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Forest communities in the vicinity of Chruślina and Wandalin (Lublin Upland, Urzędowskie Heights)

Zbiorowiska leśne w okolicach Chruśliny i Wandalina
(Wyżyna Lubelska, Wzniesienia Urzędowskie)

SUMMARY

Natural and anthropogenically changed forest communities in the physically and geographically determinate vicinity of Chruślina and Wandalin (Fig. 1–5, Tables 1–8) were phytosociologically and ecologically described. This is an area with highly varied ecological conditions, chiefly on account of exceptionally numerous erosional forms encountered on loess (Fig. 1–5). Altogether, two associations were characterized (*Tilio-Carpinetum*, in two subassociations, sixteen variants and two facies; *Peucedano-Pinetum*, in two variants) and one phytosociologically indeterminate forest community of the degraded association *Tilio-Carpinetum* (*Carpinus betulus* — *Rubus hirtus*) in two forms. It was pointed out that the investigated forest phytocenoses possess several essential, local specific features: phytosociological, floristic and ecological. Especially worth noting is the occurrence of many rare plant species in these forests, particularly of the mountain element.

STRESZCZENIE

Przedstawiono charakterystykę fitosocjologiczną i ekologiczną zbiorowisk leśnych występujących na pograniczu miejscowości Chruśliny i Wandalin w województwie lubelskim, w rejonie Wzniesień Urzędowskich na Wyżynie Lubelskiej (ryc. 1–5, tab. 1–8). Badany teren cechuje się charakterystycznie wykształconą czwartorzędową pokrywą lessową lub lessopodobną, silnie pociętą plejstoceńsko-holoceńskimi formami erozyjnymi do postaci tzw. suchych dolin i wąwozów. Lasy zachowały się tam tylko w miejscach najbardziej niedogodnych pod użytki zielone, pola i sady. Występują one głównie w rejonie rozciętych form erozyjnych. W tych specyficznych miejscowych

warunkach geomorfologicznych, a także klimatycznych, hydrologicznych i glebowych uformowały się zbiorowiska leśne o kilku istotnych interesujących cechach swoistych. Przede wszystkim dominują tam lasy grądowe z zespołu *Tilio-Carpinetum*, uformowane w dwu podzespołach — *T.-C. stachyetosum* i *T.-C. typicum*. W pierwszym podzespole wyodrębniono 7, a w drugim 9 wariantów, które są w większości zróżnicowane na mniej lub bardziej złożone układy facji. W lasach tych zwraca uwagę obecność kilku gatunków roślin charakterystycznych dla chłodniejszych i wilgotniejszych siedlisk górskich. Odnosi się to do: *Aruncus sylvestris, Petasites albus, Polystichum acuelatum, Veratrum lobelianum* i *Huperzia selago*.

W fitocenozach grądu na szczególne podkreślenie zasługuje fakt, że wyjątkowo jest w nich zredukowany udział gatunków roślin uznawanych za elementy charakterystyczne dla związku *Carpinion betuli*. Najczęściej są to rośliny z grupy drzew i krzewów. Rośliny wskaźnikowe zielne dla związku *Carpinion betuli* reprezentuje tylko *Galium schultesii*. Inne z tej grupy gatunki roślin notowano sporadycznie, poza stanowiskami zdjęć fitosocjologicznych, w różnych postaciach zbiorowisk leśnych. Odnosi się to tylko do *Carex pilosa, Stellaria holostea* i *Neotia nidus-avis*. Dlatego też miejscowy zespół grądu, biorąc pod uwagę ogólny jego skład syntaksonomiczny tylko spośród roślin zielnych, należałoby zaliczyć raczej do związku *Fagion sylvaticae* niż do związku *Carpinion betuli*. Ponadto miejscowe lasy grądowe, ze względu na ich ogólną strukturę fitosocjologiczną i warunki siedliskowe, reprezentują fitocenozy o charakterze pośrednim między zespołami *Tilio-Carpinetum* i *Aceri-Tilietum*. Porównywane dwa zespoły — *Aceri-Tilietum* i *Tilio-Carpinetum* — wyodrębiono głównie na podstawie 8 gatunków roślin uznawanych za charakterystyczne lub wyróżniające. Są to takie rośliny, jak: dla pierwszego zespołu — *Acer platanoides, A. pseudoplatanus, Tilia platyphyllos, Ulmus glabra* i *Viola mirabilis*, a drugiego — *Galium schultesii, Carex pilosa* i *Ranunculus cassubicus*. Wśród obecnie charakteryzowanych płatów zespołu *Tilio-Carpinetum* występuje tylko niewielka część wymienionych gatunków wskaźnikowych: np. dla zespołu *Aceri-Tilietum* dość często rosną *Ulmus glabra* i *Viola mirabilis*, a dla zespołu *Tilio-Carpinetum* sporadycznie występuje tylko — *Galium schultesii*. Ponadto na uwagę zasługuje fakt, że spośród trzech wymienionych gatunków roślin wskaźnikowych prawie jednakowo często w obydwu obecnie charakteryzowanych podzespołach grądu rośnie tylko *Ulmus glabra*. Inne z tych gatunków występują albo częściej w podzespole grądu niskiego niż w podzespole grądu typowego wysokiego (*Viola mirabilis*), albo niemal wyłącznie, ale sporadycznie, w podzespole grądu wysokiego typowego (*Galium schultesii*). Ogólnie biorąc, podzespół grądu niskiego (*T.-C. stachyetosum sylvaticae*) najbardziej nawiązuje do zespołu *Aceri-Tilietum*. Podzespół grądu wysokiego typowego (*T.-C. typicum*) reprezentuje jakby zubożałą florystycznie typową nazboczową postać *T.-C. typicum*. Stąd też obydwa obecnie charakteryzowane podzespoły grądu *Tilio-Carpinetum* prowizorycznie zaliczono do regionalnej ich odmiany „wąwozowej". Jak dotąd podobnie uformowane „wąwozowe" postacie podzespołu grądu niskiego i wysokiego typowego zostały wcześniej opisane z kilku innych stanowisk, m.in. na Wyżynie Lubelskiej.

Wśród obecnie scharakteryzowanych podrzędnych postaci podzespołów *T.-C. stachyetosum sylvaticae* i *T.-C. typicum* na szczególną uwagę zasługują warianty z: *Aruncus silvestris, Petasites albus, Equisetum silvaticum, Impatiens parviflora, Polypodium vulgare* oraz *Dryopteris filix-mas* i *Athyrium filix-femina*. Większa część wymienionych wariantów prawdopodobnie nie była dotąd opisana z „wąwozowych" stanowisk zespołu grądu.

Na badanym terenie zidentyfikowano także występowanie zbiorowiska zdegradowanego zespołu *Tilio-Carpinetum* (*Carpinus betulus — Rubus hirtus*) oraz dwa zespoły boru: mieszanego (*Querco roboris-Pinetum*) i świeżego (*Peucedano-Pinetum*). Fitocenozy te są dość charakterystycznie, wewnętrznie zróżnicowane, w sumie na 8 podrzędnych ich postaci zbiorowisk i wariantów. Występują one na grzbietach wierzchowin, sporadycznie na zboczach suchych dolin o łagodnym ich spadku. Są to najczęściej opisywane fitocenozy borów w makroregionie lubelskim i innych częściach kraju.

Spośród trzech wymienionych fitocenoz zbiorowisko *Carpinus betulus — Rubus hirtus*, a w pewnym stopniu i zespół *Querco roboris-Pinetum* reprezentują, w różnym stopniu sztucznie, przeobrażoną postać zespołu *Tilio-Carpinetum*. Zespół *Peucedano-Pinetum* wykształcał się na tym terenie naturalnie i w najbardziej dogodnym dla niego siedlisku. Lokalnie zespół ten negatywnie wyróżnia się m.in. brakiem uznawanego dla niego gatunku charakterystycznego *Chimaphila umbellata*, a także nieobecnością w nim kilku gatunków wyróżniających, jak np. *Peucedanum oreoselinum, Scorzonera humilis* i *Pulsatilla patens*.

Na badanym terenie zbiorowiska zdegradowanego grądu oraz zespoły boru mieszanego i boru świeżego, w porównaniu z *Tilio-Carpinetum*, odznaczają się m.in. zupełnym w nich brakiem stanowisk roślin górskich.

Key words: Natural and anthropogenic forest phytocenoses, phytosociological records and ecological profile, rare plant species, Lublin Upland, Poland.

INVESTIGATION AREA

Location and Spatial Structure

The investigations in the forests were conducted in the area located in the south-western part of the Lublin Province, on the borderland of two villages: Wandalin (with hamlets of Widły, Zadole and Kolonia Wandalin) and Chruślina (with hamlets of Biała Woda and Boby Księże). The former belongs to the commune of Opole Lubelskie, the latter to the commune of Józefów nad Wisłą (Fig. 1). The total area of the investigated region is ca. 11 sq. km. These are private-owned estates, highly diversified in respect of spatial development (Table 1).

Forests are preserved there only in the least suitable places for land cultivation. They are found in greatest strength near the so-called dry valleys and ravines. Moreover, forests occur fairly frequently on flat or slightly inclined slopes of flat-topped hills, but located only at the intersections of highly bifurcated hilltop sections of these erosional forms. The remaining area is almost entirely covered by gardens, fields, orchards, meadows etc. The preserved private forest complexes are exceptionally highly anthropogenically transformed. Older tree specimens are being constantly harvested in them. In these forests, due to stand thinning, there is a successively growing expansion of light-loving, nitrophilous plant species belonging to different forest layers.

Natural Environment

The studied area is physico-geographically and geobotanically located in the zone of Central Polish Uplands, on the western border of the Lublin Upland and the district of Urzędowskie Heights (1, 12, 21). Locally, it is situated on the

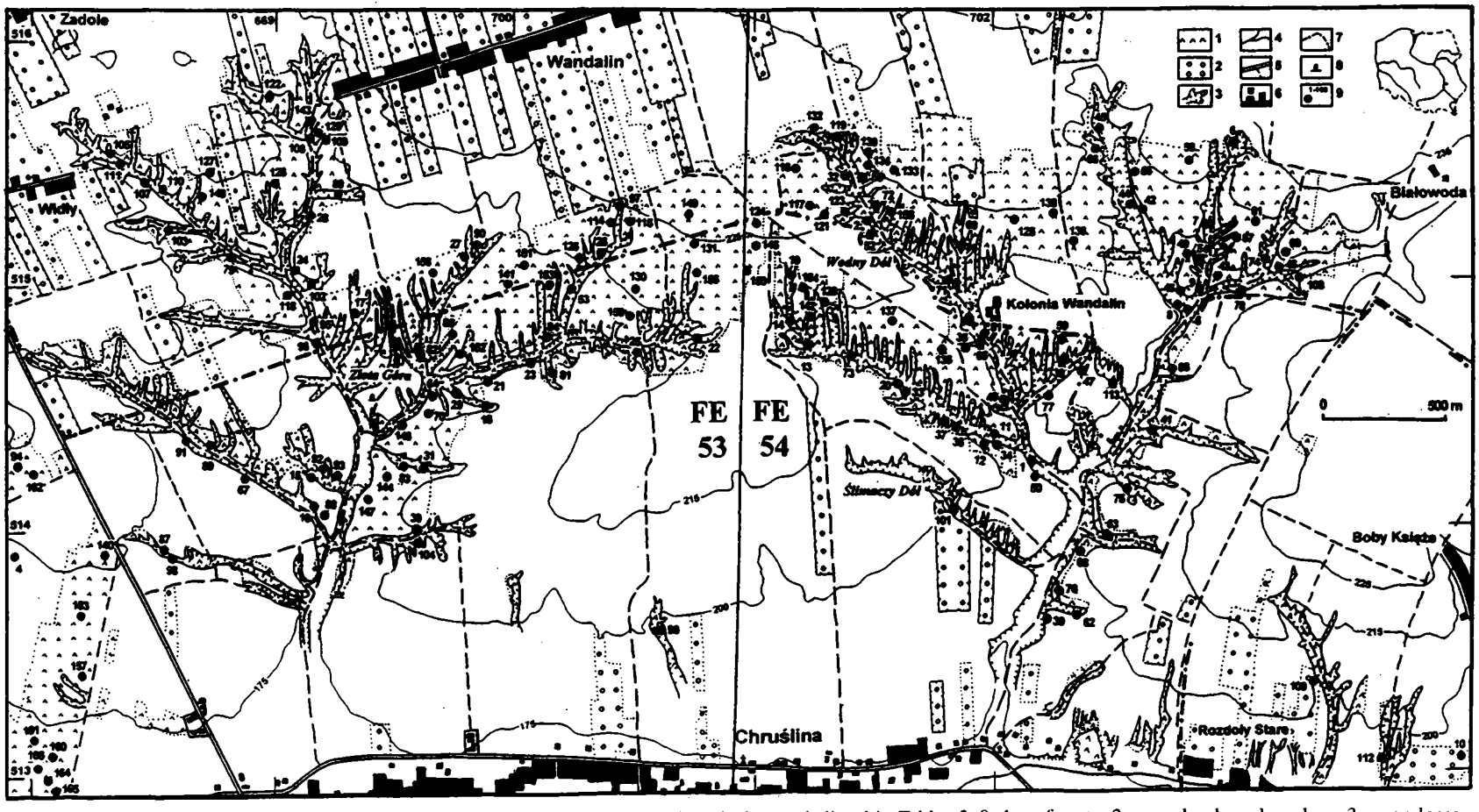

Fig. 1. Location map of the area investigated with the stations of 166 phytosociological records listed in Tables 2–8; 1 — forests, 2 — orchards and gardens, 3 — on-loess erosional forms: dry valleys and ravines, 4 — river network, 5 — highways and major local roads, 6 — rural built-up areas, 7 — boundary of gminas (rural communes): of Opole Lubelskie and Józefów upon the Vistula, 8 — memorial to the January 1863 Insurgents, 9 — stations of 166 phytosociological records (Table 9)

edge of a vast flat-topped hill passing into a gently inclined, southward slope of the wide-open valley of the Podlipie river. The studied area is located at 150–235 meters above sea level. It is distinguished by exceptionally numerous, deeply incised erosional forms represented by the bifurcated so-called dry valleys and accompanying ravines. These are geomorphological forms eroded in loess or loess-like covers, several dozen meter thick, lying on cretaceous rocks of the Upper Maestrichtian (10, 160). Those erosional forms, like in the other loess regions of the Lublin Upland, developed on the turn of Pleistocene and Holocene (16, 24). They were eroded by the accumulated flow of surface waters originating first from the melting glacier and subsequently from streams flowing out from the historical, abundant water-heads. These dry valleys are currently up to 30 m deep. They are accompanied by numerous erosional side forms such as ravines, highly diversified in respect of size and general shape. In the ravine slopes and at the hilltop edges there are numerous, currently developing, secondary erosional forms: cuttings, channels and landslide headwalls. Sometimes, at the foot of ravine and dry valley slopes, highly weathered limestone rock debris crops up from under the eroded loess cover. The beds of these erosional forms are successively silted up. There are also sporadic instances of single, small or large, erratic boulders. Between the dry valleys and ravines and outside them, there are the so-called levelled flattop hills with ridges of varying width, slightly inclined or convex.

The Quaternary cover in this area is of Eolian or water-glacial origin. Most frequently these are typical loess or loess-like sediments, highly decalcified. They are composed of loamy or dusty formations, sometimes with a high admixture of sand. Skeleton fraction is almost entirely absent in them. On the slopes of erosional forms (valley and ravines), as a result of the current processes of denudation and erosion, the physical structure of the Quaternary and soil covers is highly complex. Under such conditions, diverse soil forms developed on the loess or loess-like covers (3, 28, 29).

In general, the area under investigation, like other regions in the Lublin Upland, is successively undergoing surface over-desiccation (18). According to older informants among the local population, during the interwar period in the ravines and dry valleys there were still many and relatively strong springs with streams. At present in the local erosional forms there are no forms whatsoever of surface waters. Those historical water-heads have retained only their characteristic names, e.g. Wodny Dół (Water Ditch) (Fig. 1). The water economy there is of the ombrophilous type (18). The permanent groundwater level lies in the studied area at 50–60 m deep. All seasonal surplus precipitation water is drained along erosional forms from the higher hilltop levels towards the valley bottom of the Podlipie river.

The climatic conditions of the area are similar to those in the surrounding regions of the Lublin Upland (11, 32, 33). Average annual precipitation is relatively low, ranging between 520–560 mm. However, the mean annual air temperatures there are fairly high, ranging between 7.6–7.8°C. Larger and deeper erosional forms are characterized by specific microclimatic and hydrological conditions. First of all, erosional forms are on average cooler and wetter, and they remain snow-covered longer than the ridges of the surrounding flat hilltops. Owing to that, the dry valleys and ravines have preserved characteristic forms of forest communities characterized for example by the occurrence of plant species of typical mountain and upland habitats.

METHODS OF INVESTIGATION

The description of the natural environment of the investigated area presented in the introduction has been given on the basis of reference literature and the author's own unpublished observations. The main part of the present study contains the phytosociological and biotopic profiles of the forest communities in the studied area that have hitherto not been prepared.

Phytosociological investigations of the forests were conducted according to the generally accepted methodological assumptions (20). The nomenclature of the studied bryophytes, pteridophytes and flower plants is the same as used for those species in the earlier studies (13, 19). The basic data concerning the naming, taxonomy and the syntaxonomic composition of the investigated forest communities were essentially based on the study by Matuszkiewicz (17 and references quoted).

In the phytosociological investigations of the forests all the most characteristic and widespread forms of their communities were taken into account, regardless of the degree of their anthropogenic deformation. The phytosociological description of the forests was prepared on the basis of one hundred and sixty-six phytosociological records listed in Tables 1–7 and located in Figure 1. Floristic lists were made in expanses with a balanced phytosociological and biotopic structure, and an area of 90–100 sq. m. The coverage of plant species in phytosociological records was given on a five-degree scale with an additional marking of plant species with coverage less than 1–5% (+) and occurring sporadically in one to three species (r). Plant species occurring just outside the limits of the main surface of a phytosociological record were marked as (x).

In thirteen major and more representative expanses of determinate forms of forest phytocenoses, soil pits were tested for their physical, granulometric and chemical properties. In the soil samples collected in October 1995 there were determined: granulometric composition (with the aerometric method), and the content of humus (with the Tiurin method), $CaCO_3$ (with the Schleibler volume method), P_2O_5 (with the Egner method), and pH (with the potentiometric method). Soil analyses were carried out at the laboratory of Department of Geobotany, Institute of Earth Sciences, Maria Curie-Skłodowska University, Lublin, basing on the methods described by Dobrzański and Uziak (2). The results of the analyses are shown in Table 1.

