

# SUCCESSIONAL STAGES IN THE DEVELOPMENT OF FOREST VEGETATION IN CIRQUES OF TWO VALLEYS IN THE JULIAN ALPS (NW SLOVENIA)

## SUKCESIJSKE STOPNJE V RAZVOJU GOZDNE VEGETACIJE V KRNICAH DVEH ALPSKIH DOLIN V JULIJSKIH ALPAH (SEVEROZAHODNA SLOVENIJA)

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### ABSTRACT

**Successional stages in the development of forest vegetation in cirques of two valleys in the Julian Alps (NW Slovenia)**

We investigated different types of vegetation in cirques of two valleys in the Julian Alps, Zadnjica and Kot, which develop on slope screes and are heavily influenced by avalanches that occur here every year. Our phytosociological analysis identified the following shrub-forest developmental stages: *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis*, *Homogyno sylvestris-Salicetum glabrae*, *Polysticho lonchitis-Rhamnetum fallacis*, *Rhododendro hirsuti-Laburnetum alpini*, *Rhododendro hirsuti-Laburnetum alpini*, *Rhododendro hirsuti-Laricetum deciduae anemonetosum trifoliae* and *Rhododendro hirsuti-Fagetum sylvaticae* var. *Sorbus chamaemespilus*. On unconsolidated fluvio-glacial deposits in the Kot Valley we determined the following successional stages: *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo*, *Amelanchiero ovalis-Pinetum mugo laricetosum* and *Rhododendro hirsuti-Fagetum sylvaticae petasitetosum paradoxii*.

**Key words:** phytosociology, succession, glacial valley, Julian Alps, Natura 2000, Triglav National Park, Slovenia

### IZVLEČEK

**Sukcesijske stopnje v razvoju gozdne vegetacije v krnicah dveh alpskih dolin v Julijskih Alpah (severozahodna Slovenija)**

Raziskali smo različne oblike vegetacije v krnicah dveh dolin v Julijskih Alpah, Zadnjici in Kotu, ki nastajajo na pobočnem grušču in nanje odločilno vplivajo vsakoletni snežni plazovi. S fitocenološko analizo smo lahko prepoznali naslednje grmiščno-gozdne razvojne stopnje: *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis*, *Homogyno sylvestris-Salicetum glabrae*, *Polysticho lonchitis-Rhamnetum fallacis*, *Rhododendro hirsuti-Laburnetum alpini*, *Rhododendro hirsuti-Laricetum deciduae anemonetosum trifoliae* in *Rhododendro hirsuti-Fagetum sylvaticae* var. *Sorbus chamaemespilus*. Na nesprijetih rečno-ledeniško nanosih v dolini Kot pa smo ugotovili naslednje sukcesijske stopnje: *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo*, *Amelanchiero ovalis-Pinetum mugo laricetosum* in *Rhododendro hirsuti-Fagetum sylvaticae petasitetosum paradoxii*.

**Ključne besede:** fitocenologija, sukcesija, ledeniška dolina, Julijske Alpe, Natura 2000, Triglavski narodni park, Slovenija

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## 1 INTRODUCTION

In recent years, successional processes and development of forest vegetation in Alpine valleys in Slovenia were studied in particular by M. Zupančič and collaborators (ZUPANČIČ & ŽAGAR 2009, ZUPANČIČ, SKUMAVEC & MIHORIČ 2017) as well as several geographers (LOVRENČAK 2002, BLATNIK & REPE 2013, GERŠIČ et al. 2014). On our sporadic visits to the mountains through the Alpine valleys of Zadnjica in Trenta and Kot in the Upper Sava Valley (both in the Triglav National Park) our attention was drawn to different types

of vegetation on slope screes and alluvial fans in their cirques, where annual avalanche activity is obviously one of the main ecological factors. The human impact on the natural processes can be seen only in Zadnjica (the vicinity of a marked mountain trail) and is insignificant in the gable end of the Kot Valley (above the Kotarica falls). We made a phytosociological inventory of these, spatially relatively well-delimited shrub and forest communities and tried to classify them into a syntaxonomic system.

## 2 METHODS

The vegetation of gable ends of the Zadnjica and Kot valleys was inventoried using the Central-European

method (BRAUN-BLANQUET 1964). A total of 28 relevés (Figure 1) were entered into the FloVegSi database (T.

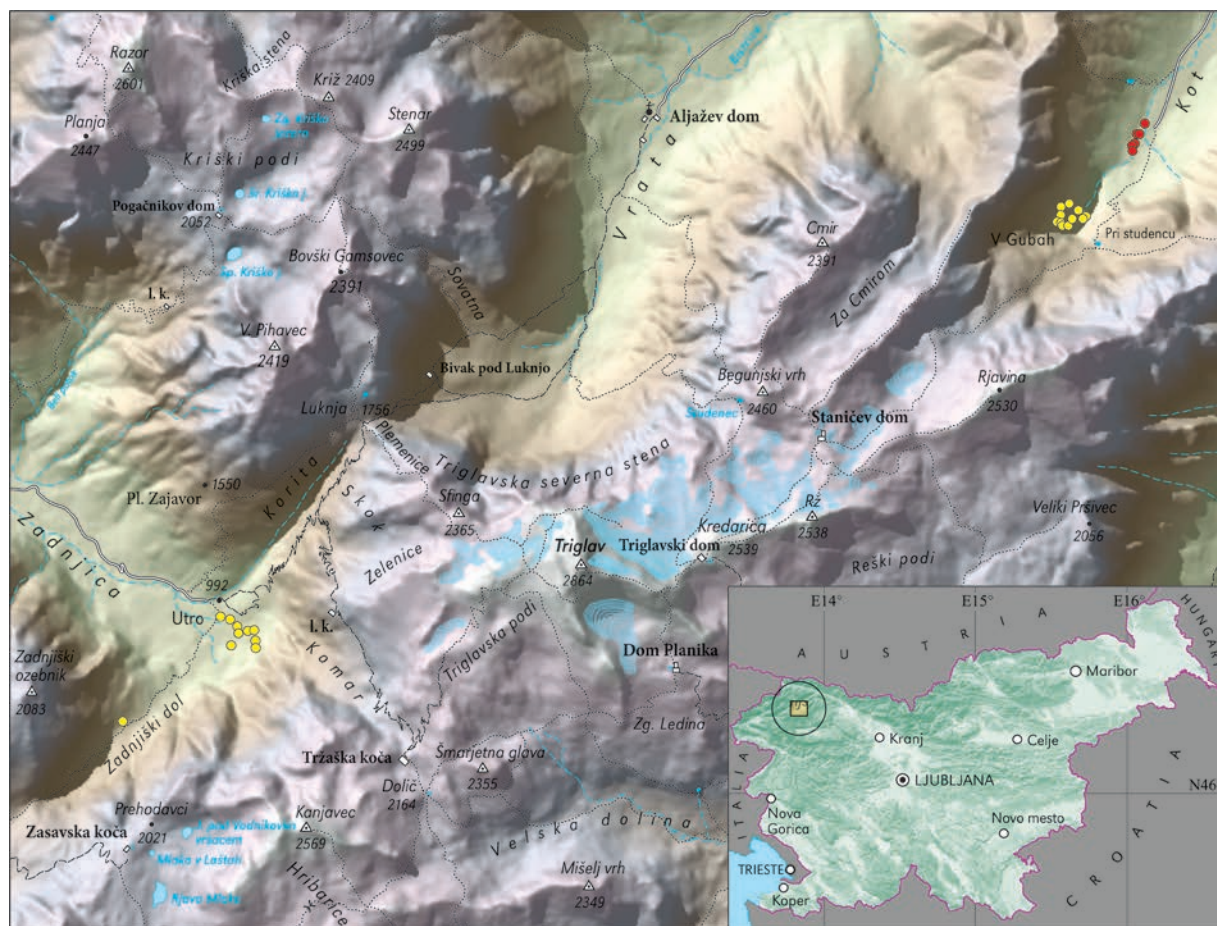


Figure 1: Research area with approximate localities of investigated stands (yellow circles: stands on slope screes, red circles: stands on fluvio-glacial deposits)

Slika 1: Raziskovano območje s približnimi nahajališči preučenih sestojev (rumeni krogi: sestoji na pobočnem grušču, rdeči krogi: sestoji na rečno-ledniških nanosih)

SELIŠKAR, VREŠ & A. SELIŠKAR 2003). The relevés were arranged in two tables. Those on slope screes in the cirques of Zadnjica and Kot (above the Kotarica falls) and the relevés on gravelly plains in the upper part of Kot (Klin) were analysed separately. They were mutually compared by means of hierarchical classification, using the (unweighted) average linkage – UPGMA method with Wishart's similarity ratio. For this purpose, we transformed combined cover-abundance values into ordinal values 1– 9 (van der MAAREL 1979). We used SYN-TAX 2000 (PODANI 2001) software package. The nomenclatural source for the names of vascular plants is MARTINČIČ & al. (2007), except for *Sesleria caerulea* (AESCHIMANN et al. 2004b). MARTINČIČ (2003, 2011) is the nomenclatural source for the names of mosses and SUPPAN et al. (2000) for the names of lichens. The nomenclatural source for the names of syntaxa are ŠILC & ČARNI (2012), except for the name of the class *Quercio-Fagetea* Braun-Blanquet et Vlieger in Vlieger 1937.

## 2.1 Ecological description of the study area

Both cirques, in Zadnjica and Kot, have a predominantly shady aspect (northeast and partly northwest); parent material is unconsolidated moraine (till) and above all slope screes (JURKOVŠEK 1987 a, b). The elevation of both cirques is similar, spanning 1000 to 1300 m. There are no significant differences in the precipitation volume either, with the average exceeding 2000 mm (B. ZUPANČIČ 1998), a large portion of which falls as snow. The mean annual temperature is similar too, ranging between 4 and 6 °C (CEGNAR 1998), with the Zadnjica Valley still showing some sub-Mediterranean influence. In recent decades the area has seen a distinctly downward trend in precipitation and higher average temperatures (DOLINAR 2018). Both cirques have a characteristically cold local climate and over the winter they receive snow avalanches from their rock walls or steps (VOLK BAHUN, ZORN & PAVŠEK 2018). The soil is therefore very shallow, partly colluvial and undeveloped, lithosol and moder rendzina.

## 3 RESULTS AND DISCUSSION

### 3.1 Phytosociological analysis of the shrub-for-est vegetation sequence on slope screes in the avalanche area in the gable end of the Zadnjica and Kot valleys

Table 1 comprises 22 relevés of stands on slope screes that grouped by floristic similarity as indicated in Figure 2.

In Table 1 we arranged the relevés by taking into account the dominant species of the highest stand layer, which means that our classification does not fully follow the results of hierarchical classification. The most unique form, the community of red and grey willow (*Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis*) with *Achnatherum calamagrostis*, *Athamanta cretensis* and *Petasites paradoxus* dominating the herb layer, was found only along a small torrential brook running from under the waterfall in the Kanjavec rock face down the slope scree until it sinks (relevé 1 in Table 1).

Open *Rhamnus fallax* shrub stands were found only in the gable end of Kot, on rather coarse and not entirely consolidated gravel – relevés 3–5 in Table 1. In terms of species composition they obviously belong to the association *Polysticho lonchitis-Rhamnetum fallacis*, which was described a few years ago (DAKSKOBLER, FRANZ & ROZMAN 2013) and is more frequent in the

Slovene Alps than previously thought (see also BLATNIK & REPE 2013). In recent years it was spotted, but not yet inventoried, also in the Krma Valley. The dominant shrub layer species in one of the *Rhamnus fallax* stands in the gable of Kot (relevé 2 in Table 1) is *Salix glabra*, and this stand could be classified also into the association *Homogyno sylvestris-Salicetum glabrae* (comp. DAKSKOBLER & SURINA 2017). Similarly, larch dominated the highest stand layers only in the gable end of Kot, on one location on fully consolidated gravel. Its initial stand (relevé 6 in Table 1) can be classified into the association *Rhodothamno-Laricetum*. Although *Anemone trifolia* was not found in the recorded stand, based on the whole floristic composition it should be classified into the subassociation *anemone-tosum trifoliae*, which is characterised by abundant *Sesleria caerulea* in the herb layer (comp. DAKSKOBLER, SELIŠKAR & ROZMAN 2018: 259).

Most relevés on the left side of the dendrogram in Figure 2, i.e. relevés in the central part of Table 1, characterise pioneer shrub communities with *Laburnum alpinum* dominating the highest stand layer. *Laburnum alpinum* is a south-European montane species distributed across most of the Alps (except the Northeastern and partly Central Alps), in the south and central Jura, the north and central Apennines, the Carpathians and the Dinaric Alps (AESCHIMANN et al.

2004a, BRUS 1999, 2005). It occurs on calcareous, mixed and silicate bedrock, in the colline, montane and partly the subalpine belt, mainly on beech forest sites. As a shade-tolerant species it frequently occurs in the lower tree and shrub layer, and establishes itself as a pioneer in windthrow and landslide areas, and on erosion slopes. Figure 3 shows its distribution in Slovenia.

