Phytocenotic features of Calluna vulgaris (L.) Hill. in Ukrainian Polesie

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Abstract. Middle-aged pine and birch-pine forests of the Dicrano-Pinenion suballiance are the most common biotopes of Calluna vulgaris (L.) Hill. in Ukrainian Polesie. This species occurs mostly as solitary plants in forest phytocenoses; rarely its projective coverage can reach 40-45%. C. vulgaris has the highest constancy in phytocenoses of the Peucedano-Pinetum association in Right-bank Polesie. The forests of the Piceo-Vaccinienion uliginosi Seibert in Oberd. (ed.) 1992 suballiance and the Piceion excelsae Pawłowski et al. 1928 alliance are rare habitats of C. vulgaris; they occur only in Right-bank Polesie of Ukraine. Heathlands are rare ecosystems for Ukrainian Polesie, their vegetation is represented by plant communities of the Calluno-Ulicetea Br.-Bl. et Tx. ex Klika et Hadač 1944 and the Nardetea strictae Rivas Goday et Borja Carbonell in Rivas Goday et Mayor Lopez 1966 classes. They are forming in the significantly anthropogenically disrupted territories (e.g. areas after wildfires) or in the areas with intensive human activities, firstly in the military training areas. The phytocenoses of the Calluno-Genistetum pilosae R. Tx. 1937 association occur only in Right-bank Polesie and are the largest heathlands of Ukrainian Polesie in general. For example, in the Rivne region, their area is up to 20 km². The area of heathlands, belonging to the Calluno-Nardetum strictae Hrync. 1959 association, does not exceed several hectares. The phytocenoses of the Scabioso canescentis-Genistetum Balcerk. et Brzeg 1993 association are represented with small plots in landscapes of pine forests and less frequently in mixed forests on upland terraces of Left-bank Polesie rivers. The characteristic feature of Calluna vulgaris spreading in Right-bank Polesie of Ukraine is its large participation (sometimes with the projective cover up to 80%) and high constancy (92,7%) in phytocenoses of oligotrophic bogs of the Ledo-Sphagnetum magellanici (Malc. 1929) Kästner et Flössner 1933 association. The populations of Calluna vulgaris, explored in the forest phytocenoses of the Cladonio-Pinetum Jurasek 1927 association on the territory of Ukrainian Polesie, are incomplete. Their age spectrum maximum falls on generative individuals. The “Right-bank” population of Calluna vulgaris are characterized by more active proliferation of plants and spreading on new territories. Aging processes dominate among the “left-bank” populations. Generally, environmental conditions of Ukrainian Right-bank Polesie are more favorable to Calluna vulgaris, than conditions of Left-bank Polesie.

Keywords: Calluna vulgaris (L.) Hill., Polesie, plant communities, syntaxonomy, population.
1. Introduction

Calluna vulgaris (L.) Hill., European Boreo-temperate element of flora, has a large geographic distribution and is dominating in many heath ecosystems. Such a type of vegetation prevails in many heathlands of northern and western Europe. In Ukrainian Polesie Calluna vulgaris is at the southern border of its distribution. That is what causes the affect on the species distribution in the region. The purpose of our study was to investigate the cenotic features of the Calluna vulgaris habitats and its population structure in Ukrainian Polesie.

Heathlands are highly dynamic habitats, with strong biotic and abiotic interactions affected by external drivers, despite their appearance as a homogeneous, stable ecosystem. All of the factors studied influence diversity patterns, community structure and general quality of the habitat (Fagúndez, 2013). As experience of European (in particular, Polish) scientists shows (Adamska et al., 2015), study of main heath formations and accompanying plant communities is very important for management, treatment and also conservation of the Calluna vulgaris ecological systems.

2. Study area

Ukrainian Polesie is the southern part of the Polessian lowland within Ukraine (Fig. 1). Poorly defined relief, considerable distribution of water-ice deposits of sand, and high marshiness are characteristic features of Polesie landscapes. Poor sandy soils and marshiness favored the conservation of natural vegetation, which occupies here about 2/3 of the area (Andrienko et al., 2006). During the maximum glaciations most of Ukrainian Polesie was covered by glacier. In modern relief glacial forms are most noticeable in the west of Polesie.

The Dnieper is the main waterway of Ukrainian Polesie. The Dnieper divides Ukrainian Polesie into Right-bank (Fig. 1: 1a) and Left-bank Polesie (Fig. 1: 1b). There are no significant differences between Right-bank Polesie and Left-Bank Polesie in the amount of weather elements. However, Left-bank Polesie has more continental climate in comparison with Right-bank Polesie. Karst processes are observed in some regions of Right-bank Polesie. So-called loess “islands” are available in Left-bank Polesie, where erosion processes take place (Lukash et al., 2018, 2019). Soils of Polesie are highly pattern structured. Rise of the ground level by only a few decimeters in Polesie usually causes major changes in soil-forming processes and vegetation. Sod-podzolic soils are most common. They occupy about 70% of the territory of Ukrainian Polesie. The sod-podzolic soils vary greatly in mechanical composition, humidity and trophicity. Sandy-loam and clayish sandy-loam soils dominate by mechanical composition. Both pine and deciduous forests are forming on those types of soils. Gray forest soils are common on loamy loessial sediments, mainly in Left-bank Polesie.

According to various literature sources, forest areas occupy 26-29% of the territory of Ukrainian Polesie (Andrienko et al., 2006). The considerable distribution of sand deposits in Ukrainian Polesie causes large areas of pine forests. Climatic conditions of Polesie are favorable for the
growth of deciduous forests, which are local climax zonal communities. However, there are differences in distribution of deciduous forests between Right-bank and Left-bank Polesie. For example, the areal of the Carpinion betuli-Issler 1931 alliance forests includes all Right-bank Polesie and only part of Left-bank Polesie (within the boundaries of the Chernihiv region) (Andrienko et al., 2006).

A high groundwater level and its slow motion favor spreading of wetland vegetation here. The climate conditions of Polesie contributed to the development of mires and in combination with mineral deficiency of the surface formations, have led to sphagnum mires formation (Fijalkowski et al., 2002). However, Left-bank Polesie is characterized by less quantity of bogs. In addition, Left-bank Polesie, compared to Right-bank Polesie, was more affected by the drainage reclamation in 1970s-1980s.

Obviously, the regularities of Calluna vulgaris distribution in these two regions of Ukrainian Polesie were affected by some differences in natural conditions (including vegetation cover) of Right-bank and Left-bank Polesie.

3. Material and methods

The materials for the article were collected during the field research of the Polesie vegetation in 1995-2019. The field study of the vegetation was carried out by geobotanical methods (Korchahin & Lavrenko, 2012). The vegetation descriptions were taken during the optimum of vegetation period in the areas of 400-625 m² (in forest phytocenoses) and 100-125 m² (in herb and dwarf shrub phytocenoses).

The projective coverage of plant communities’ layers and coverage of all the species was noted. Cover abundance scale is the following: + – up to 1%, 1 – 1 – 5%, 2 – 6 – 15%, 3 – 16 – 25%, 4 – 26 – 50%, 5 > 50%. The tables of floristic structure of the plant communities for Calluna vulgaris include the percentage share.

366 phytosociological authors relevés were done. 297 geobotanical relevés from Professor Tatiana Andrienko’s field books 1972-1985, which had been transferred to the documentation has been compiled separately for Right-bank Polesie (total number of relevés 391 including 247 relevés with Calluna vulgaris) and Left-bank Polesie (total number of relevés 302 including 195 relevés with Calluna vulgaris). Phytocenotic tables include the relevés with the projective coverage of Calluna vulgaris equal to or more than 1%.

Syntaxa were identified according to W. Matuszkiewicz (2019), Chojnacka et al. (2010a, 2010b), Bulokhov & Solomeshch (2003). Syntax names are ordered according to Mucina et al. (2016).

The field populations studies were carried out according to Rabotnov (1964). The Calluna vulgaris ontogenetic stages and evaluation indexes of the general ontogenetic status of populations (Index innovation \(I_{inn} \), Index senile \(I_{sen} \), Index generative \(I_{gen} \), Index aetias \(I_j \)) were determined according to Kovalenko (2015). The evaluation indexes of the general ontogenetic status of the populations are measured in per cent and defined as ratio of individuals quantity in different ontogenetic stages to the total quantity of plants: seedlings \(p \), juvenile \(j \), immature \(i \) and virginile \(v \) individuals \(− I_{inn} \); old generative individuals \(g_0 \) and senile plants \(s \) – \(I_{sen} \); young generative \(g_1 \) and mature generative individuals \(g_2 \) – \(I_{gen} \). Index aetias is the ratio of Index senilis to Index innovation: \(I_{j} = I_{sen}/I_{inn} \).

4. Results and discussion

In Ukrainian Polesie Calluna vulgaris grows mainly in the intrazonal boreal-temperate grasslands and heath plant communities, in swamps and also in pine, mixed and spruce forests. The general scheme of the Ukrainian Polesie plant communities with Calluna vulgaris is the following (note: * – only in Right-bank Polesie, ** – only in Left-bank Polesie):

- Class: Calluno-Ulicetea
- Order: Vaccinio-Piceetea
- Alliance: Vaccinio myrtilli-Genistetalia pilosae
- Association: Vaccinio myrtilli-Genistetum pilosae

In Left-bank Polesie:
- Class: Calluno-Arctostaphylion uvae-ursi
- Order: Vaccinio-Myrtelletea
- Alliance: Vaccinio-Arctostaphytion uvae-ursi
- Association: Vaccinio-Arctostaphylion uvae-ursi

In Right-bank Polesie:
- Class: Dicrano-Pinion sylvestris
- Order: Obertetalia
- Alliance: Ledo-Sphagnetum magellanici
- Association: Ledo-Sphagnetum magellanici

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- Class: Class: Calluno-Ulicetea
- Order: Order: Calluno-Ulicetea
- Alliance: Alliance: Calluno-Ulicetea
- Association: Association: Calluno-Ulicetea

In swamps and also in pine, mixed and spruce forests. The general scheme of the Ukrainian Polesie plant communities with Calluna vulgaris is the following (note: * – only in Right-bank Polesie, ** – only in Left-bank Polesie):

- Class: Class: Calluno-Ulicetea
- Order: Order: Calluno-Ulicetea
- Alliance: Alliance: Calluno-Ulicetea
- Association: Association: Calluno-Ulicetea
Suballiance: *Dicrano-Pinenion* Seibert in Oberd. (ed.) 1992
Association: *Cladonio-Pinetum* Jurasek 1927
Association: *Peucedano-Pinetum* W. Matuszkiewicz (1962) 1973
**Association: *Veronicio incanae-Pinetum* Bulokhov et S. lomeshch 2003
Association: *Molinio-Pinetum* W. Matuszkiewicz et J. Matuszkiewicz 1955
Suballiance: *Piceo-Vaccinienion uliginosi* Seibert in Oberd. (ed.) 1992
*Association: *Vaccinio uliginosi-Pinetum* Kleist 1929
Order: *Piceetalia excelsae* Pawłowski et al. 1928
Alliance: *Piceion excelsae* Pawłowski et al. 1928
*Association: *Sphagno girgensohnii-Piceetum* Polak 1962

The intrazonal boreo-temperate heath vegetation is represented by plant communities of the *Calluno-Ulicetea* (Table 1) and the *Calluno-Nardetum strictae* classes (Table 2).