Fig. 2. Chruślina, NW part, in the vicinity of Złota Góra. A loess ravine
Photo by F. Święs

Fig. 3. Chruślina, NW part, the slopes of a loess ravine. *Tilio-Carpinetum stachyetosum* in a variant with *Petasites albus* (phytosoc. rec. 37)
Photo by F. Święs

Fig. 4. Chruślina, NW part. Contemporary erosional forms on the edge of a slope of a dry valley. *Tilio-Carpinetum typicum* in a variant with *Oxalis acetosella*

Photo by F. Święs

Fig. 5. Chruślina, NW part, above Złota Góra. The foot of a dry valley. *Tilio-Carpinetum typicum* in a variant with *Equisetum hyemale*

Photo by F. Święs

RESULTS

Phytosociological Taxonomy of Forest Communities

The classification of the forest communities distinguished in the studied area into higher phytosociological units is as follows:

Class: *Querco-Fagetea* Br.-Bl. et Vlieg. 1937,
Order: *Fagetalia sylvaticae* Pawl. 1928,
Alliance: *Carpinion betuli* Oberd. 1953,
1. Association: *Tilio-Carpinetum* Traczyk 1962
1.1. Subassociation: *T.-C. stachyetosum sylvaticae*
1.1.1. variant: with *Urtica dioica*
1.1.2. variant: with *Aegopodium podagraria*
1.1.3. variant: with *Impatiens parviflora*
1.1.4. variant: with *Viola mirabilis*
1.1.5. variant: with *Aruncus silvestris*
1.1.6. variant: with *Equisetum sylvaticum.*
1.1.7. variant: with *Petasites albus*
1.2. Subassociation: *T.-C. typicum*
1.2.1. variant: with *Asarum europaeum*
1.2.2. variant: with *Galium odoratum*
1.2.3. variant: with *Anemone nomorosa*
1.2.4. variant: with *Oxalis acetosella*
1.2.5. variant: with *Maianthemum bifolium*
1.2.6. variant: with *Polypodum vulgare*
1.2.7. variant: with *Poa nemoralis*
1.2.8. variant: with *Equisetum hyemale*
1.2.9. variant: with *Dryopteris filix-mas* and *Athyrium filix-femina*
1.2.9.1. facies: with *Dryopteris filix-mas*
1.2.9.2. facies: with *Athyrium filix-femina*
2. Community: *Carpinus betulus — Rubus hirtus*
2.1. form: typical with *Rubus hirtus*
2.2. form: with *Rubus hirtus* and *Vaccinium myrtillus*
Class: *Vaccinio-Piceetea* Br.-Bl. 1939,
Order: Vacci*nio-Piceetalia* Br.-Bl. 1939,
Alliance: *Dicrano-Pinion* Libb. 1933
3. Association: *Querco roboris-Pinetum* I. Mat (mscr),
3.1. variant: typical with *Vaccinium myrtillus*
3.2. variant: with *Pteridum aquilinum*
3.3. variant: with *Lycopodium annotinum* and *Polytrichum formosum*

Table 1. Some granulometric and chemical soil properties in forest communities specified in Tables 2–8

Number of profile, community, record	Depth of horizon in cm	Horizon	Content of fractions in % particles < 1 mm							Content in %		Content in mg/l of soil	
			particles > 1 mm	1 - 0,1	0,1 - 0,05	0,05 - 0,02	0,02 - 0,006	0,006 - 0,002	< 0,002	humus	$CaCO_3$	P_2O_5	pH in 1 n KCl
1	5-15	A_1	0,2	12	15	48	15	4	6	1,86	0,0	8,7	4,4
1.1.2.	70-80	C	0,2	17	17	46	9	4	7	0,31	0,0	2,9	5,1
8													
2	0-4	A_1	0,0	1	17	53	19	3	7	3,21	0,0	1,8	3,8
1.1.5.	10-20	(B)	0,0	2	15	48	19	5	11	1,55	0,0	2,0	3,9
23	60-70	(B)	0,0	1	14	50	16	4	15	0,62	0,0	2,1	4,9
	110-120	C	3,0	31	15	14	13	6	21	0,52	0,0	1,1	5,4
	130-140	C	2,0	90	4	2	1	1	2	0,10	0,0	4,0	5,7
3	1-5	A_1	0,0	13	12	49	14	5	7	3,11	0,0	10,5	3,7
1.1.6.	20-30	(B)	0,1	13	11	45	15	4	12	0,93	0,0	4,0	5,5
34	80-110	C	11,0	85	5	2	1	3	4	0,10	0,0	2,3	6,0
4	5-15	A_1	0,0	3	18	49	17	6	9	2,07	2,1	5,1	6,2
1.1.7.	50-60	A_1	0,0	7	12	48	17	7	9	1,86	3,4	4,3	6,2
37	90-100	C	2,3	80	4	1	2	4	9	0,62	0,2	2,2	6,3
5	2-4	A_1	0,0	7	13	49	20	5	6	5,80	0,0	7,1	4,0
1.2.2.	5-15	A_2	0,0	2	13	48	23	6	8	1,86	0,0	4,7	3,8
50	30-40	B	0,0	4	12	45	16	5	18	0,62	0,0	11,3	3,9
	100-110	B	0,0	5	13	53	14	4	11	0,10	0,0	4,3	5,1
6	5-15	A_1	0,0	10	13	47	22	4	4	2,59	0,0	1,8	3,8
1.2.3.	25-35	A_2	0,9	10	13	48	21	3	5	0,42	0,0	1,0	3,7
70	40-50	B	4,0	15	7	24	14	16	24	0,52	0,0	0,8	3,5
	70-80	C	100	-	-	-	-	-	-	-	3,2	-	-

7	2-10	A_1	0,0	28	12	41	12	4	5	3,42	0,0	3,5	3,8
1.2.3.	20-30	(B)	0,0	17	13	42	18	5	7	0,62	0,0	1,4	3,8
71	70-80	(B)	0,1	45	20	13	10	5	7	0,21	0,0	2,1	4,8
	120-130	C	0,0	81	10	5	1	1	2	0,10	0,0	2,3	5,7
8	0-2	A_1	0,0	7	13	50	19	4	7	5,80	0,0	7,3	3,8
1.2.4.	20-30	(B)	0,0	4	16	43	15	4	18	0,83	0,0	9,2	4,0
89	90-110	C	0,0	10	17	47	13	4	9	0,41	0,0	5,1	4,3
9	0-3	A_1	0,0	11	15	45	17	4	8	5,59	0,0	4,7	3,7
1.2.8.	5-20	(B)	0,0	8	18	43	16	5	10	1,04	0,0	3,5	3,9
95	50-60	C	0,0	5	19	46	16	4	10	0,31	0,0	6,4	4,1
10	0-5	A_1	0,0	9	17	45	15	6	8	2,80	0,0	20,5	3,5
1.2.9.1.	5-20	(B)	0,3	8	20	44	15	3	10	0,31	0,0	8,9	3,9
105	40-50	C	0,0	12	16	46	15	3	8	0,10	0,0	4,7	4,8
	80-90	C	30,0	28	9	27	12	5	10	0,10	0,0	5,8	4,8
11	3-6	A_1	0,0	7	14	50	19	5	5	8,53	0,0	4,5	4,4
2.1.	15-25	A_2	0,0	2	12	48	23	7	8	0,42	0,0	9,2	4,1
117	40-50	B	0,0	4	11	42	18	8	17	0,73	0,0	17,7	3,9
	90-100	B	0,0	1	14	49	19	3	14	0,41	0,0	11,6	4,9
	170-180	C	0,0	5	13	58	14	3	9	0,10	0,0	8,2	5,8
12	3-4	A_1	0,0	5	18	44	22	5	8	4,35	0,0	11,0	3,6
3.1.	15-25	A_2	0,0	2	13	48	24	6	7	1,04	0,0	11,9	4,0
138	60-70	B	0,0	2	14	44	18	4	20	0,83	0,0	14,9	4,0
	120-130	B	0,0	5	14	49	17	4	11	0,10	0,0	8,7	4,2
13	5-7	A_1	0,0	83	5	4	2	3	3	2,11	0,0	3,5	3,4
4.1.	10-20	A_2	0,0	85	4	2	3	3	3	0,51	0,0	1,9	3,7
165	40-50	(B)	0,0	85	5	4	1	2	3	0,16	0,0	2,7	4,2
	90-110	C	0,1	90	3	2	1	2	2	0,02	0,0	2,2	5,2

4. Association: *Peucedano-Pinetum* Mat. (1062) 1973,
   4.1. variant: impoverished with *Vaccinium myrtillus*
   4.2. variant: with *Calluna vulgaris* and *Vaccium vitis-idaea*

THE SURVEY OF FOREST COMMUNITIES

1. *Tilio-Carpinetum*

This forest is formed on shady, more or less moist habitats, mainly on the slopes of dry valleys and ravines, less often in their bottoms. The tree stand is most frequently artificially transformed to a great extent, especially in respect

Table 2. Phytosociological structure: 1 — association *Tilio-Carpinetum*. 1.1. — subassociation *T.-C. stachyetosum sylvaticae* in variants: 1.1.1. — with *Urtica dioica*, 1.1.2. — with *Aegopodium podagraria*, 1.1.3. — with *Impatiens parviflora*, 1.1.4. — with *Viola mirabilis*

Number of community		1.					1.1. 2.				3.	4.			
Number of record		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date		94-06-20	93-07-22	94-06-20	96-06-26	93-07-31	93-07-24	93-07-24	93-07-31	96-06-26	96-07-02	93-05-23	94-05-31	94-05-31	93-07-23
Occurrence of community x		Aa	Aa	Aa	Aa	Aa	Bb	Bb	Bb	Ba	Bb	Bb	Bb	Bb	Bb
Exposition		I	I	I	I	I	SE	SE	SE	SE	E	SE	NE	SW	NE
Inclination of ground in	°	I	I	I	I	I	30	30	30	20	30	40	35	40	40
Maximal height of tress in	m	I	I	I	I	I	18	18	20	20	20	18	20	18	16
Maximal diameter of tress in	cm	I	I	I	I	I	40	40	35	35	35	35	40	20	30
Cover of the layer in %	>10 m A	I	I	I	90	80	60	90	100	80	–	90	90	100	70
	<10 m A_1	I	I	I	I	I	I	I	I	I	70	I	I	I	I
	>5 m B	I	I	I	I	I	I	I	I	I	60	I	I	I	40
	<5 m B_1	30	5	10	20	20	30	30	20	20	20	30	40	70	30
	C	100	100	100	100	100	100	100	100	100	90	90	90	100	90
	D	60	80	40	20	10	20	10	40	30	20	70	20	20	40
Number of species in record		34	27	29	30	25	23	23	23	26	28	26	32	40	39
A, B. Trees and shrubs															
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion* (x, x), d - *Carpinion betuli*															
a *Corylus avellana* B_1		2	+	1	.	.	+	.	+	1	4	2	2	4	+
a *Euonymus verrucosus* B		.	.	.	.	.	+	.	.	.	.	+	1	1	2
b *Ulmus glabra* A		.	.	.	.	3	1	3	4	4	.	.	.	5	.
b *Ulmus glabra* B_1		.	.	.	.	1	+	2	.	.	.	.	+	.	.
d *Carpinus betulus* A		.	.	.	2	1	3	4	3	2	.	4	4	4	3
d *Carpinus betulus* B_1		.	.	.	.	.	.	.	.	.	.	.	.	2	2
d *Carpinus betulus* C		.	.	.	.	.	.	r	.	.	+	.	r	.	r
II. Ch: *Dicrano-Pinion* (x, x)															
III. Others															
Ribes uva-crispa B_1		+	.	.	.	.	.	.	.	.	.	+	+	.	+

Table 2 continued

Cornus sanguinea B_1	.	.	1	.	.	.	.	.	+	+	.	.	+	.
Quercus petraea B	.	.	.	.	.	1	.	.	.	4	.	.	.	.
Quercus robur A	.	.	.	.	.	4	.	.	.	.	.	.	1	2
Populus tremula B_1	.	.	.	.	.	.	.	.	+	.	.	.	+	.
Sambucus nigra B_1	.	.	.	.	1	.	.	.	2	+	.	.	.	.
C. Herbaceous and other plants															
IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion*															
a *Anemone nemorosa*	2	+	.	.	+	.	.	.	+	.	+	2	.	.
a *Corydalis solida*	.	+	.	.	.	.	+	.	.	.	.	.	.	.
a *Aegopodium podagraria*	.	.	.	.	2	5	5	5	5	3	.	.	.	.
a *Carex digitata*	.	.	.	.	.	+	.	.	.	+	+	+	+	.
a *Melica nutans*	.	.	.	.	.	+	.	+	.	.	.	+	+	+
a *Viola mirabilis*	.	.	.	.	.	.	.	+	.	.	5	5	5	4
a *Poa nemoralis*	.	.	.	.	.	.	.	.	.	1	+	+	.	.
a *Brachypodium sylvaticum*	.	.	.	.	.	.	.	.	.	.	.	+	.	+
b *Asarum europaeum*	.	+	.	.	+	+	2	2	3	.	.	.	.	.
b *Pulmonaria obscura*	+	2	+	.	+	+	.	.	+	.	.	2	2	.
b *Viola reichenbachiana*	+	+	.	.	+	.	+	.	+	r	.	.	+	.
b *Adoxa moschatellina*	+	.	+	.	.	.	.	.	.	.	.	+	+	.
b *Milium effusum*	.	.	+	.	.	.	+	.	.	.	+	.	.	.
b *Galium odoratum*	.	.	+	.	.	1	1	+	1	.	+	1	2	+
b *Sanicula europaea*	.	.	+	.	.	.	.	+	.	.	.	.	+	+
b *Epilobium montanum*	.	.	.	+	.	.	.	.	.	+	.	.	+	+
b *Ranunculus lanuginosus*	.	.	.	.	+	.	+	.	.	+	.	.	.	.
b *Carex sylvatica*	.	.	.	.	+	.	.	.	.	.	+	.	.	.
b *Dryopteris filix-mas*	.	.	.	.	+	+	+	+	+	.	+	+	2	+
b *Lathyrus vernus*	.	.	.	.	.	.	.	.	.	.	+	+	.	+
b *Actaea spicata*	.	.	.	.	.	.	.	.	.	.	.	+	+	+
c *Chrysosplenium alternifolium*	3	2	+	.	1	+	+	.	+	.	.	.	.	+
c *Festuca gigantea*	+	+	.	.	+	.	.	.	+	.	.	.	.	+
c *Circaea alpina*	+	.	.	.	.	.	.	.	.	.	.	.	+	+
c *Circaea lutetiana*	.	.	+	.	.	.	+	.	.	.	.	.	.	.
V. Others															
Arctium lappa	+	r	.	.	.	.	.	.	.	.	.	.	.	.
Rumex obtusifolius	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Alchemilla sp.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Anthriscus nitida	+	+	+	.	.	.	.	.	.	.	.	.	.	.
Lapsana communis	+	r	r	+	.	.	.	.	.	.	.	.	.	.
Lysimachia nummularia	+	.	+	+	.	.	.	.	.	.	.	.	.	.
Poa annua	+	+	.	.	+	.	.	.	.	.	.	.	.	.
Glechoma hederacea	+	.	.	+	+	.	.	.	.	.	.	.	.	.
Veronica chamaedrys	r	+	.	.	+	.	.	.	.	.	.	.	.	.
Ranunculus repens	.	+	+	+	+	.	.	.	.	.	.	.	.	.
Geum rivale	+	+	+	+	+	.	.	+	+	.	.	.	.	.
Geranium robertianum	+	+	+	+	r	+	1	+	+	+	.	+	.	.
Urtica dioica	5	5	5	5	5	+	+	+	2	+	+	+	+	.
Geum urbanum	+	.	+	+	.	.	.	.	+	+	.	.	+	.
Galeopsis pubescens	1	2	1	+	+	.	.	+	.	.	.	.	.	+
Oxalis acetosella	+	+	+	.	+	1	2	+	+	.	.	r	.	2
Athyrium filix-femina	+	+	+	.	.	+	+	.	+	.	.	.	.	+
Moehringia trinervia	.	+	+	+	.	.	.	+	.	+	+	.	+	+
Galium aparine	.	.	+	+	.	.	.	.	.	+	.	.	.	.
Phegopteris connectilis	.	.	+	.	.	.	+	.	.	.	+	.	.	.
Dryopteris carthusiana	.	.	+	.	.	+	.	+	.	.	.	.	+	+
Luzula pilosa	.	.	.	+	.	+	.	.	+	.	.	+	+	.
Mycelis muralis	.	.	.	+	.	.	.	.	+	.	.	.	+	.
Fragaria vesca	.	.	.	+	.	.	.	.	.	+	.	+	+	.
Viola riviniana	.	.	.	+	.	+	.	.	.	.	.	.	r	.
Taraxacum officinale	.	.	.	r	.	.	.	.	.	r	.	.	.	.
Maianthemum bifolium	.	.	.	+	.	.	.	.	.	.	.	.	+	+
Rubus idaeus	.	.	.	+	.	.	r	.	.	.	r	.	.	+
Cystopteris fragilis	.	.	.	.	.	+	.	.	.	.	+	+	.	+
Gymnocarpium dryopteris	.	.	.	.	.	.	+	.	.	.	.	.	.	+
Impatiens parviflora	.	.	.	.	.	.	.	.	r	4	.	.	.	.
Rubus caesius	.	.	.	.	.	.	.	.	.	+	.	.	+	.
Astragalus glycyphyllos	.	.	.	.	.	.	.	.	.	.	+	r	+	.
Equisetum sylvaticum	.	.	.	.	.	.	.	.	.	.	1	2	r	+
Aruncus sylvestris	.	.	.	.	.	.	.	.	.	.	+	.	+	2
Lysimachia vulgaris	.	.	.	.	.	.	.	.	.	.	.	+	+	.

Table 2 continued

D: Mosses VI. Ch: a - *Fagetalia silvaticae*, b - others													
a *Atrichum undulatum*	.	.	1	.	1	+	1	1	+	1	.	1	+	1
b *Plagiomnium undulatum*	2	3	1	1	.	.	.	.	.	.	.	.	.	.
b *Plagiomnium affine*	.	2	1	.	.	.	.	.	.	.	.	.	.	.
b *Brachythecium rutabulum*	.	2	1	1	.	1	1	1	1	.	.	.	.	.
b *Eurhynchium schwartzii*	2	.	+	+	+	.	.	.	.	.	.	+	1	1
b *Plagiomnium cuspidatum*	2	.	.	.	.	+	.	1	.	+	.	.	.	+
b *Plagiothecium denticulatum*	.	.	.	.	.	+	.	2	2	1	3	1	1	.
b *Mnium stellare*	.	.	.	.	.	+	.	.	.	.	.	.	.	1

Species occurring in 1 record:

I a – *Fraxinus excelsior* A 4/3, B 4/+, *Acer campestre* B_1 6/+, *Lonicera xylosteum* B_1 13/2, *Corylus avellana* B 14/3. I c – *Padus avium* B_1 1/1. I d – *Tilia cordata* B_1 4/+, *Cerasus avium* B_1 10/1. II – *Pinus sylvestris* A 4/3. III – *Ribes vulgare* B_1 4/+, *Sorbus aucuparia* B_1 4/+, *Betula pendula* A 8/2, *Frangula alnus* B_1 10/+, *Quercus robur* C 11/+.