*Laburnum alpinum* is the most frequent in the stands of associations *Arunco-Fagetum*, *Ostryo-Fagetum*, *Seslerio autumnalis-Fagetum*, *Lamio orvalae-Fagetum*, *Ranunculo platanifolii-Fagetum*, *Anemone trifoliatae-Fagetum*, *Homogyno sylvestris-Fagetum*, *Saxifrago cuneifolii-Fagetum*, *Rhododendro hirsuti-Fagetum*, *Polysticho lonchitis-Fagetum*, *Luzulo-Fagetum sylvaticae*, *Laburno alpini-Piceetum*, *Rhodothamno-Larice-*

*tum*, *Saxifrago petraeae-Tilietum*, *Seslerio albicantis-Ostryetum carpinifoliae*, *Fraxino orni-Ostryetum carpinifoliae*, *Rhododendro hirsuti-Ostryetum carpinifoliae*, *Rhodothamno-Pinetum mugo*, *Amelanchiero ovalis-Pinetum mugo*, but it occurs also in several other forest and shrub communities (source: FloVegSi database, T. SELIŠKAR, VREŠ & A. SELIŠKAR, 2003). The highest it was recorded in the association *Rhodothamno-Pinetum mugo* at 1560 m a.s.l. (pasture Stržiškarska Planina under Mt. Poljanski Vrh and Mt. Hohkovbl), in the association *Polysticho lonchitis-Fagetum* at 1570 m (Planinica under Loška Stena rock wall), in the subassociation *Anemone-Fagetum laricetosum* at 1615 m (Pod Pečmi above the Tamar Valley, under Srednja Ponca), in the association *Rhodothamno-Laricetum* at

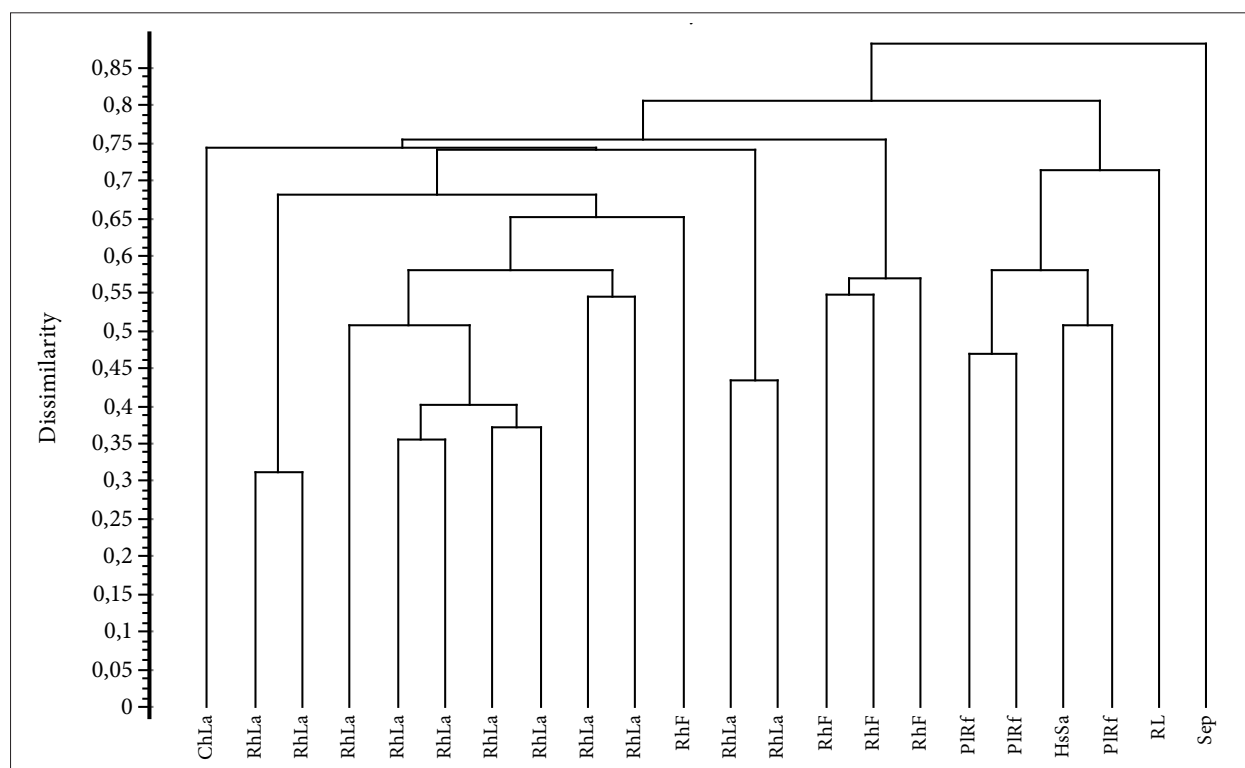


Figure 2: Dendrogram of relevés of shrub- and forest communities on slope screes in cirques of Zadnjica and Kot valleys (UPGMA, similarity ratio)

Slika 2: Dendrogram popisov grmiščnih in gozdnih združb na pobočnem grušč v krnicah dolin Zadnjice in Kota (UPGMA, similarity ratio)

#### Legend / Legenda

ChLa *Carici humilis-Laburnetum alpini* nom. prov.

RhLa *Rhododendro hirsuti-Laburnetum alpini*

RhF *Rhododendro hirsuti-Fagetum sylvaticae*

PIRf *Polysticho lonchitis-Rhamnetum fallacis*

HsSa *Homogyno sylvestris-Salicetum glabrae*

Sep *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis*

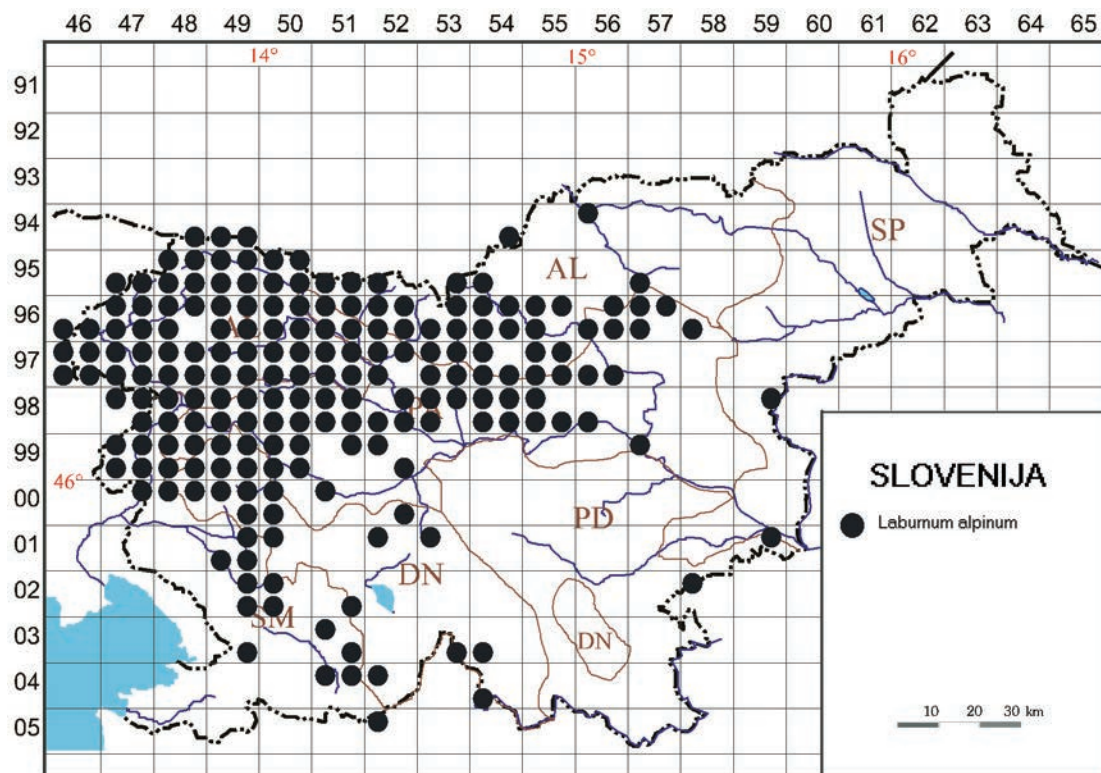


Figure 3: Distribution of *Laburnum alpinum* in Slovenia, according to the data in the FloVegSi database (authors of the map are I. Dakskobler, B. Anderle, A. Seliškar and B. Vreš)

Slika 3: Razširjenost vrste *Laburnum alpinum* v Sloveniji po podatkih v bazi FloVegSi (avtorji zemljevida so I. Dakskobler, B. Anderle, A. Seliškar in B. Vreš)

1660 m a.s.l. (Skok above Zadnjica under Mt. Triglav; under the peak Kumlehova Glava above the Suha Pišnica brook). These are the highest elevations of its occurrence known to us in the Julian Alps. BRUS (1999: 206, 2005: 241) reports that on southern (the warmest, sunny) slopes this species occurs up to 1900 m a.s.l., which almost certainly does not refer to the Julian Alps, but to the Alps in general, (Brus, in litt.). As a pioneer it establishes itself on windthrow areas, in particular in stands of associations *Anemone trifoliae-Fagetum*, *Ranunculo platanifolii-Fagetum* and *Rhododendro hirsuti-Fagetum*. In the northern part of the Dinaric Alps we described a successional stage in natural gaps of montane beech and fir-beech forest as the association *Laburno alpini-Rhamnetum fallacis* (DAKSKOBLER, FRANZ & ROZMAN 2013). In the Jura, the association *Sorbo mougeotii-Laburnetum alpini* Géhu & Géhu-Franck ex Foucault 2012 is described and designated as the edge shrub community on the sites of thermo-basophilous beech forests (RICHARD 1968, GÉHU & GÉHU-FRANCK 1987, BIONDI, PINZI & GUBELLINI 2004, FOUCAULT 2012, Theurillat 2019, in

litt.). In the Apennines, a successional stage *Geranio nodosi-Laburnetum alpini* Castelli, Biondi & Ballelli 2001 and its subassociation *sorbetosum ariae* Biondi, Pinzi et Gubellini 2004 were described on the sites of beech forests from the association *Cardamino kitaibelii-Fagetum sylvaticae* (CASTELLI, BIONDI & BALLELLI 2001, BIONDI, PINZI & GUBELLINI 2004).

Our relevés are distinctly different from the shrub communities in the Jura and the Apennines. The species shared with the stands of the association *Sorbo mougeotii-Laburnetum alpini* from the Jura are *Laburnum alpinum*, *Sorbus mougeotii*, *S. aria*, *S. chamaemespilus*, *Salix appendiculata*, *Fagus sylvatica*, *Lonicera xylosteum*, *Mercurialis perennis*, *Acer pseudoplatanus*, *Polygonatum verticillatum*, *Fragaria vesca*, *Rubus idaeus*, *Lonicera alpigena* and *Aconitum lycoctonum* s. lat. The species shared with the stands of the subassociation *Geranio nodosi-Laburnetum alpini sorbetosum ariae* from the Apennines are *Laburnum alpinum*, *Sorbus aria*, *Rhamnus fallax*, *Mercurialis perennis*, *Fagus sylvatica*, *Solidago virgaurea*, *Hepatica nobilis*, *Carex digitata*, *Ostrya carpinifolia*, *Fragaria vesca*, *Thalic-*

*trum aquilegiifolium*, *Euonymus latifolia*, *Galium album* and *Hypericum montanum*. Despite the listed species that they have in common, the studied *Laburnum alpinum* community from the Julian Alps differs from its communities from the Jura and the Apennines mainly with the presence of distinctly frigidophilous species characteristic for subalpine beech, larch, spruce and dwarf pine communities, such as *Rhododendron hirsutum*, *Polystichum lonchitis*, *Pinus mugo*, *Clematis alpina*, *Homogyne sylvestris*, *Picea abies* and *Larix decidua*. Most of the stands with dominating *Laburnum alpinum* in the highest layer are therefore classified into the new association *Rhododendro hirsuti-Laburnetum alpini*. Its nomenclatural type, *holotypus*, is relevé 16 in Table 1. The diagnostic species of the new association are *Laburnum alpinum*, *Rhododendron hirsutum*, *Polystichum lonchitis*, *Pinus mugo*, *Gymnocarpium robertianum*, *Clematis alpina*, *Homogyne sylvestris*, *Larix decidua*, *Sorbus chamaemespilus* and *Salix appendiculata* and its phytogeographical differential species are *Rhodothamnus chamaecistus*, *Cyclamen purpurascens* and *Anemone trifolia*. The listed species characterise cold, stony sites where beech can still establish itself in favourable conditions (absence of avalanches), as manifested by the entire species composition. The new association is thus classified into the alliance *Aremonio-Fagion*, order *Fagetalia sylvaticae* and class *Querco-Fagetea* (*Carpino-Fagetea*), even though it could also be classified into the classes *Erico-Pinetea* or *Roso pendulinae-Pinetea mugo*.

There are several differences between the stands in the Zadnjica and Kot valleys. The stands in Kot on moister and coarser gravel are characterised in particular by a considerable admixture of sycamore maple (*Acer pseudoplatanus*), so they are described as a new subassociation *aceretosum pseudoplatani* (its nomenclatural type is the same as the nomenclatural type of the new association, relevé 16 in Table 1). The stands in the gable end of the Zadnjica Valley are mainly situated on finer gravel, on slightly drier and warmer sites, and are differentiated by *Ostrya carpinifolia* and *Carex alba*. The nomenclatural type, *holotypus*, of the new subassociation *ostretosum carpinifoliae* is relevé 11 in Table 1. The most unique among the relevés of this subassociation is relevé 14, where the shrub layer is completely dominated by dwarf pine (*Pinus mugo*). Although this stand could also be classified into the association *Amelanchiero-Pinetum mugo*, it was included in the association *Rhododendro-Laburnetum alpini*, because in terms of entire species composition it grouped with other relevés of the latter association. However, the same cannot apply to relevé 7 in Table 1, which characterises an open *Laburnum alpinum* shrub

on the debris cone under Mt. Zadnjiški Ozebnik. It is characterised by character scree and stony grassland species such as *Achnatherum calamagrostis*, *Adenostyles glabra*, *Calamagrostis varia* and *Carex humilis*. This stand is tentatively classified into the provisional association *Carici humilis-Laburnetum alpini* nom. prov. and is syndynamically related to the stands of the association *Anemone trifoliae-Fagetum*.