Relevés 1-3 (Table 1) belong to the *Calluno-Genistetum pilosae* association (the *Calluno-Ulicetea pilosae* class). The cenoses of the *Calluno-Genistetum pilosae* association, which are present only in Right-bank Polesie, occupy the largest areas (up to 20 km²). "Calluno-Genistetum pilosae" encompasses dry heaths represented, as well as in Poland (Adamska et al., 2015), by the anthropogenic communities, developing on poor sandy soils, as a degeneration phase of pine and mixed forests.

The heathlands of the *Calluno-Genistetum pilosae* association are common on large territories of the artillery shooting range in Hoshchansk, Kostopil and Rivne districts of the Rivne region and on the northern outskirts of Volodymyr-Volynskyj (the Volyn region). A shrub layer is formed with *Sarothamnus scoparius* (L.) W.D.J. Koch (the projective cover of 40-60%). *Calluna vulgaris* dominates in a herb layer and has the projective cover of 50-80%. *Sarothamnus scoparius* is a diagnostic species of the *Calluno-Genistetum pilosae* association and the *Calluno-Genistion pilosae* alliance. Moss layer is formed with *Pleurozium schreberi* (Brd.) Mitt. Polessian communities with *Sarothamnus scoparius* differ in composition from the plant communities, described in Poland near the city of Toruń. The community dominated by common grom – *Sarothamnus scoparius* covers the areas adjacent to heathlands *Pohlio-Callunetum* Shimwell 1973 em. Brzeg 1981 and *Arctostaphylo-Callunetum* R.Tx. et Prsg 1940, as well as with grasslands of the gray clubawn grass *Spergulo vernalis-Corynephoretum* (R.Tx. 1928) Libb. 1933 (Chojnacka et al., 2010a).

The low-altitude heaths of the Atlantic and subcontinental regions of temperate Europe, belonging to the *Scabioso canescentis-Genistetum* association (Table 1, relevés 4-8), are represented only in Left-bank Polesie. They are rare and occupy small areas (up to 200 m²) among pine forests on the upland river terraces. The characteristic (*Genista tinctoria* L., *Scabiosa ochroleuca* L.) and differential (*Polygonatum odoratum* (Mill.) Druce, *Solidago virgaurea* L., *Vincetoxicum hirundinaria* Medik.) species of the association are present in all the described phytocenoses. *Calluna vulgaris* grows in curtains; its projective coverage does not exceed 10%. The plant communities have a moss layer (with the projective cover of 25-90%). *Pleurozium schreberi* dominates in the layer.

The heathlands of Ukrainian Polesie are represented by the plant communities of the *Calluno-Nardetum strictae* association (the *Nardetea strictae* class). They occupy the

| Region                      | Right-bank Polesie | Left-bank Polesie |
|-----------------------------|--------------------|-------------------|
|                | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Shrub layer (b) cover [%]   | 60 | 40 | 5 | 1 | 5 | <1 | 0 | 15 |
| Herb and dwarf shrub layer (c) cover [%] | 80 | 50 | 90 | 40 | 35 | 45 | 50 | 25 |
| Mosses layer (d) cover [%] | 10 | 0 | 30 | 25 | 70 | 80 | 90 | 85 |
| Lichens layer (e) cover [%] | 0 | 0 | 0 | 10 | 5 | 0 | 5 | 0 |

Table 1. Floristic structure of the Ukrainian Polesie heath plant communities of the *Calluno-Ulicetea* class: the *Calluno-Genistetum pilosae* (relevés 1-3) and the *Scabioso canescentis-Genistetum* (relevés 4-8) associations

Ch., D. Ass. *Calluno-Genistetum pilosae* and All. *Calluno-Genistion pilosae*

| Sarothamnus scoparius | 5 | 4 | + | . | . | . | . | . |
| Genista germanica | + | + | + | . | . | . | . | . |
| Region | Right-bank Polesie | Left-bank Polesie |
|--------|---------------------|---------------------|
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Ch., D. Ass. Scabioso canescentis-Genistetum | | | | | | | | |
| Genista tinctoria | . | . | + | + | 1 | + | + | |
| Polygonatum odoratum | . | . | + | 1 | + | + | + | |
| Scabiosa ochroleuca | . | . | + | + | + | + | + | |
| Solidago virgaurea | . | . | + | + | + | + | + | |
| Vincetoxicum hirundinaria | . | . | + | + | + | + | + | |
| Ch. All. Calluno-Arctostaphyliion | | | | | | | | |
| Arctostaphylos uva-ursi | . | . | . | . | 1 | 1 | + | + |
| Carex praecox | . | . | + | + | + | + | + | . |
| Peucedanum oreoselinum | . | . | + | + | 1 | 2 | + | |
| Scorzonera humilis | . | . | . | + | + | + | + | |
| Ch. Cl. Calluno-Ulicetalia and O. Vaccino myrtilli-Genistetalia pilosae | | | | | | | | |
| Calluna vulgaris | 80 | 50 | 30 | 10 | 5 | 8 | 10 | 5 |
| Carex ericetorum | + | + | + | + | 1 | 1 | + | . |
| Dicranum scoparium | . | . | . | + | 2 | 1 | + | |
| Hieracium umbellatum | + | + | + | + | + | + | + | + |
| Vaccinium myrtillus | 1 | + | 1 | . | . | . | . | . |
| Accompanying species | | | | | | | | |
| Cl. Vaccinio-Piceetea | | | | | | | | |
| Ajuga reptans | . | . | + | . | . | . | . | . |
| Cladina rangiferina | . | . | . | . | 1 | 1 | . | . |
| Cladonia uncialis | . | . | . | . | 1 | + | . | 1 |
| Dicranum rugosum | . | . | . | . | . | . | . | 4 |
| Luzula pilosa | . | . | 1 | . | . | . | . | . |
| Melampyrum pratense | . | . | . | + | . | . | . | . |
| Pinus sylvestris (b) | 1 | 1 | 1 | 1 | 1 | + | + | 3 |
| Pinus sylvestris (c) | . | . | . | . | + | 1 | 1 | 1 |
| Pleurozium shreberi | 2 | . | 4 | 3 | 5 | 5 | 5 | 4 |
| Polytrichum juniperinum | . | . | . | 1 | 2 | 2 | 2 | 3 |
| Pulsatilla patens | . | . | . | . | . | . | . | + |
| Tridentis europaea | . | . | . | . | + | + | + | + |
| Vaccinium uliginosum | . | . | . | . | + | + | 2 | |
| Vaccinium vitis-idaea | . | . | . | + | 1 | 1 | 1 | |
| Cl. Molinio-Arrhenatheretea | | | | | | | | |
| Achillea submillefolium | + | . | . | . | . | . | . | . |
| Agrostis stolonifera | . | . | . | . | . | . | . | + |
| Region                                      | Right-bank Polesie | Left-bank Polesie |
|---------------------------------------------|--------------------|-------------------|
| **Relevé number**                           | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| **Briza media**                             | +  | 1  | .  | .  | .  | .  | .  | .  |
| **Carex hirta**                             | .  | +  | .  | .  | .  | .  | .  | .  |
| **Festuca rubra**                           | .  | .  | 1  | 2  | .  | .  | .  | .  |
| **Holcus lanatus**                          | .  | 1  | .  | .  | .  | .  | .  | .  |
| **Ranunculus acris**                        | .  | +  | .  | .  | .  | .  | .  | .  |
| **Sieglingia decumbens**                    | .  | .  | 3  | .  | .  | .  | .  | .  |
| **Cl. Nardetea strictae**                   |     |    |    |    |    |    |    |    |
| **Genista germanica**                       | .  | .  | .  | .  | .  | .  | .  | +  |
| **Luzula campestris**                       | .  | .  | .  | .  | .  | +  | +  | +  |
| **Lycopodium clavatum**                     | .  | .  | +  | .  | +  | +  | +  | +  |
| **Nardus stricta**                          | .  | .  | +  | .  | .  | .  | .  | .  |
| **Pilosella officinarum**                   | +  | +  | +  | +  | +  | +  | +  | .  |
| **Potentilla erecta**                       | .  | +  | .  | .  | +  | .  | .  | +  |
| **Veronica officinalis**                    | +  | .  | .  | +  | +  | +  | +  | +  |
| **Cl. Koelerio-Corynephoretea canescens**   |     |    |    |    |    |    |    |    |
| **Chamaecytisus ruthenicus**                | .  | .  | +  | .  | .  | .  | .  | .  |
| **Festuca ovina**                           | .  | .  | .  | 2  | 3  | 3  | 3  | .  |
| **Jasione montana**                         | +  | +  | .  | .  | .  | .  | .  | .  |
| **Koeleria glauca**                         | .  | .  | .  | .  | 2  | 3  | 3  | .  |
| **Potentilla argentea**                     | +  | 1  | .  | .  | .  | .  | .  | .  |
| **Rumex acetosella**                        | .  | .  | .  | +  | .  | .  | .  | .  |
| **Solidago virgaurea**                      | .  | .  | +  | .  | .  | .  | .  | .  |
| **Cl. Crataego-Prunetea**                   |     |    |    |    |    |    |    |    |
| **Crataegus monogyna**                      | +  | +  | .  | .  | .  | .  | .  | .  |
| **Galeopsis bifida**                        | .  | .  | +  | .  | .  | .  | .  | .  |
| **Prunus spinosa**                          | .  | .  | +  | .  | .  | .  | .  | .  |
| **Rosa canina**                             | +  | +  | .  | .  | .  | .  | .  | .  |
| **Cl. Epilobietea angustifoli**             |     |    |    |    |    |    |    |    |
| **Calamagrostis epigeios**                  | +  | 1  | .  | +  | .  | .  | .  | .  |
| **Rubus idaeus**                            | .  | .  | .  | .  | +  | .  | .  | .  |
| **Sambucus racemosa**                       | .  | .  | .  | .  | +  | .  | .  | .  |
| **Cl. Festuco-Brometea**                    |     |    |    |    |    |    |    |    |
| **Centaurea scabiosa**                      | .  | +  | .  | .  | .  | .  | .  | .  |
| **Euphorbia cyparissias**                   | +  | 1  | .  | .  | .  | .  | .  | .  |
| **Cl. Trifolio-Geranietea sanguinei**       |     |    |    |    |    |    |    |    |
| **Anemone sylvestris**                      | +  | .  | .  | .  | .  | .  | .  | .  |
| **Galium verum**                            | +  | .  | .  | .  | .  | .  | .  | .  |
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| Region | Right-bank Polesie | Left-bank Polesie |
|--------|---------------------|-------------------|
|        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Cl. *Erico-Pinetea* | | | | | | | | |
| *Daphne cneorum* | + | . | . | . | . | . | . | . |
| Cl. *Papaveretea rhoeadis* | | | | | | | | |
| *Viola arvensis* | . | + | . | . | . | . | . | . |
| Other species | | | | | | | | |
| *Betula pendula* (b) | + | + | . | . | . | . | . | . |
| *Betula pendula* (c) | . | + | . | . | . | . | . | . |
| *Calamagrostis arundinacea* | . | . | . | . | . | . | 2 | . |
| *Cerasus mahaleb* | + | . | . | . | . | . | . | . |
| *Genista tinctoria* | . | . | + | . | . | . | . | . |
| *Holcus mollis* | + | + | . | . | . | . | . | . |
| *Hypericum perforatum* | + | + | . | 2 | . | . | . | . |
| *Populus tremula* (b) | . | + | 1 | . | . | . | . | . |
| *Populus tremula* (c) | . | + | + | . | . | . | . | . |
| *Pteridium aquilinum* | . | . | + | . | . | . | . | . |
| *Pyrus communis* (b) | + | 1 | . | . | . | . | . | . |
| *Quercus robur* (b) | . | . | 1 | . | . | . | . | . |
| *Veronica chamaedrys* | . | . | + | . | . | . | . | . |

