

## Phytosociology and ecology of *Rhamnus fallax* in the Southeastern Alps and in the northwestern part of the Dinaric Alps

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**Summary:** In the Julian Alps, the Karavanke/Karawanken and the Trnovski gozd plateau, we conducted a phytosociological study of scrubs dominated by the Illyrian species *Rhamnus fallax*. We found that these scrub communities, which mainly grow in the montane and subalpine beech forest belt, are frequently a long-term successional stage on screes, rockfall and stony gullies in which snow accumulates on an annual basis, as well as on karstified limestone ridges of the High Karst. These scrub communities are floristically very different from similar scrub communities in the central and southern parts of the Dinaric Alps, and so are classified into four new associations: *Polysticho lonchitis-Rhamnetum fallacis*, *Laserpitio latifolii-Rhamnetum fallacis* (both belong to the new alliance *Seslerio calcariae-Rhamnion fallacis*), *Laburno alpini-Rhamnetum fallacis* (classified into the alliance *Aremonio-Fagion*), and *Lunario redivivae-Rhamnetum fallacis* (alliance *Lonicero-Rhamnion fallacis*).

**Keywords:** phytosociology, *Rhamnus fallax*, *Seslerio calcariae-Rhamnion fallacis*, *Rhamnetalia fallacis*, scrub communities, succession, the Julian Alps, the Karavanke/Karawanken, the Trnovski gozd plateau, Slovenia, Austria

*Rhamnus fallax* (*Rhamnus alpina* subsp. *fallax*) is a Southeast-European montane shrub distributed in the Southeastern Alps (the Julian Alps, the Kamnik-Savinja Alps/Steiner Alps and the Karavanke Mts./Karawanken), in the Dinaric and Balkan Mts., and in the Apennine Peninsula (AESCHIMANN et al. 2004: 1018). Its northernmost localities are in southern Carinthia in Austria (HARTL et al. 1992: 297). The only locality situated further to the north is in Lower Austria (the gorge near Purgstall – Essl in FISCHER et al. 2008: 557; this locality is probably subspontaneous and *Rhamnus fallax* has probably migrated into this gorge from the nearby castle park – Essl, in litt.). Its northwesternmost localities are under the Stol ridge in Breginjski kot (Lokarje) – ČUŠIN (2006: 131) and under Matajur and Kolovrat in northeastern Italy (POLDINI 2002: 408). In Slovenia, *Rhamnus fallax* is distributed in all phytogeographical regions, in larger numbers mainly in the western part of the country, in Alpine, pre-Alpine and Dinaric phytogeographical regions. The northeasternmost localities are along the Drava in the sub-Pannonian region (where it is likely to grow deposited in riparian stands), but it is not known in the Pohorje Mountains and in southeastern Slovenia. In its sub-Mediterranean part it grows mainly on higher lying slopes, it is very rare in the Karst and does not occur in the coastal part of Istria (Fig. 1). *Rhamnus fallax* is a species of stony forests and pastures, stabilized screes and rockfalls. It can grow up to 4 metres and reach 10 cm in diameter at chest height. Its often low, clustered growth is due to natural factors such as snowslides. Its sites are on calcareous (limestone) bedrock with shallow soils (lithosol, rendzina, rarely Chromic Cambisols). While it has no special needs regarding soil depth or temperature, it requires sufficient soil and air moisture. Its occurrence extends from valleys (lowland) to the subalpine belt, with its highest localities in Slovenia situated at elevations of around 1650 m (the Kanin Mts.), 1650 m to 1700 m (the Martuljek Mts., za Akom, Rutarski Vršič), 1700 m (Potočka Zijavka under Mt. Olševo, det. M. Wraber, 24.9.1970

and B. Vreš, N. Jogan and N. Praprotnik, 29.7.1994), 1740–1760 m (the Fužina Pasturelands, Vodene rupe to the northwest from the pasture Dedno polje, det. I. Dakskobler & B. Zupan, 26.7.2007 and on pasture Jezerce between Ogradi and Stogi, under Brda in the Pokljuka plateau, reaching almost 1800 m (Škarjev rob under Mt. Storžič, det. B. Anderle & B. Vreš, 12.7.2010) and 1890 m (Velska dolina under Triglav). It grows within some scree communities, for example in the stands of the associations *Petasitetum nivei*, *Festucetum laxae*, *Moehringio-Gymnocarpietum robertiani*), in tall herb communities (e.g. in the stands of the association *Doronico austriaci-Adenostyletum alliariae*), in places also in chasmophytic communities (e.g. in stands of the associations *Campanulo carnicae-Moehringietum villosae*, *Potentillo clusianae-Campanuletum zoysii* and *Potentilletum caulescentis*). It is most frequently described in forest communities. In beech forests it is especially frequent in stands of the associations *Arunco-Fagetum*, *Ostryo-Fagetum*, *Seslerio autumnalis-Fagetum*, *Rhododendro hirsuti-Fagetum*, *Omphalodo-Fagetum*, *Lamio orvalae-Fagetum*, *Ranunculo platanifolii-Fagetum*, *Aconito paniculati-Fagetum*, *Polysticho lonchitis-Fagetum*, *Anemono trifoliae-Fagetum* and *Homogyno sylvestris-Fagetum*. In spruce forests it is known in stands of the associations *Adenostylo glabrae-Piceetum*, *Laburno alpini-Piceetum*, *Petasiti paradoxi-Piceetum*, *Ribeso alpini-Piceetum* and *Rhamno fallacis-Piceetum* (see also ZUPANČIČ 1999) and in larch forests in stands of the association *Rhodothamno-Laricetum*. It grows in some pine communities, e.g. in stands of the associations *Fraxino orni-Pinetum nigrae*, *Rhododendro hirsuti-Pinetum mugo* and *Amelanchiero ovalis-Pinetum mugo*. Very rarely it can be found also in the subalpine mountain ash and green alder community (*Alno viridis-Sorbetum aucupariae*). It can even grow on undeveloped riparian soils, gravel bars, in stands of the association *Salicetum eleagno-purpureae* and in riparian grey willow, grey alder and small-leaved lime stands (*Lamio orvalae-Salicetum eleagni*, *Lamio orvalae-Alnetum incanae*, *Carici albae-Tiliaceum cordatae*). In noble hardwood communities it is found on rendzinas and colluvial-deluvial soils (*Saxifrago petraeae-Tiliaceum platyphylli*, *Corydalido ochroleucae-Aceretum pseudoplatani*, *Veratro nigri-Fraxinetum excelsioris*, *Hacquetio-Fraxinetum excelsioris*, *Omphalodo-Aceretum pseudoplatani*, *Lamio orvalae-Aceretum pseudoplatani*). It also grows in black hornbeam, flowering ash and pubescent oak communities (*Fraxinio orni-Ostryetum*, *Rhododendro hirsuti-Ostryetum*, *Cytisanthro-Ostryetum*, *Seslerio autumnalis-Ostryetum carpinifoliae*, *Amelanchiero ovalis-Ostryetum*).

In Carinthia in Austria, *Rhamnus fallax* is known mainly on northern slopes of the Karawanken/Karavanke (Velika Suha at Pogoriach/Podgorje, Bärental/Medvedji dol under Mt. Stol, Petzen/Peca) and the Steiner/Kamnik Alps (Vellacher Kotschna/Belska Kočna). Most often it grows on established calcareous screes with northern, eastern and especially western aspects, in places with high air humidity, mean annual precipitation from 1500 mm to 2200 mm and with average snow cover duration of 150 days or more. It can often be found on rockfalls where snow between large rock blocks lingers much longer than in its surroundings. The largest and thickest specimens (height 4 m, chest-height diameter of up to 7 cm), frequently of sable growth, were spotted by one of the authors (WF) on exactly such sites on rough rockfall in Vellacher Kotschna/Belska Kočna in the Steiner/Kamnik Alps. Its free-growing and more easily accessible scrubs are often severely eaten by chamois (*Rupicapra rupicapra*) and on the sunny (Slovenian) side of the Karavanke (Sv. Ana at Ljubelj) also by ibexes (*Capra ibex*).

In Carinthia it grows sporadically in red and black pine communities (*Erico-Pinetum sylvestris*, *Fraxino orni-Pinetum nigrae*), larch (*Rhodothamno-Laricetum*), dwarf pine (*Rhododendro hirsuti-Pinetum mugo*), beech (*Anemono trifoliae-Fagetum*) and in some forms of black hornbeam and

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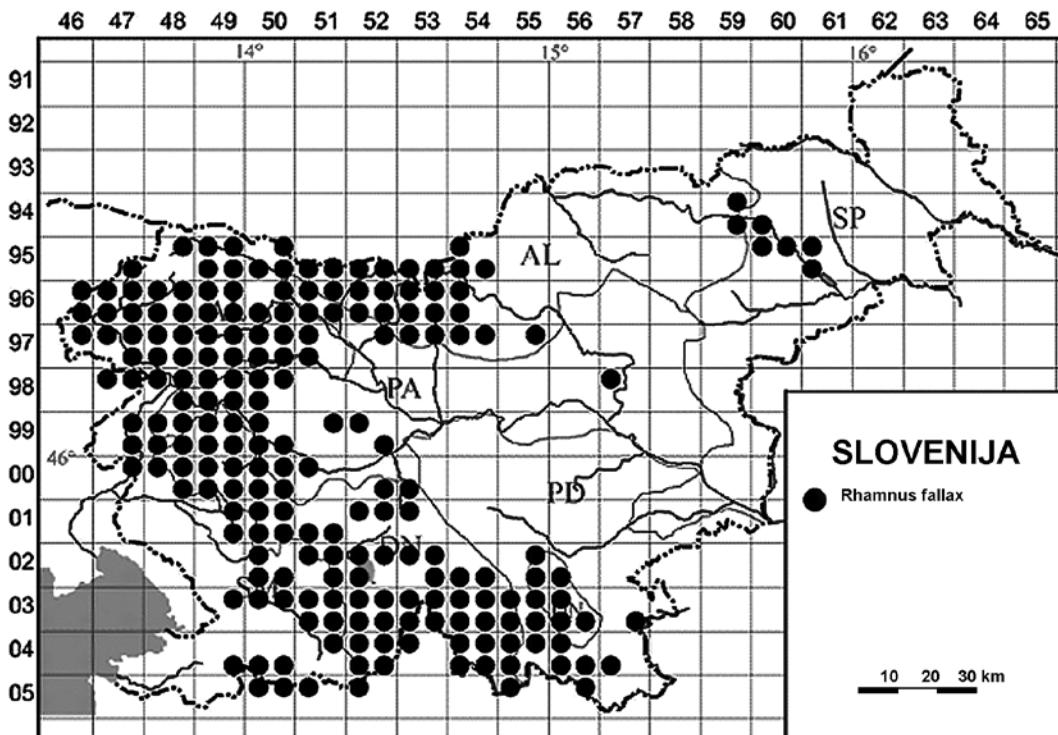


Figure 1. Distribution of *Rhamnus fallax* in Slovenia.

flowering ash communities (*Erico-Ostryetum* s. lat., sensu FRANZ & WILLNER 2007, *Sileno glareosae-Ostryetum*) – see FRANZ (2002, 2012) and FRANZ & WILLNER (2007a, b). On screes, it frequently grows in narrow strips in the slope direction, along torrents that become active only during heavy rain.

In the Dinaric Alps, *Rhamnus fallax* plays an important role in the belt of subalpine scrubs at the upper forest line. In Croatia, Bosnia and Herzegovina and further south, different authors have also described scrub communities where *Rhamnus fallax* is the dominant species. FUKAREK & STEFANOVIĆ (1958: 138–139) found its stands on screes in the subalpine beech forest belt in Bosnian and Herzegovinian mountains and presented the provisional association *Rhamnetum fallacis* (= *Rhamnus fallax-Cynanchum vincetoxicum* ass.) with two relevés. Later, FUKAREK (1969a, b) described this association in more detail, naming it *Cynancho-Rhamnetum fallacis* Fukarek & Stefanović 1958. He classified it in the new alliance *Lonicero-Rhamnion* Fukarek 1969 and new order *Rhamnetalia fallacis* Fukarek 1969. One year later (FUKAREK 1970: 255), he added to the association *Cynancho-Rhamnetum fallacis* also the association *Berberidi-Rhamnetum fallacis* Horvat 1962, a syntaxon that had been only briefly described in 1962 (HORVAT 1962: 119). STEFANOVIĆ (1986) mentions associations *Cynancho-Rhamnetum* and *Berberidi-Rhamnetum* on the forest line in the Dinaric Alps, at the contact point of subalpine maple-beech forest (*Aceri-Fagetum* s. lat.) and dwarf pine community (*Pinetum mugo* s. lat.). He also named the subassociation *Aceri-Fagetum rhamnetosum fallacis* Stefanović 1964 (STEFANOVIĆ 1964) after *Rhamnus fallax*. Among the communities of order *Rhamnetalia fallacis* and alliance *Lonicero-Rhamnion fallacis* in Croatia, TRINAJSTIĆ (2008) mentions only the association *Ribesi pallidigemmo-Rhamnetum fallacis* Trinajstić 1987 which he found on Biokovo, but his description

is based on only one relevé (TRINAJSTIĆ 1987: 169). It is evident that *Rhamnus fallax* often forms fringe communities (scrubs) in the centre of its distribution area, especially in the belt of montane and subalpine forests. These are more or less long-term successional stages, e.g. in the overgrowing of established screes or on very stony or rocky sites – wherever conditions for forest growth are extreme, allowing only the most modest tree and scrub species to survive. Similar scrubs, although with a very different floristic composition reflecting very different phytogeographical conditions, have also been spotted in the northern part of its distribution area, in Slovenia and in Carinthia in Austria. The first to catch our attention were the stands of *Rhamnus fallax* on screes and in steep gullies in the Karavanke/Karawanken and in the Julian Alps, where forest growth conditions are rather extreme due to recurring snowslides, and where these stands are obviously long-term pioneer stages. Stands were recorded also on less extreme sites, such as extensive meadows under Krn (pastures above the village Krn, see also SURINA 2005: 6), where their occurrence is subject not only to natural conditions, but above all also to human impact, and scrubs on dolomite slopes that developed in beech forests damaged by storms, especially windthrows. Even though *Rhamnus fallax* scrubs usually cover only small areas they have an important protective role. They prevent or slow down erosion and soil leaching, retain humus, improve soil conditions and allow subsequent successional development towards forest.

## Materials & Methods

Scrubs with dominant *Rhamnus fallax* were studied according to the method of BRAUN-BLANQUET (1964). 34 relevés were entered into the FloVegSi database (SELIŠKAR et al. 2003). This database was used also in the preparation of the distribution map of *Rhamnus fallax* in Slovenia and in establishing its occurrence in different communities. Combined cover-abundance values were transformed into ordinal values (van der MAAREL 1979). Numerical comparisons were made with the software package SYN-TAX (PODANI 2001) and R (R Development Core Team 2012), using the package ‘vegan’ (OKSANEN et al. 2012). The relevés were compared using the following methods: ‘(Unweighted) average linkage’ – UPGMA, ‘Incremental sum of squares’ – MISSQ and ‘Principal coordinates analysis’ – PCoA. Wishart’s similarity ratio was applied in all comparisons. Based on these comparisons the relevés formed four groups (Fig. 2). One relevé (the scree above Podljubelj) that stood out with a small number of species was excluded from further processing. Other relevés were arranged into four phytosociological tables based on the dendrogram in Fig. 2. We drew up a synthetic table and compared the columns using hierarchical classification and Principal Coordinates Analysis – PCoA (Figs 3 and 4). Wishart’s similarity ratio was also applied in this comparison.

A phytoindication analysis in the stands of the four new syntaxa was carried out using ecological indicator values (LANDOLT et al. 2010). In the relevés we determined average conditions in terms of temperature (T), continentality (K), light conditions (L), moisture (M), soil reaction (R), nutrients (N), humus content (H) and aeration (A). In our calculations we used van der Maarel’s ordinal plant cover values (medium coverage) as weight that was reduced by half in phytoindication values with a higher degree of variation (LANDOLT et al. 2010).

$$WA_{pop} = \frac{\sum_{i=1}^s (FV_i \times Abund_i \times VR_i)}{\sum_{i=1}^s (Abund_i \times VR_i)}$$

where  $WA_{pop}$  is the weighted average of indication values of plant species for an ecological factor on a relevé,  $FV_i$  is the phytoindication value of

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the [i] row factor,  $Abund_i$  is cover value,  $VR_i$  is range of variation of phytointication value (I = 1, II = 0.5) and  $s$  the number of species in a relevé.

