

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. Olševa, 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 zoyssii* 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-Tilietum cordatae*). In noble hardwood communities it is found on rendzinas and colluvial-deluvial soils (*Saxifrago petraeae-Tilietum 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*, *Cytisantho-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 Pogöriach/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 scree 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

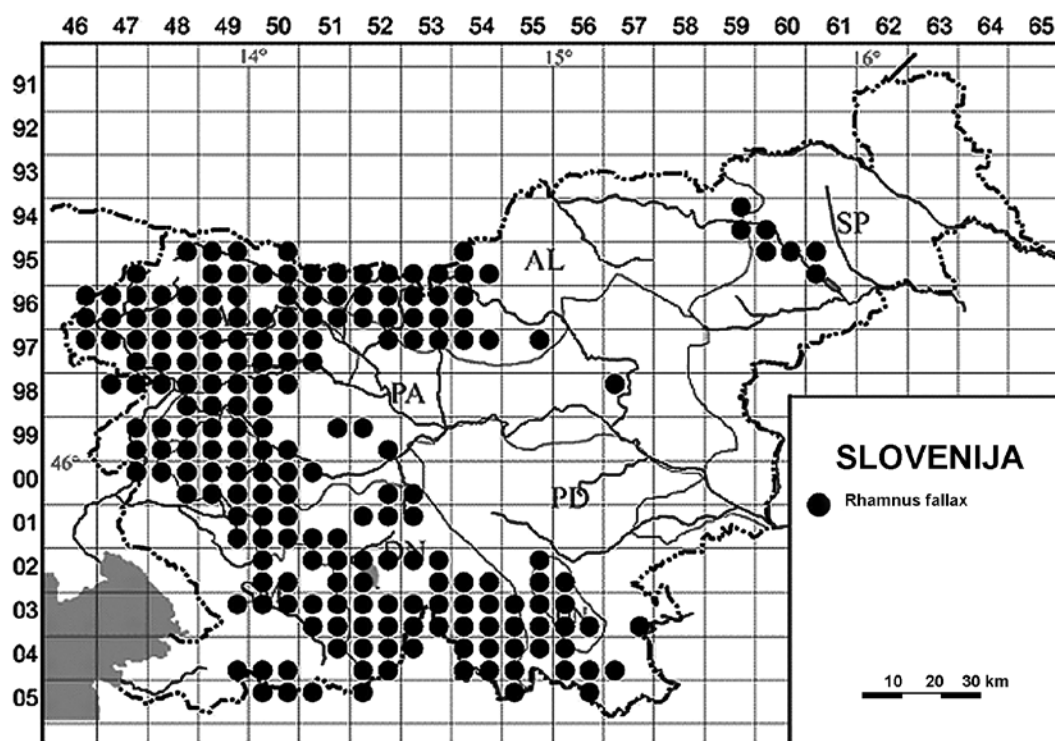
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Figure 1. Distribution of *Rhamnus fallax* in Slovenia.

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 & STEFANOVIČ (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). STEFANOVIČ (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 (STEFANOVIČ 1964) after *Rhamnus fallax*. Among the communities of order *Rhamnetalia fallacis* and alliance *Lonicero-Rhamnion fallacis* in Croatia, TRINAJSTIĆ (2008) mentions only the association *Ribes pallidigemma-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).

$$WA_{pop} = \frac{\sum_{i=1}^s (FV_i \times Abund_i \times VR_i)}{\sum_{i=1}^s (Abund_i \times VR_i)} \quad \text{where } WA_{pop} \text{ is the weighted average of indication values of plant species for an ecological factor on a relevé, } FV_i \text{ is the phytoindication value of}$$

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the $[i]$ row factor, $Abund_i$ is cover value, VR_i is range of variation of phytoindication 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 phytoindication 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