Notes. Dates, localities and authors of relevés:
1 – 12.08.2013, the Rivne shooting range, the Hoshchansk, Kostopol and Rivne districts, Rivne region; V. Melnyk.
2 – 21.07.2014, the shooting range near the northern outskirts of the Volodymyr-Volynskyi city, Volyn region; V. Melnyk.
3 – 21.08.1972, the Dubivka forestry, (sq. 36), Volodymyrets district, Rivne region; T. Andrienko.
4 – 15.06.2003, the outkirts of the Lubenets village, Korop district, Chernihiv region; Yu. Karpenko.
5 – 10.06.2018, the Liubetskiy Masyv tract, Liubech forestry (sq. 20), Ripky district, Chernihiv region; O. Lukash, V. Popruha.
6 – 10.06.2018, the Liubetskiy Masyv tract, Liubech forestry (sq. 25), Ripky district, Chernihiv region; O. Lukash.
7 – 10.06.2018, the Liubetskiy Masyv tract, Liubech forestry (sq. 25), Ripky district, Chernihiv region; O. Lukash.
8 – 05.07.1980, the Chudivka forestry, (sq.30), Ripky district, Chernihiv region; T. Andrienko.

areas of 0.5-2 ha, and are distributed on sandy soils. Sometimes they represent a stage of a post-pyrogenic succession. The relevés in Table 2 give the idea of full composition and structure of the heathlands. *Calluna vulgaris* is a diagnostic species of the association. Its projective coverage varies from 15% to 90%. *Nardus stricta* is a characteristic species of the *Nardeeta strictae* class. Its role in phytocenoses is much smaller if compared with *Calluna vulgaris*. The qualitative and quantitative characteristics of these phytocenoses are different in Right-bank Polesie and Left-bank Polesie. *Viola canina* L. (the diagnostic species of the *Calluno-Nardetum strictae* association) in Right-bank Polesie, unlike in Left-bank Polesie, is not a constant component of phytocenoses. The characteristic species of the *Violion caninae* alliance are represented by *Juncus squarrosus* L. (in Right-bank Polesie) or *Pimpinella saxifraga* L. (in Left-bank Polesie). Right-bank heathlands are characterized by high constancy of *Sieglina decumbens* (L.) Bernh, but it does not dominate. For comparison, this species dominates in communities of the *Calluno-Nardetum strictae* association in Poland (W. Matuszkiewicz, 2019), but it is absent in the relevés of Left-bank Polesie. The left-bank heathlands are characterized by high constancy of a number of characteristic species of the *Molinio-Arrhenatheretea* Tx. 1937 class and its syntaxons. For example, *Gentiana pneumonanthe* L., a regionally rare species of the Chernihiv region, is present in all the relevés.
Table 2. Floristic structure of the Ukrainian Polesie heath plant communities of the *Nardetea strictae* class: the *Calluno-Nardetum strictae* association

| Region | Right-bank Polesie | Left-bank Polesie |
|--------|-------------------|-------------------|
|        | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Shrub layer (b) cover [%] | 60 | 30 | 0  | 1  | 0  | 80 | 50 | 5  | 15 | 60 | 70 | 50 | 70 | 40 | 50 | 70 | 40 | 15 | 0  | 0  | 2  |
| Herb and dwarf shrub layer (c) cover [%] | 70 | 75 | 55 | 40 | 60 | 70 | 70 | 75 | 80 | 40 | 15 | 45 | 40 | 55 | 45 | 80 | 80 | 80 | 95 | 90 | 90 |
| Mosses layer (d) cover [%] | 10 | 50 | 50 | 30 | 70 | 2  | 10 | 50 | 60 | 80 | 35 | 60 | 50 | 30 | <1 | 30 | 0  | 0  | 0  | 10 | 0  |

D. Ass Calluno-Nardetum strictae

*Calluna vulgaris*

Viola canina

Ch. All. Violion caninae

Hypochaeris uniflora

Juncus squarrosus

Pimpinella saxifraga

Ch. O. Nardetalia strictae

Hypericum maculatum

*Nardus stricta*

2 4 + 1 + + 1 + 4 + + + + + 4 2 + 3 5 4 4

Ch.Cl. Nardetum strictae

*Antennaria dioica*

Carex pilulifera

*Luzula campestris*

*Lycopodium clavatum*

Pilosella officinarum

Potentilla erecta

Veronica officinalis

Accompanying species

*Cl. Molinio-Arrhenatheretea*

*Achillea submillefolium*

*Agrostis stolonifera*
| Region                  | Relevé number | Right-bank Polesie | Left-bank Polesie |
|------------------------|---------------|--------------------|-------------------|
|                        | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 | 18 19 20 21 |
| **Alchemilla micans**  |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . |
| **Anthoxanthum odoratum**  |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . + + + 2 |
| **Carex echinata**    |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . |
| **Carex leporina**    |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . |
| **Carex panicea**     | 2 2 2 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Centauraea jacea**  |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + + + + |
| **Cnidium dubium**    |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . |
| **Coecyganthe flos-cuculi**  |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . |
| **Deschampsia caespitosa**  |               | 3 3 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1 + 2 + |
| **Festuca rubra**     |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + 1 + . 3 1 + . 1 + + + |
| **Galeopsis pubescens** |               | + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Galium uliginosum** |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Gentiana pneumonanthe** |               | + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + + 1 + |
| **Juncus effusus**    |               | . . + 1 1 + + . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Juncus tenuis**     |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . . . . . . . . . . |
| **Leontodon autumnalis** |               | + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Luzula pallidula**  |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . . . . . . . . . . |
| **Lysimachia vulgaris** |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . . . . . . . . . . |
| **Lytthrum salicaria** |               | . . + + . . + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Mentha arvensis**   |               | . . 1 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Molinia caerulea**  | 5 + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1 4 . . . . . . |
| **Phleum pratense**   |               | . . 3 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Poa nemorais**     |               | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . + . . . . . . . . . . |
| **Prunella vulgaris** |               | + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Ranunculus acris**  |               | . . + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| **Ranunculus repens** |               | . + . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |


| Region          | Right-bank Polesie | Left-bank Polesie |
|-----------------|--------------------|-------------------|
| Relevé number   | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 |
| Sieglingia decumbens | + + + + + + + + + + + + + + + . + . | . |
| Succisa pratensis | . + . . . . . . . . . . . . . . . . . . . . + | . |
| Trifolium repentis | . . . . . . + + . . . . . . . . . | . |
| Viola uliginosa | . + . . . . . . . . . . . . . . . | . |
| **Cl. Vaccinio-Piceeta** |                      |                   |
| Arctostaphylos uva-ursi | . . . . . . . . . . . . . 1 . . . . . . . . . . | . |
| Chamaecytisus ruthenicus | . . . . . . + . + + + . . . . . . . . . . . | . |
| Dianthus pseudosquarrosus | . . . . + . . . . . . . . . . . . . . . | . |
| Dicranum rugosum | . . . . . 2 . . 4 3 3 . . . . . . | . |
| Dryopteris carthusiana | + . . . . . . . . . . . . . . . . . . . . | . |
| Frangula alnus (b) | 4 . . . . . . . . . + . + . . . . . . . . | . |
| Luzula pilosa | . . + . . . + + . 1 . . . . . . . + | . |
| Melampyrum pratense | . . . . . . . . . . + . . . . . . . . . | . |
| Pinus sylvestris (b) | . . . . . 5 3 1 1 5 5 4 5 1 . 4 . . . | . |
| Pinus sylvestris (c) | . . . . . + . . . 1 5 + . . . + . . . | . |
| Pleurozium shruberti | 2 . . . . . . . . . . . . 4 4 5 2 5 4 4 | . |
| Polytrichum commute | . . . . . . 5 . 2 . 2 . . . . . . . . | . |
| Polytrichum gracile | . . . . . 2 . . . . . . . . . . . . . . | . |
| Polytrichum juniperinum | . . . . . . . . . . . . . . . . . . + . . . 2 | . |
| Rhododendron luteum | . . . . . . . . . . . . . . . . . . . + | . |
| Trientalis europaea | . . . . . . . . . . . . . . . . . . . . + | . |
| Vaccinium uliginosum | . . . . . . . . . . . . . . . . . . . + | . |
| Vaccinium vitis-idaea | + . . . . . . . . . . . . . . . . . . . . + | . |
| **Cl. Scheuchzerio palustris-Caricetea fuscae** |                      |                   |
| Agrostis canina | . . . . . . 2 . 1 . . . . . . . . . . . . . 2 | . |
| Region | Right-bank Polesie | Left-bank Polesie |
|--------|--------------------|-------------------|
|        | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 | 18 19 20 21 |
| Carex echinata | . . + . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Carex nigra | . . . . . . . . . . . . . . . . . . | . + . . . . . . . . . . . . . . . . |
| Juncus articulatus | . + . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Lycopodiella inundata | . . 1 . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Sphagnum cuspidatum | . . 4 . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Viola palustris | . + . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Cl. Koelerio-Corynephoretea canescens | | |
| Corynephorus canescens | . . . . . . . . . . . . . . . . + . . . . | . . . . . . . . . . . . . . . . . . |
| Cytisus zingeri | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Jasione montana | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Koeleria glauca | . . . . . . . . . . . . . 2 . . . . . | . . . . . . . . . . . . . . . . . . |
| Polytrichum piliferum | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Rumex acetosella | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Cl. Epilobietea angustifolii | | |
| Calamagrostis epigeos | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Chamaecistus angustifolium | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Gnaphalium sylvaticum | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Oberna bechen | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Rubus idaeus | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Cl. Oxycocco-Sphagnetea | | |
| Andromeda polifolia | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Drosera rotundifolia | + . + . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Polytrichum strictum | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Sphagnum compactum | 4 . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Sphagnum fallax | . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . |
| Cl. Alnetea glutinosae | | |
| Region | Right-bank Polesie | Left-bank Polesie |
|--------|-------------------|------------------|
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Betula pubescens (b) | 1 | . | 1 | . | . | . | 3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Lycopus europaeus | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Salix aurita | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Salix cinerea | 3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Isoëto-Nanojuncetea | | | | | | | | | | | | | | | | | | | | |
| Gnaphalium luteoalbum | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Gypsophila muralis | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Hypericum humifusum | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Sagina nodosa | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Carpino-Fagetea sylvaticae | | | | | | | | | | | | | | | | | | | | |
| Hypericum montanum | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . |
| Oxalis acetosella | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . |
| Ranunculus auricomus | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Phragmito-Magnocaricetea | | | | | | | | | | | | | | | | | | | | |
| Carex vesicaria | . | . | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Carex vulpina | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Thyselium palustre | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Festuco-Brometea | | | | | | | | | | | | | | | | | | | | |
| Carex praecox | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Other species | | | | | | | | | | | | | | | | | | | | |
| Agrostis capillaris | + | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Betula pendula (b) | . | . | . | . | 1 | 4 | 4 | 2 | . | . | 4 | 4 | 5 | 5 | 2 | . | . | . | . | . |
| Betula pendula (c) | . | . | . | . | 1 | + | . | . | . | . | . | . | . | . | + | + | . | . | . | . |
| Genista tinctoria | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . |
| Holcus mollis | . | . | . | . | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Hypericum perforatum | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Region                          | Right-bank Polesie | Left-bank Polesie |
|--------------------------------|--------------------|-------------------|
| Phalacrocloma annuum           |                    |                   |
| Populus tremula (b)            | 1                  |                   |
| Populus tremula (c)            |                    |                   |
| Pteridium aquilinum            |                    |                   |
| Quercus robur (b)              |                    |                   |
| Sorbus aucuparia (b)           | +                  |                   |
| Veronica chamaedrys            |                    |                   |

Notes. Dates, localities and authors of relevés:

1 – 11.08.1985, the floodplain of the Prypiat river, near the Nobel lake, the Zarichansk district, Rivne region; T. Andrienko.
2 – 11.08.1985, the floodplain of the Prypiat river, the Zarichansk district, Rivne region; T. Andrienko.
3 – 03.08.1980, the Polesie Nature Reserve, the floodplain of the Kamenka river, the Kopysche forestry, Zhytomyr region; T. Andrienko.
4 – 23.06.1981, the Polesie Nature Reserve, the Perha forestry, Zhytomyr region; T. Andrienko.
5 – 13.08.1980, the sands, the Berezne district, Rivne region; T. Andrienko.
6 – 14.06.1982, the Polesie Nature Reserve, (sq. 50), the Zhytomyr region; T. Andrienko.
7 – 11.06.1982, the post-pyrogenic succesion stage, the Polesie Nature Reserve, (sq.42), the Zhytomyr region; T. Andrienko.
8 – 03.08.1980, the Polesie Nature Reserve, the floodplain of the Kamenka river, the Kopysche forestry, Zhytomyr region; T. Andrienko.
9 – 12.08.1980, the wasteland, near the Verbivka village, Berezne district, Rivne region; T. Andrienko.
10 – 27.08.1972, the Kurchytsia forestry (sq. 57), Novohrad-Volynskyi district, Zhytomyr region; T. Andrienko.
11 – 25.08.1972, the forest area at the Malynsk village, Berezne district, Rivne region; T. Andrienko.
12 – 23.08.1972, the Sarny forestry (sq. 147), Sarny district, Rivne region; T. Andrienko.
13 – 23.08.1972, the Sarny forestry (sq. 147), Sarny district, Rivne region; T. Andrienko.
14 – 25.07.1981, the Polesie Nature Reserve, the Selezhivka forestry (sq. 31), Ovruch district, Zhytomyr region; T. Andrienko.
15 – 23.07.1981, the Polesie Nature Reserve, the Selezhivka forestry (sq. 19), Ovruch district, Zhytomyr region; T. Andrienko.
16 – 07.06.1978, the dunes, the Vysotsk forestry, 6 km from the Verbivka village, Dubrovytsia district, Rivne region; T. Andrienko.
17 – 11.06.1982, the post-pyrogenic succesion stage, the Polesie Nature Reserve (sq.41), Zhytomyr region; T. Andrienko.
18 – 15.07.2013, the heathland (2 ha), Mokrets tract near the Uhlova Rudnia village, Ripky district, Chernihiv region; O. Lukash, V. Popruha.
19 – 19.07.1995, the meadow between the Berestovets and Sidorivka villages, Borzna district, Chernihiv region; O. Lukash.
20 – 18.08.2006, between the peaty meadow and pine forest, to the east of the Buda Vorobyivska village, Novhorod-Siverskyi district, Chernihiv region, N 52°22'43.2"; E 032°31'51.0"; O. Lukash.
21 – 27.07.1996, the meadow between the swamp and the pine forest, outskirts of the Smolianka village, Kulykivka district, Chernihiv region; O. Lukash.
In Right-bank Polesie *Calluna vulgaris* is a component of phytocoenoses of dwarf-shrub, sedge and peatmoss vegetation of the Holarctic ombrotrophic bogs and wet heaths on extremely acidic soils. These phytocoenoses belong to the *Oxycocco-Sphagnetae* class (Table 3). There are no such biotopes in Left-bank Polesie, as they were destroyed in 1970s-1980s as a result of drainage reclamation. Most of plant communities of the *Oxycocco-Sphagnetae* class, represented by the *Sphagnetalia medii* order and the *Sphagnion medii* alliance, can be seen in the Polesie Nature Reserve (the Zhytomyr region). *Calluna vulgaris* participation in mire phytocoenoses varies depending on a stage of mire development. The highest projective coverage of *Calluna vulgaris* (up to 60-80%) is observed in succession stages after wildfires. All the forest oligotrophic bogs with *Calluna vulgaris* (Table 3), described by prof. T. Andrienko, were identified, according to W. Matuszkiewicz (2019), as belonging to the *Ledo-Sphagnetum magellanici* association, because *Ledum palustre* L. (the diagnostic species of this association) was present in all relevés.

### Table 3. Floristic structure of the forest bogs plant communities (*Ledo-Sphagnetum magellanici* association) with *Calluna vulgaris*

| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| **Tree layer (a) cover [%]** | 0 | 5 | 0 | 0 | 0 | 50 | 0 | 0 | 40 | 40 | 0 | 0 | 70 | 0 | 40 | 0 | 0 |
| **Shrub layer (b) cover [%]** | 50 | 50 | 50 | 60 | 30 | 10 | 40 | 40 | 20 | 75 | 70 | 40 | 20 | 40 | <1 | 20 | 50 |
| **Herb and dwarf shrub layer (c) cover [%]** | 60 | 75 | 80 | 80 | 65 | 60 | 80 | 60 | 60 | 75 | 70 | 70 | 80 | 60 | 65 | 80 | 90 |
| **Mosses layer (d) cover [%]** | 70 | 20 | 20 | 40 | 80 | 60 | 95 | 98 | 90 | 80 | 40 | 70 | 40 | 95 | 98 | 30 | 0 |

**D. Ass. Ledo-Sphagnetum magellanici**

*Ledum palustre* 1 + + + + 4 1 + 3 1 + + 4 1 1 1 1

*Oxycoccus microcarpus*

---

**D. Ass. Gr. of the forest bogs (Ch. Cl. Vaccinio-Piceetea)**

*Pinus sylvestris* (a) . 1 . . . 4 . . 4 1 . . 5 . 4 . .

*Pinus sylvestris* (b) 3 2 1 1 3 1 4 4 3 4 5 4 + 4 + + +

*Pinus sylvestris* (c) . + . . . + . . . + 1 . . .

*Pleurozium schreberi* + . . . . + + . . . 3 . 4 . . 1

*Trientalis europaea* . . . + . . . + . . . + . . . +

*Vaccinium myrtillus* . + . . . + + . . . . . . . +

*Vaccinium uliginosum* + 1 + . . + + . . + + . + . . 2

*Vaccinium vitis-idaea* 1 + . . . . + . 1 . . + .

**Ch. All. Sphagnion medii and O. Sphagnetalia medii**

*Andromeda polifolia* . . + + 1 + + + 1 + + + 1 2 + .

*Eriophorum vaginatum* . . . + 4 1 4 4 3 1 1 + 1 4 4 4 +

*Oxycoccus palustris* . . 1 . 1 + 3 + 2 3 . . + 1 1 1 .