33 relevés of the stands with dominant *Rhamnus fallax* were compared using the Canonical Analysis of Principal Coordinates – CAP (ANDERSON & WILLIS 2003) on the basis of the Bray-Curtis dissimilarity index in which weighted averages of Landolt's phytointication values ( $WA_{pop}$ ) were used as constrained variables.

The nomenclature source for the names of vascular plants is the Mala flora Slovenije (MARTINČIČ et al. 2007). MARTINČIČ (2003, 2011) is the nomenclature source for the names of mosses. SUPPAN et al. (2000) is the nomenclature source for the names of lichens. The nomenclature sources for the names of syntaxa are THEURILLAT (2004) and ŠILC & ČARNI (2012). The data on the geological bedrock follow JURKOVŠEK (1987a, b) and BUSER (1986, 1987, 2009). The source for the nomenclature of soil types is URBANČIČ et al. (2005). Climate data (precipitation volume, mean temperature) were obtained on the website of the Environmental Agency of the Republic of Slovenia, Ministry of Agriculture and Environment.

## Results

### Conspectus of the determined and described syntaxa

*Querco-Fagetea* Br.-Bl. & Vlieg. 1937

*Rhamnetali fallacis* P. Fukarek 1969

*Seslerio calcariae-Rhamnion fallacis* all. nov. hoc loco

*Polysticho lonchitis-Rhamnetum fallacis* ass. nova hoc loco

*Laserpitio latifolii-Rhamnetum fallacis* ass. nova hoc loco

*Lonicero-Rhamnion fallacis* P. Fukarek 1969

*Lunario redivivae-Rhamnetum fallacis* ass. nova hoc loco

*Fagetalia sylvaticae* Walas 1933

*Aremonio-Fagion* (Ht. 1938) Borhidi in Török, Podani & Borhidi 1989

*Laburno alpini-Rhamnetum fallacis* ass. nova hoc loco

### Description of communities with dominant *Rhamnus fallax* in the Southeastern Alps

The described scrubs with dominant *Rhamnus fallax* in the Dinaric Alps (FUKAREK & STEFANOVIĆ 1958; FUKAREK 1969a, b, 1970; TRINAJSTIĆ 1987) are floristically very different, and the four groups of our relevés (Figs 2, 3 and 4), or the four columns in the synthetic Table 5 [all Tables as Appendix!], are therefore classified as four new syntaxa. Two groups of relevés originate from the Southeastern Alps (the Julian Alps and the Karavanke/Karawanken), where these communities have not yet been researched. The largest group of relevés is classified in the association *Polysticho lonchitis-Rhamnetum fallacis* ass. nova hoc loco which characterises more or less long-term successional stages on established screes, rockfalls and in stony gullies, in places repeatedly damaged by snowslides, severely hindering the development of forest vegetation. The following relevés were made in the Julian Alps: at the pasture Leskovca in the Krn mountains, under Mt. Črna gora and Kontni vrh (Šoštar) on the Bohinj side of Mt. Črna prst, in the Beli

### Rhamnus fallax communities in the Southeastern Alps

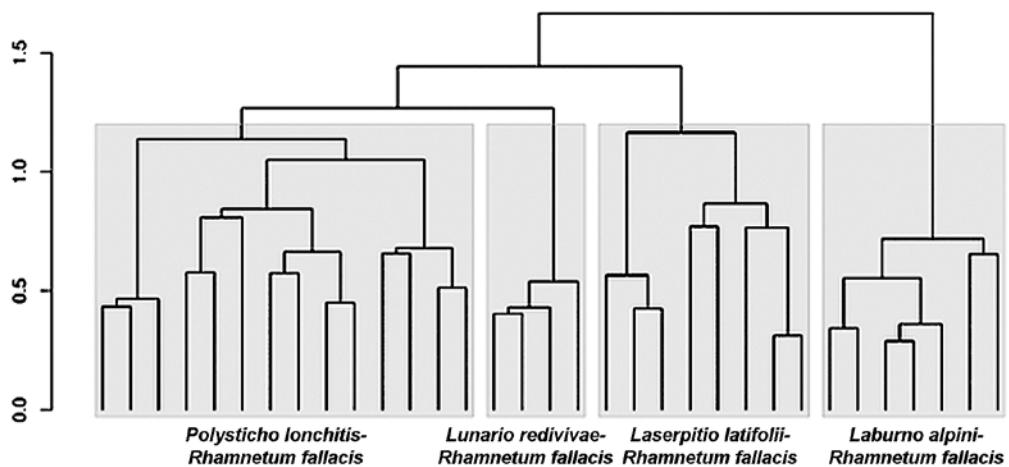


Figure 2. Dendrogram of relevé s with dominant *Rhamnus fallax* in the southeastern Alps and in the Trnovski gozd plateau (MISSQ, similarity ratio).

potok valley in the Martuljek mountains and in the Karavanke: gullies at the Zabreznica and Žirovnica alps under Stol, shady slopes of Mt. Olševa above the Koprivna valley (Fig. 5). The localities are situated at elevations from 1260 m to 1580 m, i.e. in the forest belt, especially in the belt of altimontane and subalpine beech and fir-beech forests (*Polysticho lonchitis-Fagetum*, *Homogyno sylvestris-Fagetum*, *Ranunculo platanifolii-Fagetum*, *Anemono trifoliae-Fagetum*), partly also in the belt of subalpine larch forests (*Rhodothamno-Laricetum*). In some spots on less extreme

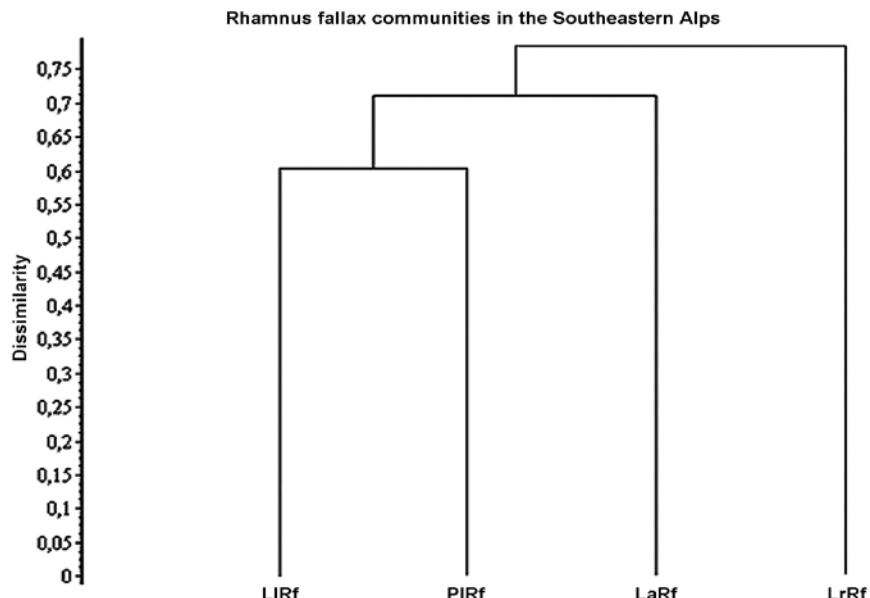
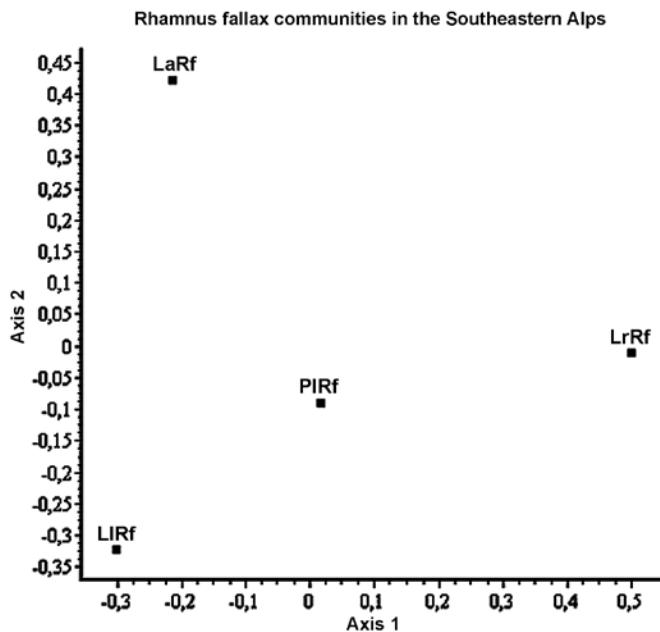


Figure 3. Dendrogram of *Rhamnus fallax* in the Southeastern Alps and in the Trnovski gozd plateau (UPMGA, similarity ratio). LIRf – *Laserpitio latifoli-Rhamnetum fallacis*; PIRf – *Polysticho lonchitis-Rhamnetum fallacis*; LaRf – *Laburno alpini-Rhamnetum fallacis*; LrRf – *Lunario redivivae-Rhamnetum fallacis*.

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**Figure 4.** Two-dimensional scatter-diagram of *Rhamnus fallax* in the Southeastern Alps and in the Trnovski gozd plateau (PCoA, similarity ratio).

sites with more accumulated moder or raw humus, the contact communities are alpine dwarf pine shrubs (*Rhododendro hirsuti-Pinetum mugo*) or green alder stands (*Rhododendro hirsuti-Alnetum viridis*), which in such cases, with improved site conditions (accumulation of organic matter), usually represent the next stage of succession. The climate is montane with abundant precipitation (annual average of about 2000 mm and more) and long-lasting snow cover (as a result of snowslides or accumulation of snow from higher-lying slopes). The soil type is lithosol, rarely shallow colluvial-deluvial soils or rendzina. These sites are very extreme for forest growth (stoniness or rockiness usually exceeds 50% of the relevé area, frequently reaching as much as 90%) and the described community is therefore a long-lasting successional stage. In the more or less open shrub layer *Rhamnus fallax* dominates, in places admixed with similarly abundant *Salix appendiculata* and individual specimens of *Acer pseudoplatanus*, *Picea abies*, *Sorbus aria*, *Fagus sylvatica* and *Larix decidua*. *Rubus idaeus* is frequent in the lower shrub layer, on several plots also *Rhododendron hirsutum* and in places also *Lonicera alpigena*, *Pinus mugo* and other species. In the herb layer, the most frequent species are tall herbs from the class *Mulgedio-Aconitetea* and species of beech and spruce forests (Table 6). Due to its open structure there is a large number of accidental species. Diagnostic species of the new association are *Rhamnus fallax*, *Aconitum lycoctonum* subsp. *ranunculifolium* s. lat. (according Podobnik in MARTINČIĆ et al. 2007 = *Aconitum lupicida* according to Starmühler in FISCHER et al. 2008), *Polystichum lonchitis* and *Rhododendron hirsutum*. The nomenclature type of the new association, *holotypus*, is relevé No. 7 in Table 1. In a way similar to dwarf pine and green alder stands, stands of the association *Polysticho lonchitis-Rhamnetum fallacis* also have a significant protective role in the montane landscape. Overgrowing bare rocks and screes, they promote soil development, accumulation of organic matter and – in the absence of annual destructive factors (snowslides) – even succession towards higher stages of development in vegetation on these sites.

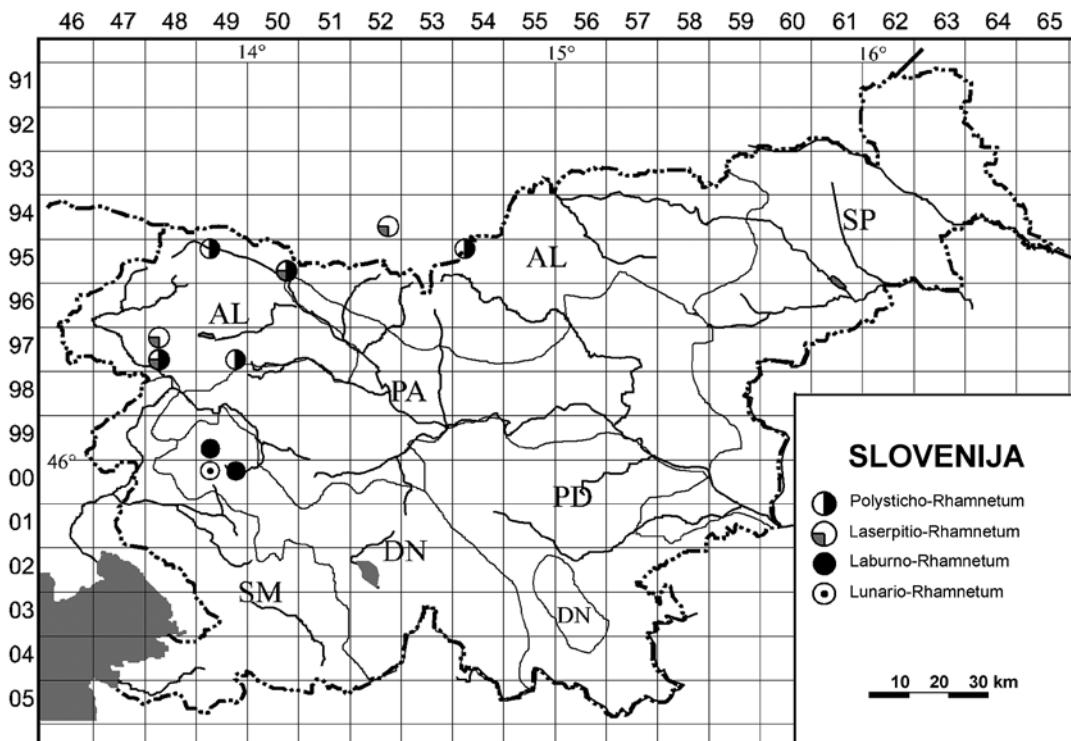


Figure 5. Approximate localities of stands of the associations *Polysticho lonchitis-Rhamnetum*, *Laserpitio-Rhamnetum*, *Laburno-Rhamnetum* and *Lunario-Rhamnetum* in Slovenia and in Carinthia (Austria).

The smaller group of relevés from the Karavanke/Karawanken and the Julian Alps (pasture Leskovca in the Krn mountains; Fig. 5) is floristically and ecologically slightly different from the stands of the association *Polysticho lonchitis-Rhamnetum fallacis*. These are very initial open scrubs on stabilized, more or less overgrown scree in the elevation belt 1200–1400 m, on both sunny and shady slopes. The sites are very dry, with poor decomposition and accumulation of organic matter (moder). The soil type is lithosol. Species of scree, dry and subalpine grasslands, forest edges and basophilous pine forests are common in the herb layer (Table 6). In the successional sere these stands represent a transition between scree communities and scrubs of the association *Polysticho lonchitis-Rhamnetum fallacis*. They are classified into the new association *Laserpitio latifoli-Rhamnetum fallacis*. Diagnostic species of the association are *Sesleria caerulea* subsp. *calcaria* (mainly because its medium cover is higher here than in the stands of the association *Polysticho-Rhamnetum*), *Laserpitium latifolium*, *Linum julicum* and *Rumex scutatus*. The nomenclature type of the new association, *holotypus*, is relevé No. 3 in Table 2. Two variants are distinguished. The variant with *Salix appendiculata* (the differential species include *Scrophularia juratensis*, *Primula veris* subsp. *columnae* and *Lilium carniolicum*) was documented mainly in the Julian Alps, on more populated screes, and the variant with *Convallaria majalis* mainly on shady aspects and scree in the Austrian part of the Karawanken/Karavanke.