IV b – *Paris quadrifolia* 12/r. V – *Deschampsia caespitosa* 1/+, *Plantago major* 1/+, *Polygonum hydropiper* 1/+, *Poa trivialis* 1 /+, *Stellaria media* 1/+, *Chelidonium majus* 4/+, *Anthriscus sylvestris* 10/+, *Equisetum pretense* 10/+, *E. variegatum* 4/+, *Cruciata glabra* 10/+, *Hieracium murorum* 11/+, *Brachypodium pinnatum* 13/+, *Clinopodium vulgare* 13/+, *Angelica sylvestris* 14/+.

VI b – *Plagiothecium nemorale* 2/2, *Mnium marginatum* 11/2, *Chiloscyphus pallens* 14/+, *Conocephalum conicum* 14/+.

x — A. bottom of dry valley or ravine: a — fringe, b — middle part. B. slope of dry valley or ravine: a — foot, b — middle part, c — upper part. C. flattop hill: a — the part above dry valleys and ravines, b — slightly convex ridge, between erosional forms, c — ridge outside the range of erosional forms. D. area of old, washed-out sand-dunes: a — ridge, b — slope, c — sandy areas between dune forms.

xx — a syntaxonomic group with sporadic plant species listed at the base of the Table.

of density and the species composition of trees. The natural composition of this forest contained mainly such tree species as *Carpinus betulus, Ulmus glabra, Tilia cordata and Quercus robur*. In cleared tree stands there are often self-seeding and light-seed tree species, mainly *Populus tremula* and *Betula pendula*. Moreover, the forest in question there often grows the planted, all-age *Pinus sylvestris*.

The coverage and species composition of the plants found in the shrub, undergrowth and bryophyte layers in this forest is highly diversified. In the shrub layer there are most often: *Corylus avellana, Euonymus verrucosus, Sambucus nigra*, and of the trees in their early growth — chiefly *Carpinus betulus, Tilia cordata* and *Populus tremula*. The undergrowth layer is dominated by generally common shade-tolerant and mesotrophic species. These include for example: *Dryopteris filix-mas, D. spinuloasa, Athyrium filix-femina, Oxalis acetosella, Galium odoratum, Viola reichenbachiana, Carex digitata, Asarum europaeum, Moehringia trinervia*. In the bryophyte layer, in different densities, there are most often inter alia the following species: *Atrichium undulatum, Brachytecium rutabulum, B. velutinum, Eurhynchium schwartzii* and *Plagiomnium cuspidatum*.

In the present *Tilio-Carpinetum* association, in respect of biotopic conditions and the general floristic structure, two subassociations were distinguished, formed in 18 variants in different facies patterns.

1.1. *Tilio-Carpinetum stachyetosum silvaticae*

This subassociation develops in the locally most fertile habitats and comparatively best wetted. This takes place mainly in the beds and slopes of the deep-cut dry valleys and ravines. In respect of the floristic structure, it is primarily characterized by not very dense tree and shrub layers and by the constant, highly dense undergrowth layer, sometimes with a fairly large bryophyte cover. The main role is played by high herbaceous and gramineous plant species connected with the relatively most fertile habitats with the optimum wetting. There is a clear absence of tree, shrub and herbaceous plant species of poor and highly overdried habitats. There is also no planted *Pinus sylvestris*. Out of the light-seeded, self-seeding tree species there are only sporadic occurrences of growing saplings of *Populus tremula* only. In the present subassociation, mainly on the basis of specific, dominant undergrowth species and biotopic conditions, seven variants were distinguished.

1.1.1. Variant with *Urtica dioica*. This is generally a variant of the *T.-C. stachyetosum sylvaticae* subassociation, exceptionally strongly relating to nitrophilous ruderal communities with high-growing herbaceous and gramineous plant species. This is primarily indicated by the absolute domination of *Urtica dioica* on the most fertile habitats on the rims of the beds of dry valleys and ravines. Worth noting are also weekly-formed, successively developing tree and shrub layers, or often their absence. This is a frequent and successively spreading form of the low dry-ground forest community.

1.1.2. Variant with *Aegopodium podagraria*. It occurs almost exclusively in the beds of dry valleys and ravines, and less frequently on their slopes with varying inclination. In the present variant as compared with the former, the tree and shrub layers are comparatively well formed. It is distinguished first of all for the absolute domination of *Aegopodium podagraria*. Moreover, worth noting is the fairly frequent and dense occurrence of, inter alia, *Ulmus scabra* and *Asarum europaeum*. It is fairly frequent, on scattered expanses of up to several ares.

1.1.3. Variant with *Impatiens parviflora*. This variant represents a strongly deformed form of *T.-C. stachyetosum* growing on the steep ravine slope. In the thinned tree layer arborescent *Corylus avellana* plays a major role. In the undergrowth layer, the most abundant are nitrophilous plant species, first of all *Impatiens parviflora* and *Aegopodium podagraria*. It was recorded only in one station of 0.5 are.

Table 3. Phytosociological structure. I — association *Tilio-Carpinetum*. 1.1. subassociation *T.-C. stachyetosum sylvaticae* in variants: 1.1.5. — with *Aruncus sylvestris*, 1.1.6. — with *Equisetum sylvaticum*, 1.1.7. — with *Petasites albus*

		1.1.																														
Number of community		5																6												7	
Number of record		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Date		94-05-24	94-05-24	95-05-29	95-05-29	95-05-29	93-07-24	93-07-24	93-07-23	93-07-24	94-05-24	94-05-24	94-05-24	93-07-22	94-05-24	95-05-29	94-05-31	94-05-24	94-05-31	93-07-23	94-05-31	93-07-24	93-07-23	93-07-23	95-05-29
Occurrence of community *		Bc	Bc	Bb	Bb	Bb	Bb	Bd	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bb	Bc	Bb	Bb	Bb	Bb	Bc	Bb	Bb	Bc
Exposition		NW	SW	SE	N	W	NW	SE	NW	N	NW	N	SE	SE	NW	NW	SE	N	S	NE	NE	N	NE	NE	SE
Inclination of ground in	°	30	35	35	30	10	25	15	30	30	20	35	35	35	35	30	30	5	30	20	5	15	15	20	35
Maximal height of tress in	m	16	20	10	18	28	15	18	18	18	16	20	25	15	18	20	20	18	18	16	20	20	16	16	10
Maximal diameter of tress in	cm	25	50	20	30	50	20	35	30	30	30	40	50	20	30	40	35	35	60	30	50	35	30	30	25
Cover of the layer in %	>10 m A	90	70	–	80	80	70	100	70	70	70	90	90	100	90	30	90	90	90	30	90	–	100	30	–
	<10 m A_1	–	–	–	–	–	–	–	–	–	40	–	–	–	–	–	–	–	–	70	–	30	–	–	–
	>5 m B	–	–	80	–	80	80	30	70	30	–	–	–	–	–	80	–	–	–	30	–	80	–	80	–
	<5 m B_1	80	30	30	60	80	10	10	20	20	30	30	30	10	20	20	30	10	80	20	40	40	40	10	80
	C	50	80	80	90	70	100	80	100	100	80	100	70	80	70	100	100	90	50	80	80	100	100	100	90
	D	100	90	60	60	60	60	40	60	10	30	30	30	10	30	30	40	70	20	20	30	10	10	20	20
Number of species in record		32	35	40	19	30	25	30	37	33	30	27	28	27	23	28	31	28	40	39	39	30	32	28	29
A, B. Trees and shrubs																									
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*																									
a *Euonymus verucosus* B_1		+	+	.	.	.	+	.	+	.	.	1	.	.	.	.	.	+	.	+	+	+	.	.	.
a *Corylus avellana* B		.	.	5	.	5	5	2	4	2	.	.	.	.	5	.	.	.	.	2	.	5	.	5	4
a *Corylus avellana* B_1		3	2	.	4	2	+	+	1	1	2	.	.	+	2	.	2	.	5	1	2	2	2	1	1
a *Lonicera xylosteum* B_1		.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	.
a *Euonymus europaea* B_1		.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+
b *Ulmus glabra* A		.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	2	.	.	.	.
c *Carpinus betulus* A		4	4	.	.	.	3	4	2	.	5	3	2	5	5	2	5	5	2	1	2	.	5	2	.
c *Carpinus betulus* A_1		.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.
c *Carpinus betulus* B_1		.	2	.	.	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.	.	x	2	+	.
c *Carpinus betulus* C		.	r	.	+	.	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	r	+	.
c *Cerasus avium* B_1		.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	+	+	+	.	.	.	.	.	+
II. Ch: *Dicrano-Pinion*																									
Pinus sylvestris A		.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
III. Others																									
Quercus robur A		1	2	.	.	4	2	3	2	4	1	4	4	.	.	1	.	.	4	2	4	.	.	.	.
Quercus robur B_1		2	.	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.
Quercus robur C		.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	r	.	r	.	.	.
Cornus sanguinea B_1		.	1	+	.	3	+	+	.	+	.	.	2	.	.	+	+	+	+	.	+	2	.	.	.
Sorbus aucuparia B_1		.	.	+	.	.	.	+	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.
Viburnum opulus B_1		.	.	+	.	+	.	.	+	.	+	.	.	.	.	.	+	.	.	+	.	.	.	.	.
Populus tremula B		.	.	.	.	.	.	.	+	+	+	1	.	+	+	.	+	.	+	.	.	.	.	.	.
Berberis vulgaris B_1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.
Ribes uva-crispa B_1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	1	+	+
Sambucus nigra B_1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.	.	1
Quercus petraea A		.	.	4	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.

Table 3 continued

C. Herbaceous and other plants																								
IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion*, d - *Carpinion betuli* (x, x), e - *Fagion silvaticae*, f - *Quercetalia pubescentis*																								
a *Carex digitata*	+	+	+	.	.	.	+	.	.	+	.	.	.	+	.	+	+	+	.	+	.	.	.	.
a *Poa nemoralis*	+	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
a *Melica nutans*	+	+	.	.	+	+	.	+	.	+	+	1	+	.	+	+	.	.	.	.	+	.	.	+
a *Viola mirabilis*	+	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	+	.	2	2	3	+	.	+
a *Anemone nemorosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	r	.	2	2	+	+	2
b *Epilobium montanum*	.	+	+	.	.	.	+	+	+	+	+	.	+	.	.	.	+	.	.	.	.	.	.	.
b *Actaea spicata*	+	+	+	.	+	.	+	+	+	.	+	.	+	.	.	+	1	+	+	+	+	.	.	.
b *Sanicula europaea*	+	+	+	+	1	+	+	+	+	1	2	+	1	1	+	1	+	+	+	+	+	+	+	.
b *Viola reichenbachiana*	+	+	.	.	.	+	+	+	+	2	.	+	+	+	+	1	+	+	.	.	.	+	+	.
b *Dryopteris filix-mas*	+	+	+	+	1	.	.	+	+	2	2	1	+	1	.	2	1	1	r	1	+	2	1	+
b *Lathyrus vernus*	.	.	.	.	+	.	.	+	.	.	+	.	+	.	.	.	.	.	+	.	.	.	.	+
b *Galium odoratum*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	+	+	2	2	1	2	2
b *Pulmonaria obscura*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	+	+
b *Carex sylvatica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.
b *Asarum europaeum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+
b *Milium effusum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	+	+
b *Adoxa moschatellina*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+
b *Paris quadrifolia*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.
c *Chrysosplenium alternifolium*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	2	+
e *Rubus hirtus*	.	.	.	.	.	.	.	+	+	+	.	1	.	.	+	.	.	+	1	.	.	.	.	.
f *Melittis melissophyllum*	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
f *Campanula persicifolia*	+	+	+	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
V. Ch: *Vaccinio-Piceetea*																								
Trientalis europaea	.	.	r	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.
Vaccinium myrtillus	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	r	.	.	.	.	.	.
VI. Others																								
Hieracium sabaudum	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Angelica sylvestris	.	.	+	.	.	+	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.
Cystopteris fragilis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Maianthemum bifolium	2	2	+	+	+	+	+	+	+	1	+	1	+	+	.	+	.	+	.	.	.	.	.	.
Mycelis muralis	+	+	+	+	+	+	.	.	+	+	+	.	+	.	.	.	+	+	.	.	.	.	.	.
Hieracium murorum	+	+	+		.	+	+	+	+	.	.	+	+	+	.	.	.	+	.	.	+	.	.	.
Athyrium filix-femina	1	.	.	.	+	.	+	.	2	+	.	+	+	.	.	.	+	1	r	1	.	2	.	.
Ajuga reptans	+	.	+	+	+	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	+	.	.
Gymnocarpium dryopteris	+	.	r	+	3	+	.	.	+	+	+	.	.	+	.	+	.	2	.	.	.	+	.	.
Aruncus sylvestris	4	4	5	5	4	3	5	4	5	4	4	4	4	5	4	1	1	3	1	+	+	.	+	.
Luzula pilosa	+	.	+	.	+	+	.	+	+	+	+	+	.	+	.	+	.	+	+	.	+	.	+	.
Moehringia trinervia	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	.	+	.	+	.	+
Cruciata glabra	.	+	+	+	.	+	+	+	.	.	.	.	.	.	+	+	.	.	+	+	.	.	.	.
Dryopteris carthusiana	.	+	.	+	.	.	.	+	+	+	.	.	+	+	.	+	+	+	+	+	+	+	.	.
Geum urbanum	.	+	.	.	.	.	+	+	+	.	.	.	.	.	+	+	.	+	.	.	.	+	.	.
Circaea alpina	.	+	+	.	+	.	+	.	+	.	.	+	.	.	+	+	.	+	+	+	.	+	+	.
Geranium robertianum	.	+	.	+	.	1	+	+	+	+	.	.	.	+	+	+	+	.	+	+	.	+	+	+
Oxalis acetosella	.	.	r	+	+	r	2	3	2	3	3	2	2	2	1	4	4	2	3	2	2	2	2	+
Lysimachia nummularia	.	.	+	.	.	.	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.
Fragaria vesca	.	.	+	.	+	.	.	+	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.
Viola riviniana	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Phegopteris connectilis	.	.	.	+	.	.	+	+	.	.	.	.	+	+	+	.	.	.	.	.	.	+	.	.
Rubus idaeus	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.
Urtica dioica	.	.	.	.	.	+	r	.	.	+	.	r	.	.	+	.	.	r	+	1	+	+	.	+
Equisetum sylvaticum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	4	4	4	4	4	4	1	+
Galeopsis pubescens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.	r
Petasites albus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	4

Table 3 continued

D. Mosses																								
VII. Ch: a - *Fagetalia silvaticae*, b - others																								
a *Atrichum undulatum*	3	3	2	2	2	.	2	2	1	2	.	2	+	1	1	2	3	+	.	+	.	+	.	.
b *Plagiochilla porrelloides*	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Plagiothecium denticulatum*	2	2	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.
b *Polytrichum formosusm*	+	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.
b *Plagiomnium cuspidatum*	2	2	2	1	1	2	1	.	+	1	.	.	1	1	1	.	.	.	.	.	+	.	.	1
b *Brachythecium salebrosum*	+	.	.	1	2	.	1	2	.	1	.	1	.	1	.	.	.	+	.	.	+	.	.	+
b *Plagiomnium undulatum*	.	.	.	.	.	1	.	2	.	.	.	.	.	.	+	.	.	.	+	.	.	+	+	.
b *Brachythecium rutabulum*	.	.	.	.	.	1	.	+	.	.	2	.	.	+	1	2	3	1	1	+	.	.	1	.
b *Plagiothecium laetum*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
b *Cirryphyllum piliferum*	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Mnium stellare*	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	.
b *Eurhynchium schwartzii*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	+	+	.	.	+	+
b *Eurhynchium angustirete*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.
b *Amblystegium serpens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.

Species occurring in 1 record:

I b – *Ulmus glabra* A_1 19/1, B_1 34/1. I c – *Cerasus avium* A_1 19/1, C 21/+. II – *Pinus sylvestris* B_1 38/+. III – *Quercus robur* A_1 35/2, *Betula pendula* A 15/2, *Crataegus sp.* B_1 25/+

IV b – *Ranunculus lanuginosus* 24/+. IV c – *Circaea lutetiana* 38/+. IV d – *Galium schultesii* (Ch: ass. I) 16/+. VI – *Cimicifuga europaea* 16/+, *Digitalis glandiflora* 16/+, *Taraxacum officinale* 16/r, *Coronilla varia* 17/+, *Heracleum sphondylium* 17/r, *Rubus saxatilis* 17/+, *Viola hirta* 17/+, *Pteridium aquilinum* 30/+, *Geum rivale* 31/+, *Brachypodium pinnatum* 33/r.

VII b – *Dicranella heteromalla* 22/+, *Plagiothecium silvaticum* 22/+, *Brachythecium velutinum* 23/+, *Mnium marginatum* 25/+, *Rhizomnium punctatum* 27/+.

x, xx — as in Table 2.

1.1.4. Variant with *Viola mirabilis*. It is formed on mesophilous, steep and shady slopes of deep-cut ravines. Floristically, it is primarily distinguished on account of the frequent and dense occurrence of *Viola mirabilis*. Out of other plant species worth noting is the comparatively frequent presence of, inter alia, *Corylus avellana, Equisetum sylvaticum* and *Aruncus silvestris*. Not very frequent, this variant is found on scattered expanses of up to 0.4 are.

1.1.5. Variant with *Aruncus silvestris*. It represents the most typical, local on-slope form of the subassociation *T.-C. stachyetosum*. It develops on fairly steep, wet and shady ravine slopes, mainly in their middle and upper sections. This community owes its characteristic appearance to the dense occurrence of *Aruncus silvestris*. Out of other plant species recorded in the variant, worth noting is the frequent and often at the same time dense occurrence of: *Quercus robur, Maiainthemum bifolium, Mycelis muralis, Hieracium murorum, Oxalis acetosella*. A large percentage of bryophytes also merits attention: chiefly with *Atrichium undulatum, Plagiommnium cuspidatum* and *Brachytecium salebrosum*. It occurs frequently, in numerous scattered expanses of up to 0.6 are.

1.1.6. Variant with *Equisetum sylvaticum*. This variant is found in the similar habitats as the former, but which are most often constantly highly wetted. This takes place mainly in the middle and lower parts of slopes of deep-cut ravines. Floristically, it is distinguished primarily for the frequent and dense occurrence of

Equisetum sylvaticum. Moreover, worth noting is a fairly large percentage of numerous plant species characteristic of the typical subassociation of this forest discussed below, for example: *Ribes uva-crispa, Anemone nemorosa, Galium odoratum, Pulmonaria obscura, Brachytecium rutabulum* and *Eurhynchium schwartzii*. A number of widespread plants species found in the former four variants do not grow in this variant at all or far less frequently. These are, for example, *Angelica sylvestris, Maianthemum bifolium, Mycelis muralis* and *Brachytecium salebrosum*. The variant is recorded only in several stations of up to 0.4 are.