The tree layer in the forest stands located on the edge or at the bottom of the studied glacial cirques, in areas that are less exposed to avalanches (relevés 19–22 in Table 1), is dominated by beech. The entire species composition indicates a community on extreme sites, very similar to beech stands on the upper forest line, classified into the association *Polysticho lonchitis-Fagetum*. Also possible is classification into the association *Rhododendro hirsuti-Fagetum*, as these stands comprise almost all of the diagnostic species of this association that otherwise characterises beech sites in the submontane and montane belt up to some 1200 m a.s.l. Given the elevation of our relevés (under 1200 m) the latter association is considered more appropriate, but to demonstrate the similarity with the stands of the first, *Polysticho lonchitis-Fagetum*, it is described as a special altitudinal variant with *Sorbus chamaemespilus* (*Rhododendro hirsuti-Fagetum* var. *Sorbus chamaemespilus*). In the Julian Alps, this species otherwise characterises communities of the altimontane and subalpine belts, and in the (lower) montane belt it is usually limited to frost hollows. In the stands of the association *Rhododendro hirsuti-Fagetum* in the Julian Alps it was reported on only a few occasions (see DAKSKOBLER 2003).

From the relevés in Table 1 we can infer the likely sequence in the development of shrub and forest vegetation on slope screes in avalanche areas in cirques of glacial valleys in the Julian Alps:

*Polysticho lonchitis-Rhamnetum fallacis* (*Homogyne sylvestris-Salicetum glabrae*) – *Rhododendro hirsuti-Laburnetum alpini* (*Amelanchiero-Pinetum mugo*) – *Rhododendro hirsuti-Fagetum sylvaticae* (*Rhodothamnus-Laricetum*).

### 3.2 Phytosociological analysis of the sequence in shrub-forest vegetation on fluvio-glacial deposits in the Kot Valley (Klin).

In Table 2 we arranged six relevés made on the gravelly plain Klin in the upper part of the Kot Valley. They were mutually compared using hierarchical classification, which produced the dendrogram in Figure 4.

Successional development of vegetation in the upper part of the Kot Valley was studied in detail by ZUPANČIČ, SKUMAVEC & MIHORIČ (2017). They determined and presented with a phytosociological table the sequence of the following plant communities:

*Petasitetum paradoxi* – *Petasiti-Salicetum purpureo-albae* – *Calamagrostio variae-Pinetum mugo* – *Dryado-Piceetum* – *Rhodothamno-Pinetum mugo* – *Rhododendro-Fagetum* – *Anemono-Fagetum lycopodietosum*.

In this area, i.e. on the gravelly plain under the Kotarica falls, we were interested mainly in beech stands with hairy alpenrose (*Rhododendro hirsuti-Fagetum*), as the findings by ZUPANČIČ et al. (ibid.) were new to the forest vegetation in this part of the Julian Alps. We

inventoried several typical stands and contact communities of *Pinus mugo* and *Salix eleagnos*. Only six relevés, however, are not sufficient to allow us to infer the right sequence in the development of shrub-forest vegetation. Our goal is therefore not to correct or supplement the findings of the much more detailed recent analysis, but merely to classify our relevés into a syn-taxonomic system.

Relevé 1 in Table 1 could be classified also into the association *Salicetum eleagno-purpureae*. Although a comparison with the relevés of this community from the foothills of the Julian Alps, in the Nadiža Valley (ŠILC & ČUŠIN 2000) does indicate some distinct differences, also with the variant with *Petasites paradoxus*. ORIOLO & POLDINI (2002) classify slightly similar

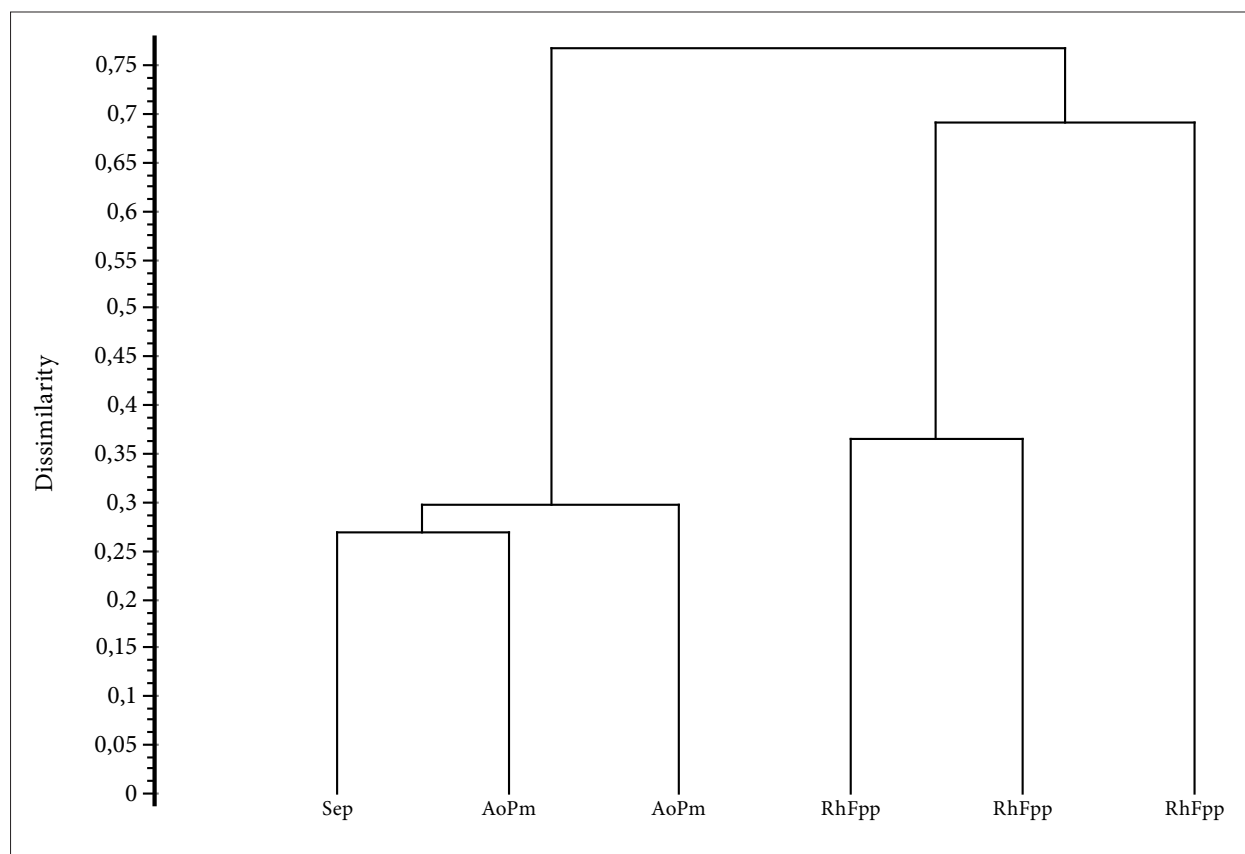


Figure 4: Dendrogram of relevés of shrub and forest vegetation on fluvio-glacial gravel sediments in Klin, in the upper part of the Kot Valley (UPGMA, similarity ratio)

Slika 4: Dendrogram popisov grmiščne in gozdne vegetacije na rečno-ledeniških sedimentih v Klinu v zgornjem delu doline Kot (UPGMA, similarity ratio)

Legend/ Legenda:

Sep *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo*

AoPm *Amelanchiero ovalis-Pinetum mugo laricetosum* nom. prov.

RhFpp *Rhododendro hirsuti-Fagetum sylvaticae petasitetosum paradoxi*

stands into the montane altitudinal form of the subassociation *typicum*. There is also a certain similarity with relevés of the subassociation *Salicetum eleagno-purpureae hieracietosum porrifolii* described by ČUŠIN & ŠILC (2006) on gravel bars of the Soča River near Bovec. The species that differentiate our relevé against the relevés published by ŠILC & ČUŠIN (2000) and ORIOLO & POLDINI (2002) are in particular *Pinus mugo*, *Hieracium porrifolium*, *Rhododendron hirsutum*, *Rhamnus fallax*, *Salix waldsteiniana*, *Dryas octopetala*, *Primula clusiana* and many species of the classes *Elyno-Seslerietea* and *Thlaspietea rotundifolii*. Some of the diagnostic species shared with the stands of the subassociation *-hieracietosum porrifolii* are *Hieracium porrifolium*, *H. piloselloides*, *Carduus crassifolius*, *Biscutella laevigata*, *Campanula cespitosa*, *Silene vulgaris* subsp. *glareosa*, *Achnatherum calamagrostis*, *Rumex scutatus*, *Sesleria caerulea* and *Dryas octopetala*. Our relevé at least slightly resembles also the relevé of the syntaxon *Petasiti-Salicetum purpureo-albae* (ZUPANČIČ, SKUMAVEC & MIHORČIĆ 2017, relevé 2 in the phytosociological table), but with a significant difference – the dominant species there is *Salix eleagnos* and not *Salix alba* – which is a result of different site conditions (M. Zupančič, in litt.). The above comparisons allow us to classify our relevé into the new variant *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo* var. nov. The differential species of the new variant are *Pinus mugo*, *Rhododendron hirsutum*, *Salix waldsteiniana* and *Potentilla clusiana*.

Relevés 2 and 3 in Table 2 can be classified into the association *Amelanchiero ovalis-Pinetum mugo*, as it comprises several its diagnostic species, but not *Fraxinus ornus* and *Ostrya carpinifolia*. Another option would be classification into the association *Rhodothamno-Pinetum mugo*. Given the elevation of occurrence we prefer (like in the case of similar associations *Rhododendro hirsuti-Fagetum* / *Polysticho lonchitis-Fagetum*) the dwarf pine community of lower altitudes (*Amelanchiero-Pinetum mugo*), indicating its similarity with the stands of the association *Rhodothamno-Pinetum mugo* with the provisional name of the subassociation, *laricetosum*.

Stands in relevés 4–6 can be classified into the association *Rhododendro hirsuti-Fagetum sylvaticae*, as they comprise most of its diagnostic species. However, these stands could also be classified into the association *Polysticho lonchitis-Fagetum*. The species supporting this classification is *Sorbus chamaemepsilus*, so these stands can also be treated within the already mentioned altitudinal variant. On the other hand, the studied stands differ from other previously described forms of the association *Rhododendro hirsuti-Fagetum*

with certain ecological characteristics. The stands of this association dominate on steep to precipitous shady slopes, whereas ours were found on levelled terrain and gravel deposits. Based on the above, they can be described and typified as a new subassociation *Rhododendro hirsuti-Fagetum sylvaticae petasitetosum paradoxo* subass. nov. The nomenclatural type, *holotypus*, is relevé 6 in Table 2. The differential species of the new subassociation are *Petasites paradoxus* and *Brachypodium rupestre*.

### 3.3 An overview of syntax described or discussed in the article:

- Salicetia purpureae* Moor 1958
- Salicetalia purpureae* Moor 1958
- Salicion eleagno-daphnoidis* (Moor 1958) Grass 1993
- Salicetum eleagno-purpureae* Sillinger 1933
- hieracietosum porrifolii* Čušin et Šilc 2006
- var. *Pinus mugo* var. nov.
- var. *Achnatherum calamagrostis* var. nov.
- Quercio-Fagetia* Br.-Bl. & Vlieg, 1937
- Rhamnetalia fallacis* Fukarek 1969
- Seslerio calcariae-Rhamnion fallacis* Dakskobler, Franz et Rozman 2013
- Polysticho lonchitis-Rhamnetum fallacis* Dakskobler, Franz et Rozman 2013
- Fagetalia sylvaticae* Pawł. in Pawł. & al. 1928
- Aremonio-Fagion* (Ht. 1938) Borhidi in Török, Podani & Borhidi 1989
- Rhododendro hirsuti-Laburnetum alpini* ass. nov.
- hoc loco
- ostryetosum carpinifoliae* subass. nov. hoc loco
- aceretosum pseudoplatani* subass. nov. hoc loco
- Carici humilis-Laburnetum alpini* nom. prov.
- Rhododendro hirsuti-Fagetum sylvaticae* Accetto ex Dakskobler 1998
- petasitetosum paradoxo* subass. nov. hoc loco
- Vaccinio-Piceetia* Br.-Bl. in Br.-Bl., Sissingh et Vlieger 1939
- Piceetalia excelsae* Pawłowski in Pawłowski et al. 1928
- Erico-Pinion mugo* Leibundgut 1948
- Rhodothamno-Laricetum deciduae* Willner et Zukrigl 1999
- anemonetosum trifoliae* Dakskobler 2006
- Erico-Pinetea* Horvat 1959
- Erico-Pinetalia* Horvat 1959
- Fraxino orni-Pinion nigrae-sylvestris* Zupančič 2007
- Helleboro nigri-Pinenion* (Horvat 1959) Zupančič 2007
- Amelanchiero-Pinetum mugo* Minghetti in Pedrotti 1994

-*laricetosum* nom. prov.