Quercus-Fagetum Br.-Bl. & Vlieg. 1937

Rhamnetum fallacis P. Fukarek 1969

Seslerio calcariae-Rhamnetum fallacis all. nov. hoc loco

Polysticho lonchitis-Rhamnetum fallacis ass. nova hoc loco

Laserpitio latifolii-Rhamnetum fallacis ass. nova hoc loco

Lonicero-Rhamnetum 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

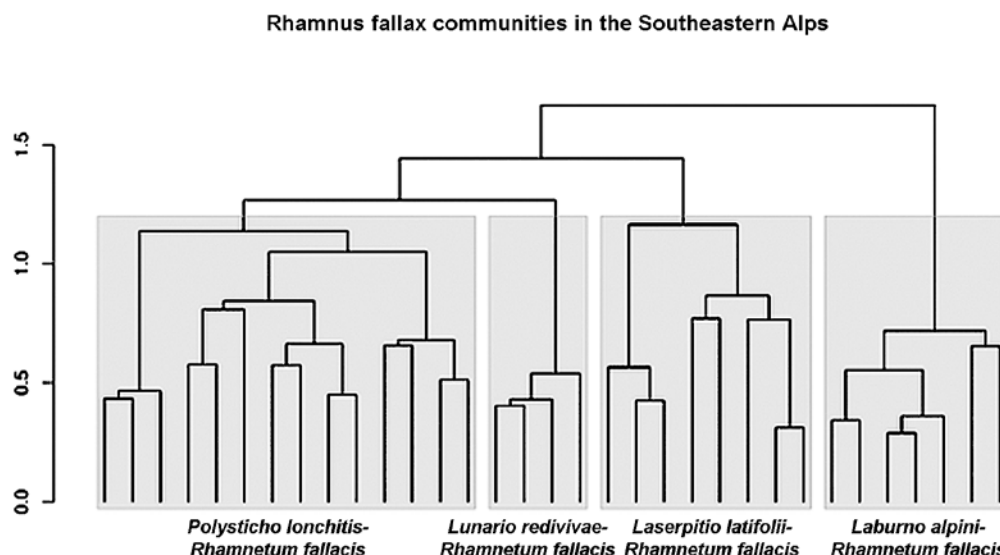


Figure 2. Dendrogram of relevés with dominant *Rhamnus fallax* in the southeastern Alps and in the Trnovski gozd plateau (MISSQ, similarity ratio).

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*, *Anemone trifoliae-Fagetum*), partly also in the belt of subalpine larch forests (*Rhododhamno-Laricetum*). In some spots on less extreme

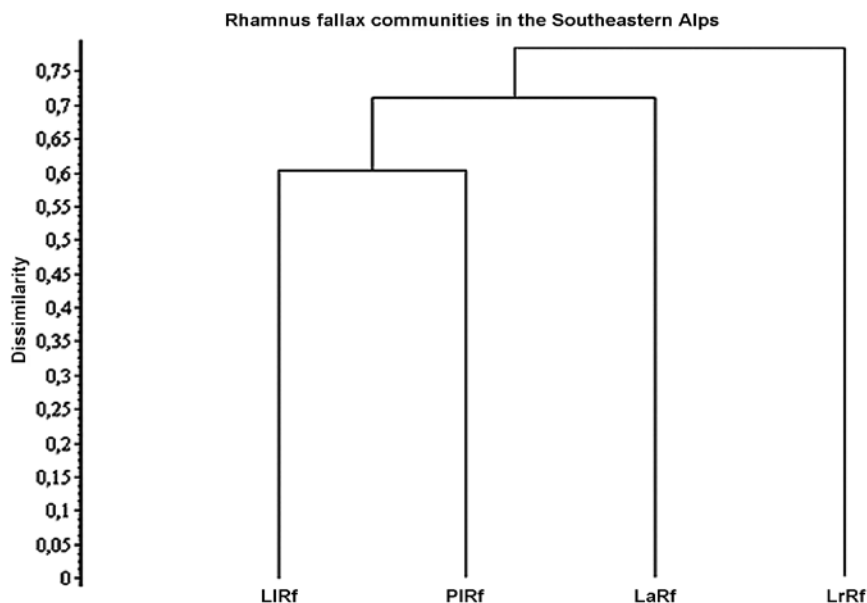


Figure 3. Dendrogram of *Rhamnus fallax* in the Southeastern Alps and in the Trnovski gozd plateau (UPMGA, similarity ratio). LIRf – *Laserpitio latifolii-Rhamnetum fallacis*; PIRf – *Polysticho lonchitis-Rhamnetum fallacis*; LaRf – *Laburno alpini-Rhamnetum fallacis*; LrRf – *Lunario redivivae-Rhamnetum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