*Sphagnum acutifolium* 4 . . . 3 3 . . . 3 . . . .

*Sphagnum centrale* . . . . . . . . . + . 5 + .

*Sphagnum compactum* . . . . . . . . . . . . . . . . 3
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| Sphagnum cuspidatum | . | . | 1 | 4 | 2 | . | . | 5 | . | 5 | . | . | 4 | . | . | . | . |
| Sphagnum fallax | . | . | . | 4 | . | 5 | . | . | . | . | . | . | . | . | . | . | . |
| Sphagnum fuscum | . | 3 | . | . | . | . | . | . | . | . | . | . | + | 1 | . | . | . |
| Sphagnum magellanicum | + | + | + | 3 | . | 3 | 2 | . | + | . | + | . | 4 | + | . | . | . |
| Sphagnum rubellum | . | . | . | . | . | . | . | 5 | . | + | 5 | 1 | + | . | . | . | . |
| Ch. Cl. Oxycocco-Sphagnetea | | | | | | | | | | | | | | | | | |
| Aulacomnium palustre | . | . | + | . | 3 | + | + | . | . | . | 2 | . | . | . | + | . | . |
| Drosera rotundifolia | + | + | + | + | . | + | + | + | . | + | + | + | + | . | . | . | . |
| Salix aurita | . | + | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Accompanying species | | | | | | | | | | | | | | | | | |
| Cl. Alnetea glutinosae | | | | | | | | | | | | | | | | | |
| Alnus glutinosa (b) | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Betula pubescens (a) | . | . | . | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Betula pubescens (b) | . | 4 | 5 | 2 | . | . | 2 | 1 | 2 | . | . | 3 | 4 | . | . | . | . |
| Betula pubescens (c) | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | . |
| Salix cinerea | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Vaccinio-Piceetea | | | | | | | | | | | | | | | | | |
| Dicranum rugosum | . | . | . | . | . | . | . | . | . | . | . | . | . | 1 | . | . | . |
| Melampyrum pratense | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Polytrichum commune | + | . | 1 | . | . | . | . | . | . | . | . | . | . | 4 | . | . | . |
| Polytrichum gracile | . | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Scheuchzerio palustris- Caricetea fuscae | | | | | | | | | | | | | | | | | |
| Carex lasiocarpa | . | . | 2 | 1 | . | . | . | + | . | . | + | . | . | + | . | . | . |
| Carex nigra | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Rhynchospora alba | . | + | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Molino-Arrhenatheretea | | | | | | | | | | | | | | | | | |
| Molinia caerulea | 2 | 2 | . | . | . | . | + | . | . | + | 2 | 4 | 3 | . | . | . | . |
| Juncus effusus | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Nardetea strictae | | | | | | | | | | | | | | | | | |
| Nardus stricta | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Potentilla erecta | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Cl. Calluno-Ulicetea | | | | | | | | | | | | | | | | | |
| Arctostaphylos uva-ursi | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . |
| Calluna vulgaris | 40 | 60 | 65 | 60 | 1 | 5 | 2 | 1 | 10 | 50 | 60 | 25 | 1 | 5 | 10 | 30 | 80 |
The European temperate and subboreal pine forests on nutrient-poor acidic sandy soils (the Vaccinio-Piceetea class) are typical and most common habitats of Calluna vulgaris in Ukrainian Polesie. The species occurs in phytocenoses mainly individually. The maximum projective coverage of Calluna vulgaris was observed in pine, birch-pine and oak-pine forests of 30-40 years of age. Tables 4 and 5 provide information on structure and floristic composition of forest phytocenoses with Calluna vulgaris, which projective coverage is over 1%. As it can be seen, all these plant communities were well diagnosed by characteristic and differentiating species. The relationships between the values of tree layer and projective coverage of Calluna vulgaris were not found.

The maximum projective coverage of Calluna vulgaris in plant communities of the Pinetalia sylvestris order associations (the Dicrano-Pinion sylvestris alliance) in Right-bank Polesie respectively is: Querco-Piceetum – 45%, Cladonio-Pinetum – 40%, Molinio-Pinetum – 35%, Peucedano-Pinetum – 30%, Vaccinio uliginosi-Pinetum – 10% (Table 4, relevés 1-26). Calluna vulgaris coverage of 40% was observed only in the phytocenoses of the Cladonio-Pinetum association (Table 5, relevés 1-5) in Left-bank Polesie. The projective coverage of Calluna vulgaris in other plant communities of pine and mixed forests of Left-bank Polesie does not exceed 5% (Table 5, relevés 6-23).
Table 4. Floristic structure of the forest plant communities of the Cladonio-Vaccinietalia (relevés 1-26) and Vaccinio-Piceetalia (relevés 27-29) orders with *Calluna vulgaris* in Right-bank Polesie

| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree layer (a) cover [%] | 20 | 50 | 50 | 50 | 70 | 50 | 50 | 60 | 60 | 60 | 60 | 60 | 60 | 70 | 50 | 70 | 60 | 70 | 60 | 70 | 60 | 70 | 60 | 60 | 60 | 65 | 75 |
| Shrub layer (b) cover [%] | 5 | 25 | 15 | <1 | 25 | 5 | <1 | 1 | 20 | 25 | 10 | 30 | 40 | 1 | 0 | 10 | 1 | 30 | 20 | 30 | 20 | 10 | 5 | 20 | 10 | 20 | 10 | 15 |
| Herb layer (c) cover [%] | 40 | 20 | 15 | 40 | 10 | 45 | 40 | 75 | 20 | 50 | 50 | 50 | 50 | 50 | 50 | 55 | 50 | 50 | 65 | 70 | 65 | 70 | 50 | 80 | 40 | 25 | 60 | 50 | 40 | 50 |
| Mosses and lichens layer (d-e) cover [%] | 0 | 85 | 70 | 70 | 80 | 55 | 65 | 0 | 0 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mosses layer (d) cover [%] | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lichens layer (e) cover [%] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Syntaxon**

| D. Ass. Cladonio-Pinetum | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------|---|---|---|---|---|---|
| Carex ericetorum | . | . | + | + | + | + |
| Cladonia mitis | 2 | + | 4 | + | 5 | 1 |
| Koeleria glauca | + | + | . | + | . | . |

| D. Ass. Peucedano-Pinetum | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------------------|---|---|---|---|---|---|
| Convallaria majalis | . | . | . | . | . | + |
| Peucedanum oreoselinum | . | . | . | . | + | + |
| Polygonatum odoratum | . | . | . | . | + | + |
| Solidago virgaurea | . | + | + | . | + | + |

| D. Ass. Molinio-Pinetum | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|-------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Molinia caerulea | . | . | + | . | . | 1 | . | + | . | + | 4 | 4 | 1 | 1 | 3 | 5 | . | + | 3 | 1 | 4 | . | . | . | . | . | . | . | . | . |
| Polytrichum commune | . | . | . | . | . | . | . | 2 | + | + | + | + | . | + | . | . | . | 4 | 4 | 4 | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Frangula alnus | . | . | . | + | . | + | . | . | . | 2 | + | + | + | 3 | 3 | 4 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |

| D. Ass. Querco-Pinetum, species of mixed forests | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carpinus betulus (b) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Carpinus betulus (c) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Corylus avellana | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Euonymus verrucosa | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Melica nutans |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Mycelis muralis |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Stellaria holostea |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Quercus robur (a) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 4  |
| Quercus robur (b) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Quercus robur (c) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D. SAll. Dicrano-Pinenion |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Dicranum rugosum | 1 | 3 | 4 | 4 | 1 | 3 | 1 | + | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 4 | 3 | 3 | 4 | 2 | 2 | 5 |   |   |   |   |   |
| Leucobryum glaucum |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Luzula pilosa | + |   |   | + |   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |   |   |   |   |   |   |
| Juniperus communis (b) | + |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Melampyrum pratense | + |   |   | + | 1 |   | + | + | + | + | + | 1 | + | + | + | + | + |   |   |   |   |   |   |   |   |   |   |   |
| Rhododendron luteum |   |   |   | + |   |   | + | + | + | + | + | + |   | + | + | + | + |   |   |   |   |   |   |   |   |   |   |   |
| Sorbus aucuparia (b) |   |   |   |   |   | + |   | + | + | + | + | + | + | + | + | + | + | + | + | + |   |   |   |   |   |   |   |   |
| Ch. Ass. Vaccinio uliginosi-Pinetum |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Ledum palustre |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D. Ass. Vaccinio uliginosi-Pinetum |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Andromeda polifolia |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Aulacomnium palustre |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Eriophorum vaginatum |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Oxycoccus palustris |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D. SAll. Piceo-Vaccinienion uliginosi |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Salix aurita |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Vaccinium uliginosum |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Ch. All. Dicrano-Pinion |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Chimaphila umbellata | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Monotropa hipopitys | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Ch., D. O. Cladonio-Vaccinietalia | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Arctostaphylos uva-ursi | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 3 | . | + | . | . | . | . | . | . | . | . | . | . | . | . |
| Pinus sylvestris (a) | 3 | . | 4 | 1 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 3 | 5 | 1 | 5 | 4 | . | 1 | + | 5 | 5 | 5 | 5 | 4 | 3 | 1 | 1 | 1 |
| Pinus sylvestris (b) | 1 | . | 3 | 2 | . | 1 | + | + | 3 | 3 | . | 1 | 3 | + | . | . | 1 | . | 1 | . | 1 | 3 | + | . | . | . | . | . | . | . | . |
| Pinus sylvestris (c) | . | . | . | . | . | . | + | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . | . |
| Cladina rangiferina | . | 3 | . | 1 | + | . | . | . | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Ch., D. Ass. Sphagno girgensohnii-Piceetum | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 5 | . | . | . | . | . | . | . | . | . | + | 1 | + | . | . | . | . |
| Betula pubescens | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Betula pubescens (b) | . | . | . | . | . | . | . | . | . | . | 3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1 | 1 | 1 | . | . | . |
| Betula pubescens (c) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | + | . | . | . |
| Sphagnum girgensohnii | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . |
| Ch. All. Piceion abietis and O. Vaccinio-Piceetalia | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Athyrium filix-femina | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . |
| Lycopodium annotinum | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | + | . | . | . |
| Mnium affine | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . |
| Mnium spinosum | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . |
| Orthilia secunda | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . | . | . |
| Picea abies (a) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 4 | 5 | 5 | . | . |
| Picea abies (b) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 3 | 2 | 3 | . | . | . |
| Ch. Cl. Vaccinio-Piceetalia | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1 | . | . | . | . |
| Hylocomium splendens | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Pleurozium schreberi | 1 | 4 | 1 | 3 | . | 4 | 1 | 5 | 4 | + | 3 | 4 | . | 4 | 4 | 5 | 4 | 2 | 1 | . | 4 | 5 | 5 | 4 | 4 | 1 | 2 | + |
| Trientalis europaea | . | . | . | . | . | + | + | . | . | . | + | . | . | . | . | . | . | + | + | + | . | . | . | + | + | + | + | + | + | + | . | . | . |

| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Vaccinium myrtillus* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Vaccinium vitis-idaea* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Accompanying species* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cl. Koderio-Corynephoretea canescents** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Chamaecytisus ruthenicus* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Corynephorus canescens* | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Cytisus zingeri* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Festuca ovina* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Jasione montana* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Lembotropis nigricans* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Polytrichum piliferum* | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Rumex acetosella* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Thymus serpyllum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| **Cl. Molinio-Arrhenatheretea** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Anthoxanthum odoratum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Festuca rubra* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Gentiana pneumonanthe* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Lysimachia vulgaris* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Plantago lanceolata* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Poa angustifolia* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Sieglingia decumbens* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| **Cl. Nardetea strictae** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Juncus squarrosus* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Luzula multiflora* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Lycopodium clavatum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Plantago lanceolata* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Poa annua* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Sieglingia decumbens* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |


| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| **Nardus stricta** |   |   |   |   |   |   |   |   |   | 4  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Pilosella officinarum** |   |   |   |   |   |   |   |   |   |   | + | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Potentilla erecta** |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   | + | + |   |   |   |   |   |   |   |
| **Veronica officinalis** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Calluno-Ulicetea** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Calluna vulgaris** | 40 | 10 | 7 | 30 | 5 | 40 | 40 | 5 | 30 | 5 | 5 | 2 | 1 | 25 | 10 | 5 | 35 | 15 | 5 | 2 | 45 | 7 | 1 | 5 | 10 | 1 | 1 | 1 | 1 |
| **Carex ericetorum** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Sarothamnus scoparius** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Hieracium umbellatum** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Scorzonera humilis** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Quercetea robori-petraea** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Genista tinctoria** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Holcus lanatus** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Maianthemum bifolium** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Alnetea glutinosae** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Alnus glutinosa (a)** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Carex cinerea** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Salix cinerea** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Epilobietea angustifolii** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Calamagrostis epigeios** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Fragaria vesca** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Carpino-Fagetea sylvaticae** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Dryopteris filis-mas** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Oxalis acetosella** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Cl. Scheuchzerio palustris-Caricetea fuscae** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **Agrostis canina** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Carex nigra* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Papaveretalia rhoeadis |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Vaccaria segetalis* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Viola arvensis* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Artemisietalia vulgaris |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Linaria genistifolia* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Juncetalia maritimi |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Juncus gerardii* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Littorelletalia uniflorae |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Juncus bulbosus* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Trifolio-Geranietaea sanguinei |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Melampyrum nemorosum* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Phragmito-Magnocharietea |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Carex juncella* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Other species |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Agrostis capillaris* |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Betula pendula* (a) |   | 1 | 4 | 1 | 2 | 3 | 2 | 3 | 2 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Betula pendula* (b) |   | 2 | 3 | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 1 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Betula pendula* (c) |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Brachythecium salebrosum* |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Hypericum perforatum* |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Malus sylvestris* (b) |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Polypodium alpestre* |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Populus tremula* (a) |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Populus tremula* (b) |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| *Populus tremula* (c) |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Relevé number | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Pteridium aquilinum | .  | .  | .  | .  | .  | +  | +  | 3  | .  | 3  | .  | 1  | .  | .  | .  | .  | .  | .  | 1  | .  | 3  | .  | .  | .  | .  | .  | .  | +  | .  |
| Pyrus communis (b)    | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| Rubus caesius        | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |

Notes.

Dates, localities and authors of relevés:
1 – 28.07.2015, the Rivne Nature Reserve, Ozersk forestry, (sq. 26), Rivne region; O. Rak
2 – 22.05.1973, the Syra Pohonia reserve, Bilsk forestry, (sq. 14), Dubrovitsia district, Rivne region; T. Andrienko.
3 – 27.07.1981, the Polesie Nature Reserve, Selizivka forestry, (sq. 29), Ovruch district, Zhytomyr region; T. Andrienko.
4 – 25.07.1981, the Polesie Nature Reserve, Selizivka forestry, (sq. 29), Ovruch district, Zhytomyr region; T. Andrienko.
5 – 23.07.1981, the Polesie Nature Reserve, Selizivka forestry, (sq. 26), Ovruch district, Zhytomyr region; T. Andrienko.
6 – 06.08.1980, the Polesie Nature Reserve, Kopyshche forestry, (sq. 6), Zhytomyr region; T. Andrienko.
7 – 06.08.1980, the Polesie Nature Reserve, Kopyshche forestry, (sq. 8), Zhytomyr region; T. Andrienko.
8 – 20.10.2012, the Horka tract, near the Svitiaz village, Slatysk district, Volyn region; O. Lukash.
9 – 10.07.1982, the Chervona Volta forestry, (sq. 5), Novohrad-Volynskyi district, Zhytomyr region; T. Andrienko.
10 – 30.07.1980, the Polesie Nature Reserve, Kopyshche forestry, (sq. 35), Zhytomyr region; T. Andrienko.
11 – 09.08.1972, the Ostroh forestry, Ostroh district, Rivne region; T. Andrienko.
12 – 08.06.1981, the Ostrovskiy tract, between the Great and Middle lakes, near the Ostrovsky village, Zarichchia district, Rivne region; T. Andrienko.
13 – 25.08.1972, the Sosnivka forestry, (sq. 27), Berezne district, Rivne region; T. Andrienko.
14 – 26.08.1972, the Horodnytsia forestry, near the Veresovsk village, Zhytomyr region; T. Andrienko.
15 – 24.06.1980, the Polesie Nature Reserve, Kopyshche forestry, (sq. 39), Zhytomyr region; T. Andrienko.
16 – 19.06.1981, the Polesie Nature Reserve, Kopyshche forestry, (sq. 38), Zhytomyr region; T. Andrienko.
17 – 27.08.1972, the Mala Tsvilia forestry, (sq. 91), Novohrad-Volynskyi district, Zhytomyr region; T. Andrienko.
18 – 19.07.1982, the Lystvyyn forestry, (sq. 27), Ovruch district, Zhytomyr region; T. Andrienko.
19 – 23.07.1981, the Polesie Nature Reserve, Selizivnske forestry, (sq. 27), Ovruch district, Zhytomyr region; T. Andrienko.
20 – 27.07.1978, the floodplain of the Pripiat river near the Nobel lake, Zarichchia district, Rivne region; T. Andrienko.
21 – 14.08.1980, the Samy forestry, (sq. 75), Sarny district, Rivne region; T. Andrienko.
22 – 27.08.1972, the Mal Tsvilia forestry, (sq. 91), Novohrad-Volynskyi district, Zhytomyr region; T. Andrienko.
23 – 14.06.1978, the Horodnytsia forestry, Novolovynsk enterprise, (sq. 36), Ivanychi district, Volyn region; T. Andrienko.
24 – 14.06.1982, the Polesie Nature Reserve, (sq. 50), Zhytomyr region; T. Andrienko.
25 – 25.07.1981, the Polesie Nature Reserve, Selizivnske forestry, (sq. 30), Ovruch district, Zhytomyr region; T. Andrienko.
26 – 11.06.1982, the Polesie Nature Reserve, (sq. 41), Zhytomyr region; T. Andrienko.
27 – 11.08.1991, the Manevychi forestry, (sq. 14), Manevychi district, Volyn region; V. Melnyk.
28 – 08.07.1990, the Holovno forestry, (sq. 43), Liubomi district, Volyn region; V. Melnyk.
29 – 17.07.1989, the Klitnyts forestry, (sq. 21), Kamin-Kashyrskyi district, Volyn region; V. Melnyk.

Plant communities: 1 – Cladonio-Pinetum, 2 – Peucedano-Pinetum, 3 – Molino-Pinetum, 4 – Querco-Piceetum, 5 – Vaccinio uliginosi-Pinetum, 6 – Sphagno girgensohnii-Piceetum.
Table 5. Floristic structure of the forest plant communities of the Cladonio-Vaccinietalia order with *Calluna vulgaris* in Left-bank Polesie

| Relevé number | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Tree layer (a) cover [%] | 20  | 70  | 30  | 25  | 35  | 30  | 25  | 90  | 50  | 45  | 45  | 90  | 60  | 40  | 70  | 90  | 40  | 55  | 65  | 70  | 45  | 40  | 50  |
| Shrub layer (b) cover [%] | 5   | 1   | <1  | <1  | 10  | 10  | <1  | 15  | 5   | 5   | 1   | 40  | 20  | 15  | <1  | 20  | 10  | 5   | 10  | <1  | 15  | 40  |
| Herb layer (c) cover [%] | 50  | 25  | 10  | 35  | 80  | 70  | 60  | 15  | 20  | 5   | 35  | 15  | 30  | 15  | 70  | 15  | 45  | 35  | 25  | 25  | 60  | 40  | 60  |
| Mosses and lichens layer (d-e) cover [%] | 65  | 85  | 35  | 5   | 15  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Mosses layer (d) cover [%] | 50  | 0   | 10  | 1   | 1   | 50  | 40  | 95  | 65  | 90  | 30  | 95  | 65  | 50  | 80  | 85  | 90  | 60  | 65  | 20  | 15  | 0   | 0   |

**Syntaxon**

**D. Ass. Cladonio-Pinetum**

- Carex ericetorum
- Cladina rangiferina
- Cladonia uncialis
- Cladonia gracilis
- Helictorichon pubescens
- Jurinea cyanoides
- Koeleria glauca

**D. Ass. Peucedano-Pinetum**

- Convallaria majalis
- Peucedanum ovoreselinum
- Polygonatum odoratum
- Pulsatilla patens
- Solidago virgaurea