1.1.7. Variant with *Petasites albus*. It occurs in almost identical biotopic conditions as the former variant. Floristically, it is distinguished primarily for the exclusive dense occurrence in it of *Petasites albus*, sometimes with a fairly high co-occurrence of some plant species most often found in two foregoing variants, chiefly: *Equisetum sylvaticium, Galium odoratum, Pulmonaria obscura, Oxalis acetosella*. It is recorded only in several stations, on expanses of the size of 0.4 to 0.9 are.

1.2. *Tilio-Carpinetum typicum*

This subassociation of the typical dry-ground forest is found most often on steep, less frequently on gentle-inclined, slopes of ravines and dry valleys. Sporadically it develops on gentle-formed ridges of flattop hills situated between the above erosional forms. It occurs in mesophilous habitats. The natural tree stands of this forest were composed mainly of *Carpinus betulus, Quercus robur and Tilia cordata*. Currently, these are forests that were artificially transformed to a great extent. This is evident first of all in that they were considerably thinned of more robust tree specimens. The planted *Pinus sylvestris* is frequently found in them. The light-seeded and self-seeding tree species that occur most often are: *Populus tremula* and *Betula pendula*.

Plant species in the layers of shrubs, herbaceous plants and bryophytes reach varying degrees of density. They are composed mainly of generally common forest and brushwood plants of mesophilous or somewhat impoverished habitats. Plants of highly wetted and fertile habitats and plants of very poor habitats practically play no role here. The most common plant species in the shrub, undergrowth and bryophyte layers include: *Carpinus betulus, Populus tremula, Ulmus glabra, Cerasus avium, Sorbus aucuparia, Corylus avellana, Sambucus nigra, Viburnus opulus, Anemone nemorosa, Galium odoratum, Oxalis acetosella, Maianthemum bifolium, Asarum europaeum, Dryopteris filix-mas, Atrichium undulatum, Plagiomnium cuspidatum, Brachythecium velutinum*.

In the present *T.-C. typicum*, primarily on the basis of the specific dominant species of the undergrowth plants, sometimes also of characteristic habitats, the following nine variants were distinguished.

Table 4. Phytosociological structure. 1 — association *Tilio-Carpinetum*. 1.2. — subassociation *T.-C. typicum* in variants: 1.2.1. — with *Asarum europaeum*, 1.2.2. — *Gallium odoratum*, 1.2.3. — with *Anemone nemorosa*

		1.2.																															
Number of community		1.	2.																3.														
Number of record		39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Date		95-05-29	94-05-27	94-05-27	94-05-27	93-07-23	93-07-23	93-07-23	94-05-27	94-05-27	94-05-27	94-05-27	94-05-27	94-05-27	93-07-22	94-05-24	94-05-27	94-05-27	95-05-18	95-05-18	95-05-18	95-05-29	94-05-31	95-05-18	95-05-18	94-05-31	94-05-24	94-05-31	95-05-18	94-05-24	95-05-18	95-05-18	95-05-18
Occurrence of community [x]		Ba	Ca	Bc	Bb	Bc	Bc	Bc	Ca	Bc	Bb	Ba	Cc	Bc	Bc	Bc	Bc	Bc	Bc	Ca	Ca	Ca	Bc	Bb	Bc	Bc	Bb	Bc	Bc	Bc	Bb	Bb	Bc
Exposition		NW	SE	SW	SW	SW	SW	NW	SW	NW	SW	NW	NE	NW	NW	SE	SW	N	SW	SW	S	SW	SW	SW	N	NW	NW	NE	SE	NW	W	S	NW
Inclination of ground in	o	2	2	20	5	10	40	15	5	20	5	20	5	5	10	20	40	10	15	2	3	4	40	3	30	10	25	20	10	15	15	3	10
Maximum height of tress in	m	25	28	16	20	18	18	20	25	25	30	20	25	25	20	16	25	18	28	20	18	25	15	25	15	18	12	25	25	16	20	25	25
Maximum diameter of tress in	cm	50	50	35	45	20	40	40	45	50	80	40	45	45	30	35	50	40	60	40	20	45	30	60	20	20	15	40	60	15	35	45	45
Cover of the layer in %	>10 m A	100	100	100	90	90	90	100	90	70	100	90	90	90	100	70	90	70	90	100	90	80	60	90	60	100	80	80	90	100	90	90	90
	<10 m A_1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	50	–	60	–	–	40	–	–	–	70	–	–	20	–	–	–	–	–
	>5 m B	–	–	–	–	–	–	–	–	–	–	–	30	–	40	20	–	–	–	–	20	60	–	–	–	20	–	–	80	–	–	–	–
	<5 m B_1	30	10	40	10	10	40	10	60	60	10	30	60	10	20	40	10	70	10	10	40	30	80	.	50	10	60	40	20	10	40	10	30
	C	100	90	90	100	100	100	90	80	90	100	100	80	100	90	70	90	100	100	90	100	90	40	40	90	70	100	80	90	70	90	90	90
	D	+	+	+	+	+	+	+	+	30	+	+	+	+	+	30	+	+	.	.	+	.	60	.	.	80	30	40	20	70	.	+	+
Number of species in record		25	28	34	26	26	26	31	36	33	27	26	35	26	32	23	24	34	31	30	18	28	33	26	24	20	23	36	21	24	32	15	28
A, B. Trees and shrubs																																	
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*, d - *Alno-Padion*																																	
a *Euonymus verrucosus* B_1		.	+	2	1	.	.	+	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.
a *Euonymus europaeus* B_1		.	.	1	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	r	.	+	.	.	.	.	.	+	.	.	.	.	.
a *Corylus avellana* B		.	.	.	.	.	.	.	.	.	.	.	2	.	3	2	.	.	.	.	2	4	.	.	4	2	.	.	4	.	.	.	.
a *Corylus avellana* B_1		2	.	.	+	+	+	.	3	.	.	2	1	.	.	3	.	4	1	.	1	2	.	.	3	.	4	5	.	+	1	.	2
b *Cerasus avium* B_1		+	+	.	.	.	+	.	.	.	+	.	+	+	+	.	+	+	r	+	.	+	+	.	.	.	.	.	.	.	.	.	+
b *Cerasus avium* C		+	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	+	.	.	.	r	.	.	.	.	.	.	.	.	.	.
b *Ulmus glabra* A		.	.	.	.	.	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
b *Ulmus glabra* B_1		.	.	.	.	.	.	+	.	+	.	.	.	1	.	.	+	.	.	+	.	.	2	.	+	.	.	1	.	.	.	.	.
c *Carpinus betulus* A		4	5	2	5	5	5	5	.	.	2	5	4	2	5	3	5	.	4	5	2	5	.	3	.	5	5	2	1	5	5	5	4
c *Carpinus betulus* A_1		.	.	.	.	.	.	.	2	.	.	.	.	.	.	3	.	1	.	.	3	.	.	.	2	.	.	2	.	.	.	.	.
c *Carpinus betulus* B_1		.	.	.	.	.	.	.	.	+	+	.	+	+	+	+	.	.	.	.	.	2	2	3	.	.	.	3	+	1	1	r	.
c *Carpinus betulus* C		.	.	.	.	.	r	.	.	.	+	+	+	.	.	.	+	.	+	+	.	+	.	+	+	+	.	+	.	+	+	+	.
c *Tilia cordata* A		.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
c *Tilia cordata* B_1		.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
d *Padus avium* B		.	+	.	.	r	.	+	+	.	+	+	.	.	+	.	.	.	.	.	.	1	.	.	.	+	.	+	.	.	.	.	.
II. Ch: a - *Dicrano-Pinion*																																	
a *Pinus sylvestris* A		.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2

III. Others																															
Cornus sanguinea B_1	+								+							+				+											
Quercus robur A		2	4					5		5	2	5	2	2	4		4	3		x	2	2	4	4	1		4	5		2		3
Quercus robur A_1								1									3														
Quercus robur B_1						+		+				+																			+
Quercus robur C										r					r				r					+					r		
Ribes uva-crispa B_1												+									+	2			r		+				
Ribes rubrum B_1	+											+												+							
Populus tremula A	5									1		2				2		1	4												
Populus tremula B_1			+		+	+		1		+	1	+	+	2		+	+	+					+				+		+	+	
Betula pendula A	1	1	1	1	2		1	2		1	1		1	2		2	1	2	2			1									1
Sambucus nigra B_1				3		+		+	1			+		+		+		+			3	2	4	1			+		2	+	
Frangula alnus B_1						+										+		+									+				
Berberis vulgaris B_1								+	+							+	+														
Crataegus sp. B_1										+			+					+	+												
Viburnum opulus B_1											+	+	+	+				+				+	1				+		+		
Sorbus aucuparia B_1												+	+	r		+	+		+	+				+		+		+			1
C. Herbaceous and other plants																															
IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion*, d - *Quercetalia pubescentis*																															
a *Brachypodium sylvaticum*			+					+	+																						
a *Viola mirabilis*		+			+		+		2					+										+							
a *Poa nemoralis*			+		+	+		+	+									+											+		
a *Carex digitata*		+	+	+		+	+	+		+		+	+	+	+	+		+	+		+								+	+	
a *Melica nutans*			+		+		+	+	+		+	+	+	+			2	+				+				+	+				+
a *Anemone nemorosa*	+	2	2			2		2	2	2	2	2	2			1		3	5	5	5	3	5	5	4	5	3	5	3	5	5	4
b *Ranunculus lanuginosus*		+	+																												
b *Polygonatum multiflorum*			+					+																							
b *Sanicula europaea*	+	+					1	+	+						1	+	+														
b *Epilobium montanum*			+						+																				+		
b *Pulmonaria obscura*	+	2	+	2	+	+	2	3	1	+	+	+		2		+	+	+	+	+	+	+		1	+			+		+		
b *Galium odoratum*		5	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	4	2	2	2	+	+	+			1	1		1		
b *Dryopteris filix-mas*		+		r		1	+	+	2	+	+	+	+	2	+	2	+	+	r	+		2	1	3	1	+	1	+		2		
b *Adoxa moschatellina*	+	+	1			+		2		+						+		+				2		+						+		
b *Asarum europaeum*	5	3	3	3	2	1	2	2	1							+		+	+		1		+	+	1					1		
b *Milium effusum*		+	+			+	+	+	+				+					+	+			+		+				+			+	
b *Viola reichenbachiana*		+	+		+	+	+	+	+	+	+		r		+	+			+				+		+	+	+		+			+
b *Actaea spicata*				+	+		r		+		+	+	+	+	+	+						+		+		+	+					
b *Scrophularia nodosa*			+																										+			
b *Rubus hirtus*															2				+						1		+			x	2	
b *Carex sylvatica*									+													+										
b *Lathyrus vernus*																					+							+				
c *Festuca gigantea*	+															+						+										
c *Chrysosplenium alternifolium*						+			1													2										
d *Melittis melissophyllum*																+												+				

Table 4 continued

V. Ch: *Vaccinio-Piceetea*																																
Vaccinium myrtillus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	2
VI. Others																																
Anthriscus nitida	.	+	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Urtica dioica	+	+	.	1	.	.	.	1	+	+	.	.	r	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Oxalis acetosella	3	4	3	2	3	4	4	.	2	3	2	2	2	2	2	.	.	2	1	2	1	1	.	+	3	3	3	.	.	.	.	.
Rubus idaeus	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	.	.	.
Galeopsis pubescens	+	+	+	.	+	.	.	+	+	.	.	+	.	+	.	.	.	.	.	.	.	+	+	.	.	.	+	+	.	.	.	.
Gymnocarpium dryopteris	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	.	.	.	.	.	2	2	3	.	.	.
Geum urbanum	.	+	+	+	+	+	+	+	+	+	1	+	.	r	.	.	+	+	+	.	.	+	.	.	.	.	.	.	.	+	.	.
Galium aparine	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.
Moehringia trinervia	+	+	.	+	.	+	+	+	+	+	.	.	.	+	r	+	+	+	.	+	+	+	+	.	.	+	+	.	+	+	.	+
Geranium robertianum	+	.	+	+	+	+	+	+	+	.	.	1	.	.	.	+	.	+	.	.	.	+	+	.	.	.	+	.	.	+	.	+
Maianthemum bifolium	.	+	+	.	+	+	+	+	.	+	2	2	+	2	+	.	+	+	+	.	+	.	+	.	+	.	1	.	3	.	+	+
Viola riviniana	.	.	+	.	.	.	.	.	.	.	.	r	.	.	.	+	+	+	.	.	+	.	+	.	.	.	.	+	.	+	.	.
Aruncus sylvestris	.	.	.	+	.	.	.	+	.	.	.	.	.	.	1	.	+	.	.	.	.	2	.	.	.	+	1	.	+	.	.	.
Mycelis muralis	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	.	+	.	+	.	.	.
Luzula pilosa	.	.	+	+	+	.	+	.	.	.	.	.	.	+	.	.	+	.	+	.	+	.	.	.	.	+	+	+	2	+	+	+
Athyrium filix-femina	.	.	.	+	.	.	1	.	.	.	+	+	+	+	+	.	.	.	+	.	.	+	+	.	+	1	1	1	+	.	+	+
Dryopteris carthusiana	.	.	.	.	+	+	+	.	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	1	+	.	.	.	r	+
Hieracium murorum	.	.	.	.	+	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+
Cruciata glabra	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+
Fragaria viridis	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+
Hieracium lachenalii	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum sylvaticum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Veronica chamaedrys	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Clinopodium vulgare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
D: Mosses																																
VII. Ch: a - *Fagetalia silvaticae*, b - others																																
a *Atrichum undulatum*	.	.	+	+	+	.	+	.	2	+	+	+	+	.	+	.	+	+	+	+	.	2	+	.	2	+	2	2	2	+	.	+
b *Plagiomnium affine*	3	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Eurhynchium schwartzii*	2	1	1	2	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
b *Plagiomnium cuspidatum*	.	.	.	.	.	+	+	+	.	.	.	+	.	+	.	+	.	.	+	.	+	2	.	+	1	2	1	+	1	.	+	.
b *Brachythecium velutinum*	.	.	.	1	+	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	1	.	+	+
b *Plagiothecium denticulatum*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	+	+	.	.	.	.	.
b *Brachythecium rutabulum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	+	+	2	1	2	.	+	+	.	.

Species occurring in 1 record:

I a – *Acer campestre* B_1 45/+, *Lonicera xylosteum* B_1 55/1. I c – *Cerasus avium* A 46/1. III – *Juniperus communis* B_1 41/r.

IV b – *Paris quadrifolia* 47/+, *Isopyrum thalictroides* 68/+. IV c – *Circaea lutetiana* 42/+, *C. alpina* 64/+. V – *Trientalis europaea* 70/+. VI – *Viola hirta* 39/+, *Chaerophyllum aromaticum* 39/+, *Angelica sylvestris* 47/+, *Rubus caesius* 39/+, *R. saxatilis* 49/+, *R. plicatus* 52/+, *Cystopteris fragilis* 60/+, *Ajuga reptans* 64/+, *Phegopteris connectilis* 65/1, *Taraxacum officinale* 68/+.

VII b – *Brachythecium salebrosum* 43/+, *Plagiomnium undulatum* 62/+, *Pohlia nutans* 68/+, *Plagiothecium laetum* 70/+, *Polytrichum juniperinum* 70/+, *P. formosum* 70/+.

1.2.1. Variant with *Asarum europaeum*. This variant represents the shadiest form of the subassociation *T.-C. typicum*. It is formed on the weak-inclined slopes of deep-cut ravines. Worth noting in it are very dense occurrences of *Populus tremula* and *Carpinus betulus* among the trees, and in the undergrowth — *Asarum europaeum*, often with a high co-occurrence of *Oxalis acetosella*. In a typical form it was recorded only in one station of 0.4 are.

1.2.2. Variant with *Gallium odoratum*. It occurs most frequently in the upper sections of slopes of dry valleys and ravines, less often on the edges and ridges of flattop hills. It develops on the substratum with a highly varied inclination of the surface. Floristically, it is distinguished primarily for its exceptionally high density of *Asperula odorata*. Moreover, in the tree layer, attention should be drawn to comparatively frequent and numerous presences of *Betula pendula*. Other plant species that occur comparatively most frequently in some expanses of this variant include: *Asarum europaeum, Anemone nemorosa, Oxalis acetosella, Pulmonaria obscura, Dryopteris filix-mas, Atrichum undulatum, Plagiomnium affine* and *Eurhynchium schwartzii*. These plant species form complex facies patterns.

The variant with *Galium odoratum* represents one of the most common, secondary forms of communities in the association *T.-C. typicum*. It develops on scattered expanses of 1 to 1.5 are.

1.2.3. Variant with *Anemone nemorosa*. The present variant within the *T.-C. typicum* association represents, in respect of biotopic conditions and the floristic structure, an intermediate community between the more fertile (with *Asarum europaeum*, with *Galium odoratum)* and its poorer variants (inter alia with *Oxalis acetosella,* with *Maianthemum bifolium)*. It develops in similar sites as the former variant. It is mainly distinguished for exceptionally numerous occurrences of *Anemone nemorosa* in it. This variant, after the die-back of its dominant spring plant, *Anemone nemorosa*, is difficult to differentiate from other variants, especially those with *Oxalis acetosella* or with *Gallium odoratum*. Other plant species that form complex facies patterns on some expanses of this variant include most often: *Oxalis acetosella, Gallium odoratum, Dryopteris filix-mas, Gymnocarpium dryopteris, Maianthemum bifolium and Atrichium undulatum*. It is a common variant, in scattered expanses of 0.5–2 are.