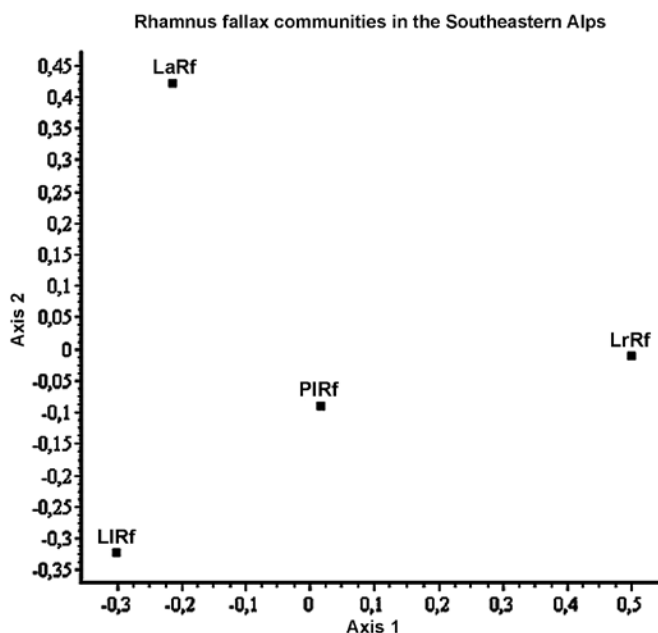
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Figure 4. Two-dimensional scatter-diagram of *Rhamnus fallax* in the Southeastern Alps and in the Trnovski gozd plateau (PCoA, similarity ratio).

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 MARTINČIČ 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.