**D. Ass. Molinio-Pinetum**

- Molinia caerulea
- Polytrichum commune
- Frangula alnus

**D. Ass. Veronico incanae-Pinetum**

- Genista tinctoria
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|    |
| Hieracium umbellatum | 1 | . | . | . | . | . | + | + | . | . | . | . | . | . | . | . | + | 1 | . | . | + | + | . |
| Geranium sanguineum | . | + | . | . | . | . | . | . | . | . | . | . | + | + | . | + | + | . | . | . | . | . | . |
| Koeleria grandis | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . |
| Rubus saxatilis | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | 1 | 1 | + | 1 | 1 | . | 1 | . |
| Veronica incana | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | 1 | . | . | . |
| D. Ass. Querco-Pinetum, species of mixed forests |
| Carex brizoides | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . |
| Carex sylvatica | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . |
| Carpinus betulus (b) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . |
| Corylus avellana | . | . | . | . | . | . | . | 4 | 2 | + | . | . | . | . | . | + | . | 1 | 3 | . | . | . | . | . |
| Euonymus verrucosa | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | 1 | + | + |
| Melica nutans | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . |
| Mycelis muralis | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . |
| Stellaria holostea | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | + | . |
| Quercus robur (a) | . | + | . | . | . | . | . | 3 | + | 1 | 2 | . | 1 | 1 | 3 | . | . | . | . | . | . | . | . |
| Quercus robur (b) | . | 1 | . | . | . | . | + | + | + | . | 1 | + | + | + | + | + | + | + | + | + | + | + |
| Quercus robur (c) | . | . | . | . | . | + | . | + | + | + | + | . | + | + | + | + | + | + | + | + | + | + | + |
| Ch. All. Dicrano-Pinion |
| Dicranum rugosum | 4 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Chimaphila umbellata | . | + | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Dianthus pseudosquarrosus | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Monotropa hipopitys | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Polytrichum juniperinum | . | 1 | 1 | . | . | + | + | . | 1 | . | + | . | . | + | . | . | . | . | . | . | . | + |
| D., Ch. O. Cladonio-Vaccinietalia |
| Arctostaphylos uva-ursi | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Pinus sylvestris | 3 | 5 | 4 | 3 | 4 | 3 | 3 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 3 |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Pinus sylvestris* (b) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Pinus sylvestris* (c) | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Dicranum polysetum* | . | . | 1 | + | + | + | + | + | . | . | . | . | . | . | . | . | 1 | + | + | + | + | + | + |
| *Orthilia secunda* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| **Ch. Cl. Vaccinio-Piceetea** | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Dicranum scoparium* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Diphasiastrum complanatum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Diphasiastrum × zeilleri* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Dryopteris carthusiana* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Hylocomium splendens* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Luzula pilosa* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Lycopodium annotinum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Melampyrum pratense* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Pleurozium shreberi* | . | 4 | 1 | + | + | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | . | 5 | 5 | 5 | 5 | 3 | + | . | . | . |
| *Ptilium crista-castrensis* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Pyrola rotundifolia* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Trisetum viride* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Vaccinium myrtillus* | . | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Vaccinium vitis-idaea* | . | 1 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| **Accompanying species** | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| **Cl. Molinio-Arrhenatheretea** | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Achillea submillefolium* | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Agrostis gigantea* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Agrostis stolonifera* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Agrostis vincalis* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Anthoxanthum odoratum* | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Carex leporina |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Dactylis glomerata |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Deschampsia caespitosa |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Dianthus borbasii |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Festuca rubra |   |   |   |   |   |   |   |   |   | 1  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Galium boreale |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Galium mollugo |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Leontodon autumnalis |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Leucanthemum vulgare |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Lysimachia vulgaris |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Plantago lanceolata |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Poa angustifolia |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Poa pratensis |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Prunella vulgaris |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Pteridium aquilinum |   |   |   |   |   |   |   |   |   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Ranunculus repens |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Sieglingia decumbens |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Viola montana |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Cl. Koelerio-Corynephoretea canescens |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Chamaecytisus ruthenicus |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Corynephorus canescens |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Eremogone saxatilis |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Festuca ovina |   |   |   |   |   |   |   |   |   | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Hypochaeris maculata |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Jasione montana |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Potentilla argentea |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Rumex acetosella* | 1 | . | . | . | . | . | . | . | . | +  | . | . | . | . | +  | . | +  | +  | +  | . | +  | . |
| *Thymus serpyllum* |  . |  +  | . |  . |  . |  . |  . | +  | . | . | +  | . | . | +  | . | . | . | . | . | . | . | . |
| **Cl. Nardetea strictae** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Antennaria dioica* |  . |  +  | . |  . |  . |  . |  . | . | . | . | +  | . | . | . | . | . | . | . | . | . | . | . | . |
| *Hypericum maculatum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | +  | . | . | . | . | . | . | . | . | . | . | . | . |
| *Lycopodium clavatum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | +  | . | . | . | . | . | . | . | . | . | . | 1  | +  | . |
| *Nardus stricta* | 1 | . | . | 4  | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| *Pilosella officinarum* |  . |  +  | . |  . |  . |  . |  . | . | 1  | . | +  | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Pimpinella saxifraga* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Platanthera chlorantha* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Potentilla erecta* |  . |  +  | . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Veronica officinalis* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Viola canina* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| **Cl. Trifolio-Geranietea sanguinei** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Anthericum ramosum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Clinopodium vulgare* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | 1 |
| *Digitalis grandiflora* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Galium verum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | 1 |
| *Geranium sylvaticum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Hylotelephium polonicum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Melampyrum nemorosum* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1  | +  | . |
| *Steris viscaria* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Trifolium alpestre* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| **Cl. Carpino-Fagetea sylvatica** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Acer platanoides (a)* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |
| *Acer platanoides (b)* |  . |  . |  . |  . |  . |  . |  . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | +  | . |

**Notes:**
- '+' indicates presence.
- '1' indicates abundance.
| Relevé number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Carex digitata* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 1 |
| *Carex pilosa* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |
| *Oxalis acetosella* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Poa nemoralis* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Viola mirabilis* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Viola riviniana* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cl. *Calluno-Ulicetea* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Calluna vulgaris* | 40 | 3 | 10 | 5 | 40 | 5 | 5 | 2 | 2 | 3 | 3 | 3 | 5 | 3 | 3 | 1 | 1 | 2 | 2 | 3 | 1 | 1 |   |
| *Carex ericetorum* |   |   |   |   |   |   |   | + | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Genista germanica* |   | + |   |   |   |   |   |   |   | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   | + |
| *Scorzonera humilis* |   | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Vincetoxicum hirundinaria* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cl. *Epilobietea angustifolii* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Calamagrostis epigeios* | 1 |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 |
| *Fragaria vesca* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | + | + |
| *Rubus idaeus* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 | + | + |
| *Salix caprea* |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Sambucus racemosa* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cl. *Papaveretea rhoeadis* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Conyza canadensis* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Galeopsis tetrahit* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Scleranthus annus* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cl. *Quercetea pubescentis* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Lathyrus niger* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Potentilla alba* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| *Pulmonaria angustifolia* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cl. *Quercetea robori-petraea* |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Relevé number | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| *Carex pallescens* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  |
| *Maianthemum bifolium* | .  | .  | .  | .  | .  | .  | +  | .  | +  | .  | +  | .  | +  | 1  | +  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Rubus nessensis* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1  | +  | .  | .  |
| CI. *Artemisieta vulgaris* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1  |
| *Geranium robertianum* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Moeringia trinerva* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  |
| CI. *Crataego-Prunetea* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Galeopsis bifida* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  |
| CI. *Festuco-Brometea* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Euphorbia cyparissias* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Oxycocco-Sphagnetea* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Ledum palustre* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| CI. *Scheuchzerio palustris-Caricetea fuscae* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Carex nigra* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| **Other species** | | | | | | | | | | | | | | | | | | | | | | | | |
| *Agrostis capillaris* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Betula pendula* | 3  | +  | +  | 3  | 3  | +  | 3  | .  | .  | .  | .  | 2  | .  | 4  | 1  | .  | .  | 3  | 3  | 3  | 3  | .  |
| *Betula pendula (b)* | 3  | +  | +  | +  | +  | 5  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | 1  | .  |
| *Betula pendula (c)* | .  | +  | .  | .  | .  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | .  | +  | +  | +  | +  | .  | .  |
| *Calamagrostis arundinacea* | .  | 3  | .  | .  | .  | .  | +  | .  | 1  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Campanula rotundifolia* | .  | .  | .  | .  | .  | +  | .  | +  | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  |
| *Hypericum perforatum* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Malus sylvestris (a)* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Malus sylvestris (b)* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Malus sylvestris (b)* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| *Populus tremula* | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| Relevé number | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| *Populus tremula* (b) | +   | .   | .   | .   | +   | .   | .   | +   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Populus tremula* (c) | +   | .   | .   | .   | +   | .   | .   | +   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Pyrus communis* (a)  | .   | .   | .   | .   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Pyrus communis* (b)  | .   | .   | .   | .   | .   | .   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Rubus caesius*       | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Salix rosmarinifolia*| 1   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Sorbus aucuparia* (a)| .   | +   | .   | .   | .   | .   | .   | +   | .   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Sorbus aucuparia* (b)| .   | +   | .   | .   | .   | .   | .   | +   | .   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |
| *Veronica chamaedrys* | .   | .   | .   | .   | .   | +   | .   | .   | +   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   | .   |

Notes.

Dates, localities and authors of relevés:

1 – 16.08.2019, Mizrighynskyi Regional Landscape Park, the shooting range, Kozelets district, Chernihiv region; O. Lukash, H. Danko, O. Rak, P. Buzunko

2 – 05.07.1980, the Chudivka forestry (sq. 30), Ripky district, Chernihiv region; T. Andrienko.

3 – 14.08.1996, the Horbachi forestry (sq. 113), Kozelets district, Chernihiv region; O. Lukash

4 – 19.07.2019, the pine-forest terrace of the Desna river, near the Krasne village, Chernihiv district, Chernihiv region; H. Danko

5 – 11.08.2019, the pine-forest terrace of the Dnieper river, near the Lisove village, Ripky district, Chernihiv region; H. Danko

6 – 13.08.2009, the Orlykivka forestry (sq. 101), Semenivka district, Chernihiv region, O. Lukash

7 – 25.08.2018, the Kupshi tract, between the Nevklia and Bezykiv villages, Horodnia district, Chernihiv region; O. Lukash

8 – 31.07.2003, the Starohutskyi forest area (sq. 45, site 8), Seredyna Buda district, Sumy region, N 52,33425°; EO 33,7469; S. Panchenko, O. Chornous (Panchenko, 2013).