1.2.4. Variant with *Oxalis acetosella*. This variant develops mainly on the slopes of ravines and dry valleys with a high gradient, less often on the flat ridges of flattop hills. Most often these are mesophilous and highly shaded habitats. Floristically, it is chiefly characterized by an exceptionally high density of *Oxalis acetosella*. Other herbaceous plant species recorded in it that show the comparatively highest co-occurrence include: *Phegopteris connectilis, Anemone nemorosa, Asarum europaeum, Dryopteris filix-mas and Pulmonaria obscura.*

Table 5. Phytosociological structure. 1 — association *Tilio-Carpinetum*. 1.2. — subassociation *T.-C. typicum* in variants: 1.2.4. — with *Oxalis acetosella*, 1.2.5. — with *Maianthemum bifolium*, 1.2.6. — with *Polypodium vulgare*, 1.2.7. — with *Poa nemoralis*, 1.2.8. — with *Equisetum hyemale*

	1.2.													
Number of community	4.													
Number of record	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Date	94-05-31	93-07-22	94-05-31	94-05-31	94-05-31	94-05-31	94-05-31	93-07-24	95-05-29	94-05-27	93-07-23	93-07-22	94-05-27	93-07-23
Occurrence of community^{x}	Bc	Ba	Bc	Bc	Bb	Bc	Bc	Bb	Bb	Bc	Bc	Bb	Bc	Bc
Exposition	SW	W	N	NW	NE	W	NW	NW	SW	N	W	SE	W	SW
Inclination of ground in °	40	30	30	30	25	10	35	30	20	30	35	25	35	40
Maximal height of tress in m	20	18	16	20	20	20	18	18	20	18	16	18	20	18
Maximal diameter of tress in cm	40	25	20	40	35	60	30	20	35	20	20	15	40	15
Cover of the layer in % >10 m A	60	40	90	90	90	40	100	100	90	90	100	100	100	100
<10 m A_1	—	60	—	—	—	80	—	—	—	—	—	—	—	—
>5 m B	80	40	—	—	—	30	—	—	—	—	—	—	—	—
<5 m B_1	60	40	20	30	40	80	20	20	10	10	60	10	10	30
C	80	80	80	80	90	90	70	100	60	40	70	50	60	50
D	30	60	30	10	30	50	60	30	10	80	80	80	50	60
Number of species in record	38	34	33	24	34	44	34	26	32	33	33	23	33	19
A, B. Trees and shrubs														
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*, d - *Alno-Padion*														
a *Lonicera xylosteum* B_1	+	+	.	.	.	.	.	.	.	.	.	.	.	.
a *Euonymus verrucosus* B_1	1	+	.	.	.	.	+	+	.	.	+	.	+	.
a *Euonymus europaeus* B_1	.	.	+	+	.	.	.	.	.	.	.	+	.	.
a *Corylus avellana* B	5	3	2	.	.	2	.	.	.	.	.	.	.	.
a *Corylus avellana* B_1	3	2	2	2	.	5	.	+	+	.	3	.	.	1
b *Ulmus glabra* A	.	.	.	.	3	.	.	1	.	.	1	.	.	.
b *Ulmus glabra* B_1	.	.	.	2	.	.	.	1	.	.	.	.	.	.
b *Cerasus avium* B_1	.	+	.	.	.	+	.	.	+	.	.	.	.	.
b *Cerasus avium* C	.	.	.	.	.	r	r	.	+	.	.	.	.	.

	1.2.											
Number of community	4.		5.					6.	7.		8.	
Number of record	85	86	87	88	89	90	91	92	93	94	95	96
Date	95-05-29	94-05-31	94-06-20	94-05-27	94-05-27	93-07-22	94-05-27	94-05-24	94-05-27	96-06-28	94-05-18	94-05-18
Occurrence of community^{x}	Ca	Bc	Bc	Bc	Bc	Ca	Bc	Bd	Bc	Bc	Ba	Ba
Exposition	—	S	S	NW	SW	SW	NE	SW	S	SW	W	NE
Inclination of ground in °	—	40	30	30	30	10	30	40	35	20	4	5
Maximal height of tress in m	25	15	18	18	16	18	27	16	16	18	15	18
Maximal diameter of tress in cm	50	20	20	30	25	50	50	30	30	35	30	25
Cover of the layer in % >10 m A	90	100	100	90	100	100	80	90	90	80	80	50
<10 m A_1	—	—	—	—	—	—	—	—	—	—	—	30
>5 m B	—	—	—	—	—	—	—	—	—	—	—	70
<5 m B_1	10	10	40	20	10	20	30	30	10	60	50	20
C	80	70	70	40	20	90	60	80	80	80	90	100
D	40	60	60	90	90	40	60	90	70	+	+	+
Number of species in record	22	23	40	28	27	30	34	38	41	33	32	21
A, B. Trees and shrubs												
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*, d - *Alno-Padion*												
a *Lonicera xylosteum* B_1	.	.	.	.	.	+	.	.	.	.	.	.
a *Euonymus verrucosus* B_1	.	r	.	2	.	+	+	2	+	.	.	.
a *Euonymus europaeus* B_1	.	.	.	.	.	.	.	r	.	.	.	.
a *Corylus avellana* B	.	.	1	.	.	.	.	.	.	.	1	4
a *Corylus avellana* B_1	.	.	.	.	r	1	+	2	+	.	2	1
b *Ulmus glabra* A	.	.	.	.	.	.	.	.	.	.	.	.
b *Ulmus glabra* B_1	.	.	.	.	.	.	.	.	.	.	.	.
b *Cerasus avium* B_1	1	.	.	.	.	.	.	.	.	.	+	.
b *Cerasus avium* C	r	.	.	.	r	.	.	.	.	.	.	.

c *Carpinus betulus* A	.	2	4	5	5	.	5	5	5	5	4	5	5	5	4	5	5	5	5	5	5	5	.	3	.
c *Carpinus betulus* A_1	.	4	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
c *Carpinus betulus* B_1	.	2	+	.	1	.	+	.	+	.	.	.	.	.	+	+	.	.	2	+	1	2	+	4	+	2
c *Carpinus betulus* C	.	.	+	.	+	.	.	.	+	.	.	.	+	.	+	+	+	.	+	+	.	.	r	+	.	.
d *Padus avium* B	.	.	.	.	+	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
II. Ch: a - *Vaccinio-Piceion*, b - *Dicrano-Pinion*																										
b *Pinus sylvestris* A	.	.	.	.	.	2	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.	.	.	2	3
III. Others																										
Sambucus nigra B_1	.	.	.	+	2	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cornus sanguinea B_1	+	.	+	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2	.	2	1	
Quercus robur A	4	3	.	.	2	.	.	.	.	.	2	.	2	.	.	.	.	2	.	.	3	2	.	5	3	.
Quercus robur B_1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	.	.	1	.	+
Quercus robur C	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.
Viburnum opulus B_1	.	.	r	.	+	+	+	.	.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	+	.
Betula pendula A	.	.	.	.	.	3	.	.	2	2	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Populus tremula A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	2	.	1	.
Populus tremula B_1	+	.	.	.	.	.	.	+	+	+	.	.	+	2	.	.	2	+	.	+	+	.	+	.	+	+
Sorbus aucuparia B_1	.	.	.	.	.	+	.	.	+	.	.	.	.	.	+	.	2	.	.	.	.	.	+	+	.	.
Sorbus aucuparia C	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Ribes vulgare B_1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Frangula alnus B_1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	3	.	.
Berberis vulgaris B_1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+
C. Herbaceous and other plants																										
IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion*, d - *Quercetalia pubescentis*																										
a *Anemone nemorosa*	2	1	2	2	2	3	2	.	r	.	.	.	r	.	.	+	+	.	+	.	+	.	.	.	.	.
a *Poa nemoralis*	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	1	+	+	+	+	+	5	5	.	.
a *Melica nutans*	+	+	.	.	+	+	+	.	+	+	+	+	+	+	.	.	+	.	.	1	+	+	1	.	+	.
a *Viola mirabilis*	.	.	.	.	2	.	.	+	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
a *Carex digitata*	.	.	.	.	+	+	.	.	+	+	.	+	+	.	.	+	+	+	.	.	.	+	+	.	.	.
b *Galium odoratum*	1	1	1	.	1	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Phyteuma spicatum*	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Pulmonaria obscura*	2	+	+	.	2	+	1	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.
b *Lathyrus vernus*	+	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.
b *Viola reichenbachiana*	+	1	+	.	.	+	+	+	.	+	+	+	+	+	.	1	2	+	+	1	1	+	+	.	.	.
b *Sanicula europaea*	1	+	+	+	.	.	+	+	+	1	1	.	.	1	.	.	+	+	.	2	1	r	+	.	.	.
b *Epilobium montanum*	+	.	.	.	.	1	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
b *Dryopteris filix-mas*	2	1	1	+	1	+	2	1	+	2	+	+	+	+	1	2	.	+	.	.	.	1	+	.	+	+
b *Actaea spicata*	.	.	+	.	+	.	+	.	.	+	+	+	+	.	.	.	+	+	.	+	+	+	+	.	.	.

Table 5 continued

b *Adoxa moschatellina*	.	.	.	2	1	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Ranunculus lanuginosus*	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Scrophularia nodosa*	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Asarum europaeum*	.	.	.	+	2	2	2	2	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	.
b *Rubus hirtus*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.
c *Chrysosplenium alternifolium*	.	.	.	+	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
c *Circaea alpina*	+	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
c *Festuca gigantea*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
d *Campanula persicifolia*	+	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.	.	+	+	+	.	+	.	.	.	.
d *Melittis melissophyllum*	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
V. Ch: *Vaccinio-Piceetea*																										
Vaccinium myrtillus	.	.	.	.	.	.	.	.	.	.	.	r	.	.	1	.	+	.	r	+	r	.	.	+	.	.
Orthilia secunda	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	+	.	.
VI. Others																										
Galeopsis pubescens	+	+	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geum urbanum	+	.	.	+	+	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum sylvaticum	.	+	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Angelica sylvestris	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lysimachia nummularia	+	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	r	.	.	+	.	.	.	.	.	.
Phegopteris connectilis	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Mycelis muralis	+	.	+	.	.	.	.	.	.	+	.	.	+	.	.	.	+	+	r	+	+	r	+	.	.	.
Hieracium murorum	.	+	.	.	.	.	.	+	+	.	.	+	+	+	.	3	3	2	+	+	+	+	+	.	.	.
Aruncus sylvestris	+	.	1	.	.	.	.	.	+	+	1	+	.	+	.	.	.	1	.	+	+	2	1	.	.	.
Luzula pilosa	+	.	+	.	.	1	+	.	+	+	+	+	.	+	1	.	2	+	+	+	1	+	+	+	.	.
Veronica chamaedrys	+	.	.	.	.	+	.	.	+	+	+	.	.	+	.	.	+	.	.	.	+	.	.	+	.	.
Moehringia trinervia	+	.	+	+	+	1	+	+	.	.	1	.	+	.	.	+	2	.	.	.	+	+	+	+	+	.
Geranium robertianum	.	1	+	+	+	+	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.
Maianthemum bifolium	.	+	+	.	.	.	.	.	.	1	+	+	2	2	3	2	2	2	2	2	3	+	+	+	+	.
Athyrium filix-femina	+	1	+	+	.	.	.	2	.	.	+	.	.	.	1	.	.	.	.	.	2	.	.	.	+	+
Oxalis acetosella	3	5	4	4	4	4	3	5	4	4	4	3	4	3	5	4	1	+	+	1	2	+	2	r	+	+
Cruciata glabra	+	+	.	.	.	+	.	.	.	+	.	.	.	+	.	.	+	+	.	+	.	.	+	+	+	.
Dryopteris carthusiana	.	+	+	.	.	.	.	+	+	+	.	.	.	.	+	.	.	.	+	.	+	+	.	+	+	+
Urtica dioica	+	.	+	+	+	+	.	+	.	+	.	.	r	.	.	.	.	.	.	.	.	.	+	.	+	+
Gymnocarpium dryopteris	.	.	2	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.
Viola riviniana	.	.	+	.	.	.	+	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	+	.
Rubus idaeus	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+
Clinopodium vulgare	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Rubus caesius	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Polypodium vulgare	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.
Cystopteris fragilis	.	.	.	.	+	.	x	.	.	+	.	.	+	.	.	.	.	.	.	.	.	r	+	.	.	.
Ajuga reptans	.	.	.	.	.	+	.	.	+	+	+	.	.	.	+	.	+	+	+	1	.	.	+	+	.	.
Fragaria viridis	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.

Campanula rotundifolia	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Taraxacum officinale	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	r	.	.	.	r	r	.	.	.	.
Veronica officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	.	.	.	.	+	+	.	.	.
Solidago virgaurea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.
Hieracium lachenalii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	+	.	.	2	.	.	.
Carex canescens spicata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.
Hieracium sabaudum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.
Equisetum hyemale	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	
D: Mosses																									
VII. Ch: a - *Fagetalia silvaticae*, b - others																									
a *Atrichum undulatum*	1	2	1	1	1	2	2	2	1	.	2	2	2	.	1	2	2	2	2	.	2	3	2	+	+	.
b *Polytrichum formosum*	+	2	1	+	.	1	2	.	.	.	.	2	1	.	.	+	.	2	2	.	.	1	1	.	.	.
b *Plagiochilla porelloides*	+	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.
b *Brachythecium velutinum*	+	1	+	.	1	1	1	.	.	+	.	.	.	1	.	.	.	+	.	.	.	+	.	.	+	.
b *Plagiothecium laetum*	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
b *Eurhynchium angustirete*	.	.	.	.	+	1	2	1	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.
b *Brachythecium salebrosum*	.	.	.	.	.	+	.	.	+	2	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
b *Plagiomnium cuspidatum*	.	.	.	.	.	.	+	.	.	2	2	1	1	3	.	1	2	2	3	2	2	1	1	.	.	.
b *Plagiothecium denticulatum*	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	1	+	.	.	1	1	1	+	.	.
b *Cirriphyllum piliferum*	.	.	.	.	.	.	.	.	+	.	1	.	.	.	.	1	.	.	+	.	.	+	.	+	.	.
b *Mnium stellare*	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	+	.	.	.	.	+	.	.	.	.
b *Dicranella heteromalla*	.	.	.	.	.	.	.	.	.	.	+	+	.	1	+	.	1	1	.	1	.	.	.	.	.	.
b *Pohlia nutans*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	1	1	.	.	.	.	.	.	.	.
b *Pohlia cruda*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	+	.	.	.	.
b *Brachythecium rutabulum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	+	+	.	.	.	+
b *Rhizomnium punctatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.
b *Polytrichum formosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.

Species occurring in 1 record:

I c – *Tilia cordata* B_1 77/+. II a – *Picea abies* B_1 82/r. III – *Ribes uva-crispa* B_1 72/+, *Juniperus communis* B_1 95/+, *Pirus communis* B_1 96/+, *Rosa canina* B_1 96/+.

IV a – *Epipactis helleborine* 90/r. IV b – *Milium effusum* 74/+, *Paris quadrifolia* 75/+, *Carex sylvatica* 78/+, *Polystichum aculeatum* 80/+, *Neottia nidus-avis* 83/+. IV c – *Circaea lutetiana* 74/+. V – *Trientalis europaea* 89/+. VI – *Rubus saxatilis* 72/+, *Galium aparine* 76/+, *Petasites albus* 77/r, *Pteridium aquilinum* 79/+, *Huperzia selago* 82/r, *Geum rivale* 83/+, *Carex pilulifera* 87/+, *Lysimachia vulgaris* 91/+, *Astragalus glycyphyllos* 93/+, *Convallaria majalis* 93/r, *Calamagrostis epigejos* 94/+, *Melampyrum pratense* 94/+, *Platanthera bifolia* 94/+, *Solidago gigantea* 94/+, *Rubus plicatus* 95/+, *Dryopteris dilatata* 96/+.

VII b – *Pellia endiviaefolia* 78/+, *Plagiomnium undulatum* 80/1, *P. affine* 96/+, *Eurhynchium schwartzii* 80/1, *Mnium marginatum* 84/+.

x, xx — as in Table 2.

These species co-dominate with *Oxalis acetosella* and they form complex facies patterns at the same time. Worth noting is the frequent occurrence of many bryophyte species with a comparatively high density. For example: *Atrichum undulatum, Polytrichum formosum* and *Brachythecium velutinum*. It is often recorded, in scattered expanses of up to 1 are.

1.2.5. Variant with *Maianthemum bifolium*. This variant occurs in the similar sites as the preceding one: on the slopes of ravines and dry valleys, less often on the ridges of flattop hills. Floristically, it is distinguished for the exceptionally frequent and numerous occurrences in it of plant species of poorer habitats, especially with *Maianthemum bifolium, Heiracium murorum* and *Luzula pilosa*. Moreover, worth noting is the high percentage of bryophyte species that grow most often only in this and the preceding variant. These species include: *Plagiomnium cuspidatum, Cirriphyllum piliferum, Dicranella heteromalla, Brachythecium rutabulum*. The variant is fairly rare, occurring in scattered expanses of up to 0.5 are.

1.2.6. Variant with *Polypodium vulgare*. Floristically, it is distinguished primarily for the exceptionally dense occurrence of *Polypodium vulgare* in it. It was recorded only in one station. It develops on a steep, mesophilous slope of the deep-cut ravine, covering the area of 0.4 are.

1.2.7. Variant with *Poa nemoralis*. It represents a self-seeding (self-regenerating) form of the typical thinned dry-ground forest growing on the substratum with a highly degraded surface layer of soil, chiefly forest litter. This takes place both on the steep ravine soils and on the almost flat ridges of flattop hills. In those conditions there has been a mass growth of *Poa nemoralis*, thereby reducing the stations of other typically forest herbaceous plant species. It was recorded only in two stands, on surfaces of 0.4 are.

1.2.8. Variant with *Equisetum hyemale*. The variant represents the most debatable form of the subassociation *T.-C. typicum*. It develops at the foot of slopes of dry valleys, in mesophilous sites with a slight gradient. It should be pointed out that under a highly dense layer of shrubs and growing saplings there grows *Equisetum hyemale* with an exceptionally high density. The species composition of the undergrowth layer is considerably simplified here on account of the high density of *Equisetum hyemale*. It occurs sporadically, usually in expanses formed as broken strips with a maximum size of 5×6 m.

1.2.9. Variant with *Dryopteris filix mas* and *Athyrium filix-femina*. The present variant occurs exclusively on the steep slopes of deep-cut erosional forms, most often ravines, less frequently dry valleys. Floristically, it is distinguished primarily for the exceptionally numerous occurrences of two pteridophyte species, which form separate facies: *Dryopteris filix-mas* and *Athyrium filix-femina*. Other recorded plant species that are found comparatively most frequently and in greatest

numbers in it include, inter alia: *Oxalis acetosella, Dryopteris carthusiana, Aruncus sylvestris* and several bryophyte species. It occurs fairly frequently, in scattered expanses of 0.4–1.5 are.

2. Community with *Carpinus betulus — Rubus hirtus*

This forest community occurs mainly on the flat ridges of vast flattop hills, less often on the gentle-inclined slopes of dry valleys. Genetically, this community represents a highly artificially deformed subassociation *Tilio-Carpinetum typicum*. This is evident first of all in a considerable percentage of the planted *Pinus sylvestris* in the tree layer. Moreover, in the tree layer there is a comparatively large percentage of self-seeding, light-seeded specimens of *Betula pendula* and *Populus tremula*. The recorded self-seeded tree species growing here, such as *Carpinus betulus, Cerasus avium* and *Quercus robur*, grow far more often and in greater numbers in their lower (A1) than in higher layer (A). It consists chiefly of *Corylus avellana* and the co-dominant tree species in their early growth stage, most often *Carpinus betulus and Cerasus avium*, and some others less often. In the undergrowth layer, usually very dense, the most common species of forest and brushwood plants of more fertile and poorer habitats play the main role. The undergrowth layer owes its characteristic appearance to the dense occurrence of *Rubus hirtus*. Moreover, this forest is clearly marked by the comparatively frequent and sometimes numerous occurrences of some plants characteristic of the class *Vaccinio-Piceetea*, especially *Vaccinium myrtillus* and *Trientalis europaea*. The percentage of bryophytes, on account of the thick-lying and weakly decomposing forest litter, is practically very low. In this community of the degraded dry-ground forest, on the basis of the quantitatively varied participation of specified plant species of the poorer habitats, class *Vaccinio-Piceetea*, two secondary forms of communities were distinguished.