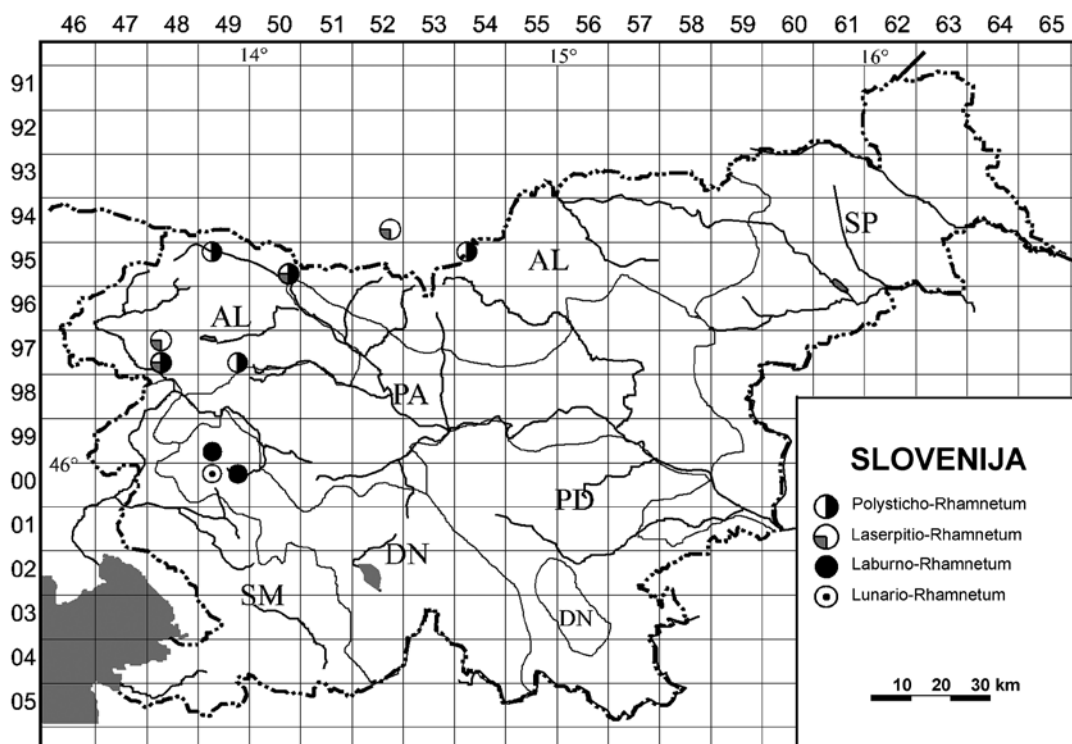


Figure 5. Approximate localities of stands of the associations *Polysticho lonchitis-Rhamnetum*, *Laserpitio-Rhamnetum*, *Laburno-Rhamnetum* and *Lunario-Rhamnetum* in Slovenia and in Carinthia (Austria).

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 fallaxis*. These are very initial open scrubs on stabilized, more or less overgrown screes 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 screes, 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 fallaxis*. They are classified into the new association *Laserpitio latifolii-Rhamnetum fallaxis*. 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 screes 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

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.

