NL	NL	NL	NL	B	NL	B	NL	NL	NL
	sa deschampsietosum														sa typicum																							
cs *Rubetum taxandriae*																																						
Rubus taxandriae	5	4	3	+	.	.	.	+	+	4	.	2a	.	+	5	2a	2b	+	r	.	3	.	4	+	3	4	2a	4	4	2b	3	4	.	5	.	3	3	.
Rubus campaniensis	.	.	+	4	5	2a	+	4	.	+	4	4	.	3	.	+	.	.	.	.	3	.	2a	.	.	.	.	.	.	.	+	.	3	.	2b	.	+	.
Rubus baronicus	.	.	.	.	.	.	.	.	4	.	.	.	4	.	.	.	.	.	.	.	.	5	.	5	.	.	4	3	.	.	.	.	.	3	.	.	.	.
Rubus insectifolius	.	.	.	+	.	.	5	.	.	.	.	.	.	.	.	.	.	.	3	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	4
ds subassociations																																						
ds *deschampsietosum*																																						
Molinia caerulea	+	2b	.	2a	.	+	2a	+	.	.	+	+	+	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dryopteris dilatata	2a	.	.	.	+	2a	+	+	.	2a	.	+	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Deschampsia flexuosa	1	1	+	.	.	+	.	2b	2m	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dicranum scoparium	.	.	2m	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium myrtillus	+	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ds *typicum*																																						
Urtica dioica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	2a	2a	1	1	+	1	+	+	1	+	.	.
Dactylis glomerata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	1	1	.	.	+	+	.	.	1
Juncus effusus	.	2b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	2a	.	1	+	.	.	.	.	.	.	.	.	.	1	.
Calamagrostis epigejos	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2a	.
Holcus lanatus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	2a	.	.	.	+
Glechoma hederacea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	r	.	.	.	.	+	.	.	.
Cirsium arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	2a	.	.	.	.
Hedera helix	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	2b	.	.	.	2a	.	.	.	.	.	.	.	2a	.	.	.	.	.	.
Chamerion angustifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	2a	.	.
cs *Rubetum silvatici*																																						
Rubus pyramidalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	2b	.	.	.
cs *Lonicero-Rubion silvatici/Lonicero-Rubetea plicati*																																						
Rubus gratus	+	2b	2b	.	2b	.	+	.	2b	2b	2a	2b	.	2a	2a	4	5	3	1	.	3	2a	.	.	.	+	+	.	1	2b	+	.	2b	.	2a	.	2a	.
Rubus integribasis	+	+	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	2a	2a	.	2b	+	.	2a	.	1	2a	.
Rubus plicatus	.	+	2b	.	.	2b	+	.	+	.	1	.	.	.	.	.	+	+	.	.	.	.	.	.	2a	+	.	.	.	.	+	.	.	.	.	.	.	.
Rubus nessensis	+	.	.	.	2a	.	+	.	.	.	.	.	2a	.	2a	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	2a	.	.	.	2b	.	.
Rubus frederici	.	.	1	.	.	1	+	.	+	2a	.	2a	.	.	+	.	.	.	.	.	.	.	.	2b	3	.	.	.	.	.	.	+	.	2a	.	2a	.	.
Rubus calotemnus	.	.	.	.	.	.	.	.	.	.	.	.	2b	3	.	.	.	3	.	.	.	.	.	4	.	.	.	1	.	.	+	.	.	2b	.	.	.	.
Rubus bertramii	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus scissus	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus divaricatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus planus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2b	.	2a	.	.	.
Rubus calvus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	.	.	.	.	.	.	.	.
cs Pruno-Rubion radulae																																						
Rubus macrophyllus	.	.	.	.	.	.	.	.	.	.	+	.	2b	.	.	+	.	.	.	.	2a	.	.	2b	.	.	.	.	.	.	.	+	4	.	.	.	.	.
Rubus geniculatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	2a	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.
cs/ds *Franguletea*																																						
Rhamnus frangula	+	+	+	.	.	.	.	+	2a	.	.	+	.	3	.	+	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	2b	+	+	.	.	.	.