9 – 25.04.2004, the Zhuklia forestry (sq. 35), Koriukivka district, Chernihiv region; O. Lukash.

10 – 18.05.2005, the Nova Zymnytsia tract, Ripky district, Chernihiv region; O. Lukash.

11 – 02.05.2005, the Kolochivska Dacha tract, Koriukivka district, Chernihiv region; O. Lukash.

12 – 12.07.2002, the Myklashevsheyna tract, Travneve village (Horodnia district, Chernihiv region), O. Lukash.

13 – 15.06.1998, the forest near the Drobski village, Kopor district, Chernihiv region; Yu. Karpenko

14 – 01.08.2010, the Radomska Dacha tract, Radomka forestry (sq. 60), Semenivka district, Chernihiv region, O. Lukash.

15 – 30.09.2003, the Nevklia forestry, between the Nevklia and Tupychiv villages, Horodnia district, Chernihiv region; O. Lukash.

16 – 14.07.2002, the Starohutskyi forest area (sq. 65, site 7), Seredyna Buda district, Sumy region, N 52,3317°; EO 33,8121, S. Panchenko (Panchenko, 2013).

17 – 16.08.1999, the Masheve forestry, Spaske tract, between the Masheve and Ivanikva villages, Semenivka district, Chernihiv region; O. Lukash.

18 – 10.07.2016, the pine-forest terrace of the Desna river, near the Sokolivka village, Kozelets district, Chernihiv region; O. Lukash.

19 – 01.07.2003, the Novi Borovychy forestry, between the Turia and Zahrebelsna Sloboda villages, Snovsk district, Chernihiv region; O. Lukash.

20 – 11.07.1997, the Starohutskyi forest area (sq. 97), Seredyna Buda district, Sumy region, N 52,3209°; EO 33,8121, S. Panchenko (Panchenko, 2013).

21 – 15.07.2010, the Hnizdyshchanska Dacha tract, Horodnia district, Chernihiv region; O. Lukash.

22 – 17.08.2013, the Yasenske tract, Liubech forestry, Ripky district, Chernihiv region; O. Lukash, V. Popruha, O. Rak.

23 – 15.08.1996, the Horbachi forestry (sq. 19), near the Lykholitky village, Kozelets district, Chernihiv region; O. Lukash.

Plant communities: 1 – *Cladonio-Pinetum*, 2 – *Peucedano-Pinetum*, 3 – *Molinio-Pinetum*, 4 – *Veronico incanae-Pinetum*, 5 – *Querco-Piceetum*.
The ontogenetic structure of *Calluna vulgaris* in plant communities of pine forests of the *Cladonio-Pinetum* association was investigated. Two model cenopopulations of *Calluna vulgaris* (equal in area, ecological and phytocenotic conditions) were selected: in Right-bank Polesie – in the Rivne Nature Reserve (Table 4, relevé 1) and in Left-bank Polesie – in Mizhrichynskyi Regional Landscape Park (Table 5, relevé 1). The results of population studies are represented in Table 6 and Figure 2.

Table 6 shows that the density of the “right-bank” population is 118 individuals per m². It has incomplete age spectrum (without seedlings and senile individuals) and is right-sided, with the peak on virginal and generative individuals (Fig. 2: I). The density of the “left-bank” population is 120 individuals per m². It is also incomplete (without seedlings, juvenile and senile individuals) and right-sided with the peak on old generative individuals (Fig. 2: II). The difference in indexes of the ontogenetic status assessment of two populations indicates the following: the growth conditions for *Calluna vulgaris* in the Rivne Nature Reserve are more optimal and are followed by more active growth of plants and settling on new territories.

**Table 6. *Calluna vulgaris* (L.) Hill. populations in *Cladonio-Pinetum* Juraszek 1927 communities of Ukrainian Polesie**

| Population localization | Average number of individuals/m² | Index of ontogenetic status assessment |
|-------------------------|----------------------------------|---------------------------------------|
|                         | p      | j  | im | v   | g₁  | g₂  | g₃  | s   | Σ    | Iᵢₘₐ | Iᵢₑᵣ | Iᵢₕᵣₙ | Iᵢₑₒᵣ     |
| Rivne Nature Reserve   | 0      | 3  | 5  | 30  | 27  | 28  | 25  | 0   | 118  | 32.20 | 21.19 | 67.80  | 0.65       |
| (Right-bank Polesie)    |        |    |    |     |     |     |     |     |      |       |       |        |           |
| Mizhrichynskyi Regional | 0      | 0  | 2  | 29  | 25  | 24  | 40  | 0   | 120  | 25.83 | 33.33 | 40.83  | 1.29       |
| Landscape Park (Left-bank Polesie) |        |    |    |     |     |     |     |     |      |       |       |        |           |

Figure 2. Age-related structure of the *Calluna vulgaris* populations in Rivne Nature Reserve (I) and Mizhrichynskyi Regional Landscape Park (II). Denotations: j – juvenile individuals, im – immature individuals, v – virginile individuals; g₁ – young generative individuals, g₂ – mature generative individuals, g₃ – old generative individuals.
The “western” population is younger \( (I_{\text{aet}} = 0.65) \) than the “eastern” one, where the aging processes are prevailing \( (I_{\text{aet}} = 1.29) \). To compare with, the aging of the Calluna vulgaris populations in the forest phytocenoses in the east of Left-bank Polesie (National Nature Park “Desmansko-Starohutskyi”), is more intensive: Index aetas \( (I_{\text{aet}}) \) is 1.72 (Kovalenko, 2015).

It should be noted that the syntaxonomical affiliation of the Calluna vulgaris forest habitats in Right-bank and Left-bank Polesie is different. In particular, rare, as for Polesie, communities of the Veronicetum incanae-Pinetum association (Table 5, relevés 17-19) occur only in Left-bank Polesie. Pine forests of the Vaccinio uliginosi-Pinetum association with Calluna vulgaris (Table 4, relevés 23-26) were described only in Right-bank Polesie. The communities of the Vaccinio uliginosi-Pinetum association are known only in National Nature Park “Desmansko-Starogutskyi” in Left-bank Polesie (Panchenko, 2013). Calluna vulgaris as well as Vaccinium uliginosum L. (diagnostic species of the Piceo-Vaccinietion uliginosi suballiance) are absent in all 10 relevés of this association. The European boreo-montane spruce forests of the Piceo-Piceetum class (Table 4, relevés 27-29) occur only in Right-bank Polesie. The phytocenoses are represented by the Sphagno girgensohnii-Piceetum association. The projective coverage of Calluna vulgaris does not exceed 1%.

According to the results of the research, the map of the Calluna vulgaris distribution in Ukrainian Polesie biotopes was created (Fig. 3).

We compared the frequency of the Calluna vulgaris constancy in plant communities of Right-bank and Left-bank Polesie. The results of the comparison are shown in Table 7.

Undoubtedly, Calluna vulgaris has the maximum constancy frequency in the phytocenoses of the Calluno-Ulicetea and the Nardetea strictae classes, where it is a characteristic or differentiating (diagnostic) species. The Calluna vulgaris high constancy is observed in the plant communities of the Ledo-Sphagnetum magellanici association. The Calluna vulgaris occurrence in pine forests of Right-bank Polesie is slightly higher (than in Left-bank Polesie). The spruce forests of the Sphagno girgensohnii-Piceetum association are rare biotopes for Calluna vulgaris. It should be noted that Calluna vulgaris does not grow in other spruce forests, which have an “island” distribution in Polesie. Rather stable position and high constancy of Calluna vulgaris in different phytocenoses of Ukrainian Polesie is a consequence of high drought and frost resistance of this species in combination with plasticity of its morphological structure (Grubb, 1992).

Figure 3. Distribution of Calluna vulgaris (L.) Hill. in the biotopes of Ukrainian Polesie. Map symbols: 1 – border of Ukrainian Polesie, 2 – temperate and subboreal pine forests on nutrient-poor acidic sandy soils (the Vaccinio-Piceetea class), 3 – boreo-temperate heathlands of the Calluno-Ulicetea class, 4 – boreo-temperate heathlands of the Nardetea strictae class, 5 – dwarf-shrub, sedge and peat-moss ombrotrophic raised bogs on extremely acidic soils (the Oxycocco-Sphagnetea class).
5. Conclusions

The heathlands are rare ecosystems in Ukrainian Polesie. Their vegetation is represented by the plant communities of the Calluno-Ulicetea and the Nardetea strictae classes. They are forming in greatly anthropogenically disturbed areas (e.g., areas after wildfires) or in the areas with intensive human activities (at shooting ranges first of all). The cenoses of the Calluno-Genistetum pilosae association, which are present only in Right-bank Polesie, have larger areas (up to 20 km²). Other heather communities are smaller in size; they usually occupy the area of several hectares (the Calluno-Nardetum strictae association) or are represented by small patches in landscape of pine forests (less frequently in mixed forests) on upland terraces of rivers (the Scabioso canescentis-Genistetum association).

Veronica incanae-Pinetum association is the habitat of Calluna vulgaris only in Left-bank Polesie. Calluna vulgaris has the lowest constancy (57.1%) in the Cladonio-Pinetum association of Left-bank Polesie and the highest constancy (76.8%) in the Peucedano-Pinetum association of Right-bank Polesie. Calluna vulgaris constancy does not exceed 40% in the oak-pine forests of the Querco-Piceetum association. The syntaxonomic difference of the Calluna vulgaris forest habitats in Right-bank Polesie and Left-bank Polesie is primarily revealed at the Piceo-Vaccinienion uliginosi suballiance level and the Piceetalia excelsae order. The spruce forests of the Sphagno girgensohnii-Piceetum association are rare biotopes for Calluna vulgaris.

The Calluna vulgaris populations within the forest plant communities of the Cladonio-Pinetum association are characterized by a similar ontogenetic structure: they are incomplete. There are no sprouts, vegetative reproduction prevails, and age spectrum maximum falls on generative individuals. However, the Calluna vulgaris cenotic population in Right-bank Polesie of Ukraine is characterized by a greater activity of plants growth and spreading on new territories, while aging prevails in the “left bank” population.

In general, the environmental conditions of Right-bank Polesie of Ukraine are more favorable to Calluna vulgaris, than the conditions in Left-bank Polesie.
Phytocenotic features of *Calluna vulgaris* (L.) Hill. in Ukrainian Polesie

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