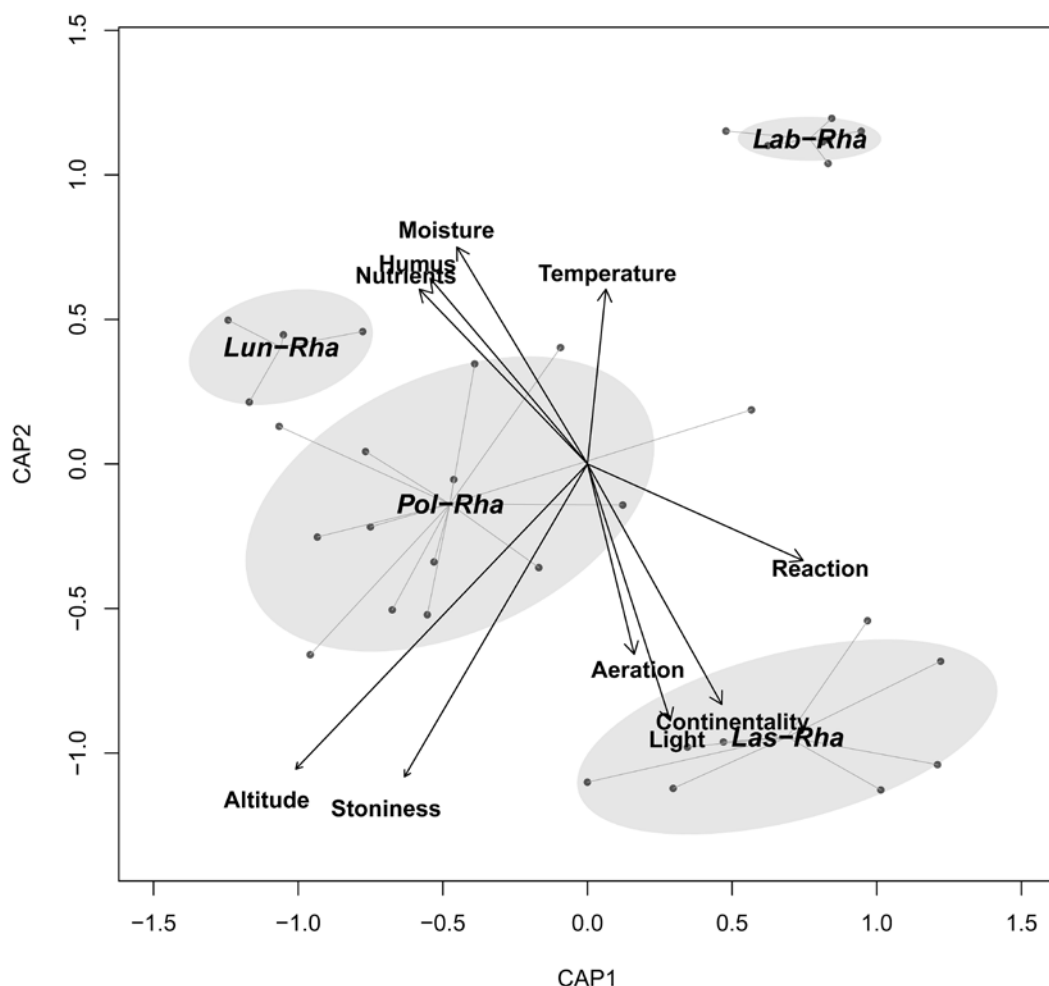


Figure 6. The ordination plot of the first and second CAP axes of vascular plant coverage in different syntaxa with dominant *Rhamnus fallax*. Arrows represent Landolt's indicator values.

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

The results of the phytoindication 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 phytoindication 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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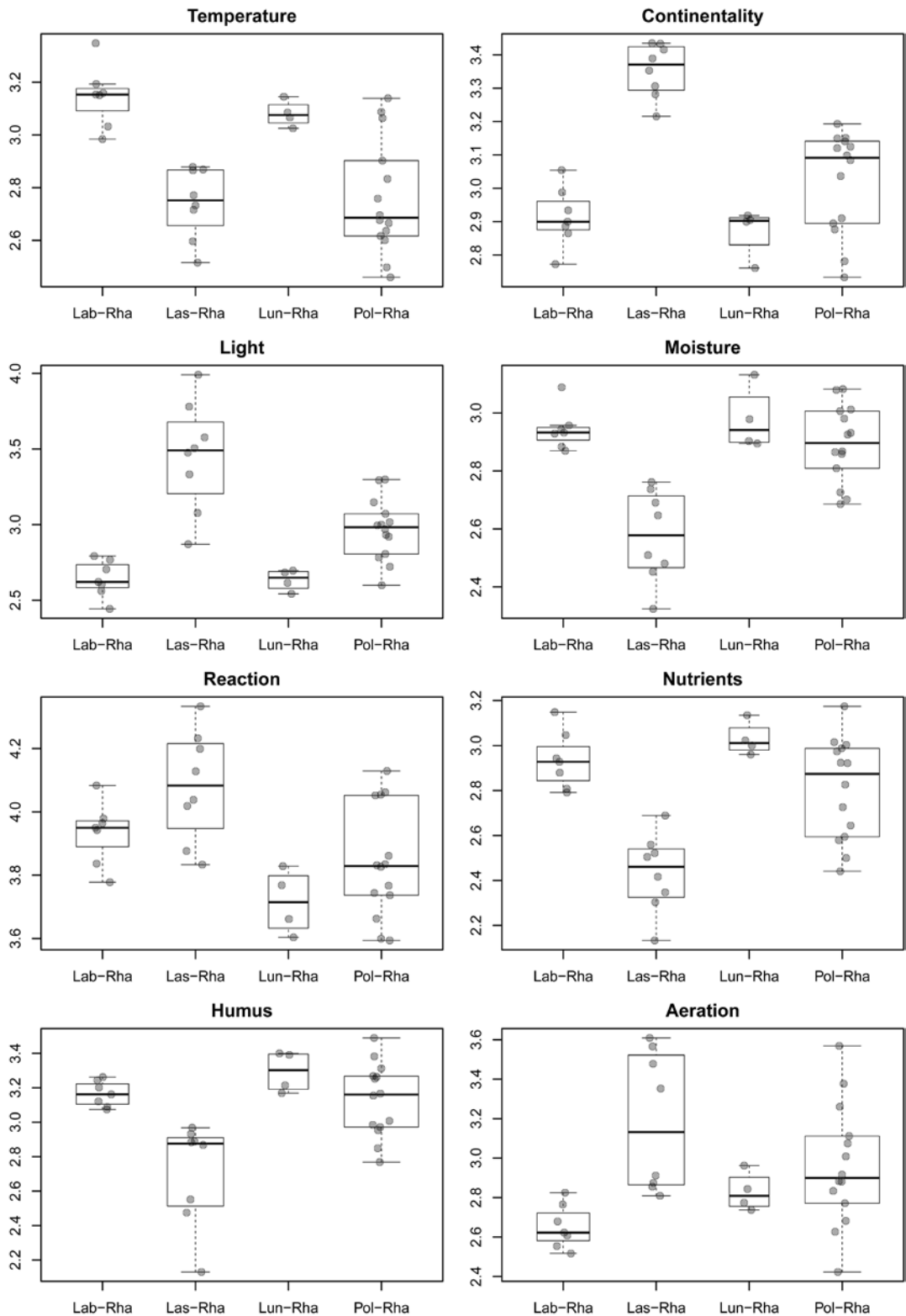