2.1. A typical form with *Rubus hirtus*. It represents a more fertile form of the community of the degraded dry-ground forest. It is characterized primarily by a constant and highly dense occurrence of a mesotrophic species, *Rubus hirtus*, and by sporadic occurrences of species characteristic of poorer forest habitats, such as *Vaccinium myrtillus* and *Trientalis europaea*. Moreover, in this variant worth noting are the frequently growing plant species regarded as characteristic of both typically nitrophilous (e.g. *Urtica dioica, Rubus idaeus, Galeopsis pubescens)* and typically mesotrophic habitats (e.g. *Galium odoratum, Asarum europaeum)*. It is found frequently, in expanses of varying size and area of up to several ares.

2.2. A form with *Vaccinium myrtillus*. Floristically and biotopically, this is a poorer form of the community of the degraded dry-ground forest with

Table 6. Phytosociological structure. 1 — association *Tilio-Carpinetum*. 1.2. — subassociation *T.-C. typicum* in variants: 1.2.9. — with *Dryopteris filix-mas* and *Athyrium filix-femina*, (in facies: 1.2.9.1. — with *Dryopteris filix-mas*, 1.2.9.2. — with *Athyrium filix-femina*)

Number of community																										
												1.2.9.														
											1.										2.					
Number of record			97	98	99	10	101	102	103	104	105	106	107	108	109	110	111	112	113							
Date			94-06-20	94-06-20	96-07-02	96-07-02	94-05-31	94-05-24	94-05-24	94-07-02	94-05-24	93-07-22	94-07-22	93-07-24	93-07-22	94-05-24	93-07-22	96-07-02	94-05-31							
Occurrence of community x			Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc	Bc							
Exposition			SE	SE	SE	SW	SW	SE	N	SW	SW	SW	NE	SE	NW	SW	NE	SW	NE							
Inclination of ground in		o	35	30	40	30	20	30	30	30	35	35	25	10	35	35	35	40	30							
Maximum height of tress in		m	18	18	14	18	18	25	16	20	13	20	20	18	16	18	15	10	18							
Maximum diameter of tress in		cm	25	40	20	25	25	50	20	45	20	25	35	25	30	50	25	15	25							
Cover of the layer in %	>10 m A		80	90	20	80	80	90	90	100	60	100	90	100	100	80	90	–	100							
	<10 m A_1		–	–	–	–	–	–	–	–	40	–	–	–	–	–	–	60	–							
	>5 m B		50	–	80	90	–	–	–	10	50	–	–	–	–	–	–	–	–							
	<5 m B_1		50	60	40	60	50	60	10	10	20	5	30	30	10	10	10	70	70							
	C		90	60	70	50	80	70	70	50	80	70	90	90	80	80	70	60	70							
	D		40	80	50	30	20	40	30	60	40	50	30	10	70	70	40	30	30							
Number of species in record			30	34	24	38	29	30	35	25	29	30	22	22	22	29	31	27	37							
A, B. Trees and shrubs																										
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*, d - *Alno-Padion*																										
a *Corylus avellana* B_1			3	5	.	.	3	.	.	.	3	.	.	.	.	.	.	3	.							
a *Corylus avellana* B_1			.	+	.	3	.	4	+	.	2	r	+	+	+	.	+	2	.							
a *Euonymus verrucosus* B			+	.	+	.	.	.	+	.	.	.	.	.	.	1	.	+	+							
b *Ulmus glabra* A			2	.	.	.	2	.	.	.	.	.	5	.	.	.	.	.	.							
b *Ulmus glabra* B_1			.	.	.	.	2	.	.	.	.	.	1	.	.	.	.	.	2							
c *Cerasus avium* B_1			.	+	+	.	+	.	+	+	.	.	.	.	.	.	+	.	.							
c *Carpinus betulus* A			.	.	.	.	5	.	5	5	4	5	4	2	5	3	5	.	5							
c *Carpinus betulus* A_1			.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	4	.							
c *Carpinus betulus* B_1			.	.	.	.	2	.	.	.	.	r	.	+	.	+	.	.	+							
c *Carpinus betulus* C			.	.	.	.	+	+	.	+	.	r	+	.	.	r	.	.	r							
d *Padus avium* B			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+							
II. Others																										
Quercus petraea A			5	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.							
Cornus sanguinea B_1			.	2	4	+	+	.	.	.	+	.	.	.	.	.	.	.	.							
Sorbus aucuparia B_1			.	+	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.							
Sorbus aucuparia C			.	+	.	r	+	.	.	.	.	r	.	.	.	r	.	.	.							
Quercus robur A			.	.	4	5	2	4	.	.	.	.	2	.	.	4	.	2	2							
Quercus robur B			+	.	.	.	.	.	r	.	.	.	2	.	.	r	.	.	.							
Populus tremula B			.	1	+	.	2	+	.	+	.	.	.	+	.	.	.	.	+							
Sambucus nigra B_1			.	2	1	.	.	+	.	.	.	.	2	.	.	.	3	3								
Ribes uva-crispa B_1			.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+							
Viburnum opulus B_1			.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+							

Table 6 continued

C. Herbaceous and other plants																
III. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Alno-Padion*, d - *Fagion silvaticae*, e - *Quercetalia pubescentis*																
a *Melica nutans*	+	+	.	.	+	+	+	.	.	1	.	.	.	.	+	.	+
a *Carex digitata*	.	+	.	+	.	+	+	+	+	+	.	.	.	+	.	.	+
a *Brachypodium sylvaticum*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
a *Viola mirabilis*	.	+	.	.	.	.	.	r	.	.	.	.	.	r	.	.	+
a *Poa nemoralis*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+
a *Anemone nemorosa*	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	2
b *Sanicula europaea*	+	.	.	.	+	+	+	.	+	+	.	.	+	+	+	.	.
b *Actaea spicata*	1	+	.	+	+	+	+	.	+	.	+	.	.	.	.	+	.
b *Dryopteris filix-mas*	5	4	3	5	3	3	4	3	4	1	+	2	2	2	2	2	2
b *Galium odoratum*	+	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	2
b *Pulmonaria obscura*	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.
b *Epilobium montanum*	.	+	.	+	.	.	+	.	+	.	.	.	.	.	.	+	+
b *Viola reichenbachiana*	.	.	.	+	+	+	+	+	+	+	+	.	+	+	+	.	.
b *Asarum europaeum*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	+
b *Adoxa moschatellina*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
b *Lathyrus vernus*	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.
c *Circaea alpina*	2	.	.	.	.	+	+	.	+	.	.	.	.	+	.	.	.
c *Circaea lutetiana*	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.
d *Rubus hirtus*	+	.	.	.	.	2	+	.	.	.	.	2	.	.	.	.	.
e *Campanula persicifolia*	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	.	.
IV. Ch: *Vaccinio-Piceetea* (x, x)																	
V. Others																	
Fragaria vesca	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Solidago virgaurea	.	+	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica chamaedrys	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Cystopteris fragilis	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.
Aruncus sylvestris	1	.	.	.	+	.	.	1	2	1	r	.	2	2	+	.	.
Hieracium murorum	+	.	.	.	2	.	.	+	.	r	.	.	+	+	+	.	.
Oxalis acetosella	+	.	r	.	.	3	4	3	2	2	3	3	3	2	2	.	.
Geum urbanum	+	.	+	+	.	+	.	+	+	.	.	.	.	+	+	+	.
Malanthemum bifolium	+	.	.	.	+	+	+	1	.	.	.	.	+	1	+	+	.
Galeopsis pubescens	+	.	.	+	.	+	.	r	.	.	+	+	.	+	.	.	+
Athyrium filix-femina	2	1	+	+	1	1	r	+	2	2	5	4	3	3	3	3	3
Mycelis muralis	+	+	.	.	+	+	+	+	+	+	+	.	.	1	+	+	+
Urtica dioica	+	1	+	1	.	+	+	.	+	.	.	.	.	+	.	+	+
Moehringia trinervia	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Dryopteris carthusiana	+	.	+	+	.	1	.	+	+	+	2	+	+	+	1	2	+
Viola riviniana	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Luzula pilosa	.	+	.	+	+	.	+	+	+	+	+	.	+	+	+	.	+
Geranium robertianum	.	+	+	+	.	+	1	+	+	+	.	.	.	+	2	+	+
Anthriscus nitida	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Rubus caesius	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+
Ajuga reptans	.	.	.	.	+	.	+	.	.	+	.	.	+	.	.	.	.
Phegopteris connectilis	.	.	.	.	.	+	.	.	+	+	+	.	.	2	.	.	.
Equisetum sylvaticum	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Lysimachia nummularia	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.

Table 6 continued

Gymnocarpium dryopteris	.	.	.	.	.	.	.	.	.	1	.	+	.	+	.	.	.
Dryopteris dilatata	.	.	.	.	.	.	.	.	.	.	.	.	1	r	.	.	.
D: Mosses																	
VI. Ch: a - *Fagetalia silvaticae*, b - others																	
a *Atrichum undulatum*	2	.	2	1	1	2	2	2	1	2	2	+	.	2	2	1	1
b *Eurhynchium schwartzii*	1	.	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.
b *Plagiomnium laetum*	1	.	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.
b *Plagiomnium cuspidatum*	2	2	1	1	1	.	+	1	1	1	.	.	2	.	1	.	1
b *Plagiothecium denticulatum*	.	2	1	1	1	1	1	1	1	1	.	.	.	2	1	1	.
b *Plagiochilla poreloides*	.	.	.	.	+	.	.	1	1	1	.	.	.	.	.	.	.
b *Mnium stellare*	.	.	.	.	.	.	+	.	+	.	.	.	2	.	1	+	1
b *Pohlia nutans*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.
b *Brachythecium rutabulum*	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	.	.
b *Plagiomnium undulatum*	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+
b *Rhizomnium punctatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.

Species occurring in 1 record:

I a – *Acer campestre* B_1 108/+, I c – *Cerasus avium* C 99/r. II – *Populus tremula* A 98/2, *Berberis vulgaris* B_1 100/+, *Crataegus* sp. B_1 100/r, *Rhamnus catharticus* B_1 100/+, *Frangula alnus* B_1 102/+.

III b – *Carex sylvatica* 102/+, *Phyteuma spicatum* 103/+, *Paris quadrifolia* 113/+. III c – *Chrysosplenium alternifolium* 113/+. III e – *Polystichum aculeatum* 101/r. IV – *Vaccinium myrtillus* 101/+, *Trientalis europaea* 109/r. V – *Cruciata glabra* 98/+, *Taraxacum officinale* 98/r, *Poa angustifolia* 100/+, *Silene nutans* 100/r, *Clinopodium vulgare* 103/+, *Solidago gigantea* 103/+, *Rubus idaeus* 108/+, *Veronica officinalis* 111/r, *Astragalus glycyphyllos* 112/+.

VI b – *Pohlia cruda* 98/1, *Atrichum cuspidatum* 98/+, *Dicranella heteromalla* 106/+, *Lepidozia reptans* 106/+, *Brachythecium velutinum* 107/1, *Polytrichum formosum* 110/2.

x, xx — as in Table 2.

Rubus hirtus. This is mainly evident in the co-domination of *Rubus hirtus* with *Vaccinium myrtillus*, sometimes with *Trientalis europaea* and *Pteridium aquilinum*. Plant species characteristic of typically nitrophilous or mesotrophic forest habitats play practically no role here. This form does not develop very frequently, mainly in small expanses of up to 1 are.

3. *Querco roboris-Pinetum*

This association is found mainly on the flat or slightly inclined ridges of flattop hills. It develops less often in the upper sections of the slopes of dry valleys with a slight gradient. It also occurs sporadically at the foot of flattop hills in the area of old, washed-out sand-dunes. Genetically, the association represents a highly artificially transformed subassociation of the typical dry-ground forest that occurs on poor soils susceptible to podzolization processes. The layers of trees, brushwood and undergrowth are composed in this coniferous forest of species characteristic both of mesotrophic forests of the class *Querco-Fagetea* and the acidophilous forests of the class *Vaccinio-Piceetea*. The tree species

Table 7. Phytosociological structure. 2. — community with *Carpinus betulus — Rubus hirtus*, in forms: 2.1. — typical with *Rubus hirtus*, 2.2. — with *Rubus hirtus* and *Vaccinium myrtillus*

Number of community		2.																				
		1.													2.							
Number of record		114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131			
Date		94-06-20	94-06-20	94-06-20	94-05-24	95-05-18	94-06-20	95-05-18	95-05-18	95-05-18	85-05-18	94-06-20	94-05-18	94-06-20	94-05-18	94-05-18	94-05-18	94-05-18	94-05-18			
Occurrence of community x		Ca	Cb	Cc	Cb	Bc	Ca	Ca	Cb	Bc	Bc	Cc	Cc	Ca	Cb	Cb	Ca	Cb	Cb			
Exposition		-	-	-	-	SE	SW	-	-	SW	SE	-	-	-	-	-	SW	SW	SW			
Inclination of ground in	°	-	-	-	-	4	4	-	-	10	4	-	-	-	-	-	2	3	2			
Maximal height of tress in	m	20	25	25	20	25	25	20	25	25	20	25	18	20	18	20	25	25	25			
Maximal diameter of tress in	cm	40	70	45	28	50	50	45	50	80	40	45	35	40	25	30	40	45	45			
Cover of the layer in %	>10 m A_1	30	40	60	70	90	80	80	80	80	70	70	80	90	90	90	80	60	70			
	<10 m A_1	60	40	50	-	-	80	-	30	-	-	40	30	40	-	-	-	40	40			
	>5 m B	20	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	<5 m B_1	30	80	50	60	20	50	30	70	40	70	50	60	60	50	40	60	20	40			
	C	70	90	80	100	100	100	100	80	90	80	80	100	80	70	90	90	80	90			
	D	.	+	+	.	.	.	.	.	+	+	.	.	+	.	.	.	+	.			
Number of species in record		34	22	37	23	11	14	16	22	19	21	22	39	23	20	23	19	21	21			
A, B. Trees and shrubs																						
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*																						
a *Corylus avellana* B		2	2	.	.	.	4	.	.	3	.	.	2	4	.	.	.	.	.			
a *Corylus avellana* B_1		2	3	2	4	.	2	.	.	3	.	.	3	.	2	2	2	.	2			
b *Ulmus glabra* A_1		2	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
b *Ulmus glabra* B_1		.	.	.	.	1	.	+	.	.	.	.	2	.	.	.	.	+	.			
c *Carpinus betulus* A		1	.	.	1	4	.	.	3	2	2	.	.	.	.	3	2	.	.			
c *Carpinus betulus* A_1		2	2	.	.	.	.	.	.	.	.	2	1	1	.	.	.	3	3			
c *Carpinus betulus* B_1		+	3	2	.	.	.	.	4	.	.	3	.	.	2	2	.	+	.			
c *Carpinus betulus* C		.	.	.	.	+	.	.	+	+	.	.	.	.	.	+	.	.	r			
c *Cerasus avium* A		.	.	2	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.			
c *Cerasus avium* A_1		.	1	2	.	.	.	.	.	.	.	.	2	.	.	.	.	.	2			
c *Cerasus avium* B_1		.	.	.	+	.	+	.	1	+	.	2	2	+	2	.	3	1	+			
c *Cerasus avium* C		.	.	.	.	.	.	.	+	.	.	r	r	.	.	.	r	.	r			
II. Ch: a - *Vaccinio-Piceetea* (x, x), b - *Dicrano-Pinion*																						
b *Pinus sylvestris* a		2	.	.	2	.	4	5	2	3	3	3	2	.	2	1	2	4	.			
III. Others																						
Populus tremula A		2	.	.	.	.	.	2	.	.	1	.	.	.	.	.	.	.	.			
Populus tremula B_1		.	.	.	.	.	.	.	.	.	.	.	.	2	.	+	2	.	.			
Sorbus aucuparia B_1		.	+	+	+	.	.	+	.	.	.	+	+	+	.	.	.	.	.			
Sorbus aucuparia C		.	.	r	.	.	.	.	.	.	+	.	.	.	r	.	.	.	.			
Berberis vulgaris B_1		+	+	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.			
Betula pendula A		2	.	2	.	2	.	.	2	.	1	1	2	2	.	1	2	.	3			
Quercus petraea A		2	.	.	.	.	.	.	.	2	.	.	.	5	.	.	.	2	.			
Quercus petraea A_1		.	.	.	.	.	5	.	.	.	.	.	.	2	.	.	.	.	.			
Cornus sanguinea B_1		+	.	.	.	.	.	.	.	.	+	.	1	+	.	.	+	.	.			
Quercus robur A		.	4	4	2	2	.	.	3	.	.	2	3	.	4	4	4	.	2			
Quercus robur B_1		.	.	.	.	.	2	.	.	.	.	.	2	.	2	+	.	.	.			
Frangula alnus B		.	.	+	.	.	.	.	.	.	.	.	2	.	+	.	1	.	.			