#### Description of communities with dominant *Rhamnus fallax* in the northwestern part of the Dinaric Alps

*Rhamnus fallax* is just as, or even more, frequent in the beech forests of the Dinaric Alps than in the forests and stony sites of the Southeastern Alps. It is therefore considered a character

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species of the Illyrian alliance *Aremonio-Fagion*. In the northwesternmost part of the Dinaric Alps, in the Trnovski gozd plateau, which is characterised by a humid montane climate with abundant precipitation (average between 2000 mm to 3000 mm per year), we have studied two types of its scrubs so far. One is a distinctly pioneer successional stage in secondary succession in gaps following windthrows in beech forests on very steep shady dolomite slopes, especially in the stands of the associations *Arunco-Fagetum*, *Rhododendro hirsuti-Fagetum* and in part also *Omphalodo-Fagetum* and *Ranunculo platanifolii-Fagetum*. These scrubs, in succession usually soon replaced by beech forest, were classified into the new association *Laburno alpini-Rhamnetum fallacis*. Its diagnostic species are *Rhamnus fallax*, *Carex ferruginea*, *Laburnum alpinum*, *Ostrya carpinifolia* and *Fraxinus ornus*. Gaps are therefore populated mainly by heliophilous and relatively thermophilous species, while *Carex ferruginea* is diagnostic for preserved beech stands on these sites (especially for the association *Rhododendro hirsuti-Fagetum*). The nomenclature type of the new association, *holotypus*, is relevé No. 3 in Table 3. The stands of this association were recorded in the elevation belt of 650 m to 1100 m, on the northern edge of the Trnovski gozd plateau (Fig. 5). Their floristic composition is dominated by beech forest species (*Aremonio-Fagion*, *Fagetalia sylvaticae*) and species of basophilous pine forests (*Erico-Pinetea*; Table 6). Such species composition indicates original beech communities, and this association is therefore classified into the order *Fagetalia sylvaticae* and into the alliance *Aremonio-Fagion*. The pioneer stage plays an important protective role, preventing erosion and leaching of shallow soils on steep slopes.

The ecology of *Rhamnus fallax* at very rocky sites on ridges of the highest peaks of the Trnovski gozd plateau between Veliki Golak and Javorški vrh in the Golaki forest reserve (Fig. 5) is different. These ridges are situated at elevations from 1350 m to 1400 m and are continuously overgrown with altimontane – partly also by subalpine – beech and maple-beech forest and are for the time being still classified into the associations *Stellario montanae-Fagetum*, *Ranunculo platanifolii-Fagetum* and *Polysticho lonchitis-Fagetum*. The geological bedrock is limestone. On these ridges we found smaller, karstified rocky patches not overgrown by forest. They are overgrown by more or less open scrubs with dominant *Rhamnus fallax*. We do not know the origin of these natural forest gaps. These are totally remote regions where forests have never been managed, so human impact can be excluded with certainty. Possible reasons for formation of these rocky sites are natural factors, such as windthrow, snow breakage and consequently (with substantial precipitation levels of 2500 mm to 3000 mm) leaching of soil on the ridge and karstification. *Rhamnus fallax* is a pioneer, one of the first species to populate these rocks. In pockets between rocks it helps organic matter to accumulate and retain moisture, thus allowing tall herb species and some maple forest (*Tilio-Acerion*) species such as *Lunaria rediviva* or the indicator of nitrophilous sites *Urtica dioica*, to thrive in this community. These species occur also in the surrounding altimontane beech stands. Due to these site and floristic characteristics, which clearly differentiate these stands from other previously described communities, they are classified into the new association *Lunario redivivae-Rhamnetum fallacis*. Its diagnostic species are *Rhamnus fallax*, *Sambucus racemosa*, *Sedum hispanicum* and *Lunaria rediviva*. The nomenclature type of the new association, *holotypus*, is relevé No. 1 in Table 4. Unlike the previously described, relatively short-lived successional stage *Laburno-Rhamnetum fallacis*, the scrubs of the association *Lunario-Rhamnetum fallacis* are long-lasting vegetation on rocky, high-karst ridges, and have a significant regenerative role, being the core transitional stage from bare rocks towards the former forest.

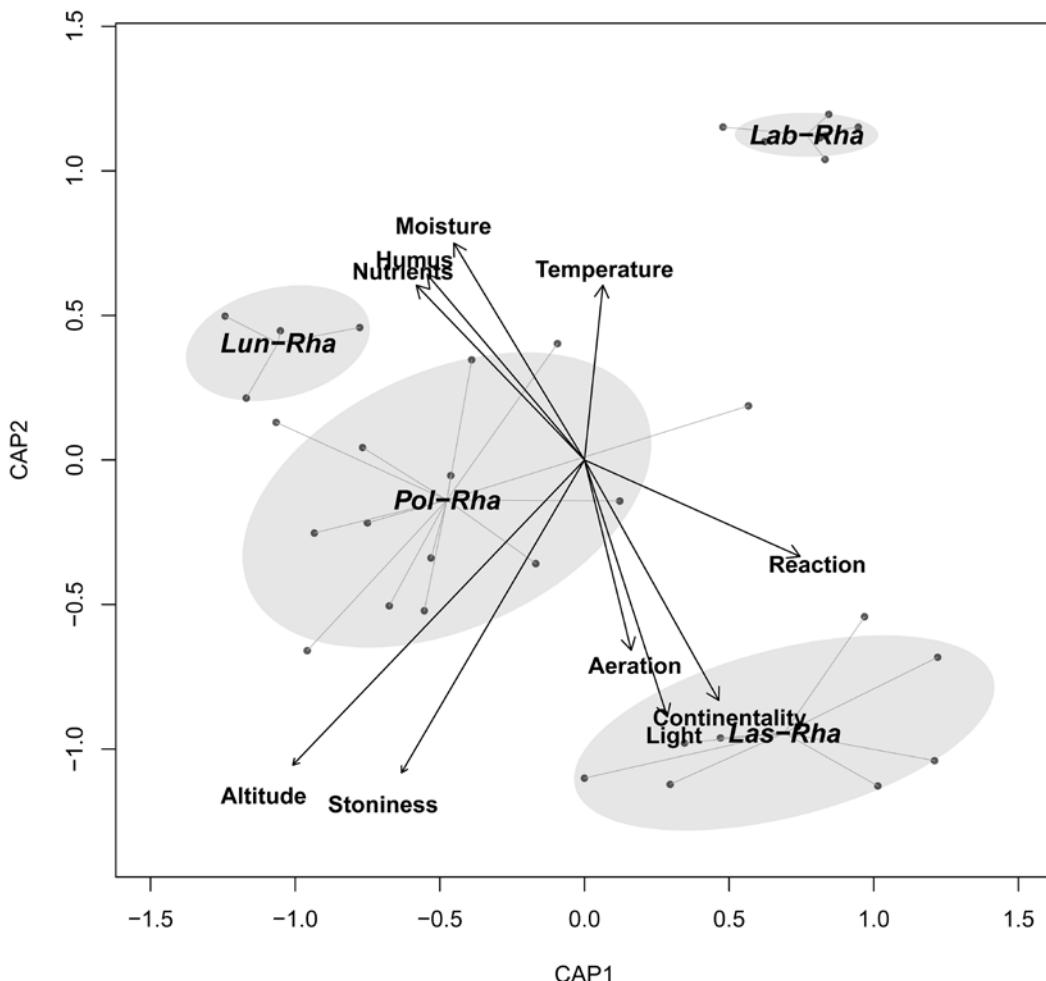


Figure 6. The ordination plot of the first and second CAP axes of vascular plant coverage in different syntaxa with dominant *Rhamnus fallax*. Arrows represent Landolt's indicator values.

### Comparison of communities with dominant *Rhamnus fallax* according to Landolt's indicator values

The results of the phytocorrelation analysis in stands with dominant *Rhamnus fallax* that was carried out using ecological indicator values (LANDOLT et al. 2010) are presented in Figs 6 and 7. Calculated temperature values (T) indicate slightly more favourable temperature conditions in the stands of the association *Laburno-Rhamnetum fallacis* in comparison with the stands of the other compared syntaxa. Continentality (K) is most pronounced in the stands of the association *Laserpitio-Rhamnetum fallacis* and least pronounced in the stands of the association *Lunario-Rhamnetum fallacis*. Similarly, light conditions (L) are the most favourable in the stands of the association *Laserpitio-Rhamnetum*. Moisture (M) is highest in the stands of the associations *Lunario-Rhamnetum* and *Polysticho lonchitis-Rhamnetum*. Calculated soil reaction values (R) indicate slightly higher soil acidity in the stands of the associations *Lunario-Rhamnetum* and *Polysticho-Rhamnetum*, which is the result of accumulation of organic matter. The highest mean phytocorrelation values for soil reaction (R) were calculated in the stands of the association *Laserpitio-Rhamnetum*. Calculated nutrient values (N) indicate better nutrient supply on the sites

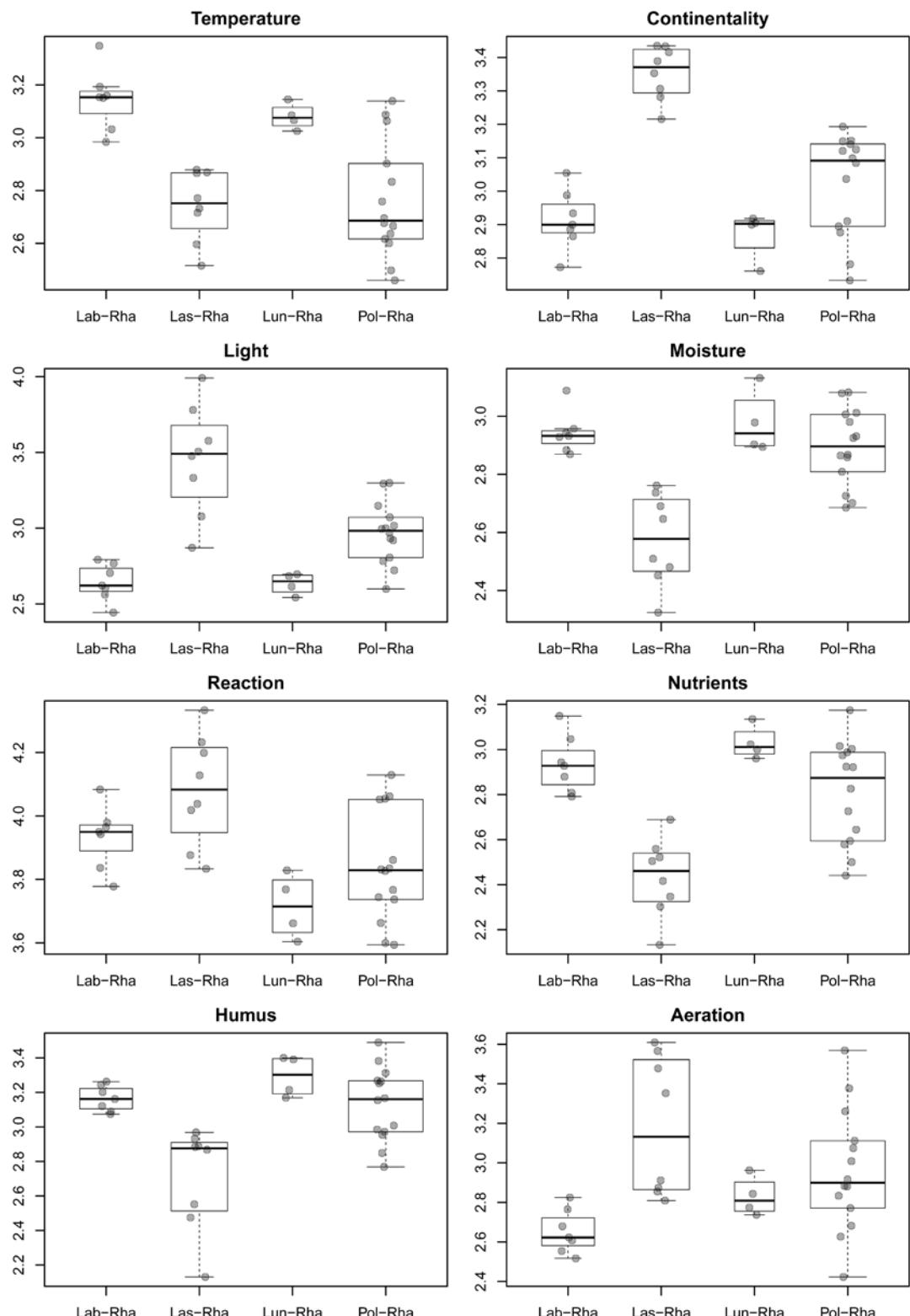
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Figure 7. Comparison of ecological conditions in the communities with dominant *Rhamnus fallax*, determined with Landolt's phytoindication values.

of the associations *Lunario-Rhamnetum*, *Polysticho-Rhamnetum* and *Laburno-Rhamnetum*, while the sites of the association *Laserpitio-Rhamnetum* are the most nutrient-poor. On the sites of the associations *Lunario-Rhamnetum*, *Polysticho-Rhamnetum* and *Laburno-Rhamnetum* the humus content in soils (H) is higher and soil aeration (A) poorer than in the stands of the association *Laserpitio-Rhamnetum*.

## Discussion and conclusions

*Rhamnus fallax* is a character species of Illyrian beech forests from the alliance *Aremonio-Fagion* and grows in the shrub layer of many beech associations from this alliance. Its modest ecological (soil) requirements allow it to thrive (with sufficient soil and air moisture) on very shallow initial soil (lithosol) from valleys to the subalpine belt. It is an important pioneer species in overgrowing established screes, rockfall, karstified ridges and forest gaps caused by windthrows. Its scrubs and fringe communities caught the attention of phytosociologists more than fifty years ago (HORVAT 1925: 117 and 118, 1962). While character species of the alliance *Berberidion* and order *Prunetalia spinosae* are usually absent from these communities, FUKAREK's proposal (1969a, b) to bring them together in a special alliance and order seems well-founded. His description of the new order *Rhamnetalia fallacis* and the new alliance *Lonicero-Rhamnion* is not substantiated with any tabular material and only provides a list of character species of the alliance and order. The conspectus of vegetation of Southeastern Europe (HORVAT et al. 1974) does not refer to Fukarek's new order, new alliance and its associations. Based on the referenced publications (FUKAREK & STEFANOVIĆ 1958, FUKAREK 1969a,b, 1970), it is, however, possible to implement the typification required by the existing applicable Code (WEBER et al. 2000). The nomenclature type of the association *Cynancho vincetoxici-Rhamnetum fallacis* P. Fukarek & Stefanović 1958 is relevé No. 1 in Table 9 (FUKAREK & STEFANOVIĆ 1958: 139), *lectotypus* hoc loco. The nomenclature type of the alliance *Lonicero-Rhamnion* P. Fukarek 1969 is association *Cynancho vincetoxici-Rhamnetum fallacis* P. Fukarek & Stefanović 1958, *lectotypus* hoc loco, and the nomenclature type of the order *Rhamnetalia fallacis* P. Fukarek 1969 is the alliance *Lonicero-Rhamnion* P. Fukarek 1969, *lectotypus* hoc loco. Scrubs with dominant *Rhamnus fallax* are classified by TRINAJSTIĆ (2008) into the class *Querco-Fagetea*, which is appropriate considering their floristic composition and syndynamic affinity with beech forests. In terms of their physiognomy and the appearance of the several-metres high vegetation (rather than 10 and more metre-tall forest), their classification in the class of scrubs *Rhamno-Prunetea* would be also possible.

Scrub communities with dominant *Rhamnus fallax* in the northern part of its distribution area in the Southeastern Alps and on the northwestern edge of the Dinaric Alps are floristically very different from the scrub communities described so far where this species is in the centre of its distribution area. Their ecology, on the other hand, is very similar – they grow on very stony sites, screes, rockfall, karstified ridges and initial soils (lithosol, rendzina), mainly in the belt of montane and subalpine beech forests and are more or less long-lasting pioneer stages of succession that can be replaced, if natural conditions allow, by other scrubs (such as dwarf pine, green alder) or beech forest. In the Southeastern Alps (the Julian Alps and the Karavanke/Karawanken), the *Rhamnus fallax* scrubs on screes and rockfall take on a similar ecological and protective role to dwarf pine and green alder communities and are in places even syndynamically related to them. The factors decisive for their occurrence include gravelly, rocky bedrock, initial soil (lithosol) and annual snowslides. Stands of the newly described associations *Laserpitio latifolii-Rhamnetum fallacis* and *Polysticho lonchitis-Rhamnetum fallacis* represent natural scrub communities on the

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most gravelly or rocky sites in the upper beech forest belt; whereas the first are explicitly initial, the latter already slightly resemble dwarf pine shrubs in their formation. The classification of these two syntaxa into higher units is somewhat problematic. Subalpine scrub communities of the Southeastern Alps are mainly classified into two classes: *Betulo carpaticae-Alnetea viridis* and *Roso pendulinae-Pinetea mugo* (ŠILC & ČARNI 2012). Character species of both classes are presented in the stands of the researched syntaxa, but except *Salix appendiculata* with low presence and cover value. For the initial association *Laserpitio latifolii-Rhamnetum fallacis*, classification into classes *Elyno-Seslerietea* or *Thlaspietea rotundifolii* would be also possible (see Table 6). But, considering the dominant species of the upper stand layer, we find that classification into a new alliance *Seslerio calcariae-Rhamnion fallacis* all. nov. hoc loco is also appropriate. The new alliance comprises scrubs with dominant *Rhamnus fallax* in the Southeastern Alps. Its nomenclature type, *holotypus*, is the association *Polysticho lonchitis-Rhamnetum fallacis*. Diagnostic species of the alliance is *Rhamnus fallax*, differential species are *Sesleria caerulea* subsp. *calcarea*, *Linum julicum*, *Pinus mugo*, *Larix decidua* and *Aconitum angustifolium*.