*Rhododendro hirsuti-Ericetea carnea* Schubert et al. 2001

*Rhododendro hirsuti-Ericetalia carnea* Grabherr, Greimler et Mucina 1993

*Ericion carnea* Rübél ex Grabherr, Greimler et Mucina 1993

*Homogyno sylvestris-Salicetum glabrae* Dakskobler et Surina 2017

#### 4 CONCLUSIONS

On slope screes and gravel deposits in the gable end of two glacial valleys in the Julian Alps, in Zadnjica and Kot (Triglav National Park), we phytosociologically described several shrub and forest communities whose development is affected not only by the size, consolidation and moisture level of the gravel, but most decisively by avalanches that occur there every year. Only two shrub and one forest community were documented with a sufficient number of relevés. Stands of associations *Polysticho lonchitis-Rhamnetum fallacis* and *Amelanchiero ovalis-Pinetum mugo* are new to the Kot Valley. We described a new association *Rhododendro hirsuti-Laburnetum alpini*, which belongs to the group of shrub-forest communities of the montane-subalpine belt (*Rhododendro hirsuti-Sorbetum aucupariae*, *Rhododendro hirsuti-Salicetum appendiculatae*, *Rhododendro hirsuti-Betuletum carpaticae*, *Alno viridis-Sorbetum aucupariae*, *Calamagrostio arundinaceae-Sorbetum ariae*) – comp. DAKSKOBLER, KUTNAR & ROZMAN (2016) that are a more or less long-term stages on potential beech sites and their occurrence could, although not necessarily, be associated with human impact or past activities. In our case, the stands of the new association are a stage in development towards beech forest on extreme sites in the montane belt classified into the association *Rhododendro hirsuti-Fagetum*. The stands of this association in the gable ends of Zadnjica and

Kot valleys are characterised by their similarity with stands of the association *Polysticho lonchitis-Fagetum* (and are therefore treated as a special altitudinal variant with *Sorbus chamaemespilus*). Its form on fluvio-glacial gravel deposits that can be treated as a new sub-association *petasitetosum paradoxo* was found only on levelled terrain in the Kot Valley. Our findings confirm and supplement the findings of ZUPANČIČ, SKUMAVEC & MIHORIČ (2017) on the exceptionally diverse and fascinating shrub-forest vegetation in the gable end of the Kot Valley and its substantial biotic value. Most of this vegetation belongs to Natura 2000 habitat types: 91K0 Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*), 4070 *Pinus mugo* and *Rhododendrum hirsutum* shrubs (*Mugo-Rhododendretum hirsuti*) and 9420 Alpine *Larix decidua* forests. It comprises several protected (*Cypripedium calceolus* – also a Natura 2000 species, *Gymnadenia odoratissima*, *G. conopsea*, *Epipactis helleborine*, *Dianthus sternbergii*, *Gentiana clusii*, *Lycopodium annotinum*), endemic (*Cerastium subtriflorum*, *Papaver alpinum* subsp. *ernesti-mayeri* = *P. ernesti-mayeri*) and rare species (*Sorbus mougeotii*). The study area is situated in the inner Triglav National Park area, so human impact on the development of vegetation here (other than increased mountaineering in recent years and human-induced climate changes) is insignificant.

#### 5 POVZETEK

V zatrepu dveh ledeniških dolin v Julijskih Alpah, v Zadnjici in Kotu (Triglavski narodni park), smo na po-bočnih gruščih in prodnatih nanosih fitocenološko opisali več grmiščnih in gozdnih združb, na katerih razvoj poleg velikosti in ustaljenosti ter vlažnosti grušča najbolj odločilno vplivajo predvsem vsakoletni snežni plazovi. Z zadostnim številom popisov smo v obeh dolinah dokumentirali le dve grmiščni in eno gozdno združbo. Sestoji asociacij *Polysticho lonchitis-Rhamnetum fallacis* in *Amelanchiero ovalis-Pinetum mugo* so novost v dolini Kota. V obeh raziskovanih do-

linah smo našli sestoje subasociacije *Salicetum elegno-purpureae hieracietosum porrifolii*, ki smo jo do zdaj poznali le v Zgornjem Posočju (ČUŠIN & ŠILC 2006). Kot novo smo opisali asociacijo *Rhododendro hirsuti-Laburnetum alpini*, ki sodi v skupino grmiščno-gozdnih združb montansko-subalpinskega pasu (*Rhododendro hirsuti-Sorbetum aucupariae*, *Rhododendro hirsuti-Salicetum appendiculatae*, *Rhododendro hirsuti-Betuletum carpaticae*, *Alno viridis-Sorbetum aucupariae*, *Calamagrostio arundinaceae-Sorbetum ariae*) – prim. DAKSKOBLER, KUTNAR & ROZMAN

(2016), ki so bolj ali manj dolgotrajen stadij na potencialno bukovih rastiščih in je njihov nastanek lahko, ne pa nujno, povezan tudi s človekovimi vplivi oz. njegovo preteklo dejavnostjo. V našem primeru so sestoji nove asociacije razvojna stopnja proti bukovemu gozdu na skrajnih rastiščih v montanskem pasu, ki jih uvrščamo v asociacijo *Rhododendro hirsuti-Fagetum*. Za sestoj te asociacije v zatrepih dolin Zadnjice in Kota je značilna podobnost s sestoji asociacije *Polysticho lonchitis-Fagetum* (zato jih obravnavamo kot posebno višinsko varianto z vrsto *Sorbus chamaemespilus*). Samo v dolini Kot pa smo doslej našli njeno obliko na rečno-ledeniških prodatih nanosih, na uravnavi, ki jo lahko vrednotimo kot novo subasociacijo *petasitetosum paradoxii*. Naša spoznanja potrjujejo in dopolnjujejo ugotovitve ZUPANČIČA in sodelavcev (2017) o izredno raznolikem in zanimivem grmiščno-gozdnem ra-

stju v zatrepu doline Kot in o njegovi veliki biotski vrednosti. Večinsko sodi v evropsko varstveno pomembne habitatne tipe: 91K0 Ilirski bukov gozdovi (*Aremonio-Fagion*), 4070 \*Ruševje z dlakavim slečem (*Mugo-Rhododendretum hirsuti*) in 9420 Alpski macesnovi gozdovi. V njem raste več zavarovanih vrst (*Cypripedium calceolus* – tudi Natura 2000 vrsta, *Gymnadenia odoratissima*, *G. conopsea*, *Epipactis helleborine*, *Dianthus sternbergii*, *Gentiana clusii*, *Lycopodium annotinum*), endemitov (*Cerastium subtriflorum*, *Papaver alpinum* subsp. *ernesti-mayeri* = *P. ernesti-mayeri*) in redkih vrst (*Sorbus mougeotii*). Ker raziskano območje leži v strožje varovanem delu Triglavskega narodnega parka, so človekovi vplivi na tukajšnji razvoj vegetacije (z izjemo povečanega obiska planincev v zadnjih letih in od človeka povzročenih podnebnih sprememb) majhni.

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Figure 5: Stand of the syntaxon *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis* in the Zadnjica Valley

Slika 5: Sestoj sintaksona *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Achnatherum calamagrostis* v dolini Zadnjice



Figure 6: Stand of the syntaxon *Rhododendro hirsuti*-*Laburnetum alpini ostryetosum* in the Zadnjica Valley  
Slika 6: Sestoj sintaksona *Rhododendro hirsuti*-*Laburnetum alpini ostryetosum* v dolini Zadnjice



Figure 7: Stand of the association *Polysticho lonchitis*-*Rhamnetum fallacis* in the Kot Valley  
Slika 7: Sestoj asociacije *Polysticho lonchitis*-*Rhamnetum fallacis* v dolini Kot



Figure 8: Successional stages of vegetation on slope screes in the gable end of the Kot Valley (from the left to the right): *Rhododendro-Laburnetum* – *Rhodothamno-Laricetum* – *Polysticho-Rhamnetum* – *Rhododendro-Laburnetum* – *Rhododendro-Fagetum*  
 Slika 8: Sukcesijske stopnje rastja na pobočnem grušču v zatrepu doline kot (od leve proti desni): *Rhododendro-Laburnetum* – *Rhodothamno-Laricetum* – *Polysticho-Rhamnetum* – *Rhododendro-Laburnetum* – *Rhododendro-Fagetum*



Figure 9: Stand of the syntaxon *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo* in the Kot Valley  
 Slika 9: Sestoj sintaksona *Salicetum eleagno-purpureae hieracietosum porrifolii* var. *Pinus mugo* v dolini Kot



Figure 10: Stand of the syntaxon *Rhododendro hirsuti*-*Fagetum petasitetosum paradoxo* in the Kot Valley

Slika 10: Sestoj sintaksona *Rhododendro hirsuti*-*Fagetum petasitetosum paradoxo* v dolini Kot

Table 1: Successional stages of shrub-forest vegetation on slope screes in glacial cirques of Zadnjica and Kot valleys in the Julian Alps  
 Preglednica 1: Sukcesijski stadiji rasti na pobočnem grušču v krnicah dolin Zadnjice in Kota v Julijskih Alpah

| Number of relevé (Zaporedna številka popisa)             | 1              | 2         | 3         | 4         | 5         | 6         | 7             | 8             | 9             | 10            | 11            | 12            | 13            | 14            | 15        | 16        | 17        | 18        | 19            | 20            | 21        | 22        |
|----------------------------------------------------------|----------------|-----------|-----------|-----------|-----------|-----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------|-----------|-----------|-----------|---------------|---------------|-----------|-----------|
| Database number of relevé (Delovna številka popisa)      | 1030           | 1190      | 1180      | 1200      | 1200      | 1150      | 1280          | 1015          | 1000          | 1050          | 1070          | 1080          | 1070          | 1030          | 1170      | 1140      | 1130      | 1115      | 1030          | 1090          | 1190      | 1190      |
| Elevation in m (Nadmorska višina v m)                    | 273163         | 273181    | 273178    | 273180    | 273184    | 273186    | 258936        | 273144        | 273164        | 273145        | 273146        | 273148        | 273147        | 273161        | 273177    | 273182    | 273171    | 273183    | 273162        | 273149        | 273185    | 273176    |
| Aspect (Lega)                                            | NW             | SE        | NE        | E         | SE        | E         | SEE           | NW            | NW            | W             | W             | W             | Sc-Mo         | NW            | NE        | SE        | NW        | N         | NW            | NW            | SE        | NE        |
| Slope in degrees (Nagib v stopinjah)                     | 15             | 35        | 30        | 35        | 40        | 25        | 30            | 15            | 10            | 10            | 15            | 20            | 20            | 25            | 35        | 30        | 40        | 40        | 15            | 45            | 40        | 35        |
| Parent material (Matična podlaga)                        | Gr-Sc          | Sc        | Sc        | Sc        | Sc        | Sc        | Sc            | Sc-Mo         | Sc-Mo         | Sc-Mo         | Sc-Mo         | Ta            | Sc-Mo         | Sc            | Sc        | Rs        | Sc        | Sc        | Rs            | D             | Sc        | Sc        |
| Soil (Tla)                                               | Co             | Li        | Li        | Li        | Li        | Re        | Li            | Re            | Re            | Re            | Re            | Re            | Re            | Re            | Re        | Re        | Co        | Co        | Re            | Re            | Re        | Re        |
| Stoniness in % (Kamnitost v %)                           | 40             | 40        | 35        | 50        | 30        | 30        | 30            | 20            | 20            | 20            | 20            | 20            | 20            | 20            | 20        | 30        | 10        | 20        | 30            | 30            | 20        | 20        |
| Cover in % (Zastiranje v %):                             |                |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Upper tree layer (Zgornja drevesna plast)                |                |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Lower tree layer (Spodnja drevesna plast)                |                |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Shrub layer (Grmovna plast)                              | E3b            |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Herb layer (Zeliščna plast)                              | E3a            |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Moss layer (Mahovna plast)                               | E2             |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Maximum diameter of trees (Največji prsni premer dreves) | E1             | 40        | 50        | 40        | 50        | 80        | 80            | 80            | 80            | 70            | 80            | 80            | 80            | 60            | 60        | 60        | 80        | 70        | 80            | 50            | 50        | 70        |
| Maximum height of trees (Največja drevesna višina)       | E0             |           | 5         | 10        | 5         | 10        |               | 5             | 5             | 15            | 10            | 10            | 10            | 30            | 10        | 10        | 10        | 10        | 10            | 20            | 5         | 10        |
| Number of species (Število vrst)                         | cm             |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
| Relevé area (Velikost popisne ploskve)                   | m              |           |           |           |           |           |               |               |               |               |               |               |               |               |           |           |           |           |               |               |           |           |
|                                                          | m <sup>2</sup> | 49        | 42        | 57        | 48        | 36        | 52            | 33            | 57            | 45            | 52            | 49            | 50            | 48            | 41        | 42        | 48        | 55        | 68            | 52            | 61        | 52        |
|                                                          |                | 100       | 200       | 400       | 200       | 100       | 200           | 100           | 400           | 200           | 400           | 400           | 400           | 200           | 400       | 200       | 200       | 200       | 400           | 400           | 400       | 400       |
| Date of relevé (Datum popisa)                            | 9/21/2018      | 9/19/2018 | 9/19/2018 | 9/19/2018 | 9/19/2018 | 9/19/2018 | 7/3/2015      | 9/21/2018     | 9/21/2018     | 9/21/2018     | 9/21/2018     | 9/21/2018     | 9/21/2018     | 9/21/2018     | 9/19/2018 | 9/19/2018 | 9/19/2018 | 9/21/2018 | 9/21/2018     | 9/21/2018     | 9/19/2018 | 9/19/2018 |
| Locality (Nahajališče)                                   | Zadnjica-Utro  | Kot       | Kot       | Kot       | Kot       | Kot       | Zadnjiški dol | Zadnjica-Utro | Zadnjica-Utro | Zadnjica-Utro | Zadnjica-Utro | Zadnjica-Utro | Zadnjica-Utro | Zadnjica-Utro | Kot       | Kot       | Kot       | Kot       | Zadnjica-Utro | Zadnjica-Utro | Kot       | Kot       |
| Quadrant (Kvadrant)                                      | 9648/2         | 9549/3    | 9549/3    | 9549/3    | 9549/3    | 9549/3    | 9648/2        | 9648/2        | 9648/2        | 9648/2        | 9648/2        | 9648/2        | 9648/2        | 9648/2        | 9549/3    | 9549/3    | 9549/3    | 9648/2    | 9648/2        | 9549/3        | 9549/3    | 9549/3    |
| Coordinate GK Y (D-48)                                   | 408256         | 414505    | 414509    | 414482    | 414510    | 414595    | 407384        | 408199        | 408127        | 408335        | 408395        | 408392        | 408385        | 408208        | 414558    | 414640    | 414680    | 414701    | 408264        | 408395        | 414572    | 414528    |