Figure 7. Comparison of ecological conditions in the communities with dominant *Rhamnus fallax*, determined with Landolt's phytosociological values.

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 *Quercio-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. *calcariae*, *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 *Fagetalia 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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Tab. 1	Number of relevé																
VP	<i>Polystichum lonchitis</i>																
EP	<i>Rhododendron hirsutum</i>																
ScR	Differential species of the alliance <i>Seslerio calcariae-Rhannonia fallacis</i>																
ES	<i>Sesleria caerulea</i> subsp. <i>calcaria</i>																
VP	<i>Larix decidua</i>																
ES	<i>Linum julicum</i>																
EP	<i>Pinus mugo</i>																
MuA	<i>Aconitum angustifolium</i>																
AF	<i>Arenonio-Fagion</i>																
	<i>Cyclamen purpurascens</i>																
	<i>Helleborus niger</i>																
	<i>Dentaria enneaphyllos</i>																
EC	<i>Primula vulgaris</i>																
	<i>Anemone trifolia</i>																
	<i>Omphalodes verna</i>																
	<i>Arenonia agrimonoides</i>																
EC	<i>Helleborus odorus</i>																
	<i>Knaulia drymeia</i>																
FS	<i>Fagetalia sylvaticae</i>																
	<i>Dryopteris filix-mas</i>																
	<i>Mercurialis perennis</i>																
	<i>Daphne mezereum</i>																
	<i>Melica nutans</i>																
	<i>Actaea spicata</i>																
	<i>Galeobdolon flavidum</i>																
	<i>Myosotis sylvatica</i>																
	<i>Mycelis muralis</i>																
	<i>Corydalis cava</i>																
	<i>Poa nemoralis</i>																
	<i>Epilobium montanum</i>																
	<i>Campanula trachelium</i>																
	<i>Paris quadrifolia</i>																
	<i>Asarum europaeum</i> subsp. <i>caucasicum</i>																
	<i>Pulmonaria officinalis</i>																

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Tab. 1	Number of relevé															Pr.	Fr.
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	E3	r	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	E2b	+	.	+	.	.	.	.	.	.	.	+	.	.	.	3	21
	E2a	.	.	.	.	.	.	.	r	.	.	.	.	.	.	1	7
	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	+	2	14
	E2a	+	.	.	.	+	.	.	.	.	.	+	.	.	.	3	21
	E1	.	.	.	.	+	.	.	+	.	.	.	.	.	.	3	21
	E1	+	.	.	.	.	.	.	.	.	.	+	.	+	.	3	21
	E1	+	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	E1	.	+	.	.	.	.	.	.	.	.	.	+	.	.	2	14
	E1	.	.	.	.	.	.	+	.	.	.	.	.	.	+	2	14
	E3a	r	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	E1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	7
	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
TA	Tilio-Acerion																
	<i>Acer pseudoplatanus</i>	r	+	.	+	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Acer pseudoplatanus</i>	+	1	+	+	+	+	+	+	1	.	+	.	.	.	9	64
	<i>Acer pseudoplatanus</i>	.	.	.	.	.	.	.	.	+	.	+	.	.	.	2	14
	<i>Geranium robertianum</i>	1	1	+	1	+	1	.	.	.	.	.	.	.	.	6	43
	<i>Polystichum aculeatum</i>	+	.	.	r	.	.	.	.	.	.	+	.	+	+	5	36
	<i>Hesperis candida</i>	.	.	.	+	.	.	.	.	+	.	.	.	.	.	2	14
	<i>Phyllitis scolopendrium</i>	.	.	.	+	.	.	.	r	.	.	.	.	.	.	2	14
	<i>Acer platanoides</i>	.	.	r	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Tephrosia pseudocrispa</i>	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Ulmus glabra</i>	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Aruncus dioicus</i>	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	7
	Quercetalia pubescentis																
QP	<i>Sorbus aria</i>	+	.	+	.	.	+	.	.	.	.	.	.	.	+	4	29
	<i>Arabis turrita</i>	+	.	.	.	.	+	.	.	.	.	.	.	.	.	2	14
	<i>Peucedanum schottii</i> var. <i>petraeum</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7