In the northern part of the Dinaric Alps, the species *Rhamnus fallax* plays an important role in forest regeneration after natural disasters, especially windthrows. Bedrock is also an important factor here, and the results of these events are also different, depending on whether the bedrock is dolomite or limestone. The soil on steep dolomite slopes is usually preserved despite increased erosion after flash floods. Stands of the new association *Laburno alpini-Rhamnetum fallacis* are therefore a transitional form of vegetation on windthrow areas, over decades gradually replaced by beech forest. This association is therefore classified into the alliance *Aremonio-Fagion* and order *Fagetales sylvaticae*. Soil leaching is much more radical on karstified limestone ridges of altimontane and subalpine belt and the pioneer role of *Rhamnus fallax* is crucial in allowing accumulation of organic matter to take place in rock crevices, thus facilitating the growth of tall herbs. Stands of the new association *Lunario redivivae-Rhamnetum fallacis* are a long-term pioneer stage on beech or maple-beech sites. They are classified into the Dinaric alliance *Lonicero-Rhamnion fallacis*. Even though they may be insignificant in terms of size, stands of the newly described associations can be the key link in the primary and secondary succession in montane forests of the Southeastern Alps and the northern part of the Dinaric Alps.

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Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW DinaridesTable 1. *Polygonio lachnitis-Rhamnetum fallacis* ass. nov.

	Number of relevé	Database number of relevé	Elevation in m	Aspect	Slope in degrees	Parent material	Soil	Stoniness in %	Cover of shrub layer in %	Cover of herb layer in %	Cover of moss layer in %	Number of species	Relevé area	Date of taking relevé	Locality	Quadrant	Coordinate GK Y (D-48)	Coordinate GK X (D-48)	Diagnostic species of the association	ScRFRF	AF	MuA	Fr.	Pr.
1	240922	1260	1260	SW	SW	SEE	Li	50	40	80	100	30	60	8/30/2011	Zabreška planina	E2b	435932	5142380	<i>Rhamnus fallax</i>				4	14
2	240923	1260	1260	E2	15	15	Gr	80	80	70	90	35	60	8/30/2011	Zabreška planina	E1	435819	5142520	<i>Rhamnus fallax</i>				2	14
3	240924	1260	1260	E1	60	60	Gr	60	40	30	60	35	60	8/30/2011	Žirovniška planina	m	435779	5142571	<i>Aconitum lycoctonum</i> subsp. <i>nummularifolium</i> s.l.				1	11
4	244173	1260	1260	E0	10	5	Gr	80	63	40	45	37	67	8/30/2011	Home - Črna gora	m	418774	5122014	<i>Rhamnus fallax</i>				+	79
5	244517	1260	1260	m <sup>2</sup>	50	40	Gr	60	60	40	30	5	10	8/24/2012	Pl. Za Liscem	9749/4	417882	5122265	<i>Rhamnus fallax</i>				+	100
6	243318	1260	1260	E0	60	60	Gr	80	63	40	45	37	67	8/24/2012	Pl. Za Liscem	9749/4	418441	5122014	<i>Rhamnus fallax</i>				+	80
7	244172	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/24/2012	Pl. Za Liscem	9749/4	418565	5122243	<i>Rhamnus fallax</i>				+	20
8	244433	1260	1260	E0	60	60	Gr	80	63	40	45	37	67	8/22/2012	Pl. Za Liscem	9749/4	418695	5121770	<i>Rhamnus fallax</i>				+	10
9	244523	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/24/2012	Pl. Za Liscem	9749/4	4177466	5145632	<i>Rhamnus fallax</i>				+	70
10	244557	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/24/2012	Olševo - Koprivna	9554/1	418262	5121597	<i>Rhamnus fallax</i>				+	80
11	244842	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/30/2011	Beli potok	9549/1	413559	5147320	<i>Rhamnus fallax</i>				+	100
12	240895	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/30/2011	Beli potok	9549/1	412687	5146516	<i>Rhamnus fallax</i>				+	100
13	240909	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/30/2011	Beli potok	9549/1	412748	5146791	<i>Rhamnus fallax</i>				+	100
14	240910	1260	1260	E0	60	60	Gr	80	63	40	30	5	10	8/30/2011	Beli potok	9549/1	412748	5146791	<i>Rhamnus fallax</i>				+	100

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Tab. 1

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	Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
<i>Fagus sylvatica</i>	E3	r	+	+	+	+	+	+	+	+	+	+	+	+	-	2	14
<i>Fagus sylvatica</i>	E2b	+	+	+	+	+	+	+	+	+	+	+	+	+	3	21	21
<i>Fagus sylvatica</i>	E2a	-	-	-	-	-	-	r	-	-	-	-	-	-	1	7	7
<i>Fagus sylvatica</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Lonicera alpigena</i>	E2a	+	-	-	-	-	-	-	-	-	-	-	-	-	3	21	21
<i>Gallium laevigatum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21	21
<i>Brachypodium sylvaticum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21	21
<i>Denaria bulbifera</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Salvia glutinosa</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Prenanthes purpurea</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Fraxinus excelsior</i>	E3a	r	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Lathyrus vernus</i> subsp. <i>vernus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Dentaria pentaphyllos</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Scrophularia nodosa</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Lilium martagon</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Euphorbia amygdaloides</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Ranunculus lanuginosus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Symphytum tuberosum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<b>Tilio-Acerion</b>																	
<i>Acer pseudoplatanus</i>	E3a	r	+	-	-	-	-	-	-	-	-	-	-	-	-	3	21
<i>Acer pseudoplatanus</i>	E2	+	1	+	+	+	-	-	-	-	-	-	-	-	9	64	64
<i>Acer pseudoplatanus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Genniun robertianum</i>	E1	1	1	+	1	+	-	-	-	-	-	-	-	-	6	43	43
<i>Polyistichum aculeatum</i>	E1	+	-	-	-	r	-	-	-	-	-	-	-	-	5	36	36
<i>Hesperis candida</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Phyllitis scolopendrium</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Aer platanoides</i>	E3a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Tephrosia pseudotrichia</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Ulmus glabra</i>	E3a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Aruncus dioicus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Quercetalia pubescens</i>	E2	+	-	-	-	-	-	-	-	-	-	-	-	-	4	29	29
<i>Sorbus aria</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	2	14	14
<i>Arabis turrita</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	7
<i>Peucedanum schottii</i> var. <i>petaeum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Tab. 1

TA

QP

*Sorbus aria*  
*Arabis turrita*  
*Peucedanum schottii* var. *petaeum*

I. DAKSKOBLER, W. R. FRANZ & A. ROZMAN

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
<i>Chaeophyllum hirsutum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Saxifrage rotundifolia</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Viola biflora</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Strepocarpus amplexifolius</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Allium victorialis</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carduus personata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Poa hybrida</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Primula elatior</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunc arifolius</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunc alpinus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Doronicum austriacum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Crepis pyrenaica</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Athyrium distentifolium</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Aconitum tauricum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Crepis paludosa</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Epilobetea angustifolii</i>	EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Rubus idaeus</i>	E2a	1	1	+	-	1	2	-	1	1	1	2	-	-	-	71
<i>Urtica dioica</i>	E1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	57
<i>Sambucus racemosa</i>	E2	-	-	-	r	+	-	-	-	-	-	-	-	-	-	43
<i>Fragaria vesca</i>	E1	+	-	-	+	-	-	-	-	-	-	-	-	-	-	29
<i>Solanum dulcamara</i>	E1	+	-	-	+	-	-	-	-	-	-	-	-	-	-	21
<i>Eupatorium cannabinum</i>	E1	+	-	-	+	-	-	-	-	-	-	-	-	-	-	14
<i>Salix caprea</i>	E3a	r	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Cassia europea</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Geum urbanum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Bromus benekei</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Tussilago farfara</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Cirsium palustre</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Eruo-Pinetea</i>	EP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Cirsium erisithales</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Rubus saxatilis</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Baphialbum salicifolium</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Juniperus sibirica</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Calanagrostis nardina</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14

Tab. 1

Number of relevé

## I. DAKSKOBLER, W. R. FRANZ &amp; A. ROZMAN

Tab. 1	Number of relevé	VP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
	<i>Allium ericetorum</i>	E1	+	+	+	-	-	-	-	-	-	-	-	-	-	3	21	
	<i>Paeonia austriacum</i>	E1	1	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Rhododanthus chamaecistus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Erica carnea</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Aquilegia nigricans</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Genista radiata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Carex ornithopoda</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Asperula arvensis</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<b>Vaccinio-Piceetea</b>																	
	<i>Picea abies</i>	E3a	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Picea abies</i>	E2b	-	-	-	-	-	-	-	-	-	-	-	-	-	4	29	
	<i>Picea abies</i>	E2a	+	-	-	-	-	-	-	-	-	-	-	-	-	6	43	
	<i>Picea abies</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Rosa pendulina</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	5	36	
	<i>Genista aculeata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	5	36	
	<i>Solidago virgaurea</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	29	
	<i>Valeriana tripterus</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	29	
	<i>Honogynne sylvestris</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	29	
	<i>Clematis alpina</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21	
	<i>Larix decidua</i>	E3a	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21	
	<i>Larix decidua</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21	
	<i>Larix decidua</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Lonicera caerulea</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Oxalis acetosella</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Veronica urticifolia</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Phegopteris connectilis</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	14	
	<i>Apocynis foetida</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Loniceria nigra</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14	
	<i>Abies alba</i>	E2a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Luzula luzuloides</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Dryopteris dilatata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Gymnocarpium dryopteris</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
	<i>Maianthemum bifolium</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

RP	Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
<b>Rhamno-Prunetea</b>																	
RP	<i>Rosa canina</i>	E2	r	+	+	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Berberis vulgaris</i>	E2a	r	1	.	.	.	.	.	.	.	.	.	.	.	3	21
<b>Elymo-Scleritea</b>																	
ES	<i>Betonica alpestris</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	8	57
	<i>Festuca calva</i>	E1	+	+	+	+	1	.	.	.	.	.	.	.	.	5	36
	<i>Thymus praecox</i> subsp. <i>pohleianus</i>	E1	+	+	+	+	.	.	.	.	.	.	.	.	.	4	29
	<i>Sabicea lucida</i> subsp. <i>stricta</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	4	29
	<i>Carex crassifolia</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Laserpitium peucedanoides</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Myosotis alpestris</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Eriogonum glabratum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Pulsatilla alpina</i> subsp. <i>australopina</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Carex ferruginea</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Thesium alpinum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Hieracium villosum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Achillea clavennae</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Aster bellidiastrium</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Campanula wisselskiana</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Genista lutea</i> subsp. <i>symplyrena</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Leontopodium alpinum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Soldanella alpina</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Juncus monanthos</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Carduus defloratus</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Heliosperma alpestre</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	1	7
<b>Trifolio-Geranietea</b>																	
TG	<i>Origanum vulgare</i>	E1	1	1	+	r	.	.	.	.	.	.	.	.	.	5	36
	<i>Calamintha cinneliana</i>	E1	+	1	.	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Digitalis grandiflora</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Iris graminea</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Vincetoxicum hirundinaria</i>	E1	+	1	.	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Libanotis sibirica</i> subsp. <i>montana</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Clinopodium vulgare</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Polygonatum odoratum</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	2	14

Tab. 1

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Tab. 1		Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
		<i>Thalictrum minus</i>	E1	+	+	-	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Verbascum lanatum</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Valeriana wallrothii</i>	E1	-	+	-	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Laserpitium siler</i>	E1	-	-	+	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Silene nutans</i>	E1	-	-	-	+	-	-	-	-	-	-	-	-	-	1	7
		<i>Achillea distans</i>	E1	-	-	-	-	+	-	-	-	-	-	-	-	-	1	7
		<i>Anemone pauciflora</i>	E1	-	-	-	-	-	+	-	-	-	-	-	-	-	1	7
		<i>Saxifrys recta</i>	E1	-	-	-	-	-	-	+	-	-	-	-	-	-	1	7
	FB	<b>Festuco-Brometea</b>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	21
		<i>Carex acutiformis</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	3	21
		<i>Koeleria pyramidata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Galium lucidum</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	2	14
		<i>Centaurea triumfetti</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Gymnadenia conopsea</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Gentianella ciliata</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Linum catharticum</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
	PaT	<b>Poo alpinae-Trisetalia</b>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	5	36
		<i>Poa alpina</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	3	21
		<i>Crocus albiflorus</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	4	29
	MA	<b>Molinio-Arrhenatheretea</b>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	29
		<i>Galium album</i>	E1	+	1	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Angelica sylvestris</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Vicia sepium</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Vicia cracca</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Deschampsia cespitosa</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Lathyrus pratensis</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Tanacetum officinale</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Pimpinella major</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
		<i>Dactylis glomerata</i> s.str.	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7
	SCF	<b>Schenczerio-Caricetalia fuscue</b>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	14
	TR	<b>Thlaspietalia rotundifoliae</b>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	9	64
		<i>Adenostyles glabra</i>	E1	+	-	-	-	-	-	-	-	-	-	-	-	-	7	50
		<i>Festuca nitida</i>	E1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

Tab. 1

## I. DAKSKOBLER, W. R. FRANZ &amp; A. ROZMAN

Tab. 1		Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
	<i>Festuca stenantha</i>	E1	.	.	.	r	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Cystopteris fragilis</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	7
	<i>Saxifaga hostii</i>	E1	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Carex brachystachys</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Asplenium ruta-muraria</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
O	<b>Other species</b>																2	14
	<i>Sorbus aucuparia</i>	E3a	r	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Sorbus aucuparia</i>	E2b	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Sorbus aucuparia</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Juncus communis</i>	E2a	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7
ML	<b>Mosses and lichens</b>																8	57
	<i>Pseudosclerella catenulata</i>	E0	1	+	.	1	1	.	+	.	1	1	+	.	.	.	1	8
	<i>Tortella tortuosa</i>	E0	.	.	.	+	.	1	+	.	1	1	+	.	.	2	2	57
	<i>Ctenidium mollissimum</i>	E0	.	.	.	.	+	.	1	+	.	1	+	.	.	2	7	50
	<i>Schistidium apocarpum</i>	E0	.	.	.	.	.	+	.	+	.	+	.	.	.	3	21	
	<i>Homalothecium lutescens</i>	E0	+	.	.	.	.	.	+	.	.	+	.	.	.	2	14	
	<i>Rhytidadelphus triquetrus</i>	E0	.	.	.	.	.	.	+	.	.	+	.	.	.	2	14	
	<i>Iorthecium alopecuroides</i>	E0	.	.	.	.	.	1	+	.	1	+	.	.	.	1	7	
	<i>Homalothecium philippianum</i>	E0	.	.	.	.	.	.	+	.	.	+	.	.	.	1	7	
	<i>Euryhynchium striatum</i>	E0	.	.	.	.	.	.	+	.	.	+	.	.	.	1	7	
	<i>Polytrichum formosum</i>	E0	.	.	.	.	.	1	+	.	1	+	.	.	.	1	7	
	<i>Dicranum scoparium</i>	E0	.	.	.	.	.	.	+	.	+	.	+	.	.	1	7	
	<i>Hylacomium splendens</i>	E0	.	.	.	.	.	.	+	.	+	.	+	.	.	1	7	
	<i>Peltigera leucophlebia</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	

A – Limestone  
D – Dolomite  
Gr – Gravel  
Li – Lithosols  
R – Rendzina  
Ko – Colluvial-deluvial soil

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW DinaridesTable 2. *Laserpitio latifolii-Rhamnetum fallacis* ass. nov.