Salix cinerea ssp. *cinerea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.
Other brambles																																						
Rubus idaeus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2a	1	.	.	2b	.	.	.	.	.	.	.	.	.
Rubus poliothyrsus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	3	.	.	.	.	.	.	.	.	.
Rubus glareosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus guestphalicus	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ×*pseudoidaeus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.
Rubus subsectio *Subidaeus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Rubus ferocior	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tree layer																																						
Quercus robur	2b	.	.	.	.	3	2a	2a	.	.	2a	.	.	.	2b	.	.	.	2a	2b	.	.	.	2b	.	.	.	5	.	4	5	.	.	3	.	.	5
Betula pendula	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	3	.	4	.	.	.	.	.	.	5	.	.	2a	.	.	.	.	4	.	.	+
Pinus sylvestris	.	.	.	.	.	.	2a	2b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.
Quercus rubra	.	.	.	.	.	.	+	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Betula pubescens	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	+	.	.	2a	.	.	.	.
Pseudotsuga menziesii	.	.	.	2b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fagus sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Shrub layer																																						
Sorbus aucuparia	.	.	+	.	2a	.	.	+	2a	+	.	2m	.	2a	2a	2a	.	+	2a	.	.	2a	2a	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+
Betula pendula	+	2b	+	.	+	.	.	+	+	.	.	2m	.	2b	2b	.	.	+	.	+	.	+	.	+	.	.	.	.	.	+	2a	.	.	.	.	.	+	.
Quercus robur	2a	.	2a	.	2a	.	.	.	+	.	.	2a	.	.	+	+	.	+	2a	2a	+	+	2a	.	.	+	.	2a	.	2b	.	+	+	+	+	2m	.
Lonicera periclymenum	.	.	.	.	.	.	.	.	.	.	.	2b	.	2a	+	2m	.	+	+	.	.	.	.	+	.	.	.	+	.	+	1	2a	.	.	.	.	.	.
Amelanchier lamarckii	r	.	.	.	.	.	.	+	.	.	.	2a	.	.	.	.	.	+	.	.	.	.	2a	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Betula pubescens	.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Prunus serotina	.	.	.	.	.	+	.	.	.	.	.	.	2b	.	+	.	.	.	.	.	.	.	.	.	.	.	+	2b	.	.	.	.	.	.	.	.	.	2b
Picea abies	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Prunus padus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Sambucus nigra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	2b	.	.	.	.	.	.	.	.	.	+
Corylus avellana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	+	.	.	.	.	.	.	.	.	2b	.	.	+	.	.	.
Acer pseudoplatanus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	2m	.	.	.	.	2a	.	.	.	.	.	.	.
Salix caprea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2a	.	.	.	.	.	.	.	.
Quercus rubra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	.	.	.	2b	.	.	.	.	.
Crataegus monogyna	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phragmites australis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ilex aquifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Robinia pseudoacacia	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinus sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.
Alnus glutinosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.
Malus species	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Herb layer																																						
Agrostis capillaris	.	1	2m	.	.	.	1	.	.	.	1	2b	2a	1	1	+	+	+	+	1	.	.	1	1	1	2m	+	.	2m	+	+	.	.	+	.	1	+	1
Holcus mollis	.	1	.	.	1	2m	.	.	.	.	.	2m	.	.	1	.	.	.	2m	1	2m	2a	.	.	1	.	+	.	1	.	.	.	2m	.	.	.	.	.	+
Quercus rubra	+	.	.	.	.	.	+	+	.	.	.	1	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.	.	.	.	.
Quercus robur	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	1	.	2a	.	.	.
Dryopteris carthusiana	+	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	2a	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.
Sorbus aucuparia	r	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Ranunculus repens	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	r	+	+	.	+	.	.	.	.
Pteridium aquilinum	.	.	.	4	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	2a	.	.	.	.	+	.	.	.	.	.	.	.
Teucrium scorodonia	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.