|                                                                                                           |                                                          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Fr. |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| Number of relevé (Zaporedna številka popisa)                                                              |                                                          |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| Coordinate GK X (D-48)                                                                                    |                                                          |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| Diagnostic species of the associations and subassociations (Diagnostične vrste asociacij in subasociacij) |                                                          |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| SP                                                                                                        | <i>Salix purpurea</i>                                    | E2b | 4 |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 1   |
| SP                                                                                                        | <i>Salix eleagnos</i>                                    | E2b | + |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 5   |
| BA                                                                                                        | <i>Salix glabra</i>                                      | E2  | + | 4 |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 1   |
| AF                                                                                                        | <i>Rhamnus fallax</i>                                    | E2b |   | 1 | 4 | 4 | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 11  |
| AF                                                                                                        | <i>Rhamnus fallax</i>                                    | E2a |   | 1 |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 50  |
| AF                                                                                                        | <i>Rhamnus fallax</i>                                    | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 23  |
| EP                                                                                                        | <i>Rhododendron hirsutum</i>                             | E2a | + |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 2   |
| VP                                                                                                        | <i>Polystichum lonchitis</i>                             | E1  |   | 1 | + | + | + |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 17  |
| MuA                                                                                                       | <i>Aconitum lycoctonum</i> subsp. <i>ranunculifolium</i> | E1  | + |   | + | + | + |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 77  |
| TR                                                                                                        | <i>Gymnocarpium robertianum</i>                          | E1  | + | 1 | 1 | 1 | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 15  |
| FS                                                                                                        | <i>Laburnum alpinum</i>                                  | E3  |   |   |   |   | 4 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 68  |
| FS                                                                                                        | <i>Laburnum alpinum</i>                                  | E2b | + | 1 | + | + |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 20  |
| FS                                                                                                        | <i>Laburnum alpinum</i>                                  | E2a | + |   |   |   | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 91  |
| FS                                                                                                        | <i>Laburnum alpinum</i>                                  | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 14  |
| EP                                                                                                        | <i>Pinus mugo</i>                                        | E2b |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 64  |
| EP                                                                                                        | <i>Pinus mugo</i>                                        | E2a |   | 1 |   |   | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 9   |
| VP                                                                                                        | <i>Clematis alpina</i>                                   | E1  | + |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 2   |
| VP                                                                                                        | <i>Homogyne sylvestris</i>                               | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 14  |
| BA                                                                                                        | <i>Salix appendiculata</i>                               | E2  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 32  |
| BA                                                                                                        | <i>Sorbus chamaemespilus</i>                             | E2a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 7   |
| VP                                                                                                        | <i>Larix decidua</i>                                     | E3a |   |   |   |   | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 32  |
| VP                                                                                                        | <i>Larix decidua</i>                                     | E2b |   | + |   |   | 4 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 32  |
| VP                                                                                                        | <i>Larix decidua</i>                                     | E2a |   |   |   |   | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 6   |
| EP                                                                                                        | <i>Carex alba</i>                                        | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 7   |
| QP                                                                                                        | <i>Ostrya carpinifolia</i>                               | E3  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 32  |
| QP                                                                                                        | <i>Ostrya carpinifolia</i>                               | E2b |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 5   |
| QP                                                                                                        | <i>Ostrya carpinifolia</i>                               | E2a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 23  |
| TA                                                                                                        | <i>Acer pseudoplatanus</i>                               | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 4   |
| TA                                                                                                        | <i>Acer pseudoplatanus</i>                               | E3a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 18  |
| TA                                                                                                        | <i>Acer pseudoplatanus</i>                               | E2b |   | + | 1 | 1 |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 9   |
| TA                                                                                                        | <i>Acer pseudoplatanus</i>                               | E2a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 4   |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E1  |   |   |   |   | 1 |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 18  |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E3b |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 4   |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E3a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 18  |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E2b |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 9   |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E2a |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 27  |
| FS                                                                                                        | <i>Fagus sylvatica</i>                                   | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 10  |
| EP                                                                                                        | <i>Rhodothamnus chamaecistus</i>                         | E1  | + |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 1   |
| ES                                                                                                        | <i>Carex ferruginea</i>                                  | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 5   |
| AT                                                                                                        | <i>Carex brachystachys</i>                               | E1  |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | 32  |

|                                              | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Pr. | Fr. |
|----------------------------------------------|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
| Number of relevé (Zaporedna številka popisa) |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| AF <b>Artemion-Fagion</b>                    |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Cyclamen purpurascens</i>                 | E1  | . | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 86  |
| <i>Anemone trifolia</i>                      | E1  | . | . | + | . | . | . | + | . | .  | 1  | +  | +  | 1  | 1  | 1  | .  | .  | 1  | 1  | 1  | 1  | +   | 13  |
| <i>Knautia drymeia</i>                       | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | 1  | +  | .  | .  | .  | .  | +   | 3   |
| <i>Helleborus niger</i>                      | E1  | . | . | . | . | . | . | + | + | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Cardamine enneaphyllos</i>                | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 1   |
| TA <b>Tilio-Acerion</b>                      |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Thalictrum aquilegifolium</i>             | E1  | . | . | + | . | + | . | . | . | .  | .  | .  | .  | .  | +  | .  | 1  | 1  | .  | .  | .  | .  | .   | 6   |
| <i>Polystichum aculeatum</i>                 | E1  | . | . | r | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | +   | 4   |
| <i>Geranium robertianum</i>                  | E1  | . | . | 1 | + | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 3   |
| <i>Euonymus latifolia</i>                    | E2b | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .   | 1   |
| <i>Aruncus dioicus</i>                       | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | 1  | .  | .  | .  | .  | .   | 1   |
| FS <b>Fagetalia sylvaticae</b>               |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Melica nutans</i>                         | E1  | . | . | + | + | 1 | + | 2 | 1 | 1  | 1  | 1  | 2  | 1  | 1  | 1  | +  | +  | 1  | 1  | 1  | 1  | +   | 20  |
| <i>Mercurialis perennis</i>                  | E1  | + | + | 1 | . | 1 | 2 | 1 | 1 | 1  | 1  | 1  | 1  | +  | 1  | 1  | +  | +  | .  | +  | 1  | 1  | +   | 20  |
| <i>Galium laevigatum</i>                     | E1  | . | . | + | . | . | 1 | . | . | +  | 1  | 1  | +  | +  | +  | +  | +  | +  | 1  | 1  | 1  | +  | +   | 15  |
| <i>Daphne mezereum</i>                       | E2a | . | . | + | + | . | . | 1 | 1 | 1  | +  | +  | +  | .  | .  | .  | +  | +  | .  | +  | +  | +  | +   | 13  |
| <i>Lonicera alpigena</i>                     | E2a | . | . | + | + | . | . | . | . | 1  | +  | .  | +  | +  | +  | +  | .  | +  | 1  | +  | +  | .  | .   | 12  |
| <i>Galeobdolon flavidum</i>                  | E1  | . | + | + | + | 1 | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | 1  | +  | .   | 7   |
| <i>Dryopteris filix-mas</i>                  | E1  | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | +  | .  | .  | +   | 6   |
| <i>Euphorbia amygdaloides</i>                | E1  | . | . | . | . | + | . | . | . | .  | .  | .  | .  | .  | +  | .  | .  | +  | .  | .  | .  | +  | 1   | 5   |
| <i>Mycelis muralis</i>                       | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .   | 23  |
| <i>Salvia glutinosa</i>                      | E1  | . | . | . | . | . | . | + | + | +  | +  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .   | 5   |
| <i>Actaea spicata</i>                        | E1  | . | . | . | . | . | . | . | + | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Brachypodium sylvaticum</i>               | E1  | . | . | . | . | . | . | . | . | +  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Luzula nivea</i>                          | E1  | . | . | . | . | . | . | . | . | +  | .  | .  | .  | .  | .  | .  | .  | .  | 1  | .  | .  | .  | .   | 2   |
| <i>Paris quadrifolia</i>                     | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Epilobium montanum</i>                    | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .   | 1   |
| <i>Epipactis helleborine</i>                 | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .   | 1   |
| <i>Poa nemoralis</i>                         | E1  | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 1   |
| QP <b>Quercetalia pubescenti-petraeae</b>    |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Sorbus aria (Aria edulis)</i>             | E3a | . | . | . | . | . | . | 1 | 1 | 1  | +  | .  | 1  | +  | .  | +  | .  | .  | .  | .  | .  | .  | .   | 8   |
| <i>Sorbus aria</i>                           | E2b | . | . | . | . | + | . | . | . | 1  | +  | 1  | +  | +  | +  | .  | .  | +  | 1  | .  | .  | .  | .   | 9   |
| <i>Sorbus aria</i>                           | E2a | . | . | . | . | + | . | + | . | 1  | 1  | +  | +  | .  | .  | .  | .  | 1  | 2  | .  | .  | +  | +   | 41  |
| <i>Sorbus aria</i>                           | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | +  | +   | 2   |
| <i>Primula veris</i>                         | E1  | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 1   |
| <i>Hypericum montanum</i>                    | E1  | . | . | . | . | . | . | . | + | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 5   |
| <i>Convallaria majalis</i>                   | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | 1  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 1   |
| QF <b>Quercus-Fagetea</b>                    |     |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Hepatica nobilis</i>                      | E1  | . | . | . | . | . | . | . | . | 1  | 1  | 1  | 1  | +  | .  | .  | .  | .  | 1  | 1  | .  | .  | .   | 7   |
| <i>Carex digitata</i>                        | E1  | . | . | . | . | + | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | +  | .  | .  | .   | 5   |
| <i>Potentilla erecta</i>                     | E1  | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Lonicera xylosteum</i>                    | E2a | . | . | . | . | . | . | . | + | .  | .  | +  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 2   |
| <i>Platanthera bifolia</i>                   | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .   | 1   |
| <i>Dryopteris carthusiana</i>                | E1  | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | r  | .  | .  | .  | .   | 5   |

| Number of relevé (Zaporedna številka popisa) |                                          |                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|----------------------------------------------|------------------------------------------|-------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|
| VP                                           |                                          | Vaccinio-Piceetea |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|                                              | <i>Picea abies</i>                       | E2b               | . | . | + | . | . | 1 | . | . | + | . | . | + | . | . | + | + | . | . | . | . | . | 5  | 23  |
|                                              | <i>Picea abies</i>                       | E2a               | . | + | + | r | . | 1 | . | + | + | + | . | . | . | . | 1 | + | + | + | . | . | . | 11 | 50  |
|                                              | <i>Vaccinium myrtillus</i>               | E1                | . | . | . | . | . | . | . | 2 | + | + | + | . | . | . | 1 | . | 1 | + | . | . | + | 8  | 36  |
|                                              | <i>Maianthemum bifolium</i>              | E1                | . | . | . | . | . | . | . | + | + | + | + | . | . | . | . | . | . | + | . | . | . | 6  | 27  |
|                                              | <i>Valeriana tripteris</i>               | E1                | . | . | . | . | . | . | . | 1 | + | + | + | + | . | . | . | . | + | + | . | . | . | 6  | 27  |
|                                              | <i>Lonicera nigra</i>                    | E2a               | . | . | . | . | . | . | . | 1 | + | 1 | + | . | . | . | . | 1 | . | . | . | . | . | 5  | 23  |
|                                              | <i>Solidago virgaurea</i>                | E1                | . | . | . | . | . | . | . | . | . | + | + | + | . | . | . | . | + | . | . | . | . | 4  | 18  |
|                                              | <i>Vaccinium vitis-idaea</i>             | E1                | . | . | . | . | . | . | . | 1 | 1 | 1 | . | . | . | . | 1 | . | . | . | . | . | . | 4  | 18  |
|                                              | <i>Veronica urticifolia</i>              | E1                | . | . | . | . | . | . | . | + | . | . | . | . | . | . | + | . | 1 | . | . | 1 | + | 4  | 18  |
|                                              | <i>Abies alba</i>                        | E2b               | . | . | . | . | . | . | . | . | . | + | + | + | . | . | . | . | . | . | . | . | . | 3  | 14  |
|                                              | <i>Abies alba</i>                        | E2a               | . | . | . | . | . | . | + | . | . | . | + | + | . | . | . | . | . | . | . | . | . | 3  | 14  |
|                                              | <i>Gymnocarpium dryopteris</i>           | E1                | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | + | . | . | . | 3  | 14  |
|                                              | <i>Oxalis acetosella</i>                 | E1                | . | . | . | . | . | . | . | . | . | . | + | . | . | . | 1 | . | . | . | . | + | . | 3  | 14  |
|                                              | <i>Calamagrostis villosa</i>             | E1                | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 3  | 14  |
|                                              | <i>Lycopodium annotinum</i>              | E1                | . | . | . | . | . | . | . | . | . | 1 | . | . | . | . | . | . | . | . | . | . | . | 2  | 9   |
|                                              | <i>Gentiana asclepiadea</i>              | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 2 | 2 | . | . | . | . | . | 2  | 9   |
|                                              | <i>Saxifraga cuneifolia</i>              | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | + | . | 2  | 9   |
|                                              | <i>Huperzia selago</i>                   | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | + | 2  | 9   |
|                                              | <i>Rosa pendulina</i>                    | E2a               | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
|                                              | <i>Phlegopteris connectilis</i>          | E1                | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
|                                              | <i>Aposperis foetida</i>                 | E1                | . | . | . | . | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
|                                              | <i>Hieracium murorum</i>                 | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | 1  | 5   |
|                                              | <i>Luzula pilosa</i>                     | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | 1  | 5   |
|                                              | <i>Dryopteris expansa</i>                | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | 1  | 5   |
|                                              | <i>Luzula sylvatica</i>                  | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1 | 1  | 5   |
| EP                                           |                                          | Erico-Pinetea     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|                                              | <i>Calamagrostis varia</i>               | E1                | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | + | 1 | 2 | 1 | 2 | 1 | 2 | + | 1 | 22 | 100 |
|                                              | <i>Molinia arundinacea</i>               | E1                | + | 1 | + | + | 1 | + | . | . | + | + | 3 | 3 | + | + | . | 3 | + | . | 1 | . | 1 | 17 | 77  |
|                                              | <i>Rubus saxatilis</i>                   | E1                | . | + | + | + | 1 | + | . | . | . | 1 | 1 | 1 | 1 | + | 1 | + | 1 | . | + | + | . | 16 | 73  |
|                                              | <i>Erica carnea</i>                      | E1                | . | . | . | . | 2 | . | + | . | 2 | 2 | 3 | 2 | 3 | 1 | 2 | . | . | + | + | + | 3 | 12 | 55  |
|                                              | <i>Peucedanum rablense</i>               | E1                | 1 | + | 1 | + | 1 | 1 | . | + | . | . | r | . | . | . | 1 | . | . | . | . | + | . | 9  | 41  |
|                                              | <i>Amelanchier ovalis</i>                | E2b               | . | . | . | . | . | . | . | . | . | . | + | + | + | . | . | . | . | . | . | . | . | 3  | 14  |
|                                              | <i>Amelanchier ovalis</i>                | E2a               | . | . | . | . | . | r | . | . | . | + | 1 | + | + | . | . | . | . | + | . | . | . | 6  | 27  |
|                                              | <i>Polygala chamaebuxus</i>              | E1                | . | + | . | . | . | . | . | . | + | . | 1 | + | + | . | . | . | . | . | . | . | . | 5  | 23  |
|                                              | <i>Cotoneaster tomentosus</i>            | E2a               | . | . | . | . | . | . | . | . | . | + | 1 | . | + | . | . | . | . | . | . | . | . | 4  | 18  |
|                                              | <i>Euphrasia cuspidata</i>               | E1                | . | + | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . | + | . | . | . | 4  | 18  |
|                                              | <i>Asperula aristata</i>                 | E1                | . | + | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 2  | 9   |
|                                              | <i>Rhamnus saxatilis</i>                 | E1                | . | . | . | . | . | . | . | . | 1 | . | . | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
|                                              | <i>Aquilegia nigricans</i>               | E1                | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
| BA                                           |                                          | Betulo-Alnetea    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |     |
|                                              | <i>Sorbus mougeotii</i>                  | E3a               | . | . | . | . | . | . | + | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1  | 5   |
|                                              | <i>Sorbus mougeotii</i>                  | E2b               | . | . | . | r | . | . | . | . | . | + | + | r | . | . | + | . | . | + | . | . | . | 6  | 27  |
|                                              | <i>Sorbus austriaca subsp. austriaca</i> | E2b               | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | + | 1  | 5   |