	Number of relevé	1	2	3	4	5	6	7	8			
	Database number of relevé	243312	243316	243315	240925	246830	246829	246827	246828			
Elevation in m		1255	1275	1280	1230	1395	1280	1322	1307			
Aspect		SW	SW	SW	SSE	W	N	N	N			
Slope in degrees		30	30	30	20	30	20	25	20			
Parent material		Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr			
Soil		Li	Li	Li	Li	Li	Li	Li	Li			
Stoniness in %		80	80	80	100	100	100	100	100			
Cover of shrub layer in %	E2	70	60	70	60	70	70	70	70			
Cover of herb layer in %	E1	30	40	60	30	80	80	60	60			
Cover of moss layer in %	E0	5	5	.	.	.	.	.	.			
Number of species		51	70	85	66	27	20	22	22			
Relevé area	m <sup>2</sup>	100	100	100	200	400	200	200	200			
Date of taking relevé		5/20/2012	5/20/2012	Pl. Lekovca	8/30/2011 (Stol)	6/19/2009 Obir - A	10/1/2011 Bärenthal - A	9550/4 Bärenthal - A	9550/4 9550/4 435694 5144980 5144977			
Locality												
Quadrant												
Coordinate GK Y (D-48)	m											
Coordinate GK X (D-48)	m											
Author of relevé		ID	ID	ID	ID	WF	WF	WF	WF			
<b>Diagnostic species of the association</b>												
ScRF	<i>Rhamnus fallax</i>	E2b	4	4	4	3	2	2	4	8	100	
ScRF	<i>Rhamnus fallax</i>	E2a	.	+	.	.	.	.	.	1	13	
ScRF	<i>Rhamnus fallax</i>	E1	.	.	+	.	.	.	.	1	13	
ES	<i>Sesleria caerulea</i> subsp. <i>calcaria</i>	E1	2	1	2	+	2	1	.	6	75	
TG	<i>Laserpitium latifolium</i>	E1	+	+	+	.	.	+	r	6	75	
CA	<i>Linum julicum</i>	E1	+	1	1	.	.	1	+	5	63	
TR	<i>Rumex scutatus</i>	E1	.	+	+	1	+	1	.	5	63	
<b>Diagnostic species of lower units</b>												
BcAv	<i>Salix appendiculata</i>	E2b	1	1	1	+	.	.	.	4	50	
TR	<i>Scrophularia juratensis</i>	E1	.	+	+	+	.	.	.	3	38	
QP	<i>Primula veris</i> subsp. <i>columnae</i>	E1	1	+	1	.	.	.	.	3	38	
TG	<i>Lilium carniolicum</i>	E1	+	+	+	.	.	.	.	3	38	
QP	<i>Convallaria majalis</i>	E1	.	.	.	.	5	1	2	4	50	
<b>Differential species of the alliance <i>Seslerio calcariae-Rhamnion fallacis</i></b>												
EP	<i>Pinus mugo</i>	E2b	.	.	.	1	1	.	1	+	4	50
MuA	<i>Aconitum angustifolium</i>	E1	1	1	1	.	.	.	.	3	38	
AF	<b><i>Aremonio-Fagion</i></b>											
	<i>Cyclamen purpurascens</i>	E1	+	+	+	1	.	.	3	3	6	75
	<i>Helleborus niger</i>	E1	.	.	.	.	+	.	1	1	3	38
	<i>Anemone trifolia</i>	E1	+	.	+	.	.	.	.	.	2	25
	<i>Knautia drymeia</i>	E1	.	.	.	+	.	.	.	.	1	13

## I. DAKSKOBLER, W. R. FRANZ &amp; A. ROZMAN

Tab. 2 Number of relevé

		1	2	3	4	5	6	7	8	Pr.	Fr.
TA	<b><i>Tilio-Acerion</i></b>										
	<i>Acer pseudoplatanus</i>	E3a	.	+	.	.	.	.	.	1	13
	<i>Acer pseudoplatanus</i>	E2b	.	.	r	.	.	.	.	r	2
	<i>Acer pseudoplatanus</i>	E1	.	+	+	.	.	.	.	r	3
	<i>Geranium robertianum</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Hesperis candida</i>	E1	.	.	+	.	.	.	.	1	13
FS	<b><i>Fagetalia sylvaticae</i></b>										
	<i>Mercurialis perennis</i>	E1	.	+	.	.	.	.	+	+	3
	<i>Daphne mezereum</i>	E2a	+	.	+	.	.	.	.	.	2
	<i>Lilium martagon</i>	E1	+	.	+	.	.	.	.	.	2
	<i>Galeobdolon flavidum</i>	E1	.	+	.	1	.	.	.	2	25
	<i>Laburnum alpinum</i>	E2b	.	1	1	.	.	.	.	2	25
	<i>Laburnum alpinum</i>	E1	.	+	.	.	.	.	.	1	13
	<i>Myosotis sylvatica</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Campanula trachelium</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Euphorbia amygdaloides</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Fagus sylvatica</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Fraxinus excelsior</i>	E3a	.	.	+	.	.	.	.	1	13
	<i>Heracleum sphondylium</i>	E1	.	.	.	.	.	+	.	1	13
	<i>Lathyrus vernus</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Lathyrus vernus</i> subsp. <i>flaccidus</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Melica nutans</i>	E1	.	.	.	.	.	.	.	+	1
	<i>Mycelis muralis</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Paris quadrifolia</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Dryopteris filix-mas</i>	E1	.	.	.	+	.	.	.	1	13
QP	<b><i>Quercetalia pubescantis</i></b>										
	<i>Sorbus aria</i>	E2a	.	+	.	+	+	.	.	r	4
	<i>Fraxinus ornus</i>	E2a	.	.	.	r	.	.	.	1	13
	<i>Ostrya carpinifolia</i>	E2b	r	.	.	.	.	.	.	1	13
QF	<b><i>Querco-Fagetea</i></b>										
	<i>Listera ovata</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Carex digitata</i>	E1	.	.	.	.	+	r	.	2	25
	<i>Corylus avellana</i>	E2b	1	.	.	.	.	.	.	1	13
	<i>Corylus avellana</i>	E1	+	.	.	.	.	.	.	1	13
	<i>Clematis vitalba</i>	E2a	.	.	.	+	.	.	.	1	13
	<i>Lonicera xylosteum</i>	E2a	.	.	.	+	.	.	.	1	13
EP	<b><i>Erico-Pinetea</i></b>										
	<i>Buphtalmum salicifolium</i>	E1	1	1	1	1	2	+	1	+	8
	<i>Calamagrostis varia</i>	E1	+	1	+	1	.	1	2	1	7
	<i>Cirsium erisithales</i>	E1	.	+	.	+	.	+	1	2	5
	<i>Carex ornithopoda</i>	E1	+	.	1	+	.	.	.	3	38
	<i>Allium ericetorum</i>	E1	.	.	.	+	.	4	.	1	3
	<i>Pedicularis austriaca</i>	E1	.	.	.	+	.	.	1	1	38
	<i>Aquilegia nigricans</i>	E1	.	.	.	+	.	1	.	1	2
	<i>Rhododendron hirsutum</i>	E2a	.	.	+	.	.	.	.	1	13
	<i>Cotoneaster tomentosus</i>	E2a	.	.	.	+	.	.	.	1	13
	<i>Epipactis atrorubens</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Amelanchier ovalis</i>	E2b	.	.	.	.	1	.	.	1	13
	<i>Amelanchier ovalis</i>	E1	.	.	.	.	1	.	.	1	13
	<i>Polygala chamaebuxus</i>	E1	.	.	.	.	1	.	.	1	13
	<i>Erica carnea</i>	E1	.	.	.	.	.	r	.	1	13
	<i>Rubus saxatilis</i>	E1	.	.	.	.	.	.	.	+	1

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

Tab. 2 Number of relevé

		1	2	3	4	5	6	7	8	Pr.	Fr.
VP	<b>Vaccinio-Piceetea</b>										
	<i>Valeriana tripteris</i>	E1	.	.	+	.	.	1	1	3	4
	<i>Picea abies</i>	E3a	.	+	.	+	.	.	.	.	2
	<i>Picea abies</i>	E2b	+	.	.	.	.	.	.	1	13
	<i>Picea abies</i>	E2a	.	.	.	+	.	.	.	1	13
	<i>Picea abies</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Solidago virgaurea</i>	E1	.	.	.	+	.	.	.	2	25
	<i>Clematis alpina</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Veronica urticifolia</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Rosa pendulina</i>	E2a	.	.	.	.	+	.	.	1	13
BcAv	<b>Betulo carpatica-Alnetea viridis</b>										
	<i>Salix glabra</i>	E2a	.	.	.	+	2	.	.	2	25
MuA	<b>Mulgedio-Aconitetea</b>										
	<i>Aconitum lycoctonum</i> subsp. <i>ranunculifolium</i> s. lat.	E1	.	+	.	.	.	.	1	1	3
	<i>Heracleum pollinianum</i> (incl. <i>H. montanum</i> )	E1	.	+	+	1	.	.	.	3	38
	<i>Thalictrum aquilegiifolium</i>	E1	.	+	+	.	.	.	+	.	3
	<i>Senecio ovatus</i>	E1	.	1	1	.	.	.	.	2	25
	<i>Pleurospermum austriacum</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Polygonatum verticillatum</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Viola biflora</i>	E1	.	+	+	.	.	.	+	.	2
	<i>Allium victorialis</i>	E1	.	r	.	.	.	.	.	1	13
	<i>Lathyrus occidentalis</i> var. <i>montanus</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Primula elatior</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Rumex arifolius</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Phyteuma ovatum</i>	E1	.	.	.	.	.	.	r	1	13
Ca	<b>Caricion austroalpinae</b>										
	<i>Festuca calva</i>	E1	2	2	2	.	.	.	.	3	38
	<i>Centaurea haynaldii</i> subsp. <i>julica</i>	E1	+	1	+	.	.	.	.	3	38
	<i>Laserpitium peucedanoides</i>	E1	.	.	.	.	+	.	.	1	13
	<i>Ranunculus hybridus</i>	E1	.	.	.	r	+	.	.	2	25
	<i>Carduus crassifolius</i>	E1	+	.	.	.	.	.	.	1	13
ES	<b>Elyno-Seslerietea</b>										
	<i>Betonica alopecuroides</i>	E1	1	1	.	+	.	.	1	+	5
	<i>Ranunculus carinthiacus</i>	E1	+	1	1	.	.	.	.	3	38
	<i>Acinos alpinus</i>	E1	+	+	+	.	.	.	.	3	38
	<i>Leucanthemum adustum</i>	E1	+	+	+	.	.	.	.	3	38
	<i>Pimpinella alpina</i>	E1	+	+	+	.	.	.	.	3	38
	<i>Carex sempervirens</i>	E1	+	+	.	.	.	.	.	2	25
	<i>Hieracium villosum</i>	E1	+	+	.	.	.	.	.	2	25
	<i>Potentilla crantzii</i>	E1	+	.	+	.	.	.	.	2	25
	<i>Achillea clavata</i>	E1	+	.	.	.	.	1	.	2	25
	<i>Arabis vochinensis</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Polygala alpestris</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Thymus praecox</i> subsp. <i>polytrichus</i>	E1	.	.	+	+	.	.	.	2	25
	<i>Globularia cordifolia</i>	E1	.	.	.	+	1	.	.	2	25
	<i>Carex ferruginea</i>	E1	.	.	.	.	2	.	+	.	2
	<i>Helianthemum grandiflorum</i>	E1	+	.	.	.	.	.	.	1	13
	<i>Androsace villosa</i>	E1	+	.	.	.	.	.	.	1	13
	<i>Anemone narcissiflora</i>	E1	+	.	.	.	.	.	.	1	13
	<i>Cerastium strictum</i>	E1	.	+	.	.	.	.	.	1	13
	<i>Gentiana verna</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Rhinanthus aristatus</i>	E1	.	.	.	1	.	.	.	1	13
	<i>Senecio abrotanifolius</i>	E1	.	.	.	.	+	.	.	1	13

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Tab. 2 Number of relevé

		1	2	3	4	5	6	7	8	Pr.	Fr.
TG	<b><i>Trifolio-Geranietea</i></b>										
	<i>Polygonatum odoratum</i>	E1	.	+	+	.	1	.	1	.	4
	<i>Libanotis sibirica</i> subsp. <i>montana</i>	E1	+	+	.	+	.	.	.	.	3
	<i>Laserpitium siler</i>	E1	+	.	.	+	1	.	.	.	3
	<i>Silene nutans</i>	E1	+	+	.	.	.	.	.	.	2
	<i>Stachys recta</i>	E1	.	1	.	1	.	.	.	.	2
	<i>Valeriana wallrothii</i>	E1	.	+	r	.	.	.	.	.	2
	<i>Verbascum lanatum</i>	E1	.	+	+	.	.	.	.	.	2
	<i>Origanum vulgare</i>	E1	.	.	+	+	.	.	.	.	2
	<i>Achillea distans</i>	E1	.	.	+	.	.	.	.	.	1
	<i>Calamintha einseleana</i>	E1	.	.	.	+	.	.	.	.	1
RP	<b><i>Rhamno-Prunetea</i></b>										
	<i>Rosa canina</i>	E2a	+	+	.	.	.	.	.	.	2
TR	<b><i>Thlaspietea rotundifolii</i></b>										
	<i>Silene vulgaris</i> subsp. <i>glareosa</i>	E1	.	+	.	1	.	.	r	.	3
	<i>Gypsophila repens</i>	E1	1	+	.	.	.	.	.	.	2
	<i>Adenostyles glabra</i>	E1	+	+	.	.	.	.	.	.	2
	<i>Dryopteris villarii</i>	E1	1	.	+	.	.	.	.	.	2
	<i>Biscutella laevigata</i>	E1	1	.	.	1	.	.	.	.	2
	<i>Gymnocarpium robertianum</i>	E1	1	.	.	+	.	.	.	.	2
	<i>Sedum sexangulare</i>	E1	.	+	1	.	.	.	.	.	2
	<i>Valeriana montana</i>	E1	.	.	.	1	+	.	.	.	2
	<i>Petasites paradoxus</i>	E1	.	.	.	+	2	.	.	.	2
	<i>Athamanta cretensis</i>	E1	.	.	.	+	+	.	.	.	2
	<i>Campanula cespitosa</i>	E1	.	.	.	1	.	+	.	.	2
	<i>Dianthus sternbergii</i>	E1	.	.	.	.	+	1	.	.	2
	<i>Ligusticum segueri</i>	E1	1	.	.	.	.	.	.	.	1
	<i>Trisetum argenteum</i>	E1	.	.	.	1	.	.	.	.	1
	<i>Festuca laxa</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Hieracium porrifolium</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Viola pyrenaica</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Rhodiola rosea</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Trisetum distichophyllum</i>	E1	.	.	.	.	.	3	.	.	1
FB	<b><i>Festuco-Brometea</i></b>										
	<i>Carlina acaulis</i>	E1	.	+	+	.	.	.	+	.	3
	<i>Hippocrepis comosa</i>	E1	.	+	.	+	+	.	.	.	3
	<i>Galium lucidum</i>	E1	.	.	.	1	.	1	1	.	3
	<i>Gymnadenia conopsea</i>	E1	+	+	.	.	.	.	.	.	2
	<i>Dianthus monspessulanus</i>	E1	.	+	+	.	.	.	.	.	2
	<i>Euphorbia cyparissias</i>	E1	.	+	+	.	.	.	.	.	2
	<i>Allium senescens</i>	E1	+	.	.	.	.	.	.	.	1
	<i>Polygala amarella</i>	E1	.	+	.	.	.	.	.	.	1
	<i>Melica ciliata</i>	E1	.	.	+	.	.	.	.	.	1
	<i>Plantago media</i>	E1	.	.	r	.	.	.	.	.	1
	<i>Centaurea triumfettii</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Koeleria pyramidata</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Gentianella germanica</i> subsp. <i>rhaetica</i>	E1	.	.	.	.	.	r	.	.	1
PaT	<b><i>Poo alpinae-Trisetalia</i></b>										
	<i>Cardaminopsis ovirensis</i>	E1	.	.	+	.	.	.	.	.	1
	<i>Crocus albiflorus</i>	E1	.	.	+	.	.	.	.	.	1
	<i>Polygonum bistorta</i>	E1	.	.	+	.	.	.	.	.	1
	<i>Trollius europaeus</i>	E1	.	.	+	.	.	.	.	.	1