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Tab. 1	Number of relev	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
QF	<i>Convallaria majalis</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	<i>Quercus-Fagetum</i>																
	<i>Lonicera xylosteum</i>	E2	1	+	2	.	+	.	.	.	.	.	.	.	.	4	29
	<i>Hepatica nobilis</i>	E1	+	+	1	.	.	.	.	.	.	1	.	.	.	4	29
	<i>Anemone nemorosa</i>	E1	+	+	.	.	+	.	.	.	.	.	.	.	.	3	21
	<i>Corylus avellana</i>	E2b	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Clematis vitalba</i>	E2	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Galium sylvaticum</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	<i>Bertulo carpaticae-Alnetea viridis</i>																
	<i>Salix appendiculata</i>	E2	.	.	+	.	r	4	.	+	1	+	.	+	.	8	57
BcAv	<i>Salix glabra</i>	E2	1	.	.	+	+	.	+	+	.	.	.	.	+	5	36
	<i>Ribes alpinum</i>	E2a	+	.	+	.	r	.	.	1	.	+	.	.	.	5	36
	<i>Salix waldsteiniana</i>	E2a	.	.	.	.	.	.	.	+	.	+	.	.	.	2	14
	<i>Sorbus mougeotii</i>	E3a	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Sorbus mougeotii</i>	E2b	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Alnus viridis</i>	E2b	.	.	.	.	.	.	.	.	.	.	.	.	1	1	7
	<i>Mulgedio-Aconitetea</i>																
	<i>Heracleum pollinianum</i> (incl. <i>H. montanum</i>)	E1	.	.	+	1	+	1	+	+	.	.	.	.	.	8	57
	<i>Senecio ovatus</i>	E1	1	+	1	.	+	1	.	.	.	+	.	.	.	7	50
	<i>Polygonatum verticillatum</i>	E1	+	.	+	.	+	1	+	.	.	1	.	.	.	7	50
MuA	<i>Aconitum degenii</i> subsp. <i>paniculatum</i>	E1	1	+	+	.	.	.	.	+	.	+	.	.	.	6	43
	<i>Hypericum maculatum</i>	E1	+	+	1	.	.	.	.	+	.	1	.	.	.	6	43
	<i>Myrrhis odorata</i>	E1	1	1	1	.	.	.	.	+	.	.	.	.	.	6	43
	<i>Agropyron caninum</i>	E1	1	1	1	.	1	1	.	.	.	.	.	.	.	5	36
	<i>Thalictrum aquilegifolium</i>	E1	+	+	.	.	.	.	+	.	+	.	.	.	.	4	29
	<i>Silene dioica</i>	E1	.	+	+	.	.	.	.	.	.	+	.	.	.	4	29
	<i>Ranunculus platanifolius</i>	E1	.	+	.	.	.	.	.	r	1	+	.	.	.	4	29
	<i>Geranium sylvaticum</i>	E1	.	.	.	.	.	1	.	+	.	+	.	.	+	4	29
	<i>Lamium maculatum</i>	E1	1	2	1	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Veratrum album</i>	E1	.	.	.	.	1	1	.	.	.	+	.	.	.	3	21
	<i>Senecio cacaliaster</i>	E1	.	.	.	.	.	.	+	1	+	.	.	.	.	3	21
	<i>Athyrium filix-femina</i>	E1	.	.	.	.	.	.	r	.	.	+	.	.	.	3	21
	<i>Scrophularia scopolii</i>	E1	.	.	r	.	.	.	.	r	.	.	.	+	.	2	14
	<i>Pleurospermum austriacum</i>	E1	.	.	.	.	.	r	.	.	.	.	.	.	.	2	14