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| Number of relevé (Zaporedna številka popisa)               |    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Pr. | Fr. |
|------------------------------------------------------------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
| <i>Arabis hirsuta</i>                                      | E1 | . | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Hippocrepis comosa</i>                                  | E1 | . | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Teucrium montanum</i>                                   | E1 | . | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Gymnadenia conopsea</i>                                 | E1 | . | . | . | . | r | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Briza media</i>                                         | E1 | . | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| MA <b>Molinio-Arrhenatheretea</b>                          |    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Galium album</i>                                        | E1 | . | . | . | . | . | . | 1 | + | . | +  | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 5   | 23  |
| PaT <i>Ranunculus nemorosus</i> agg.                       | E1 | . | . | . | . | . | . | . | + | . | +  | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 4   | 18  |
| <i>Achillea millefolium</i>                                | E1 | . | . | . | . | . | . | . | 1 | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 2   | 9   |
| <i>Lathyrus pratensis</i>                                  | E1 | . | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 2   | 9   |
| <i>Trifolium pratense</i>                                  | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| CD <b>Caricetalia davallianae</b>                          |    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Parnassia palustris</i>                                 | E1 | . | . | . | . | . | + | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 2   | 9   |
| <i>Tofieldia calyculata</i>                                | E1 | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 1   | 5   |
| ES <b>Elyno-Seslerietea</b>                                |    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Betonica alopecurus</i>                                 | E1 | . | 2 | 1 | 1 | 1 | 2 | 2 | + | 1 | 1  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 21  | 95  |
| <i>LasERPitium peucedanoides</i>                           | E1 | + | + | + | . | . | 1 | 1 | + | + | +  | .  | +  | .  | +  | .  | .  | .  | +  | .  | +  | +  | +  | 15  | 68  |
| <i>Sesleria caerulea</i>                                   | E1 | . | 1 | + | + | . | 2 | + | . | . | .  | 1  | .  | +  | .  | +  | 1  | +  | .  | .  | .  | .  | +  | 13  | 59  |
| <i>Scabiosa lucida</i> subsp. <i>stricta</i>               | E1 | + | . | 1 | + | + | 1 | . | . | . | .  | +  | .  | .  | .  | .  | +  | 1  | 1  | .  | .  | .  | +  | 10  | 45  |
| <i>Carduus crassifolius</i>                                | E1 | 1 | 1 | + | 1 | 1 | 1 | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | +  | .  | 8   | 36  |
| <i>Thymus praecox</i> subsp. <i>polytrichus</i>            | E1 | . | 1 | + | . | + | + | + | + | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | 8   | 36  |
| <i>Linum julicum</i>                                       | E1 | . | + | + | + | . | . | + | . | . | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | 6   | 27  |
| <i>Festuca calva</i>                                       | E1 | . | . | . | . | . | + | . | + | . | .  | .  | .  | +  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 5   | 23  |
| <i>Rhnanthus glacialis</i>                                 | E1 | . | + | + | + | . | + | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 4   | 18  |
| <i>Lotus corniculatus</i> s. lat. (L. <i>alpinus</i> ?)    | E1 | + | . | . | . | . | + | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 3   | 14  |
| <i>Carex mucronata</i>                                     | E1 | . | + | + | + | 1 | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 3   | 14  |
| <i>Helianthemum nummularium</i> subsp. <i>grandiflorum</i> | E1 | . | + | . | . | + | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | 3   | 14  |
| <i>Phyteuma orbiculare</i>                                 | E1 | + | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 3   | 14  |
| <i>Aster bellidiastrum</i>                                 | E1 | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | +  | .  | .  | 2   | 9   |
| <i>Thesium alpinum</i>                                     | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Dryas octopetala</i>                                    | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Achillea clavinae</i>                                   | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Acinos alpinus</i>                                      | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Alchemilla alpigena</i>                                 | E1 | + | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Carex sempervirens</i>                                  | E1 | + | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Euphrasia picta</i>                                     | E1 | . | . | . | . | . | 1 | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Juncus monanthos</i>                                    | E1 | . | . | . | . | . | + | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Astrantia bavarica</i>                                  | E1 | . | . | . | . | . | . | . | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Arabis vohinensis</i>                                   | E1 | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Globularia nudicaulis</i>                               | E1 | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Selaginella selaginoides</i>                            | E1 | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | 1   | 5   |
| TR <b>Thlaspietea rotundifolii</b>                         |    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |
| <i>Astrantia carniolica</i>                                | E1 | + | + | . | + | + | 1 | . | . | . | .  | .  | .  | .  | .  | +  | .  | 2  | 2  | .  | 2  | 1  | +  | 11  | 50  |
| <i>Valeriana montana</i>                                   | E1 | . | 2 | 1 | 1 | 2 | . | . | . | . | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | 1  | +  | 7   | 32  |
| <i>Adenostyles glabra</i>                                  | E1 | + | . | + | . | . | + | 2 | . | . | .  | .  | .  | .  | .  | .  | .  | .  | 2  | .  | .  | +  | .  | 6   | 27  |

| Number of relevé (Zaporedna številka popisa)    |  | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Pr. | Fr.  |
|-------------------------------------------------|--|----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|------|
| <i>Achnatherum calamagrostis</i>                |  | E1 | 3 | . | . | . | . | 1 | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | 5   | 23   |
| <i>Biscutella laevigata</i>                     |  | E1 | . | + | + | . | . | + | . | . | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 5   | 23   |
| <i>Campanula cespitosa</i>                      |  | E1 | + | + | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 5   | 23   |
| <i>Festuca nitida</i>                           |  | E1 | . | 1 | + | . | . | . | . | . | .  | .  | .  | .  | +  | .  | +  | .  | .  | .  | .  | .  | .  | 5   | 23   |
| <i>Aquilegia einseleana</i>                     |  | E1 | + | . | + | . | . | + | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 4   | 18   |
| <i>Gypsophila repens</i>                        |  | E1 | + | + | + | . | . | + | + | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 4   | 18   |
| <i>Hieracium bifidum</i>                        |  | E1 | + | . | . | . | . | + | . | . | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 4   | 18   |
| <i>Rumex scutatus</i>                           |  | E1 | + | + | 1 | . | . | + | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 4   | 18   |
| <i>Trisetum argenteum</i>                       |  | E1 | . | . | + | 1 | . | . | . | . | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | .  | 4   | 18   |
| <i>Scrophularia juratensis</i>                  |  | E1 | . | . | + | 1 | . | + | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 3   | 14   |
| <i>Asplenium fissum</i>                         |  | E1 | . | . | 1 | + | 2 | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 3   | 14   |
| <i>Arabis alpina</i>                            |  | E1 | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 2   | 9    |
| <i>Hieracium porrifolium</i>                    |  | E1 | + | + | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 2   | 9    |
| <i>Silene vulgaris subsp. glareosa</i>          |  | E1 | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 2   | 9    |
| <i>Viola pyrenaica</i>                          |  | E1 | . | + | . | . | . | . | . | . | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | .  | .  | .  | 2   | 9    |
| <i>Athamanta cretensis</i>                      |  | E1 | 1 | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Petasites paradoxus</i>                      |  | E1 | 1 | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Hieracium piloselloides</i>                  |  | E1 | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Leontodon hyosceroides</i>                   |  | E1 | + | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Heliosperma alpestre</i>                     |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Dianthus sternbergii</i>                     |  | E1 | . | . | . | . | . | . | . | . | .  | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| <i>Cerastium subtriflorum</i>                   |  | E1 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 1   | 5    |
| <i>Cystopteris montana</i>                      |  | E1 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | 1  | .  | .  | .  | .  | 1   | 5    |
| <i>Soldanella alpina</i>                        |  | E1 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |
| AT <b><i>Asplenietea trichomanis</i></b>        |  |    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| <i>Asplenium viride</i>                         |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | +  | +  | .  | +  | +  | +  | 7   | 32   |
| <i>Paederota lutea</i>                          |  | E1 | . | . | + | . | + | . | . | . | .  | .  | .  | .  | .  | .  | +  | +  | +  | .  | .  | .  | .  | 5   | 23   |
| <i>Asplenium trichomanes</i>                    |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | +  | .  | .  | .  | .  | .  | 4   | 18   |
| <i>Kernera saxatilis</i>                        |  | E1 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | +  | .  | 2   | 9    |
| <i>Moehringia muscosa</i>                       |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | 2   | 9    |
| <i>Asplenium ruta-muraria</i>                   |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | 2   | 9    |
| <i>Cystopteris regia</i>                        |  | E1 | . | . | + | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | +  | .  | .  | .  | .  | 2   | 9    |
| <i>Cystopteris fragilis</i>                     |  | E1 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | +  | +  | .  | .  | .  | .  | 2   | 9    |
| ML <b>Mosses and lichens (Mahovi in lišaji)</b> |  |    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| <i>Ctenidium molluscum</i>                      |  | E0 | . | . | 1 | 1 | . | 1 | . | . | 1  | 1  | 1  | 1  | +  | 1  | .  | 1  | 1  | .  | 1  | 1  | 1  | 14  | 64   |
| <i>Tortella tortuosa</i>                        |  | E0 | + | . | . | 1 | 1 | . | + | . | 1  | 1  | 1  | .  | .  | +  | 1  | 1  | +  | .  | .  | .  | .  | 12  | 54,5 |
| <i>Hylocomium splendens</i>                     |  | E0 | . | . | + | . | 1 | . | . | . | .  | +  | 1  | +  | 1  | +  | .  | .  | .  | +  | +  | .  | .  | 11  | 50   |
| <i>Rhytidiadelphus triquetrus</i>               |  | E0 | . | . | . | . | 1 | . | + | . | 1  | 1  | 2  | 1  | 2  | 1  | 1  | .  | 1  | .  | .  | .  | +  | 11  | 50   |
| <i>Fissidens dubius</i>                         |  | E0 | . | . | . | . | . | . | . | . | +  | .  | .  | .  | .  | +  | .  | 1  | 1  | .  | .  | .  | 1  | 5   | 23   |
| <i>Dicranum scoparium</i>                       |  | E0 | . | . | . | . | . | . | . | . | .  | .  | +  | .  | +  | .  | +  | .  | .  | .  | +  | .  | .  | 3   | 14   |
| <i>Peltigera canina</i>                         |  | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | +  | .  | .  | +  | +  | .  | .  | 3   | 13,6 |
| <i>Homalothecium lutescens</i>                  |  | E0 | . | . | . | + | . | . | . | . | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 2   | 9    |
| <i>Conocephalum conicum</i>                     |  | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | 1  | 1  | .  | .  | .  | .  | 2   | 9    |
| <i>Schistidium apocarpum</i>                    |  | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | +  | .  | 2   | 9    |
| <i>Mnium thomsonii</i>                          |  | E0 | . | . | . | . | . | . | . | . | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5    |

| Number of relevé (Zaporedna številka popisa) | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Pr. | Fr. |
|----------------------------------------------|----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
| <i>Plagiochila porelloides</i>               | E0 | . | . | . | . | . | . | . | . | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Plagiomnium undulatum</i>                 | E0 | . | . | . | . | . | . | . | . | +  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | 1   | 5   |
| <i>Mnium</i> sp.                             | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | .  | 1   | 5   |
| <i>Polytrichum formosum</i>                  | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | .  | 1   | 5   |
| <i>Neckera crispa</i>                        | E0 | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  | .  | +  | .  | .  | 1   | 5   |

**Legend - Legenda**

Pr. Presence (number of relevés in which the species is presented) - število popisov, v katerih se pojavlja vrsta