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

Tab. 2 Number of relevé

		1	2	3	4	5	6	7	8	Pr.	Fr.
MA	<b><i>Molinio-Arrhenatheretea</i></b>										
	<i>Galium album</i>	E1	+	+	1	.	.	.	.	3	38
	<i>Angelica sylvestris</i>	E1	.	+	+	.	.	.	.	2	25
	<i>Lathyrus pratensis</i>	E1	.	+	.	.	.	.	.	1	13
	<i>Taraxacum officinale</i>	E1	.	.	1	.	.	.	.	1	13
	<i>Veronica chamaedrys</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Vicia cracca</i>	E1	.	.	.	+	.	.	.	1	13
AT	<b><i>Asplenietea trichomanis</i></b>										
	<i>Primula auricula</i>	E1	+	+	+	.	.	.	.	3	38
	<i>Saxifraga hostii</i>	E1	+	+	+	.	.	.	.	3	38
	<i>Sedum maximum</i>	E1	.	+	+	+	.	.	.	3	38
	<i>Sedum album</i>	E1	.	.	+	+	.	.	.	2	25
	<i>Saxifraga crustata</i>	E1	+	.	.	.	.	.	.	1	13
	<i>Cystopteris regia</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Moebringia muscosa</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Silene hayekiana</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Erysimum sylvestre</i>	E1	.	.	.	.	1	.	.	1	13
EA	<b><i>Epilobietea angustifoliiti</i></b>										
	<i>Rubus idaeus</i>	E2a	.	+	+	.	.	.	.	2	25
	<i>Ranunculus sardous</i>	E1	.	+	.	.	.	.	.	1	13
	<i>Cirsium eriophorum</i>	E1	.	.	r	.	.	.	.	1	13
	<i>Urtica dioica</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Sambucus racemosa</i>	E2a	.	.	r	.	.	.	.	1	13
	<i>Solanum dulcamara</i>	E1	.	.	.	+	.	.	.	1	13
O	<b>Other species</b>										
	<i>Juniperus communis</i>	E2a	.	+	+	.	.	.	.	2	25
	<i>Alchemilla sp.</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Poa sp.</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Salix purpurea</i>	E2b	.	.	.	1	.	.	.	1	13
ML	<b>Mosses</b>										
	<i>Homalothecium lutescens</i>	E0	1	+	+	.	.	.	.	3	38
	<i>Schistidium apocarpum</i>	E0	+	+	.	+	.	.	.	3	38
	<i>Tortella tortuosa</i>	E0	.	+	.	+	.	.	.	2	25
	<i>Ctenidium molluscum</i>	E0	.	.	+	.	.	.	.	1	13

Gr – Gravel

Li – Lithosols

ID – Igor Dakskobler

WF – Wilfried Franz

**Table 3.** *Laburno alpini-Rhamnetum fallacis* ass. nov.

	Number of relevé									
	Database number of relevé									
Elevation in m	830	845	960	1100	1040	1010	650	7	244416	
Aspect	NEE	SEE	E	W	SW	E	NE		244297	
Slope in degrees	25	30	30	35	30	25	35		244295	
Parent material	D	D	D	D	D	D	D		244296	
Soil	R	R	R	R	R	R	R		244294	
Stoniness in %	5	2	20	10	5	20	20		244293	
Cover of tree layer in %	E3	.	5	5	20	20	.		244292	
Cover of shrub layer in %	E2	80	90	80	70	60	80	60	8/10/2012	Nemškarica
Cover of herb layer in %	E1	80	80	60	60	30	30	50	8/10/2012	Govči-
Cover of moss layer in %	E0	5	5	5	5	0	5	0	8/10/2012	Poldanovec
Number of species		36	27	33	32	30	27	19	9949/3	9949/3
Relevé area	m <sup>2</sup>	100	100	100	100	100	100	100	410603	5096532
Date of taking relevé		8/10/2012	8/10/2012	Govči-	Govči-	Govči-	Govči-		9949/3	5096456
Locality				Orlejci	9949/3	410953	5096528		9949/3	5097320
Quadrant										
Coordinate GK Y (D-48)	m									
Coordinate GK X (D-48)	m									
<b>Diagnostic species of the association</b>										
AF <i>Rhamnus fallax</i>	E2b	4	4	4	4	4	3	3	7	100
AF <i>Rhamnus fallax</i>	E2a	.	.	+	1	+	+	.	4	57
AF <i>Rhamnus fallax</i>	E1	1	+	.	.	.	.	.	2	29
ES <i>Carex ferruginea</i>	E1	.	1	1	1	1	+	.	5	71
FS <i>Laburnum alpinum</i>	E3a	.	.	.	.	+	+	.	2	29
FS <i>Laburnum alpinum</i>	E2b	+	.	+	+	+	1	.	5	71
FS <i>Laburnum alpinum</i>	E1	.	.	+	+	+	.	.	3	43
QP <i>Ostrya carpinifolia</i>	E3a	.	.	.	+	1	+	.	3	43
QP <i>Ostrya carpinifolia</i>	E2b	+	1	1	.	1	.	1	5	71
QP <i>Ostrya carpinifolia</i>	E2a	.	1	.	.	+	.	.	2	29
QP <i>Ostrya carpinifolia</i>	E1	+	.	.	.	.	.	.	1	14
FS <i>Fraxinus ornus</i>	E2	.	+	.	.	.	+	.	2	29
QP <i>Fraxinus ornus</i>	E1	+	.	+	+	+	.	+	5	71
AF <i>Arenonio-Fagion</i>										
<i>Cyclamen purpurascens</i>	E1	+	+	1	1	1	+	6	86	
<i>Dentaria enneaphyllos</i>	E1	+	+	+	+	+	+	6	86	
<i>Anemone trifolia</i>	E1	+			+		+	3	43	
<i>Helleborus niger</i>	E1				+			1	14	
FS <i>Fagellalia sylvaticae</i>										
<i>Salvia glutinosa</i>	E1	3	2	1	2	2	.	1	6	86
<i>Daphne mezereum</i>	E2a	+	+	+	1	+	+	.	6	86

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

Tab. 3 Number of relevé

		1	2	3	4	5	6	7	Pr.	Fr.	
	<i>Fagus sylvatica</i>	E3	.	.	+	.	.	1	.	2	29
	<i>Fagus sylvatica</i>	E2b	.	.	+	+	1	3	+	5	71
	<i>Fagus sylvatica</i>	E2a	.	+	1	1	1	2	.	5	71
	<i>Fagus sylvatica</i>	E1	+	1	.	.	+	1	1	5	71
	<i>Acer pseudoplatanus</i>	E3a	.	.	.	.	+	.	.	1	14
	<i>Acer pseudoplatanus</i>	E2	.	.	+	1	.	1	.	3	43
	<i>Acer pseudoplatanus</i>	E1	+	+	.	+	+	+	.	5	71
	<i>Polystichum aculeatum</i>	E1	+	+	.	+	+	.	+	5	71
	<i>Mercurialis perennis</i>	E1	+	.	1	.	1	1	.	4	57
	<i>Lonicera alpigena</i>	E2a	.	+	1	+	.	+	.	4	57
	<i>Actaea spicata</i>	E1	.	.	+	+	.	+	.	3	43
	<i>Galium laevigatum</i>	E1	+	.	1	.	.	+	.	3	43
	<i>Galeobdolon flavidum</i>	E1	.	+	.	.	+	.	.	2	29
	<i>Melica nutans</i>	E1	+	.	.	.	+	.	.	2	29
	<i>Euphorbia amygdaloides</i>	E1	.	.	+	.	+	.	.	2	29
	<i>Dryopteris filix-mas</i>	E1	.	+	.	.	.	.	.	1	14
	<i>Epilobium montanum</i>	E1	.	.	.	.	.	.	+	1	14
	<i>Mycelis muralis</i>	E1	.	.	.	.	.	+	.	1	14
	<i>Prenanthes purpurea</i>	E1	.	.	.	.	r	.	.	1	14
	<i>Sambucus nigra</i>	E2	.	.	.	.	.	.	+	1	14
	<i>Fraxinus excelsior</i>	E1	.	.	.	.	.	.	+	1	14
	<i>Epipactis helleborine</i>	E1	.	.	.	+	.	.	.	1	14
QP	<b><i>Quercetalia pubescantis</i></b>										
	<i>Sorbus aria</i>	E2	+	.	.	.	.	.	.	1	14
	<i>Sorbus aria</i>	E1	.	.	+	.	.	.	.	1	14
QF	<b><i>Querco-Fagetea</i></b>										
	<i>Carex digitata</i>	E1	+	.	.	.	.	.	+	2	29
	<i>Hepatica nobilis</i>	E1	.	.	+	.	.	.	.	1	14
BcAv	<b><i>Betulo carpaticae-Alnetea viridis</i></b>										
	<i>Salix glabra</i>	E2	+	2	+	+	+	.	.	5	71
	<i>Salix glabra</i>	E1	.	.	.	+	.	.	.	1	14
	<i>Salix appendiculata</i>	E2	.	.	.	+	.	.	.	1	14
	<i>Salix appendiculata</i>	E1	.	.	.	+	.	.	.	1	14
MuA	<b><i>Mulgedio-Aconitetea</i></b>										
	<i>Senecio ovatus</i>	E1	+	1	+	.	+	.	.	4	57
	<i>Aconitum lycoctonum</i> subsp. <i>ranunculifolium</i> s. lat.	E1	.	+	.	.	.	.	.	1	14
	<i>Athyrium filix-femina</i>	E1	+	.	.	.	.	.	.	1	14
EA	<b><i>Epilobietea angustifoliit</i></b>										
	<i>Eupatorium cannabinum</i>	E1	3	3	1	1	1	+	3	7	100
	<i>Rubus idaeus</i>	E2a	.	.	+	+	+	+	1	5	71
	<i>Atropa bella-donna</i>	E1	.	.	.	.	.	1	1	2	29
	<i>Verbascum thapsus</i>	E1	.	.	.	.	.	r	+	2	29
	<i>Cirsium vulgare</i>	E1	.	.	.	.	r	.	.	1	14
	<i>Solanum dulcamara</i>	E1	.	.	.	.	.	+	.	1	14
EP	<b><i>Erico-Pinetea</i></b>										
	<i>Calamagrostis varia</i>	E1	2	3	2	2	2	1	1	7	100
	<i>Cirsium erisithales</i>	E1	+	+	1	1	1	+	.	6	86
	<i>Carex alba</i>	E1	2	1	3	3	+	.	.	5	71
	<i>Molinia arundinacea</i>	E1	3	1	+	.	.	.	.	3	43
	<i>Buphthalmum salicifolium</i>	E1	.	.	+	+	+	.	.	3	43
	<i>Rhododendron hirsutum</i>	E2a	1	.	.	.	.	.	.	1	14
VP	<b><i>Vaccinio-Piceetea</i></b>										
	<i>Polystichum lonchitis</i>	E1	.	.	r	+	.	.	.	2	29

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Tab. 3 Number of relevé

		1	2	3	4	5	6	7	Pr.	Fr.
	<i>Picea abies</i>	E2a	.	.	.	+	.	.	+	29
	<i>Valeriana triptera</i>	E1	.	+	.	.	.	.	1	14
	<i>Veronica urticifolia</i>	E1	.	.	.	+	.	.	1	14
	<i>Aposeris foetida</i>	E1	.	.	+	.	.	.	1	14
	<i>Phegopteris connectilis</i>	E1	r	.	.	.	.	.	1	14
	<i>Hieracium murorum</i>	E1	.	.	+	.	.	.	1	14
ES	<b><i>Elyno-Seslerietea</i></b>									
	<i>Carduus crassifolius</i>	E1	.	.	.	+	1	.	2	29
	<i>Betonica alopecuros</i>	E1	+	.	.	.	.	.	1	14
TG	<b><i>Trifolio-Geranietea</i></b>									
	<i>Digitalis grandiflora</i>	E1						+	1	14
TR	<b><i>Thlaspietea rotundifolii</i></b>									
	<i>Gymnocarpium robertianum</i>	E1	1	1	1	2	1	+	7	100
	<i>Adenostyles glabra</i>	E1	1	2	1	1	2	1	.	86
	<i>Petasites paradoxus</i>	E1	.	+	.	.	.	.	1	14
	<i>Hieracium porrifolium</i>	E1	r	.	.	.	.	.	1	14
	<i>Arabis</i> sp.	E1	.	.	.	.	.	+	1	14
AT	<b><i>Asplenietea trichomanis</i></b>									
	<i>Paederota lutea</i>	E1	+	+	+	.	.	.	3	43
	<i>Asplenium viride</i>	E1	+	.	.	.	.	.	1	14
	<i>Asplenium ruta-muraria</i>	E1	.	.	.	.	r	.	1	14
ML	<b>Mosses</b>									
	<i>Ctenidium molluscum</i>	E0	+	.	.	+	.	+	3	43
	<i>Tortella tortuosa</i>	E0	+	.	.	.	.	.	1	14
	<i>Schistidium apocarpum</i>	E0	.	.	.	.	.	+	1	14
	<i>Polytrichum formosum</i>	E0	+	.	.	.	.	.	1	14

D – Dolomite

R – Rendzina

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW DinaridesTable 4. *Lunario redivivae-Rhamnetum fallacis* ass. nov.

	Number of relevé	1	2	3	4	245788		
	Database number of relevé							
Elevation in m		1375	1380	1400	1395			
Aspect		SW	SE	S	SW			
Slope in degrees		25	30	15	30			
Parent material		A	A	A	A			
Soil		R	Li	Li	Li			
Stoniness in %		60	90	90	90			
Cover of shrub layer in %	E2	60	70	60	70			
Cover of herb layer in %	E1	70	30	40	30			
Cover of moss layer in %	E0	20	30	20	40			
Number of species		41	29	29	31			
Relevé area	m <sup>2</sup>	50	50	50	50			
Date of taking relevé		5/11/2012	5/11/2012	7/2/2012	5/11/2012			
Locality		Golaki-vrh	Javorški vrh	Golaki-vrh	Javorški vrh			
Quadrant		0049/1	414834	5092221	0049/1			
Coordinate GK Y (D-48)	m							
Coordinate GK X (D-48)	m							
<b>Diagnostic species of the association</b>								
LRf	<i>Rhamnus fallax</i>	E2b	4	4	3	4	4	100
EA	<i>Sambucus racemosa</i>	E2	+	2	1	1	4	100
AT	<i>Sedum hispanicum</i>	E1	+	+	2	+	4	100
TA	<i>Lunaria rediviva</i>	E1	2	.	2	2	3	75
<b>Differential species of the alliance <i>Lonicero-Rhamnion fallacis</i></b>								
QF	<i>Lonicera xylosteum</i>	E2	+	.	+	.	2	50
FS	<i>Lonicera alpigena</i>	E2a	.	.	+	.	1	25
BcAv	<i>Salix appendiculata</i>	E1	.	r	.	.	1	25
AF	<b><i>Aremonio-Fagion</i></b>							
	<i>Dentaria enneaphyllos</i>	E1	1	+	.	1	3	75
FS	<b><i>Fagetalia sylvaticae</i></b>							
	<i>Dryopteris filix-mas</i>	E1	1	+	+	1	4	100
	<i>Galeobdolon flavidum</i>	E1	1	+	1	1	4	100
	<i>Epilobium montanum</i>	E1	+	+	+	.	3	75
	<i>Mercurialis perennis</i>	E1	2	r	.	+	3	75
	<i>Dentaria bulbifera</i>	E1	1	+	.	1	3	75
	<i>Actaea spicata</i>	E1	+	+	.	+	3	75
	<i>Heracleum sphondylium</i>	E1	+	+	.	+	3	75
	<i>Campanula trachelium</i>	E1	+	.	+	.	2	50
	<i>Paris quadrifolia</i>	E1	+	+	.	.	2	50
	<i>Corydalis cava</i>	E1	1	.	.	+	2	50
	<i>Polygonatum multiflorum</i>	E1	+	.	.	+	2	50
	<i>Poa nemoralis</i>	E1	.	.	+	+	2	50