Table 7 continued

C. Herbaceous and other plants																		
IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Fagion silvaticae*, d - *Alno-Padion*																		
a *Anemone nemorosa*	r	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
a *Melica nutans*	+	+	.	.	.	+	+	+	+	.	.	2	+	.	+	+	+	.
b *Asarum europaeum*	.	+	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.
b *Sanicula europaea*	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
b *Galium odoratum*	+	2	2	+	.	+	.	+	.	+	+	1	.	.	.	.	+	+
b *Viola reichenbachiana*	+	.	+	+	.	+	.	.	.	.	+	+	.	+	.	.	.	+
b *Dryopteris filix-mas*	+	.	+	.	+	.	.	+	.	.	.	2	1	.	.	.	.	+
c *Rubus hirtus*	5	5	5	5	5	5	5	5	5	5	5	4	5	4	4	4	5	5
d *Festuca gigantea*	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.
V. Ch: *Vaccinio-Piceetea*																		
Trientalis europaea	+	+	.	+	.	+	.	+	+	.	.	+	+	2	+	.	+	.
Vaccinium myrtillus	+	r	+	.	.	+	+	+	.	+	+	1	2	2	3	3	3	1
VI. Others																		
Viola riviniana	.	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.
Rubus idaeus	+	.	.	2	.	.	+	.	.	.	+	.	.	.	.	.	.	.
Urtica dioica	+	.	2	2	.	.	.	+	.	.	.	+	.	.	.	.	.	.
Geum urbanum	+	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Ajuga reptans	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Lysimachia nummularia	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Galeopsis pubescens	.	r	.	+	+	+	+	+	+	.	.	r	.	.	.	.	.	.
Geranium robertianum	.	.	+	+	.	.	.	+	.	.	.	+	.	.	.	.	.	.
Fragaria viridis	+	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.
Rubus plicatus	+	+	.	.	.	.	.	+	.	+	+	.	2	.	.	.	+	.
Maianthemum bifolium	+	+	.	1	+	+	+	.	+	.	+	+	+	+	+	+	+	.
Dryopteris carthusiana	+	+	+	1	.	.	+	.	+	+	+	+	.	.	+	.	+	.
Athyrium filix-femina	2	.	+	1	.	.	+	+	+	+	.	.	1	.	+	.	r	+
Moehringia trinervia	+	.	+	+	.	.	+	.	+	.	.	+	.	+	+	.	.	+
Oxalis acetosella	+	+	+	2	2	.	+	+	+	+	+	+	.	+	+	1	+	+
Cruciata glabra	+	+	.	.	.	.	.	.	.	+	.	+	+	+	+	+	.	+
Pteridium aquilinum	.	.	1	.	.	.	.	.	.	+	.	+	.	.	.	.	2	3
Carex hirta	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Luzula pilosa	.	.	.	.	.	.	.	.	.	+	.	+	.	+	+	+	.	.
D: Mosses																		
VII. Ch: a - *Fagetalia silvaticae*, b - others																		
b *Polytrichum formosum*	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.
b *Brachythecium salebrosum*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.
b *Amblystegium serpens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+

Species occurring in 1 record:

I a – *Euonymus verrucosus* B_1 125/+. II a – *Picea abies* A 117/1. III – *Ribes uva-crispa* B_1 116/+, *Sambucus nigra* B_1 117/2, *Ribes vulgare* B_1 118/+, *Pyrus communis* B_1 121/+, *Quercus robur* A_1 124/2, *Prunus spinosa* B_1 128/+.

IV a – *Brachypodium sylvaticum* 125/+, *Carex digitata* 126/+. IV b – *Actaea spicata* 122/+, *Milium effusum* 123/+. IV d – *Circaea lutetiana* 116/+. VI – *Galium aparine* 116/+, *Veronica officinalis* 117/+, *V. chamaedrys* 125/+, *Mycelis muralis* 122/+, *Aruncus sylvestris* 123/+, *Rubus sp.* 125/2, *R. caesius* 130/+, *Phegopteris connectilis* 126/+, *Hieracium lachenalii* 126/+, *H. sabaudum* 127/+, *Carex pallescens* 128/+, *Agrostis capillaris* 129/+.

VII a – *Atrichum undulatum* 116/+. VII b – *Pohlia nutans* 124/+, *Plagiomnium cuspidatum* 130/+, *P. affine* 131/+, *Brachythecium rutabulum* 131/+.

x, xx — as in Table 2.

that grow here in different numbers — *Pinus sylvestris* and *Quercus robur* are there mainly as a result of planting. There is also a considerable percentage of self-seeding, light-seeded tree species, the main ones being *Betula pendula* and *Populus tremula*. The frequent, naturally growing tree species and with different density, such as *Carpinus betulus* and *Cerasius avium*, indicate the genetic origin of this mixed coniferous forest from the poorer expanses of *Tilio-Carpinetum*. The brushwood layer in this coniferous forest usually has an exceptionally high density and diverse species. It consists mainly of both typical fruticose species (*Corylus avellana, Frangula alnus, Cornus sanguinea*) and young, growing tree species (chiefly *Carpinus betulus, Cerasus avium, Quercus robur, Populus tremula* and *Sorbus aucuparia*). Worth noting in this coniferous forest is the sporadic presence of seedlings and young specimens of *Pinus sylvestris*. In the undergrowth layer, usually highly dense and not very rich in species, there are first of all very dense occurrences of *Vaccinium myrtillus*. This plant species dominates independently, less often with a fairly considerable co-occurrence of several other species, mainly *Anemone nemorosa, Galium odoratum, Pteridium aquilinum* and *Calluna vulgaris*. The bryophyte layer in this forest is usually underdeveloped, less often highly dense. It most common components include: *Atrichum undulatum, Brachythecium velutinum, B. rutabulum* and *Polytrichum formosum*. Many other bryophyte and lichen species were recorded only either in more fertile or poorer expanses of the association.

In this association of the mixed coniferous forest, on the basis of specific co-dominant species in the undergrowth layer, three variants were distinguished.

3.1. Variant with *Vaccinium myrtillus*. In respect of the general floristic structure and biotopic conditions, this variant seems to represent a more fertile and floristically richer form of the association. In the undergrowth layer *Vaccinium myrtillus* has the highest density. Moreover, in this variant there is a markedly frequent occurrence, sometimes with a high degree of coverage, of several plant species characteristic of more fertile leafy forests. These include: *Anemone nemorosa, Gallium odoratum, Carex digitata, Melica nutans*. Bryophytes occur here fairly often, yet usually with a low degree of coverage.

In the studied area this variant represents the most common form of the association of a mixed coniferous forest. It develops in expanses of varying size, the maximum being up to 1 hectare.

3.2. Variant with *Pteridium aquilinum*. It is found equally frequently both on the ridges and slopes of old, washed-out sand-dunes and on the sloping loess ridges of vast flattop hills. Floristically it is distinguished in the association primarily for the exclusive co-domination of *Pteridium aquilinum* and *Vaccinium myrtillus*. Within the area investigated it occurs rarely, mostly in small expanses of up to 1.5 are.

Table 8. Phytosociological structure. 3. — association *Querco roboris-Pinetum* in variants: 3.1. — typical with *Vaccinium myrtillus*, 3.2. — with *Pteridium aquilinum*, 3.3. — with *Lycopodium annotinum*. 4. — association *Peucedano-Pinetum* in variants: 4.1. — impoverished with *Vaccinium myrtillus*, 4.2. — with *Calluna vulgaris* and *Vaccinium vitis-idaea*

Number of community		3.1.																	
Number of record		132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149
Date		93-07-22	95-05-18	94-05-31	95-05-18	94-04-31	95-05-18	95-05-18	95-05-18	96-06-28	95-05-18	94-05-31	95-05-18	94-05-22	95-05-31	94-05-24	94-05-22	95-05-18	94-05-31
Occurrence of community[x]		Bc	Bc	Bc	Ca	Cb	Cb	Cb	Ca	Cb	Cb	Cc	Bc	Bb	Cb	Bb	Bb	Cc	Cb
Exposition		SE	SW	SW	SE	–	–	–	SE	–	S	W	NW	W	–	NW	W	W	–
Inclination of ground in	o	2	2	2	2	–	–	–	3	–	2	2	10	3	–	2	3	2	–
Maximum height of tress in	m	18	20	16	20	18	25	18	20	20	20	16	18	20	20	16	18	18	25
Maximum diameter of tress in	cm	20	25	25	25	25	30	30	30	45	30	20	30	35	25	20	25	35	30
Cover of the layer in %	>10 m A	90	90	30	90	90	90	90	80	80	80	90	90	80	80	90	70	90	80
	<10 m A_1	–	–	70	–	–	–	–	–	–	–	–	–	70	60	–	–	–	–
	>5 m B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<5 m B_1	80	60	60	70	60	80	40	70	60	50	60	70	40	60	60	90	30	60
	C	90	90	100	90	100	90	90	90	90	90	100	80	60	80	80	50	90	90
	D	10	10	10	+	+	+	+	+	+	+	+	+	+	+	40	20	+	+
Number of species in record		36	35	33	20	32	24	28	28	30	24	30	31	32	30	38	37	27	28
A, B. Trees and shrubs																			
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*																			
a *Euonymus verrucosus* B_1		+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.
a *Corylus avellana* B_1		3	3	3	4	2	2	2	+	.	2	3	4	.	3	3	.	+	2
a *Lonicera xylosteum* B_1		.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
b *Ulmus glabra* B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
c *Cerasus avium* B_1		2	1	2	+	+	1	+	2	+	2	+	2	+	2	.	.	+	.
c *Cerasus avium* C		r	.	r	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.
c *Carpinus betulus* A		.	2	.	.	1	.	1	2	2	.	.	1	.	.	4	2	4	.
c *Carpinus betulus* A_1		.	.	1	.	.	.	.	.	.	.	.	.	4	2	.	.	.	.
c *Carpinus betulus* B_1		.	2	.	.	.	1	.	4	4	3	.	.	2	.	2	3	2	.
c *Carpinus betulus* C		.	+	.	.	.	.	.	r	+	+	.	.	.	.	+	.	+	.

Number of community		3.1.								3.2.			3.3.	4.1.		4.2.		
Number of record		150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
Date		95-05-18	94-05-31	94-05-31	95-05-31	95-05-18	95-05-18	95-05-18	96-06-28	94-05-31	95-05-18	96-06-28	96-06-28	96-06-26	96-06-26	96-06-26	96-06-26	96-06-26
Occurrence of community[x]		Cb	Cb	Bc	Cb	Ca	Cb	Cc	Ca	Ca	Ca	Db	Dc	Cb	Cb	Dc	Da	Db
Exposition		–	–	SW	–	–	–	–	–	–	SE	–	–	–	–	–	SE	–
Inclination of ground in	o	–	–	10	–	–	–	–	–	–	2	–	–	–	–	–	2	–
Maximum height of tress in	m	25	18	20	20	18	25	18	20	18	12	18	20	18	20	18	18	20
Maximum diameter of tress in	cm	45	30	40	40	25	30	25	30	30	30	35	50	30	40	30	35	40
Cover of the layer in %	>10 m A	80	40	80	80	80	80	80	70	80	80	80	80	80	80	90	90	70
	<10 m A_1	–	60	30	40	–	–	–	60	40	–	–	–	–	70	20	–	–
	>5 m B	–	–	30	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<5 m B_1	70	50	60	60	70	70	10	60	60	70	40	70	40	40	20	10	10
	C	90	70	70	100	90	90	90	70	100	100	100	100	90	100	100	90	90
	D	+	+	+	+	+	10	20	20	10	10	20	60	10	10	10	100	90
Number of species in record		28	26	33	24	35	28	21	35	25	18	13	35	18	25	20	13	19
A, B. Trees and shrubs																		
I. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Carpinion betuli*																		
a *Euonymus verrucosus* B_1		.	2	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
a *Corylus avellana* B_1		.	3	.	2	2	+	4	3	1	.	.	2	.	.	.	.	.
a *Lonicera xylosteum* B_1		.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	.	.
b *Ulmus glabra* B		.	.	+	.	.	.	.	.	.	.	.	2	.	.	.	.	.
c *Cerasus avium* B_1		2	2	+	.	+	+	+	1	+	.	.	.	+	.	.	.	.
c *Cerasus avium* C		.	r	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.
c *Carpinus betulus* A		.	3	1	.	.	5	.	.	.	.	.	3	.	.	.	.	.
c *Carpinus betulus* A_1		.	.	.	.	.	.	.	.	.	.	.	1	3	.	.	.	.
c *Carpinus betulus* B_1		3	+	2	.	2	1	+	.	4	.	.	.	.	.	.	.	.
c *Carpinus betulus* C		r	.	.	.	.	+	.	.	.	.	.	r	.	r	.	.	.

II. Ch: a - *Vaccinio-Piceetea*

b *Picea abies* B_1

b *Pinus sylvestris* A

b *Pinus sylvestris* B

b *Pinus sylvestris* C

III. Others

Viburnum opulus B_1

Berberis vulgaris B_1

Cornus sanguinea B_1

Frangula alnus B

Populus tremula A

Populus tremula B_1

Sorbus aucuparia B_1

Sorbus aucuparia C

Betula pendula A

Betula pendula B_1

Quercus robur A

Quercus robur A_1

Quercus robur B_1

Quercus robur C

Quercus petraea A

Juniperus communis B_1

Quercus petraea B_1

Pyrus communis B_1

C. Herbaceous and other plants

IV. Ch: a - *Querco-Fagetea*, b - *Fagetalia silvaticae*, c - *Fagion silvaticae*, d - *Quercetalia pubescentis* (x, x)

a *Anemone nemorosa*

a *Brachypodium sylvaticum*

a *Melica nutans*

a *Carex digitata*

b *Millium effusum*

b *Asarum europaeum*

b *Actaea spicata*

b *Pulmonaria obscura*

b *Lathyrus vernus*

b *Sanicula europaea*

b *Galium odoratum*

b *Viola reichenbachiana*

b *Dryopteris filix-mas*

c *Rubus hirtus*

Table 8 continued

V. Ch: *Vaccinio-Piceetea*																																			
Pyrola rotundifolia	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trientalis europaea	.	+	1	+	+	+	+	.	.	+	.	+	+	+	+	+	.	+	+	+	+	+	+	+	.	+	+	.	.	+	.	.	.	.	.
Vaccinium myrtillus	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	5	5	5	5	2
Orthilia secunda	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium vitis-idaea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	+	+	1
VI. Others																																			
Geum urbanum	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galeopsis pubescens	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus idaeus	+	.	+	.	.	.	.	.	+	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Moehringia trinervia	.	.	+	.	.	.	.	+	+	.	.	.	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mycelis muralis	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Clinopodium vulgare	+	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Athyrium filix-femina	2	.	.	+	.	+	.	.	.	+	.	.	.	+	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola riviniana	.	+	.	.	.	.	+	+	+	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gymnocarpium dryopteris	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Cruciata glabra	.	+	+	+	+	+	+	r	+	.	.	+	+	+	.	.	+	.	+	+	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.
Ajuga reptans	.	+	.	.	.	.	.	.	+	.	.	.	.	.	+	[illegible]	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Oxalis acetosella	.	+	1	.	.	1	.	.	.	1	.	+	+	1	.	.	.	2	+	.	+	.	1	.	.	.	1	.	.	+	.	.	.	.	.
Rubus opacus	.	.	.	+	+	.	+	+	.	.	+	.	.	+	+	.	.	1	+	+	+	.	+	.	+	.	+	.	.	+	.	.	.	.	.
Dryopteris carthusiana	+	+	.	+	.	+	.	.	+	+	+	+	+	+	+	.	+	+	+	+	+	.	.	+	.	+	+	.	.	+	.	.	.	.	.
Fragaria viridis	1	.	+	.	+	.	+	+	+	.	+	+	+	+	+	[illegible]	+	1	+	.	.	+	+	.	.	.	.	.	+	+	.	.	.	.	.
Hieracium murorum	+	+	.	.	+	+	+	+	+	r	.	+	+	+	1	.	+	+	.	.	.	+	.	+	.	+	.	.	.	.	.	+	.	.	.
Pteridium aquilinum	.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	1	1	r	+	+	3	5	5	+	.	.	.	.	.
Maianthemum bifolium	2	+	.	+	+	+	+	.	+	+	.	+	+	+	.	1	+	+	+	+	+	+	+	+	.	+	+	+	.	+	+	.	.	.	.
Luzula pilosa	+	+	.	+	+	+	+	+	.	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	.
Carex pallescens	.	+	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+
Carex pilulifera	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Hieracium lachenalii	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Veronica chamaedrys	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	+	r	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Festuca ovina	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	.	+	.
Melampyrum pratense	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	+	+	+	+	.	.	+	+	+	+
Hieracium sabaudum	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Solidago virgaurea	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.
Veronica officinalis	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Aruncus sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anthoxanthum odoratum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.
Luzula multiflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Angelica sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.
Rubus saxatilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	+	.	.	.	.	.	.	.	.	.
Peucedanum oreoselinum (D: ass. 4)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+
Calluna vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	5

D: Mosses and others
VII. Ch: a - *Fagetalia silvaticae*, b - others

a *Atrichum undulatum*	+	+	+	.	+	.	.	.	+	.	+	+	+	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	+	+	.	.	.
b *Brachythecium velutinum*	.	+	+	.	.	+	.	.	.	+	+	+	.	+	+	1	+	.	+	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.
b *Plagiomnium affine*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	+	.	.	+	+	.	.	.	.	.	.
b *Brachythecium rutabulum*	.	+	.	+	+	.	+	.	+	.	+	+	+	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	+	.	.
b *Polytrichum formosum*	+	.	+	.	.	.	.	+	+	+	.	+	.	+	+	+	.	+	.	+	+	.	.	+	.	+	.	+	+	2	+	.	+	+	+
b *Eurhynchium angustirete*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	+	.	.	+
b *Pohlia nutans*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
b *Plagiomnium cuspidatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	+	.	+	+	.	.	.	+	.	.	+	.	.	.
b *Brachythecium salebrosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.	.	.	+	.	+
b *Pleurozium schreberi*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	1	2	2	2	3	3	3
b *Polytrichum juniperinum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	1	1	+	1	1	1
b *Rhizomnium punctatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+
b *Mnium stellare*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	+
b *Cladonia rangiferina*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+

Species occurring in 1 record:

I b – *Ulmus glabra* A 143/2. III – *Betula obscura* A 133/1.

IV a – *Epipactis helleborine* 132/r. IV b – *Neotia nidus-avis* 136/+, *Scrophularia nodosa* 152/+. IV d – *Melittis melissophyllym* 157/+.V – *Lycopodium annotinum* 161/3. VI – *Ranunculus repens* 132/r, *Viola hirta* 142/+, *Dryopteris dilatata* 143/+, *Dactylis glomerata* 147/+, *Lycopodium clavatum* 47/+, *Lysimachia nummularia* 147/+, *Platanthera bifolia* 147/+, *Prunella vulgaris* 147/+, *Solidago gigantea* 147/+, *Holcus lanatus* 154/+, *Potentilla erecta* 154/+, *Nardus stricta* 155/+, *Hieracium umbellatum* 157/+, *Agrostis capillaris* 159/+, *Scorzonera humilis* 159/+, *Convallaria majalis* 164/1, *Calamagrostis epigejos* 164/+.

x, xx — as in Table 2.

3.3. An impoverished variant with *Lycopodium annotinum* and with *Polytrichum formosum*. In respect of the general floristic structure and biotopic conditions, this variant represents an intermediate community between associations *Querco roboris-Pinetum* and *Peucedano-Pinetum*. It develops only at the foot of flattop hills, on highly depleted, sandy podzolic soils. In the undergrowth layer it is characterized primarily by the exceptionally and highly simplified species composition. It owes its characteristic appearance to the occurrence of *Vaccinium myrtillus*, often with *Lycopodium annotinum* and with *Polytrichum formosum*.

Locally, this is the rarest form of the mixed coniferous forest. It develops in the neighbourhood of other variants of this association, in scattered expanses of up to 0.5 are.