Fr. Frequency in % - frekvenca v %

Gr Gravel - prod

Sc Scree - grušč

Mo Moraine (Til) - morena (til)

Ta Talus - vršaj

Rs Rockslide - podorno skalovje

D Dolomite - dolomit

Co Colluvial soil - koluvialna tla

Li Lithosols - kamnišče

Re Rendzina - rendzina

QR *Quercetalia roboris*Al *Alnion incanae*PaT *Poo alpinae-Trisetetalia*

**Table 2: Succession of vegetation on fluvial-glacial gravel sediments of the Kotarica in Klin (the Kot Valley), the Julian Alps**  
**Preglednica 2: Sukcesijski razvoj rastja na rečno-ledeeniških prodnatih nanosih Kotarice v Klinu v dolini Kot, Julijske Alpe**

| Number of relevé (Zaporedna številka popisa)                          | 1              | 2         | 3         | 4         | 5         | 6         |         |       |
|-----------------------------------------------------------------------|----------------|-----------|-----------|-----------|-----------|-----------|---------|-------|
| Database number of relevé (Delovna številka popisa)                   | 273197         | 273196    | 273194    | 273191    | 273190    | 273192    |         |       |
| Elevation in m (Nadmorska višina v m)                                 | 990            | 990       | 990       | 980       | 990       | 980       |         |       |
| Aspect (Lega)                                                         | NE             | NE        | NE        | NE        | NE        | NE        |         |       |
| Slope in degrees (Nagib v stopinjah)                                  | 1              | 1         | 1         | 1         | 1         | 1         |         |       |
| Parent material (Matična podlaga)                                     | Gr             | Gr        | Gr        | Gr        | Gr        | Gr        |         |       |
| Soil (Tla)                                                            | Li             | Li        | Re        | Re        | Re        | Re        |         |       |
| Stoniness in % (Kamnitost v %)                                        | 60             | 20        | 5         | 5         | 0         | 0         |         |       |
| Cover in % (Zastiranje v %):                                          |                |           |           |           |           |           |         |       |
| Upper tree layer (Zgornja drevesna plast)                             | E3b            |           |           | 60        | 60        | 60        |         |       |
| Lower tree layer (Spodnja drevesna plast)                             | E3a            |           | 5         | 10        | 20        | 10        |         |       |
| Shrub layer (Grmovna plast)                                           | E2             | 20+60     | 70+20     | 80        | 30+30     | 20+20     | 40+60   |       |
| Herb layer (Zeliščna plast)                                           | E1             | 30        | 70        | 90        | 90        | 95        | 90      |       |
| Moss layer (Mahovna plast)                                            | E0             | 20        | 5         |           | 10        | 5         | 5       |       |
| Maximum diameter of trees (Največji prsni premer dreves)              | cm             |           | 20        | 35        | 35        | 35        |         |       |
| Maximum height of trees (Največja drevesna višina)                    | m              |           | 15        | 22        | 20        | 19        |         |       |
| Number of species (Število vrst)                                      | 50             | 73        | 69        | 54        | 60        | 47        |         |       |
| Relevé area (Velikost popisne ploskve)                                | m <sup>2</sup> | 100       | 200       | 200       | 400       | 400       | 400     |       |
| Date of taking relevé (Datum popisa)                                  | 9/19/2018      | 9/19/2018 | 9/19/2018 | 9/19/2018 | 9/19/2018 | 9/19/2018 |         |       |
| Locality (Nahajališče)                                                | Kot-Klin       | Kot-Klin  | Kot-Klin  | Kot-Klin  | Kot-Klin  | Kot-Klin  |         |       |
| Quadrant (Kvadrant)                                                   | 9549/3         | 9549/3    | 9549/3    | 9549/3    | 9549/3    | 9549/3    |         |       |
| Coordinate GK Y (D-48)                                                | m              | 415054    | 415051    | 415090    | 415145    | 415070    | 415105  |       |
| Coordinate GK X (D-48)                                                | m              | 5140955   | 5140996   | 5141082   | 5141160   | 5141009   | 5141081 |       |
| Diagnostic species of the associations (Diagnostične vrste asociacij) |                |           |           |           |           |           | Pr.     | Fr.   |
| SP <i>Salix eleagnos</i>                                              | E3a            | .         | 1         | +         | .         | .         | .       | 2 33  |
| SP <i>Salix eleagnos</i>                                              | E2b            | 1         | +         | .         | .         | .         | .       | 2 33  |
| SP <i>Salix eleagnos</i>                                              | E2a            | 4         | .         | +         | .         | .         | .       | 2 33  |
| SP <i>Salix eleagnos</i>                                              | E1             | 2         | .         | .         | .         | .         | .       | 1 17  |
| SP <i>Salix purpurea</i>                                              | E2b            | +         | .         | .         | .         | .         | .       | 1 17  |
| TR <i>Petasites paradoxus</i>                                         | E1             | 3         | +         | +         | 1         | +         | +       | 6 100 |
| EP <i>Pinus mugo</i>                                                  | E2b            | +         | 4         | 4         | .         | 1         | 1       | 5 83  |
| EP <i>Pinus mugo</i>                                                  | E2a            | +         | 1         | 1         | +         | +         | .       | 5 83  |
| EP <i>Pinus mugo</i>                                                  | E1             | +         | .         | +         | .         | .         | .       | 2 33  |
| EP <i>Amelanchier ovalis</i>                                          | E2b            | .         | +         | .         | .         | .         | .       | 1 17  |
| EP <i>Amelanchier ovalis</i>                                          | E2a            | .         | +         | r         | .         | r         | .       | 3 50  |
| TR <i>Hieracium porrifolium</i>                                       | E1             | 1         | 1         | +         | .         | .         | .       | 3 50  |
| FS <i>Fagus sylvatica</i>                                             | E3b            | .         | .         | .         | 3         | 3         | 4       | 3 50  |
| FS <i>Fagus sylvatica</i>                                             | E3a            | .         | .         | .         | 1         | 1         | .       | 2 33  |
| FS <i>Fagus sylvatica</i>                                             | E2b            | .         | +         | .         | +         | 1         | 1       | 4 67  |
| FS <i>Fagus sylvatica</i>                                             | E2a            | .         | .         | +         | +         | 1         | 1       | 4 67  |
| FS <i>Fagus sylvatica</i>                                             | E1             | +         | +         | 1         | +         | .         | +       | 5 83  |
| FS <i>Laburnum alpinum</i>                                            | E3a            | .         | .         | +         | +         | 1         | r       | 4 67  |
| FS <i>Laburnum alpinum</i>                                            | E2b            | 1         | .         | +         | +         | 1         | +       | 5 83  |
| FS <i>Laburnum alpinum</i>                                            | E2a            | .         | +         | .         | +         | 1         | +       | 4 67  |
| EP <i>Rhododendron hirsutum</i>                                       | E2a            | +         | 1         | +         | 3         | 2         | 1       | 6 100 |
| VP <i>Clematis alpina</i>                                             | E1             | .         | .         | .         | 1         | 1         | 1       | 3 50  |
| FB <i>Brachypodium rupestre</i>                                       | E1             | .         | .         | .         | 1         | 1         | +       | 3 50  |
| VP <i>Homogyne sylvestris</i>                                         | E1             | .         | .         | .         | +         | .         | +       | 2 33  |
| EP <i>Erico-Pinetea</i>                                               |                |           |           |           |           |           |         |       |
| <i>Calamagrostis varia</i>                                            | E1             | 1         | 1         | +         | 2         | 3         | 3       | 6 100 |
| <i>Erica carnea</i>                                                   | E1             | +         | 4         | 4         | 4         | 4         | 4       | 6 100 |
| <i>Molinia arundinacea</i>                                            | E1             | 1         | 2         | 4         | +         | 1         | 1       | 6 100 |
| <i>Carex alba</i>                                                     | E1             | .         | +         | +         | 1         | 2         | 1       | 5 83  |
| <i>Euphrasia cuspidata</i>                                            | E1             | +         | 1         | 1         | .         | .         | .       | 3 50  |
| <i>Rubus saxatilis</i>                                                | E1             | .         | .         | .         | 1         | 1         | 1       | 3 50  |
| <i>Allium ericetorum</i>                                              | E1             | .         | +         | .         | .         | +         | .       | 2 33  |
| <i>Aquilegia nigricans</i>                                            | E1             | .         | +         | .         | .         | +         | .       | 2 33  |

| Number of relevé (Zaporedna številka popisa) |                                        | 1   | 2 | 3 | 4 | 5 | 6 | Pr. | Fr. |     |
|----------------------------------------------|----------------------------------------|-----|---|---|---|---|---|-----|-----|-----|
|                                              | <i>Asperula aristata</i>               | E1  | . | + | + | . | . | 2   | 33  |     |
|                                              | <i>Carex ornithopoda</i>               | E1  | 1 | + | . | . | . | 2   | 33  |     |
|                                              | <i>Polygala chamaebuxus</i>            | E1  | . | 1 | 1 | . | . | 2   | 33  |     |
|                                              | <i>Rhodothamnus chamaecistus</i>       | E1  | . | + | 1 | . | . | 2   | 33  |     |
|                                              | <i>Crepis slovenica</i>                | E1  | . | + | . | . | . | 1   | 17  |     |
|                                              | <i>Gymnadenia odoratissima</i>         | E1  | . | . | r | . | . | 1   | 17  |     |
|                                              | <i>Cotoneaster tomentosus</i>          | E2a | . | . | . | . | r | 1   | 17  |     |
| AF                                           | <b>Aremonio-Fagion</b>                 |     |   |   |   |   |   |     |     |     |
|                                              | <i>Helleborus niger</i>                | E1  | . | 1 | 1 | 2 | 1 | 5   | 83  |     |
|                                              | <i>Cyclamen purpurascens</i>           | E1  | . | + | + | + | 1 | 5   | 83  |     |
|                                              | <i>Anemone trifolia</i>                | E1  | . | + | + | + | 1 | 5   | 83  |     |
|                                              | <i>Rhamnus fallax</i>                  | E2a | + | . | . | . | . | 1   | 17  |     |
|                                              | <i>Rhamnus fallax</i>                  | E2b | r | . | . | . | . | 1   | 17  |     |
| TA                                           | <b>Tilio-Acerion</b>                   |     |   |   |   |   |   |     |     |     |
|                                              | <i>Acer pseudoplatanus</i>             | E3b | . | . | . | 1 | 1 | +   | 3   | 50  |
|                                              | <i>Acer pseudoplatanus</i>             | E3a | . | . | . | + | 1 | +   | 3   | 50  |
|                                              | <i>Acer pseudoplatanus</i>             | E2b | . | . | . | . | . | +   | 1   | 17  |
|                                              | <i>Acer pseudoplatanus</i>             | E2a | . | + | . | . | . | .   | 1   | 17  |
|                                              | <i>Acer pseudoplatanus</i>             | E1  | + | + | + | + | 1 | 1   | 6   | 100 |
| FS                                           | <b>Fagetalia sylvaticae</b>            |     |   |   |   |   |   |     |     |     |
|                                              | <i>Melica nutans</i>                   | E1  | . | . | + | 1 | 1 | +   | 4   | 67  |
|                                              | <i>Daphne mezereum</i>                 | E2a | . | . | . | 1 | 1 | 1   | 3   | 50  |
|                                              | <i>Lonicera alpigena</i>               | E2a | . | . | . | 2 | 1 | +   | 3   | 50  |
|                                              | <i>Galium laevigatum</i>               | E1  | . | . | . | + | + | +   | 3   | 50  |
|                                              | <i>Euphorbia amygdaloides</i>          | E1  | . | + | . | + | . | .   | 2   | 33  |
|                                              | <i>Cypripedium calceolus</i>           | E1  | . | . | r | + | . | .   | 2   | 33  |
|                                              | <i>Mercurialis perennis</i>            | E1  | . | . | . | + | . | +   | 2   | 33  |
|                                              | <i>Prenanthes purpurea</i>             | E1  | . | . | . | . | + | +   | 2   | 33  |
|                                              | <i>Galeobdolon flavidum</i>            | E1  | . | . | . | . | + | .   | 1   | 17  |
|                                              | <i>Dryopteris filix-mas</i>            | E1  | . | . | . | . | . | +   | 1   | 17  |
| QP                                           | <b>Quercetalia pubescenti-petraeae</b> |     |   |   |   |   |   |     |     |     |
|                                              | <i>Sorbus aria (Aria edulis)</i>       | E3a | . | . | . | . | . | +   | 1   | 17  |
|                                              | <i>Sorbus aria (Aria edulis)</i>       | E2b | . | . | . | 1 | 1 | .   | 2   | 33  |
|                                              | <i>Sorbus aria (Aria edulis)</i>       | E2a | + | + | + | 1 | 1 | +   | 6   | 100 |
|                                              | <i>Sorbus aria (Aria edulis)</i>       | E1  | . | + | + | . | . | .   | 2   | 33  |
| QF                                           | <b>Quercu-Fagetea</b>                  |     |   |   |   |   |   |     |     |     |
| QR                                           | <i>Potentilla erecta</i>               | E1  | . | . | 1 | 1 | + | 1   | 4   | 67  |
|                                              | <i>Hepatica nobilis</i>                | E1  | . | + | + | 1 | . | .   | 3   | 50  |
|                                              | <i>Viola riviniana</i>                 | E1  | . | + | . | r | . | .   | 2   | 33  |
| AI                                           | <i>Frangula alnus</i>                  | E2a | . | . | . | . | + | .   | 1   | 17  |
| VP                                           | <b>Vaccinio-Piceetea</b>               |     |   |   |   |   |   |     |     |     |
|                                              | <i>Picea abies</i>                     | E3b | . | . | . | + | 1 | 1   | 3   | 50  |
|                                              | <i>Picea abies</i>                     | E3a | . | . | + | + | r | +   | 4   | 67  |
|                                              | <i>Picea abies</i>                     | E2b | 1 | . | + | + | 1 | +   | 5   | 83  |
|                                              | <i>Picea abies</i>                     | E2a | . | . | + | + | + | +   | 4   | 67  |
|                                              | <i>Picea abies</i>                     | E1  | + | . | . | . | . | .   | 1   | 17  |
|                                              | <i>Pyrola rotundifolia</i>             | E1  | . | + | + | 2 | 1 | 1   | 5   | 83  |
|                                              | <i>Larix decidua</i>                   | E3b | . | . | . | r | + | +   | 3   | 50  |
|                                              | <i>Larix decidua</i>                   | E3a | . | 1 | + | . | . | .   | 2   | 33  |
|                                              | <i>Larix decidua</i>                   | E2b | 1 | + | + | . | + | .   | 4   | 67  |
|                                              | <i>Larix decidua</i>                   | E2a | . | + | + | + | + | .   | 4   | 67  |
|                                              | <i>Larix decidua</i>                   | E1  | + | + | . | . | . | .   | 2   | 33  |
|                                              | <i>Vaccinium myrtillus</i>             | E1  | . | . | + | 3 | 3 | 3   | 4   | 67  |
|                                              | <i>Vaccinium vitis-idaea</i>           | E1  | . | . | + | 2 | 2 | 2   | 4   | 67  |
|                                              | <i>Lonicera nigra</i>                  | E2a | . | . | . | 1 | 1 | +   | 3   | 50  |
|                                              | <i>Orthilia secunda</i>                | E1  | . | . | . | 1 | + | +   | 3   | 50  |
|                                              | <i>Lycopodium annotinum</i>            | E1  | . | . | . | + | + | +   | 3   | 50  |
|                                              | <i>Gentiana asclepiadea</i>            | E1  | . | + | . | . | + | .   | 2   | 33  |
|                                              | <i>Veronica urticifolia</i>            | E1  | . | . | . | + | . | .   | 1   | 17  |
|                                              | <i>Hieracium murorum</i>               | E1  | . | . | . | + | . | .   | 1   | 17  |
|                                              | <i>Lonicera caerulea</i>               | E2a | . | . | . | r | . | .   | 1   | 17  |
|                                              | <i>Maianthemum bifolium</i>            | E1  | . | . | . | . | + | .   | 1   | 17  |