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Tab. 4 Number of relevé

		1	2	3	4	Pr.	Fr.	
	<i>Sambucus nigra</i>	E2	+	.	.	1	25	
	<i>Daphne mezereum</i>	E2a	+	.	.	1	25	
	<i>Mycelis muralis</i>	E1	.	.	+	1	25	
	<i>Lilium martagon</i>	E1	.	.	.	1	25	
	<i>Fagus sylvatica</i>	E1	.	.	.	1	25	
TA	<b><i>Tilio-Acerion</i></b>							
	<i>Geranium robertianum</i>	E1	+	+	1	.	3	75
	<i>Acer pseudoplatanus</i>	E2	r	.	r	r	3	75
	<i>Hesperis candida</i>	E1	+	.	.	1	2	50
	<i>Adoxa moschatellina</i>	E1	.	+	.	+	2	50
QF	<b><i>Querco-Fagetea</i></b>							
	<i>Corylus avellana</i>	E2b	.	.	+	r	2	50
	<i>Stellaria holostea</i>	E1	.	+	.	.	1	25
MuA	<b><i>Mulgedio-Aconitetea</i></b>							
	<i>Senecio ovatus</i>	E1	1	+	+	.	3	75
	<i>Veratrum album</i>	E1	2	+	.	.	2	50
	<i>Ribes alpinum</i>	E2a	+	+	.	.	2	50
	<i>Aconitum degenii</i> subsp. <i>paniculatum</i>	E1	1	.	.	+	2	50
	<i>Ranunculus platanifolius</i>	E1	+	.	.	.	1	25
	<i>Doronicum austriacum</i>	E1	+	.	.	.	1	25
	<i>Centaurea montana</i>	E1	+	.	.	.	1	25
	<i>Hypericum maculatum</i>	E1	.	+	.	.	1	25
	<i>Chaerophyllum aureum</i>	E1	.	.	+	.	1	25
	<i>Milium effusum</i>	E1	.	.	+	.	1	25
	<i>Polygonatum verticillatum</i>	E1	.	.	.	+	1	25
EA	<b><i>Epilobietea angustifoliae</i></b>							
	<i>Urtica dioica</i>	E1	1	3	1	1	4	100
	<i>Rubus idaeus</i>	E2a	2	1	.	.	2	50
	<i>Solanum dulcamara</i>	E1	.	.	+	.	1	25
	<i>Hypericum hirsutum</i>	E1	.	.	.	+	1	25
EP	<b><i>Erico-Pinetea</i></b>							
	<i>Calamagrostis varia</i>	E1	.	.	.	+	1	25
MA	<b><i>Molinio-Arrhenatheretea</i></b>							
	<i>Angelica sylvestris</i>	E1	.	.	+	.	1	25
AT	<b><i>Asplenietea trichomanis</i></b>							
	<i>Polypodium vulgare</i>	E1	+	+	.	.	2	50
	<i>Cystopteris fragilis</i>	E1	+	.	.	.	1	25
	<i>Moehringia muscosa</i>	E1	.	+	.	.	1	25
	<i>Asplenium trichomanes</i>	E1	.	.	+	.	1	25
	<i>Asplenium ruta-muraria</i>	E1	.	.	.	+	1	25
ML	<b>Mosses and lichens</b>							
	<i>Ctenidium molluscum</i>	E0	2	2	1	1	4	100
	<i>Schistidium apocarpum</i>	E0	+	1	1	1	4	100
	<i>Homalothecium lutescens</i>	E0	2	3	1	3	4	100
	<i>Tortella tortuosa</i>	E0	1	.	1	1	3	75
	<i>Pseudoleskeella catenulata</i>	E0	1	1	+	.	3	75
	<i>Isothecium alopecuroides</i>	E0	+	.	+	.	2	50
	<i>Peltigera canina</i>	E0	+	.	+	.	2	50
	<i>Cladonia pyxidata</i>	E0	.	+	.	+	2	50
	<i>Thamnobryum alopecurum</i>	E0	+	.	.	.	1	25

A – Limestone

R – Rendzina

Li – Lithosols

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW DinaridesTable 5. Synoptic table of scrub communities with dominant *Rhamnus fallax* in Slovenia and Carinthia (A).

	Successive number	1	3	2	4
	Number of relevés	8	14	7	4
	Sign for syntaxa	LIRf	PIRF	LaRf	LrRf
	Author	ID, WF	ID, AR	ID	ID
	<b>Diagnostic species of the syntaxa</b>				
AF	<i>Rhamnus fallax</i>	E2b	100	100	100
AF	<i>Rhamnus fallax</i>	E2a	13	0	57
AF	<i>Rhamnus fallax</i>	E1	13	14	29
ES	<i>Sesleria caerulea</i> subsp. <i>calcaria</i>	E1	75	57	0
TG	<i>Laserpitium latifolium</i>	E1	75	0	0
ES	<i>Linum julicum</i>	E1	63	14	0
TR	<i>Rumex scutatus</i>	E1	63	21	0
QP	<i>Convallaria majalis</i>	E1	50	7	0
TR	<i>Scrophularia juratensis</i>	E1	38	7	0
QP	<i>Primula veris</i> subsp. <i>columnae</i>	E1	38	0	0
TG	<i>Lilium carniolicum</i>	E1	38	0	0
MuA	<i>Aconitum lycoctonum</i> subsp. <i>ranunculifolium</i> s. lat.	E1	38	79	14
VP	<i>Polystichum lonchitis</i>	E1	0	64	29
EP	<i>Rhododendron hirsutum</i>	E2a	13	50	14
ES	<i>Carex ferruginea</i>	E1	25	14	71
FS	<i>Laburnum alpinum</i>	E3a	0	0	29
FS	<i>Laburnum alpinum</i>	E2b	25	0	71
FS	<i>Laburnum alpinum</i>	E1	13	0	43
QP	<i>Ostrya carpinifolia</i>	E3a	0	0	43
QP	<i>Ostrya carpinifolia</i>	E2b	13	0	71
QP	<i>Ostrya carpinifolia</i>	E2a	0	0	29
QP	<i>Ostrya carpinifolia</i>	E1	0	0	14
QP	<i>Fraxinus ornus</i>	E2	13	0	29
QP	<i>Fraxinus ornus</i>	E1	0	0	71
EA	<i>Sambucus racemosa</i>	E2	13	43	0
AT	<i>Sedum hispanicum</i>	E1	0	21	0
TA	<i>Lunaria rediviva</i>	E1	0	0	100
					100
	<b>Diagnostic species of the order Rhamnetalia fallacis</b>				
BcAv	<i>Salix appendiculata</i>	E2	50	57	14
BcAv	<i>Salix appendiculata</i>	E1	0	0	14
	<b>Differential species of the alliance Seslerio calcariae-Rhamnion fallacis</b>				
EP	<i>Pinus mugo</i>	E2	50	14	0
MuA	<i>Aconitum angustifolium</i>	E1	38	7	0
VP	<i>Larix decidua</i>	E3a	0	21	0
VP	<i>Larix decidua</i>	E2b	0	29	0
VP	<i>Larix decidua</i>	E2a	0	21	0
VP	<i>Larix decidua</i>	E1	0	7	0
	<b>Differential species of the alliance Lonicero-Rhamnion fallacis</b>				
	<i>Lonicera alpigena</i>	E2a	0	21	57
	<i>Lonicera xylosteum</i>	E2	13	29	0
AF	<b>Aremonio-Fagion</b>				
	<i>Cyclamen purpurascens</i>	E1	75	43	86
	<i>Anemone trifolia</i>	E1	25	14	43
	<i>Knautia drymeia</i>	E1	13	7	0
	<i>Dentaria enneaphyllos</i>	E1	0	21	86
	<i>Helleborus niger</i>	E1	38	36	14
	<i>Primula vulgaris</i>	E1	0	14	0
	<i>Aremonia agrimonoides</i>	E1	0	7	0
	<i>Omphalodes verna</i>	E1	0	7	0
	<i>Helleborus odorus</i>	E1	0	7	0
FS	<b>Fagetalia sylvaticae</b>				
	<i>Mercurialis perennis</i>	E1	38	71	57
					75

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Tab. 5 Successive number

		1	3	2	4
	<i>Melica nutans</i>	E1	13	57	29
	<i>Heracleum sphondylium</i>	E1	13	0	0
	<i>Daphne mezereum</i>	E2a	25	71	86
	<i>Galeobdolon flavidum</i>	E1	25	43	29
	<i>Myosotis sylvatica</i>	E1	25	36	0
	<i>Lilium martagon</i>	E1	25	7	0
	<i>Dryopteris filix-mas</i>	E1	13	86	14
	<i>Fagus sylvatica</i>	E3	0	14	29
	<i>Fagus sylvatica</i>	E2b	0	21	71
	<i>Fagus sylvatica</i>	E2a	0	7	71
	<i>Fagus sylvatica</i>	E1	13	14	71
	<i>Mycelis muralis</i>	E1	13	36	14
	<i>Campanula trachelium</i>	E1	13	29	0
	<i>Paris quadrifolia</i>	E1	13	29	0
	<i>Euphorbia amygdaloides</i>	E1	13	7	29
	<i>Fraxinus excelsior</i>	E3a	13	7	0
	<i>Lathyrus vernus</i> subsp. <i>vernus</i>	E1	13	7	0
	<i>Lathyrus vernus</i> subsp. <i>flaccidus</i>	E1	13	0	0
	<i>Salvia glutinosa</i>	E1	0	14	86
	<i>Actaea spicata</i>	E1	0	43	43
	<i>Galium laevigatum</i>	E1	0	21	43
	<i>Epilobium montanum</i>	E1	0	29	14
	<i>Prenanthes purpurea</i>	E1	0	14	14
	<i>Sambucus nigra</i>	E2	0	0	14
	<i>Fraxinus excelsior</i>	E1	0	0	14
	<i>Epipactis helleborine</i>	E1	0	0	14
	<i>Corydalis cava</i>	E1	0	29	0
	<i>Poa nemoralis</i>	E1	0	29	0
	<i>Asarum europaeum</i> subsp. <i>caucasicum</i>	E1	0	21	0
	<i>Brachypodium sylvaticum</i>	E1	0	21	0
	<i>Pulmonaria officinalis</i>	E1	0	21	0
	<i>Dentaria bulbifera</i>	E1	0	14	0
	<i>Dentaria pentaphyllos</i>	E1	0	7	0
	<i>Ranunculus lanuginosus</i>	E1	0	7	0
	<i>Scrophularia nodosa</i>	E1	0	7	0
	<i>Symphytum tuberosum</i>	E1	0	7	0
	<i>Polygonatum multiflorum</i>	E1	0	0	50
TA	<b>Tilio-Acerion</b>				
	<i>Acer pseudoplatanus</i>	E3a	13	21	14
	<i>Acer pseudoplatanus</i>	E2	25	64	43
	<i>Acer pseudoplatanus</i>	E1	38	14	71
	<i>Geranium robertianum</i>	E1	13	43	0
	<i>Hesperis candida</i>	E1	13	14	0
	<i>Polystichum aculeatum</i>	E1	0	36	71
	<i>Phyllitis scolopendrium</i>	E1	0	14	0
	<i>Adoxa moschatellina</i>	E1	0	0	0
	<i>Acer platanoides</i>	E3a	0	7	0
	<i>Aruncus dioicus</i>	E1	0	7	0
	<i>Tephroseris pseudocrispia</i>	E1	0	7	0
	<i>Ulmus glabra</i>	E3a	0	7	0
QP	<b>Quercetalia pubescantis</b>				
	<i>Sorbus aria</i>	E2	50	29	14
	<i>Sorbus aria</i>	E1	0	0	14
	<i>Arabis turrita</i>	E1	0	14	0
	<i>Peucedanum schottii</i> var. <i>petraeum</i>	E1	0	7	0
QF	<b>Querco-Fagetea</b>				
	<i>Carex digitata</i>	E1	25	0	29
	<i>Listera ovata</i>	E1	25	0	0

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Tab. 5 Successive number

		1	3	2	4	
	<i>Corylus avellana</i>	E2b	13	7	0	50
	<i>Corylus avellana</i>	E1	13	0	0	0
	<i>Clematis vitalba</i>	E2	13	7	0	0
	<i>Hepatica nobilis</i>	E1	0	29	14	0
	<i>Anemone nemorosa</i>	E1	0	21	0	0
	<i>Galium sylvaticum</i>	E1	0	7	0	0
	<i>Stellaria holostea</i>	E1	0	0	0	25
BcAv	<b><i>Betulo carpatica-Alnetea viridis</i></b>					
	<i>Salix glabra</i>	E2	25	36	71	0
	<i>Salix glabra</i>	E1	0	0	14	0
	<i>Ribes alpinum</i>	E2a	0	36	0	50
	<i>Salix waldsteiniana</i>	E2a	0	14	0	0
	<i>Sorbus mougeotii</i>	E3a	0	7	0	0
	<i>Sorbus mougeotii</i>	E2b	0	7	0	0
	<i>Alnus viridis</i>	E2	0	7	0	0
MuA	<b><i>Mulgedio-Aconitetea</i></b>					
	<i>Thalictrum aquilegiifolium</i>	E1	38	29	0	0
	<i>Viola biflora</i>	E1	25	14	0	0
	<i>Phyteuma ovatum</i>	E1	13	0	0	0
	<i>Heracleum pollinianum</i> (incl. <i>H. montanum</i> )	E1	38	57	0	0
	<i>Senecio ovatus</i>	E1	25	50	57	75
	<i>Polygonatum verticillatum</i>	E1	25	50	0	25
	<i>Pleurospermum austriacum</i>	E1	25	14	0	0
	<i>Allium victorialis</i>	E1	13	7	0	0
	<i>Primula elatior</i>	E1	13	7	0	0
	<i>Rumex arifolius</i>	E1	13	7	0	0
	<i>Lathyrus occidentalis</i> var. <i>montanus</i>	E1	13	0	0	0
	<i>Athyrium filix-femina</i>	E1	0	21	14	0
	<i>Aconitum degenii</i> subsp. <i>paniculatum</i>	E1	0	43	0	50
	<i>Hypericum maculatum</i>	E1	0	43	0	25
	<i>Myrrhis odorata</i>	E1	0	43	0	0
	<i>Agropyron caninum</i>	E1	0	36	0	0
	<i>Ranunculus platanifolius</i>	E1	0	29	0	25
	<i>Veratrum album</i>	E1	0	21	0	50
	<i>Geranium sylvaticum</i>	E1	0	29	0	0
	<i>Silene dioica</i>	E1	0	29	0	0
	<i>Lamium maculatum</i>	E1	0	21	0	0
	<i>Senecio cacaliaster</i>	E1	0	21	0	0
	<i>Chaerophyllum hirsutum</i>	E1	0	14	0	0
	<i>Saxifraga rotundifolia</i>	E1	0	14	0	0
	<i>Scrophularia scopolii</i>	E1	0	14	0	0
	<i>Doronicum austriacum</i>	E1	0	7	0	25
	<i>Aconitum tauricum</i>	E1	0	7	0	0
	<i>Carduus personata</i>	E1	0	7	0	0
	<i>Crepis paludosa</i>	E1	0	7	0	0
	<i>Crepis pyrenaica</i>	E1	0	7	0	0
	<i>Poa hybrida</i>	E1	0	7	0	0
	<i>Rumex alpinus</i>	E1	0	7	0	0
	<i>Streptopus amplexifolius</i>	E1	0	7	0	0
	<i>Athyrium distentifolium</i>	E1	0	7	0	0
	<i>Centaurea montana</i>	E1	0	0	0	25
	<i>Chaerophyllum aureum</i>	E1	0	0	0	25
	<i>Milium effusum</i>	E1	0	0	0	25
EA	<b><i>Epilobietea angustifoli</i></b>					
	<i>Rubus idaeus</i>	E2a	25	71	71	50
	<i>Urtica dioica</i>	E1	13	57	0	100
	<i>Solanum dulcamara</i>	E1	13	21	14	25
	<i>Cirsium eriophorum</i>	E1	13	0	0	0