Festuca rubra	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Prunus serotina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	+
Pinus sylvestris	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum perforatum	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.
Carex arenaria	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2m	.	.	.	.	.	.
Athyrium filix-femina	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.
Senecio jacobaea	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Cerastium fontanum ssp. *vulgare*	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Taraxacum species	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Pleurozium schreberi	.	.	.	.	.	.	.	+	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Senecio sylvaticus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Rumex acetosella	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rumex acetosa	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Dryopteris filix-mas	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonatum multiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anthriscus sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Luzula pilosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Elytrigia repens ssp. *repens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2m	.	.	.	.	.	.	.	2a
Lysimachia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	+	.	.	.	.	.	.
Geum urbanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.
Silene dioica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.
Epipactis helleborine	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.
Carex hirta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.
Calluna vulgaris	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.
Mosses																																						
Eurhynchium praelongum	.	.	.	4	3	.	.	.	.	.	.	.	.	2b	.	.	.	+	.	.	.	.	.	.	.	.	1	.	1	.	.	.	2m	.	.	.	+	.
Brachythecium rutabulum	.	.	+	3	3	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	2m	.	.	.	2a	.	.	.	.	.	.
Pseudoscleropodium purum	.	.	.	1	.	.	+	1	.	.	.	2a	.	1	.	.	.	1	.	.	.	.	.	.	.	2a	.	.	.	.	.	2m	.	.	.	.	.	.
Hypnum cupressiforme	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Campylopus pyriformis	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polytrichum formosum	.	.	.	+	.	.	2m	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mnium hornum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.
Dicranella heteromalla	2m	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypnum jutlandicum	.	.	2m	.	.	.	.	2m	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Atrichum undulatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.

Addenda (species other than the *Rubus* species in only one relevé and abundance < 5%): Tree layer: Hedera helix (24, +), Populus tremula (38, +), Sorbus aucuparia (15, +); Shrub layer: Acer platanoides (23, +), Carpinus betulus (30, +), Castanea sativa (1, +), Fagus sylvatica (24, +), Humulus lupulus (20, +), Larix species (31, +), Pseudotsuga menziesii (4, +), Rhododendron ponticum (25, +), Salix aurita (20, +), Sambucus racemosa (16, +), Tilia x vulgaris (30, r); Herb layer: Aegopodium podagraria (23, +), Arctium minus (36, +), Arrhenatherum elatius ssp. elatius (31, +), Artemisia vulgaris (3, r), Betula pendula (6, +), Calystegia species (25, +), Cardamine flexuosa (28, +), Ceratocapnos claviculata (6, +), Cirsium vulgare (31, r), Digitalis purpurea (39, +), Fagus sylvatica (34, +), Festuca filiformis (12, +), Galeopsis bifida (5, +), Galeopsis species (21, 1), Galeopsis tetrahit (29, r), Galium aparine (21, 1), Galium saxatile (3, r), Geranium robertianum (33, 1), Heracleum sphondylium (31, +), Hieracium umbellatum (27, +), Hypochaeris radicata (3, 1), Ilex aquifolium (15, +), Impatiens parviflorum (36, 1), Juncus acutiflorus (21, +), Juncus tenuis (37, +), Linaria vulgaris (31, +), Lycopus europaeus (25, +), Persicaria hydropiper (37, +), Phleum pratense (35, +), Plantago major (3, r), Poa trivialis (31, 1), Pseudotsuga menziesii (4, +), Stellaria graminea (21, +), Stellaria holostea (33, 1), Trifolium repens (3, r), Vaccinium vitis-idaeus (8, +), Verbascum nigrum (30, r); Moss layer: Aulacomnium androgynum (29, 1), Calypogeia muelleriana (29, 1), Lophocolea bidentata (8, 2m), Lophocolea semiteres (3, 2m), Rhytidiadelphus squarrosus (11, +).

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Artikel/Article: The Rubetum taxandriae ass. nov. (Lonicero-Rubion silvatici, Lonicero-Rubetea plicati), a new bramble association from the Belgian and Dutch Campine 55-65