4. *Peucedano-Pinetum*

This association occurs exclusively on the ridges and slopes of old, washed--out sand-dunes that are found at the foot of vast flattop-hills. This takes places exclusively on the south-western edge of the area investigated. Floristically, this association is distinguished primarily for its highly simplified composition of the undergrowth layer species and for the exceptionally high occurrence of bryophytes in it. Its characteristic appearance is owed to the dense occurrence of two species: *Vaccinium myrtillus and Pleurozium schreberi.*

In this association, two variants were distinguished that are chiefly characterized by specific co-dominant plant species in the undergrowth layer.

4.1. A typical variant. In the investigated area it represents the most typical, developed form of the fresh coniferous forest. It develops on poor, podzolic sandy soils. Floristically, it is distinguished primarily for very dense occurrences of *Vaccinium myrtillus* exclusively. It is recorded rarely, in scattered expanses of up to several are-size.

4.2. Variant with *Calluna vulgaris*. It is found on extremely depleted, podzolic sandy soils. Floristically, it is characterized primarily by an exceptionally highly simplified composition of the undergrowth species and by the exclusive occurrence of *Calluna vulgaris* in great numbers. Moreover, it is characterized by the frequent occurrence of *Vaccinium vitis– idaea.* It develops rarely, in expanses of up to 0.5 are.

Forest soils (Table 1)

In the area investigated the condition of development of the soils and the forest communities that settled on them is highly complex. This follows first of all from diversified geomorphological properties (dry valleys and ravines) and from the complex structure of the substratum of Quaternary covers (loess, loam,

dusts, silts, sands). Altogether, in the studied forest communities, four basic soil forms were found.

Locally, the most spatially complex mosaic of soil forms occurs in the distinguished variants of the subassociation *Tilio-Carpinetum stachyetosum silvaticae*. Black-earth soils were identified in two variants: with *Aegopodium podagraria* (profile 1) and with *Petasites albus* (profile 4). Black-earth soils probably also occur in the variant with *Urtica dioica*. However, brown soils and related acid brown soils were found in variants with *Aruncus sylvestris* (profile 2) and with *Equisetum sylvaticum* (profile 3).

In the studied forests the most common are acid brown soils (profiles 2, 7–10) and podzolic soils (profiles 5, 6, 11, 12). The two soil forms dominate spatially in mosaics in different variants of the subassociation *Tilio-Carpinetum typicum* (profiles 5–10). In the *Carpinus betulus — Rubus hirtus* forest community and in associations *Querco roboris-Pinetum* and *Peucedano-Pinetum* there are almost exclusively podzolic soils (profiles 11, 12). In the investigated area, the extremely depleted, typical sandy podzolic soils are characteristic only of the association *Peucedano-Pinetum* (profile 13).

The recorded forest soils were essentially formed on four kinds of the Quaternary substratum. The most frequent substratum for those soils are loess covers, pure or with dust, loam or sand interbedding (profiles 2, 3, 5, 8–12). Less often they are homogeneous sediments of dust (profiles 1, 4) or sand (profile 13) or loess with a high sand content (profile 7). Only in one case was a soil type recorded that was formed on the dusty substratum lying on the limestone rock (profile 6). Generally these are soils with average humus content. The percentage of skeleton elements and $CaCO_3$ compounds in them is sporadic and negligible. They differ in abundance in P_2O_5 compounds. Their structure is usually prismatic and lump-like, and the fraction pattern is compact or medium compact. Their pH values range 3.5–6.3. Generally, they are mesophilous soils or constantly highly wetted, shallow or medium deep. They are characterized by the ombrophilous water economy.

Descriptions of Soil Pits

Profile 1

0–33 cm, humus level, dark grey; ordinary dust, lump-like structure, medium-firm pattern, distinct transition.

< 33 cm, matrix level; ordinary stratified dust, plate-like structure, medium-firm pattern.

Profile 2

0–4 cm, humus level, almost black; ordinary dust, granular structure, weakly-firm pattern, distinctly uneven transition.

4–30 cm, browning level of brown colour; ordinary dust, prismatic structure, weakly-firm pattern, gradual transition.

30–110 cm, browning level, stratified, of dark brown colour; silty dust, prismatic structure, medium-firm pattern, distinct transition.

110–120 cm, brown underlying rock; medium loam, dusty, with a negligible amount of northern grit.

< 120 cm, matrix level; loose sand, light grey.

Profile 3

0–1 cm, weak-decomposed forest litter level, of brown colour.

1–5 cm, humus level, almost black; ordinary dust, granular structure, weakly-firm system, distinct transition,

5–50 cm, browning level of light brown colour; ordinary dust, prismatic structure, medium-firm pattern, distinct transition.

< 50 cm, underlying layer; light-coloured sand with northern grit.

Profile 4

0–50 cm, humus level, dark with steel-like shade, traces of gleying; ordinary dust, lump-like structure, medium-firm pattern, indistinct transition.

50–70 cm, mineral humus level, somewhat darker colour than in Level A; ordinary dust, lump-like structure, medium-firm pattern, distinct transition.

< 70 cm, underlying layer; light loamy sand, of grey colour.

Profile 5

0–2 cm, weak-decomposed forest litter level, of brown colour.

2–4 cm, humus level, dark-grey; ordinary dust, limp-like structure, light-form pattern, distinct transition with smudges.

4–20 cm, eluvial level, light grey; silty dust, lamellar structure, medium-firm pattern, distinct transition.

20–40 cm, illuvial level of dark brown colour; silty dust, prismatic structure, firm pattern, indistinct transition.

40–160 cm, illuvial level, alternately stratified, light and dark brown thin layers, several cm--thick; ordinary dust, prismatic structure, weakly-firm pattern.

Profile 6

0–25 cm, humus level, dark grey; ordinary dust, lump-like structure, medium-firm pattern, indistinct transition.

25–35 cm, eluvial level, light grey; ordinary dust, lamellar structure, medium-firm pattern, indistinct transition.

35–60, illuvial level, rust-coloured; heavy loam, prismatic structure, firm pattern, gradual transition.

< 60 cm, matrix level, grey weathered limestone rock.

Profile 7

0–10 cm, humus level, dark-grey; ordinary dust with a high sand content, lump-like structure, medium-firm pattern, distinct pattern.

10–50 cm, browning level, brown; ordinary dust, prismatic structure, firm pattern, distinct transition.

50–110 cm, alternately stratified browning level, light and dark brown thin layers, several cm thick; light dusty loam with northern grit, lump-like structure, medium-firm pattern, distinct transition.

< 110 cm, matrix level; loose light-grey sand.

Profile 8

0–2 cm, humus level, almost black; ordinary level, granular structure, weakly-firm pattern, distinct transition yet uneven with pockets.

2–60 cm, browning level, dark brown; silty dust, prismatic structure, firm pattern, indistinct transition.

< 60 cm, matrix level, decalcified loess, of grey colour.

Profile 9

0–2 cm, humus level, of dark almost black colour; ordinary dust, granular structure, weakly--firm pattern, distinct transition yet uneven with pockets.

3–20 cm, browning level, of light brown colour; ordinary dust, prismatic structure, weakly-firm pattern, distinct transition.

< 20 cm, matrix level; straw-coloured, weak-stratified loess, decalcified.

Profile 10

0–5 cm, humus level, almost black; ordinary dust, granular structure, medium-firm pattern, distinct yet uneven transition.

5–20 cm, browning level, of dark brown colour; ordinary dust, prismatic structure, medium--firm pattern, distinct transition.

20–70 cm, matrix level, straw-coloured; ordinary dust, prismatic structure, weakly-firm pattern, distinct transition.

< 70 cm, underlying rock level, of light-brown colour; medium loam with a large amount of northern grit.

Profile 11

0–2 cm, forest litter level, medium-decomposed, of brown colour.

3–6 cm, humus level, dark grey; ordinary dust, lump-like structure, weakly-firm pattern, distinct yet uneven transition.

6–30 cm, eluvial level, light grey; silty dust, lamellar structure, l-medium-firm pattern, distinct transition.

30–60 cm, illuvial level, dark brown; silty dust, firm pattern, prismatic structure, indistinct transition.

60–160 cm, illuvial level, alternately stratified, thin layers several cm thick, of light and dark brown colour; silty dust, prismatic structure, weakly-firm pattern, indistinct transition.

< 160 cm, matrix level, decalcified, straw-coloured loess.

Profile 12

0–3 cm, weak-decomposed forest litter level, of brown colour.

3–4 cm, humus level, dark, discontinuous, not occurring in some places; ordinary dust, lump--like structure, weakly-firm pattern, distinct transition.

4–50 cm, eluvial level, light grey; silty dust, lamellar structure, medium-firm pattern, distinct--transition.

50–110 cm, illuvial level, dark brown, silty dust, prismatic structure, firm pattern, indistinct transition.

110–160 cm, illuvial level, alternately stratified, light and dark brown thin layers several cm thick; ordinary dust.

Profile 13

0–3 cm, the level of bryophyte raw humus and of not decomposed coniferous litter.

3–5 cm, humus level, grey; loose humus sand, rooted, indistinct, smudgy transition.

40–50 cm, illuvial level, rust-brown; loose, compressed sand, indistinct transition.

90–100 cm, matrix level; loose wet sand, light yellow.

RESULTS

The Phytosociological and Ecological Structure and the State of Knowledge of the Forest Phytocenoses Described

The forest phytocenoses investigated possess certain specific phytosociological and ecological properties. This is determined primarily by the original geomorphological, geological and hydrological terrain diversity. Moreover, these are private-owned forests and generally highly and diversely artificially deformed, especially in respect of the tree layer structure.

Altogether, in the studied area four principal ecological-phytosociological groups of forest communities developed: dry-ground forests, degraded dry-ground forests with *Rubus hirtus,* mixed coniferous forests and fresh coniferous forests. The spatially most widespread are forests of the alliance *Carpinion betuli* belonging to the association *Tilio-Carpinetum* formed in two subassociations and sixteen variants. One of the subassociations, *T.-C. stachyetosum sylvaticae*, occurs mainly on the bottoms, less often on the slopes of dry valleys and ravines. The other, *T.-C. typicum*, develops almost exclusively on the slopes of the above erosional forms lying on loess.

The phytosociological rank and position of the two subassociations of the dry-ground forest is difficult to determine definitively. Above all, these are forests that have been anthropogenically transformed to a different degree, especially in respect of the density and floristic composition of the tree layer. Chiefly for that reason, apart from the natural-growing trees here (*Carpinus betulus, Tilia cordata, Quercus robur)*, they also have a large percentage of self-seeding, light-seeded tree species (*Betula pendula, Populus tremula*), and of the artificially planted *Pinus sylvestris*. Moreover, in the tree stand of these forests worth noting is, on the one hand, a comparatively large percentage of *Ulmus glabra* and on the other — a sporadic participation, inter alia, of *Tilia cordata* and the total absence of, for example, *Tilia platyphyllos, Acer pseudoplatanus, Fagus sylvatica.* In the undergrowth layer of the dry-ground forest association, worth noting is above all a considerably lower percentage of plants regarded as characteristic species of phytocenoses of the alliance *Carpinion betuli* than of the alliance *Fagion sylvaticae*. This is especially conspicuous in the layer of herbaceous plant species. Another puzzling feature in these forests is the absence of several species characteristic of the forest associations of the alliance *Carpinion betuli*, for example *Carex pilosa, Stellaria holostea, Ranunculus cassubicus*. Moreover, in the investigated dry-ground forests, worth noting is the occurrence of stations of several plant species regarded as mountain elements. Among these plants *Aruncus sylvestris* has common occurrence while *Petasites albus* is found far

less frequently. The two species of mountain plants in the subassociation *T.-C. stachyetosum sylvaticae* form separate variants. Another mountain plant species, *Polystichum lobatum*, was recorded in the form of a single tuft in one expanse of *T.-C. typicum*, in a variant with *Dryopteris filix-mas* and *Athyrium filix-femina*.

The former subassociation, *T.-C. stachyetosum sylvaticae*, represents a community strongly related to the association *Aceri-Tilietum*. The latter, *T.-C. typicum*, in a way represents its floristically impoverished natural form. Generally, the two subassociations of the dry-ground forest can be also regarded as their regionally original 'ravine' varieties. Very similar 'ravine' varieties of the dry-ground forest subassociations, *T.-C. stachyetosum sylvaticae* and *T.-C. typicum*, have been recorded earlier in several stations on the Lublin Upland (23, 24, 25). Within the two investigated dry-ground forest subassociations of the 'ravine' variety, most often were described their variants with *Galium odoratum*, with *Oxalis acetosella* and with *Anemone nemorosa*, far less often variants with *Aruncus sylvestris, Viola mirabilis* and with *Asarum europaeum* (7, 23, 24, 25 and literature quoted). However, the other variants distinguished in the subassociation *T.-C. stachyetosum sylvaticae* (with *Petasites albus*, with *Impatiens parviflora* and with *Equisetum sylvaticum*) and in the subassociation *T.-C. typicum* (with *Dryopteris filix-mas*, with *Polypodium vulgare*, with *Equisetum hyemale*) have probably not been described yet in Poland.

The forest community defined as *Carpinus betulus — Rubus hirtus* represents in turn a highly degraded natural form of the subassociation *Tilio-Carpinetum typicum*. It develops on flat or slightly inclined ridges of flattop hills, less often on the upper sections of the slopes of dry valleys with a low gradient. In the primary habitat of the local typical dry-ground forest, due to intensive stand thinning and the simultaneous artificial preference of *Pinus sylvestris* in that area, there was, among other things, a massive expansion of the nitrophilous species *Rubus hirtus*. With the poorer habitats of the degraded dry-ground forest, apart from *Rubus hirtus*, some plant species also settled that are regarded as characteristic of the coniferous forests of the class *Vaccinio-Piceetea*. In that case, the community of the degraded dry-ground forest (*Carpinus betulus — Rubus hirtus*) formed in a variant with *Vaccinium myrtillus* represents an intermediate community between the forests of fertile habitats (alliance *Carpinion betuli*) and oligotrophic ones (class *Vaccinio-Piceetea*). Quite similar communities of the degraded dry-ground forest association with *Rubus hirtus* have been described earlier from other stations, e.g. in the Lublin macro-region (7).

The associations described — with *Querco roboris-Pinetum* and *Peucedano-Pinetum* of the alliance *Dicrano-Pinion*, belong to those most commonly described at home and abroad (e.g. 5, 8, 9, 14, 15, 27, 30, 31). In the area investigated these are semi-natural phytocenoses of coniferous forests, mainly on account

of the artificial preference of *Pinus sylvestris* and *Quercus robur*. These associations are exceptionally poor in index species of the characteristic and distinctive ones. Locally, the two phytocenoses are distinguished primarily for a comparatively quite percentage of the naturally self-seeding *Carpinus betulus*. Both the associations of the coniferous forests occur outside erosional forms lying on loess. This takes place mainly on the flat ridges and footholds of the flattop hill surfaces on the typically formed sandy podzolic soils. One of the two associations, *Peucedano-Pinetum*, develops only in the south-westernmost part of the area studied, on the substratum of old, Quaternary, washed-out sand-dunes, with the most typical, developed podzolic soils.

Floristic Peculiarities

In the forests of the investigated area the stands of ca. 270 plant species of pteridophytes and flower plants were recorded (26). Most of these plant stations were earlier described and published from this area, yet usually from indeterminate sites (4, 6). Worth noting are the stations of a dozen-odd rare species of the mountain and non-mountain plant group that are partly under legal protection. A great majority of these plant species grow exclusively or most often in the stations of the appended phytosociological records in Tables 1–7. These include, out of the non-mountain plant species, *Equisetum hyemale* L. (rec. 95, 96 and between them), *Digitalis grandiflora* Mill. (rec. 16) and *Brachypodium pinnatum* (L.) Beauv. (rec. 13, 33), and of the mountain ones: *Huperzia selago* (L.) Benh. Schrank et Mart. (rec. 82), *Polystichum aculeatum* (L.) Roth. (rec. 101) and *Petasites albus* (L.) Gaertn. (rec. 36, 37, 38, 77). Moreover, the mountain plant group also includes *Aruncus sylvestris* Kostel. In the studied area this is one of the most common plant species that occurs on the slopes of ravines and dry valleys within *Tilio-Carpinetum stachyetosum* and *T.-C. typicum*.

Several more interesting plant species were recorded mainly outside the stations of the appended phytosociological records in Tables 1–7. This applies above all to the following plant species:

1. *Equisetum variegatum* Scheich. Wandalin, SW part. On a ravine slope with E exposure, *T.-C. typicum*, an impoverished form of the variant with *Oxalis acetosella*. One tuft. FE53, below the bridge on the Wandalin-Widły road and phytosociological [phytosoc.] rec. 106.

2. *Cimifuga europaea* Schipcz. In two sites: Chruślina, N part. On a ravine slope with N exposure, *Tilio-Carpinetum*, high-growing herbaceous plant stage. A dozen-odd specimens. FE53, near the station of phytosoc. rec. 23; Chruślina, NW part. On the slope of a side ravine with NE exposure. Several specimens. FE53, on the station of phytosoc. rec. 16 and near phytosoc. rec. 67.

3. *Veratrum lobelianium* Bernh. Chruślina, NW part. On the bottom and slopes of a dry valley and side ravines, *Tilio-Carpinetum typicum*, a depleted form of variant with *Oxalis acetosella.* In two sites, a dozen-odd specimens each. FE54, near the stations of phytosoc. rec. 37 and 73.

4. *Cephalanthera longifolia* (L.) Fritsch. Chruślina, NW-most part. On the rim of the bottom of dry valley, *Tilio-Carpinetum typicum,* with weakly dense tree stand. Several specimens. FE53, 300 m E of phytosoc. rec. station no. 98.

Moreover, worth noting in the studied forests are numerous and scattered stations also of other more interesting plant species, such as *Daphne mezereum* L., *Neotia nidus-avis* (L.) Rich., *Platanthera bifolia* (L.) Rich., *Lycopodium annotinum* L., *Cystopteris fragilis* (L.) Bernh., *Gymnocarpium dryopteris* (L.) Newman, *Phegopteris connectilis* (Michx) Watt., *Dryopteris dilatata* (Hoffin.) A. Gray and *Isopyrum thalictroides* L. They were also recorded in the stations of the appended phytosociological records in Tables 1–7 and outside them.

Out of the above mentioned twenty plant species, special attention should be drawn to the small part of them that represents the mountain flora. These are: *Huperzia selago, Polystichum lobatum, Petasites albus* and *Veratrum lobelianum.* The stations of those and other mountain plant species are known from many other forests growing in the similarly formed dry valleys and ravines on the loess terrain of the Lublin Upland (4, 6, 7, 24, 25). These plants, almost in all the stations known so far — in the uplands, dry valleys and ravines, with specific micro--climatic and humidity conditions, represent interesting relict elements, which, however, are successively disappearing at the same time (23, 24, 25)

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