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Tab. 5 Successive number

		1	3	2	4
	<i>Eupatorium cannabinum</i>	E1	0	14	100
	<i>Atropa bella-donna</i>	E1	0	0	29
	<i>Verbascum thapsus</i>	E1	0	0	29
	<i>Cirsium vulgare</i>	E1	0	0	14
	<i>Fragaria vesca</i>	E1	0	29	0
	<i>Cuscuta europaea</i>	E1	0	14	0
	<i>Geum urbanum</i>	E1	0	14	0
	<i>Salix caprea</i>	E3a	0	14	0
	<i>Bromus benekenii</i>	E1	0	7	0
	<i>Cirsium palustre</i>	E1	0	7	0
	<i>Tussilago farfara</i>	E1	0	7	0
	<i>Hypericum hirsutum</i>	E1	0	0	25
EP	<b><i>Erico-Pinetea</i></b>				
	<i>Buphtalmum salicifolium</i>	E1	100	36	43
	<i>Calamagrostis varia</i>	E1	88	36	100
	<i>Cirsium erisithales</i>	E1	63	64	86
	<i>Allium ericetorum</i>	E1	38	21	0
	<i>Peucedanum austriacum</i>	E1	38	14	0
	<i>Aquilegia nigricans</i>	E1	25	7	0
	<i>Rubus saxatilis</i>	E1	13	43	0
	<i>Erica carnea</i>	E1	13	14	0
	<i>Amelanchier ovalis</i>	E2	13	0	0
	<i>Polygala chamaebuxus</i>	E1	13	0	0
	<i>Carex ornithopoda</i>	E1	38	7	0
	<i>Cotoneaster tomentosus</i>	E2a	13	0	0
	<i>Epipactis atrorubens</i>	E1	13	0	0
	<i>Carex alba</i>	E1	0	0	71
	<i>Molinia arundinacea</i>	E1	0	0	43
	<i>Juniperus sibirica</i>	E2a	0	36	0
	<i>Rhodothamnus chamaecistus</i>	E1	0	14	0
	<i>Asperula aristata</i>	E1	0	7	0
	<i>Genista radiata</i>	E1	0	7	0
VP	<b><i>Vaccinio-Piceetea</i></b>				
	<i>Valeriana tripteris</i>	E1	50	29	14
	<i>Picea abies</i>	E3a	25	14	0
	<i>Picea abies</i>	E2b	13	29	0
	<i>Picea abies</i>	E2a	13	43	29
	<i>Picea abies</i>	E1	13	7	0
	<i>Solidago virgaurea</i>	E1	25	29	0
	<i>Rosa pendulina</i>	E2a	13	36	0
	<i>Clematis alpina</i>	E1	13	21	0
	<i>Veronica urticifolia</i>	E1	13	14	14
	<i>Aposeris foetida</i>	E1	0	14	14
	<i>Phegopteris connectilis</i>	E1	0	14	14
	<i>Gentiana asclepiadea</i>	E1	0	36	0
	<i>Homogyne sylvestris</i>	E1	0	29	0
	<i>Hieracium murorum</i>	E1	0	0	14
	<i>Lonicera caerulea</i>	E2a	0	14	0
	<i>Lonicera nigra</i>	E2a	0	14	0
	<i>Oxalis acetosella</i>	E1	0	14	0
	<i>Abies alba</i>	E2a	0	7	0
	<i>Luzula luzuloides</i>	E1	0	7	0
	<i>Maianthemum bifolium</i>	E1	0	7	0
	<i>Dryopteris dilatata</i>	E1	0	7	0
	<i>Gymnocarpium dryopteris</i>	E1	0	7	0
ES	<b><i>Elyno-Seslerietea</i></b>				
	<i>Betonica alopecuroides</i>	E1	63	57	14
	<i>Achillea clavennae</i>	E1	25	7	0

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Tab. 5 Successive number

		1	3	2	4
<i>Globularia cordifolia</i>	E1	25	0	0	0
<i>Ranunculus hybridus</i>	E1	25	0	0	0
<i>Laserpitium peucedanoides</i>	E1	13	14	0	0
<i>Carduus defloratus</i>	E1	13	7	0	0
<i>Senecio abrotanifolius</i>	E1	13	0	0	0
<i>Astrantia bavarica</i>	E1	13	0	0	0
<i>Festuca calva</i>	E1	38	36	0	0
<i>Acinos alpinus</i>	E1	38	0	0	0
<i>Centaurea haynaldi</i> subsp. <i>julica</i>	E1	38	0	0	0
<i>Leucanthemum adustum</i>	E1	38	0	0	0
<i>Pimpinella alpina</i>	E1	38	0	0	0
<i>Ranunculus carinthiacus</i>	E1	38	0	0	0
<i>Thymus praecox</i> subsp. <i>polytrichus</i>	E1	25	29	0	0
<i>Hieracium villosum</i>	E1	25	7	0	0
<i>Arabis vochinensis</i>	E1	25	0	0	0
<i>Carex sempervirens</i>	E1	25	0	0	0
<i>Polygala alpestris</i>	E1	25	0	0	0
<i>Potentilla crantzii</i>	E1	25	0	0	0
<i>Carduus crassifolius</i>	E1	13	21	29	0
<i>Androsace villosa</i>	E1	13	0	0	0
<i>Anemone narcissiflora</i>	E1	13	0	0	0
<i>Cerastium strictum</i>	E1	13	0	0	0
<i>Gentiana verna</i>	E1	13	0	0	0
<i>Helianthemum grandiflorum</i>	E1	13	0	0	0
<i>Rhinanthus aristatus</i>	E1	13	0	0	0
<i>Scabiosa lucida</i> subsp. <i>stricta</i>	E1	0	29	0	0
<i>Erigeron glabratus</i>	E1	0	14	0	0
<i>Myosotis alpestris</i>	E1	0	14	0	0
<i>Pulsatilla alpina</i> subsp. <i>austroalpina</i>	E1	0	14	0	0
<i>Thesium alpinum</i>	E1	0	14	0	0
<i>Aster bellidiastrum</i>	E1	0	7	0	0
<i>Campanula witasekiana</i>	E1	0	7	0	0
<i>Gentiana lutea</i> subsp. <i>symphyandra</i>	E1	0	7	0	0
<i>Heliosperma alpestre</i>	E1	0	7	0	0
<i>Juncus monanthos</i>	E1	0	7	0	0
<i>Leontopodium alpinum</i>	E1	0	7	0	0
<i>Soldanella alpina</i>	E1	0	7	0	0
TG <b>Trifolio-Geranietea</b>					
<i>Polygonatum odoratum</i>	E1	50	14	0	0
<i>Laserpitium siler</i>	E1	38	14	0	0
<i>Thalictrum minus</i>	E1	0	14	0	0
<i>Libanotis sibirica</i> subsp. <i>montana</i>	E1	38	14	0	0
<i>Origanum vulgare</i>	E1	25	36	0	0
<i>Valeriana wallrothii</i>	E1	25	14	0	0
<i>Verbascum lanatum</i>	E1	25	14	0	0
<i>Silene nutans</i>	E1	25	7	0	0
<i>Stachys recta</i>	E1	25	7	0	0
<i>Calamintha einseleana</i>	E1	13	21	0	0
<i>Achillea distans</i>	E1	13	7	0	0
<i>Digitalis grandiflora</i>	E1	0	21	14	0
<i>Iris graminea</i>	E1	0	21	0	0
<i>Vincetoxicum hirundinaria</i>	E1	0	21	0	0
<i>Clinopodium vulgare</i>	E1	0	14	0	0
<i>Arabis pauciflora</i>	E1	0	7	0	0
FB <b>Festuco-Brometea</b>					
<i>Galium lucidum</i>	E1	38	14	0	0
<i>Carlina acaulis</i>	E1	38	21	0	0
<i>Hippocrepis comosa</i>	E1	38	0	0	0

## I. DAKSKOBLER, W. R. FRANZ &amp; A. ROZMAN

Tab. 5 Successive number

		1	3	2	4
	<i>Gentianella germanica</i>	E1	13	0	0
	<i>Gymnadenia conopsea</i>	E1	25	7	0
	<i>Dianthus monspessulanus</i>	E1	25	0	0
	<i>Euphorbia cyparissias</i>	E1	25	0	0
	<i>Koeleria pyramidata</i>	E1	13	21	0
	<i>Centaurea triumfettii</i>	E1	13	14	0
	<i>Allium senescens</i>	E1	13	0	0
	<i>Melica ciliata</i>	E1	13	0	0
	<i>Plantago media</i>	E1	13	0	0
	<i>Polygala amarella</i>	E1	13	0	0
	<i>Gentianella ciliata</i>	E1	0	7	0
	<i>Linum catharticum</i>	E1	0	7	0
PaT	<b><i>Poo alpinae-Trisetalia</i></b>				
	<i>Cardaminopsis ovirensis</i>	E1	13	0	0
	<i>Crocus albiflorus</i>	E1	13	21	0
	<i>Polygonum bistorta</i>	E1	13	0	0
	<i>Trollius europaeus</i>	E1	13	0	0
	<i>Poa alpina</i>	E1	0	36	0
MA	<b><i>Molinio-Arrhenatheretea</i></b>				
	<i>Galium album</i>	E1	38	29	0
	<i>Angelica sylvestris</i>	E1	25	29	0
	<i>Lathyrus pratensis</i>	E1	13	7	0
	<i>Taraxacum officinale</i>	E1	13	7	0
	<i>Vicia cracca</i>	E1	13	7	0
	<i>Ranunculus sardous</i>	E1	13	0	0
	<i>Veronica chamaedrys</i>	E1	13	0	0
	<i>Dactylis glomerata s. str.</i>	E1	0	7	0
	<i>Deschampsia cespitosa</i>	E1	0	7	0
	<i>Pimpinella major</i>	E1	0	7	0
	<i>Vicia sepium</i>	E1	0	7	0
RP	<b><i>Rhamno-Prunetea</i></b>				
	<i>Rosa canina</i>	E2	25	21	0
	<i>Berberis vulgaris</i>	E2a	0	21	0
SCF	<b><i>Scheuchzerio-Caricetea fuscae</i></b>				
	<i>Parnassia palustris</i>	E1	0	14	0
TR	<b><i>Iblaspietea rotundifoli</i></b>				
	<i>Silene vulgaris</i> subsp. <i>glareosa</i>	E1	38	7	0
	<i>Petasites paradoxus</i>	E1	25	14	14
	<i>Dianthus sternbergii</i>	E1	25	0	0
	<i>Tisetum distichophyllum</i>	E1	13	0	0
	<i>Campanula cespitosa</i>	E1	25	14	0
	<i>Valeriana montana</i>	E1	25	14	0
	<i>Festuca laxa</i>	E1	13	7	0
	<i>Athamanta cretensis</i>	E1	25	0	0
	<i>Tisetum argenteum</i>	E1	13	14	0
	<i>Adenostyles glabra</i>	E1	25	64	86
	<i>Gymnocarpium robertianum</i>	E1	25	43	100
	<i>Dryopteris villarii</i>	E1	25	43	0
	<i>Biscutella laevigata</i>	E1	25	7	0
	<i>Gypsophila repens</i>	E1	25	0	0
	<i>Sedum sexangulare</i>	E1	25	0	0
	<i>Rhodiola rosea</i>	E1	13	36	0
	<i>Hieracium porrifolium</i>	E1	13	7	14
	<i>Ligusticum seguieri</i>	E1	13	14	0
	<i>Viola pyrenaica</i>	E1	13	14	0
	<i>Festuca nitida</i>	E1	0	50	0
	<i>Arabis alpina</i>	E1	0	14	0
	<i>Campanula cochleariifolia</i>	E1	0	14	0

Phytosociology and ecology of *Rhamnus fallax* in the SE Alps and NW Dinarides

Tab. 5 Successive number

		1	3	2	4
	<i>Astrantia carniolica</i>	E1	0	7	0
	<i>Hieracium bifidum</i>	E1	0	7	0
	<i>Leontodon hispidus</i> subsp. <i>hyoseroides</i>	E1	0	7	0
	<i>Saxifraga caesia</i>	E1	0	7	0
	<i>Taraxacum laevigatum</i> agg.	E1	0	7	0
AT	<b>Asplenietea trichomanis</b>				
	<i>Erysimum sylvestre</i>	E1	13	0	0
	<i>Sedum maximum</i>	E1	38	14	0
	<i>Primula auricula</i>	E1	38	7	0
	<i>Saxifraga hostii</i>	E1	38	7	0
	<i>Sedum album</i>	E1	25	29	0
	<i>Moebringia muscosa</i>	E1	13	14	0
	<i>Silene hayekiana</i>	E1	13	14	0
	<i>Saxifraga crustata</i>	E1	13	0	0
	<i>Cystopteris regia</i>	E1	13	0	0
	<i>Paederota lutea</i>	E1	0	36	43
	<i>Asplenium viride</i>	E1	0	29	14
	<i>Asplenium ruta-muraria</i>	E1	0	7	14
	<i>Asplenium trichomanes</i>	E1	0	29	0
	<i>Kernera saxatilis</i>	E1	0	21	0
	<i>Valeriana saxatilis</i>	E1	0	14	0
	<i>Cystopteris fragilis</i>	E1	0	7	0
	<i>Carex brachystachys</i>	E1	0	7	0
	<i>Festuca stenantha</i>	E1	0	7	0
	<i>Polypodium vulgare</i>	E1	0	0	50
O	<b>Other species</b>				
	<i>Juniperus communis</i>	E2a	25	7	0
	<i>Alchemilla</i> sp.	E1	13	0	0
	<i>Poa</i> sp.	E1	13	0	0
	<i>Salix purpurea</i>	E2b	13	0	0
	<i>Sorbus aucuparia</i>	E3a	0	14	0
	<i>Sorbus aucuparia</i>	E2b	0	14	0
	<i>Sorbus aucuparia</i>	E1	0	7	0
	<i>Arabis</i> sp.	E1	0	0	14
ML	<b>Mosses and lichens</b>				
	<i>Schistidium apocarpum</i>	E0	38	21	14
	<i>Homalothecium lutescens</i>	E0	38	14	0
	<i>Tortella tortuosa</i>	E0	25	57	14
	<i>Ctenidium molluscum</i>	E0	13	50	43
	<i>Pseudoleskeella catenulata</i>	E0	0	57	0
	<i>Isothecium alopecuroides</i>	E0	0	7	0
	<i>Polytrichum formosum</i>	E0	0	7	14
	<i>Rhytidiodelphus triquetrus</i>	E0	0	14	0
	<i>Dicranum scoparium</i>	E0	0	7	0
	<i>Euryhynchium striatum</i>	E0	0	7	0
	<i>Homalothecium philippeanum</i>	E0	0	7	0
	<i>Hylocomium splendens</i>	E0	0	7	0
	<i>Peltigera leucophlebia</i>	E0	0	7	0
	<i>Cladonia pyxidata</i>	E0	0	0	50
	<i>Peltigera canina</i>	E0	0	0	50
	<i>Thamnobryum alopecurum</i>	E0	0	0	25

LIRf – *Laserpitio latifolii-Rhamnetum fallacis*PIRF – *Polysticho lonchitis-Rhamnetum fallacis*LaRf – *Laburno alpini-Rhamnetum fallacis*LrRf – *Lunario redivivae-Rhamnetum fallacis*

**Table 6.** Groups of diagnostic species in the *Rhamnus fallax* scrub communities in the Southeastern Alps and in the Trnovski gozd plateau (Slovenia, S-Austria).

Successive number	1 ScRf	2 PIRf	3 LaRf	4 LrRf
Sign for syntaxa				
<i>Aremonio-Fagion</i>	6	5	<b>12</b>	5
<i>Fagetalia sylvaticae</i>	7	<b>15</b>	<b>28</b>	<b>30</b>
<i>Tilio-Acerion</i>	2	4	6	<b>10</b>
<i>Quercetalia pubescantis</i>	3	1	<b>9</b>	0
<i>Querco-Fagetea</i>	2	2	1	4
<i>Mulgedio-Aconitetea, Betulo carpatica-Alnetea viridis</i>	8	<b>16</b>	6	<b>13</b>
<i>Epilobietea angustifolii</i>	2	5	8	<b>9</b>
<i>Erico-Pinetea</i>	<b>12</b>	7	<b>11</b>	0
<i>Vaccinio-Piceetea</i>	4	<b>10</b>	4	0
<i>Elyno-Seslerietea</i>	<b>17</b>	7	3	0
<i>Trifolio-Geranietae</i>	<b>8</b>	4	0	0
<i>Festuco-Brometea</i>	<b>6</b>	2	0	0
<i>Poo alpinae-Trisetalia</i>	1	1	0	0
<i>Molinio-Arrhenatheretea</i>	2	2	0	0
<i>Rhamno-Prunetea</i>	0	0	0	0
<i>Scheuchzerio-Caricetea fuscae</i>	0	0	0	0
<i>Iblaspietea rotundifolii</i>	<b>11</b>	<b>8</b>	7	0
<i>Asplenietea trichomanis</i>	4	5	2	<b>8</b>
Other species	1	0	0	0
Mosses and lichens	2	5	3	<b>19</b>
Total	100	100	100	100

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