| Number of relevé (Zaporedna številka popisa) |                                                          | 1   | 2 | 3 | 4 | 5 | 6 | Pr. | Fr. |
|----------------------------------------------|----------------------------------------------------------|-----|---|---|---|---|---|-----|-----|
|                                              | <i>Abies alba</i>                                        | E2a | . | . | . | + | . | 1   | 17  |
|                                              | <i>Aposeris foetida</i>                                  | E1  | . | . | . | + | . | 1   | 17  |
|                                              | <i>Solidago virgaurea</i>                                | E1  | . | . | . | + | . | 1   | 17  |
|                                              | <i>Luzula pilosa</i>                                     | E1  | . | . | . | . | + | 1   | 17  |
| BA                                           | <b>Betulo-Alnetea</b>                                    |     |   |   |   |   |   |     |     |
|                                              | <i>Salix appendiculata</i>                               | E2b | . | + | + | . | . | 2   | 33  |
|                                              | <i>Salix appendiculata</i>                               | E2a | 2 | . | + | . | . | 3   | 50  |
|                                              | <i>Salix appendiculata</i>                               | E1  | 1 | . | . | . | . | 1   | 17  |
|                                              | <i>Juniperus sibirica</i>                                | E2a | . | . | . | . | r | 2   | 33  |
|                                              | <i>Sorbus chamaemespilus</i>                             | E2a | . | . | + | . | + | 3   | 50  |
|                                              | <i>Salix waldsteiniana</i>                               | E2a | + | . | . | . | . | 1   | 17  |
|                                              | <i>Salix glabra</i>                                      | E2a | . | + | . | . | . | 1   | 17  |
| MuA                                          | <b>Mulgedio-Aconitetea</b>                               |     |   |   |   |   |   |     |     |
|                                              | <i>Polygonatum verticillatum</i>                         | E1  | . | . | . | + | . | 1   | 17  |
|                                              | <i>Athyrium filix-femina</i>                             | E1  | . | . | . | . | + | 1   | 17  |
| EA                                           | <b>Epilobietea angustifolii</b>                          |     |   |   |   |   |   |     |     |
|                                              | <i>Fragaria vesca</i>                                    | E1  | . | . | . | + | + | 3   | 50  |
| SSC                                          | <b>Sambuci-Salicion capreae, Rhamno-Prunetea</b>         |     |   |   |   |   |   |     |     |
|                                              | <i>Sorbus aucuparia</i>                                  | E3a | . | + | . | + | . | 3   | 50  |
|                                              | <i>Sorbus aucuparia</i>                                  | E2b | . | . | . | + | . | 1   | 17  |
|                                              | <i>Sorbus aucuparia</i>                                  | E1  | . | . | + | + | + | 4   | 67  |
| RP                                           | <i>Berberis vulgaris</i>                                 | E2a | . | . | . | . | r | 1   | 17  |
| FB                                           | <b>Festuco-Brometea</b>                                  |     |   |   |   |   |   |     |     |
|                                              | <i>Bupthalmum salicifolium</i>                           | E1  | + | + | 1 | + | + | 5   | 83  |
|                                              | <i>Galium lucidum</i>                                    | E1  | + | + | + | + | . | 4   | 67  |
|                                              | <i>Carlina acaulis</i>                                   | E1  | . | + | + | . | + | 3   | 50  |
|                                              | <i>Cirsium erisithales</i>                               | E1  | + | + | . | . | . | 2   | 33  |
|                                              | <i>Hippocrepis comosa</i>                                | E1  | . | 1 | + | . | . | 2   | 33  |
|                                              | <i>Prunella grandiflora</i>                              | E1  | . | + | 1 | . | . | 2   | 33  |
|                                              | <i>Gentianella ciliata</i>                               | E1  | . | 1 | . | . | + | 2   | 33  |
|                                              | <i>Festuca rupicola</i>                                  | E1  | + | . | . | . | . | 1   | 17  |
|                                              | <i>Coronilla vaginalis</i>                               | E1  | . | + | . | . | . | 1   | 17  |
|                                              | <i>Stachys recta s. lat.</i>                             | E1  | . | + | . | . | . | 1   | 17  |
|                                              | <i>Gymnadenia conopsea</i>                               | E1  | . | . | + | . | . | 1   | 17  |
| TG                                           | <i>Viola hirta</i>                                       | E1  | . | . | + | . | . | 1   | 17  |
| PaT                                          | <b>Poo alpinae-Trisetetalia, Molinio-Arrhenatheretea</b> |     |   |   |   |   |   |     |     |
| MA                                           | <i>Angelica sylvestris</i>                               | E1  | . | + | r | . | . | 2   | 33  |
|                                              | <i>Campanula scheuchzeri</i>                             | E1  | . | . | . | + | . | 1   | 17  |
|                                              | <i>Ranunculus nemorosus</i>                              | E1  | . | . | . | r | . | 1   | 17  |
| ES                                           | <b>Elyno-Seslerietea</b>                                 |     |   |   |   |   |   |     |     |
|                                              | <i>Laserpitium peucedanoides</i>                         | E1  | . | + | 1 | + | 1 | 5   | 83  |
|                                              | <i>Dryas octopetala</i>                                  | E1  | 1 | 3 | 2 | + | . | 4   | 67  |
|                                              | <i>Lotus corniculatus s. lat. (L. alpinus)</i>           | E1  | . | + | 1 | + | + | 4   | 67  |
|                                              | <i>Betonica alopecuros</i>                               | E1  | . | + | 1 | . | 1 | 4   | 67  |
|                                              | <i>Aster bellidiastrum</i>                               | E1  | + | 1 | 2 | . | . | 3   | 50  |
|                                              | <i>Carex mucronata</i>                                   | E1  | + | 1 | + | . | . | 3   | 50  |
|                                              | <i>Globularia cordifolia</i>                             | E1  | + | 1 | + | . | . | 3   | 50  |
|                                              | <i>Carex firma</i>                                       | E1  | + | + | 1 | . | . | 3   | 50  |
|                                              | <i>Senecio abrotanifolius</i>                            | E1  | . | + | + | + | . | 3   | 50  |
|                                              | <i>Scabiosa lucida subsp. stricta</i>                    | E1  | . | + | 1 | . | + | 3   | 50  |
|                                              | <i>Carduus crassifolius</i>                              | E1  | + | + | . | . | . | 2   | 33  |
|                                              | <i>Sesleria caerulea</i>                                 | E1  | + | . | + | . | . | 2   | 33  |
| NS                                           | <i>Antennaria dioica</i>                                 | E1  | . | + | + | . | . | 2   | 33  |
| CD                                           | <i>Tofieldia calyculata</i>                              | E1  | . | + | + | . | . | 2   | 33  |
|                                              | <i>Achillea clavenae</i>                                 | E1  | + | . | . | . | . | 1   | 17  |
|                                              | <i>Phyteuma orbiculare</i>                               | E1  | + | . | . | . | . | 1   | 17  |
|                                              | <i>Globularia nudicaulis</i>                             | E1  | . | + | . | . | . | 1   | 17  |
|                                              | <i>Thymus praecox subsp. polytrichus</i>                 | E1  | . | + | . | . | . | 1   | 17  |
|                                              | <i>Arctostaphylos alpinus</i>                            | E1  | . | . | + | . | . | 1   | 17  |
|                                              | <i>Gentiana clusii</i>                                   | E1  | . | . | + | . | . | 1   | 17  |
|                                              | <i>Rhinanthus glacialis</i>                              | E1  | . | . | + | . | . | 1   | 17  |
|                                              | <i>Thesium alpinum</i>                                   | E1  | . | . | + | . | . | 1   | 17  |

| Number of relevé (Zaporedna številka popisa) |                                                     | 1  | 2 | 3 | 4 | 5 | 6 | Pr. | Fr. |
|----------------------------------------------|-----------------------------------------------------|----|---|---|---|---|---|-----|-----|
|                                              | <i>Ranunculus carinthiacus</i>                      | E1 | . | . | . | . | + | 1   | 17  |
| TR                                           | <b><i>Thlaspietea rotundifolii</i></b>              |    |   |   |   |   |   |     |     |
|                                              | <i>Campanula cespitosa</i>                          | E1 | 1 | + | . | + | . | 4   | 67  |
|                                              | <i>Astrantia carniolica</i>                         | E1 | + | + | . | + | . | 4   | 67  |
|                                              | <i>Heliosperma alpestre</i>                         | E1 | 2 | + | . | . | . | 3   | 50  |
|                                              | <i>Dianthus sternbergii</i>                         | E1 | + | + | . | . | . | 3   | 50  |
|                                              | <i>Hieracium bifidum</i>                            | E1 | + | + | . | . | . | 3   | 50  |
|                                              | <i>Adenostyles glabra</i>                           | E1 | . | + | + | + | . | 3   | 50  |
|                                              | <i>Gymnocarpium robertianum</i>                     | E1 | . | . | . | 1 | 1 | 3   | 50  |
|                                              | <i>Achnatherum calamagrostis</i>                    | E1 | + | + | . | . | . | 2   | 33  |
|                                              | <i>Biscutella laevigata</i>                         | E1 | + | + | . | . | . | 2   | 33  |
|                                              | <i>Hieracium piloselloides</i>                      | E1 | + | + | . | . | . | 2   | 33  |
|                                              | <i>Rumex scutatus</i>                               | E1 | + | + | . | . | . | 2   | 33  |
|                                              | <i>Trisetum argenteum</i>                           | E1 | + | + | . | . | . | 2   | 33  |
|                                              | <i>Valeriana montana</i>                            | E1 | + | . | . | 1 | . | 2   | 33  |
|                                              | <i>Silene vulgaris</i> subsp. <i>glareosa</i>       | E1 | 1 | . | . | . | . | 1   | 17  |
|                                              | <i>Minuartia austriaca</i>                          | E1 | + | . | . | . | . | 1   | 17  |
|                                              | <i>Papaver alpinum</i> subsp. <i>ernesti-mayeri</i> | E1 | + | . | . | . | . | 1   | 17  |
|                                              | <i>Scrophularia juratensis</i>                      | E1 | + | . | . | . | . | 1   | 17  |
|                                              | <i>Linaria alpina</i>                               | E1 | . | + | . | . | . | 1   | 17  |
| AT                                           | <b><i>Asplenietea trichomanis</i></b>               |    |   |   |   |   |   |     |     |
|                                              | <i>Potentilla clusiana</i>                          | E1 | + | . | . | . | . | 1   | 17  |
|                                              | <i>Campanula thyrsoidea</i>                         | E1 | . | + | . | . | . | 1   | 17  |
| ML                                           | <b>Mosses and lichens (Mahovi in lišaji)</b>        |    |   |   |   |   |   |     |     |
|                                              | <i>Tortella tortuosa</i>                            | E0 | 2 | + | 1 | . | + | 4   | 67  |
|                                              | <i>Hylocomium splendens</i>                         | E0 | . | . | + | 1 | . | 3   | 50  |
|                                              | <i>Rhytidiadelphus triquetrus</i>                   | E0 | . | . | + | 1 | . | 2   | 33  |
|                                              | <i>Dicranum scoparium</i>                           | E0 | . | . | . | + | . | 2   | 33  |
|                                              | <i>Cladonia rangiferina</i>                         | E0 | . | . | + | . | . | 1   | 17  |

**Legend - Legenda**

Pr. Presence (number of relevés in which the species is presented) - število popisov, v katerih se pojavlja vrsta

Fr. Frequency in % - frekvenca v %

Gr Gravel - prod

Li Lithosols - kamnišče

Re Rendzina - rendzina

QR *Quercetalia roboris*AI *Alnion incanae*TG *Trifolio-Geranietea*NS *Nardetea strictae*CD *Caricetalia davallianae*