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

Tab. 1 Number of relevé

Tab. 1	Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
	<i>Chaerophyllum hirsutum</i>	E1	.	.	.	.	+	.	.	.	.	1	.	.	.	2	14
	<i>Saxifraga rotundifolia</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	1	2	14
	<i>Viola biflora</i>	E1	.	.	.	.	.	.	.	.	.	.	.	1	+	2	14
	<i>Streptopus amplexifolius</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Allium victorialis</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Carduus personata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Poa hybrida</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Primula elatior</i>	E1	.	.	.	.	2	.	.	.	.	.	.	.	.	1	7
	<i>Rumex elatior</i>	E1	.	.	.	.	1	.	.	.	.	.	.	.	.	1	7
	<i>Rumex arifolius</i>	E1	.	.	.	.	.	.	r	.	.	.	.	.	.	1	7
	<i>Rumex alpinus</i>	E1	.	.	.	.	.	.	.	+	.	.	.	.	.	1	7
	<i>Doronicum austriacum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Crepis pyrenaica</i>	E1	.	.	.	.	.	.	.	r	.	.	.	.	.	1	7
	<i>Athyrium distentifolium</i>	E1	.	.	.	.	.	.	.	r	.	.	.	.	.	1	7
	<i>Aconitum tauricum</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
	<i>Crepis paludosa</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
EA	<i>Epilobietea angustifolii</i>																
	<i>Rubus idaeus</i>	E2a	1	1	+	1	2	.	1	1	.	2	+	.	+	10	71
	<i>Urtica dioica</i>	E1	1	1	1	1	1	.	1	1	.	.	.	.	.	8	57
	<i>Sambucus racemosa</i>	E2	.	.	r	+	.	+	.	.	.	.	.	+	+	6	43
	<i>Fragaria vesca</i>	E1	+	.	+	.	.	.	.	.	.	+	.	.	+	4	29
	<i>Solanum dulcamara</i>	E1	+	.	+	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Eupatorium cannabinum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Salix caprea</i>	E3a	r	.	+	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Cuscuta europaea</i>	E1	.	+	.	1	.	.	.	.	.	.	.	.	.	2	14
	<i>Geum urbanum</i>	E1	.	+	+	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Bromus benekenii</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7
	<i>Tussilago farfara</i>	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	1	7
	<i>Cirsium palustre</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7
EP	<i>Erico-Pinetea</i>																
	<i>Cirsium erisithales</i>	E1	+	+	+	+	+	2	+	.	+	+	.	.	.	9	64
	<i>Rubus saxatilis</i>	E1	.	+	+	+	.	1	+	1	.	1	.	.	.	6	43
	<i>Buphthalmum salicifolium</i>	E1	+	+	.	.	.	1	r	.	.	.	.	+	.	5	36
	<i>Juniperus sibirica</i>	E2a	.	.	.	+	.	+	+	1	+	.	.	.	.	5	36
	<i>Calamagrostis varia</i>	E1	.	.	.	.	.	+	.	.	.	+	1	+	+	5	36

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Tab. 1

Number of relev

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
<i>Allium ericetorum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	3	21
<i>Peucedanum austriacum</i>	E1	1	+	.	.	.	.	.	.	.	.	.	.	.	2	14
<i>Rhodohamnus chamacistus</i>	E1	.	.	.	.	.	+	.	.	.	.	.	+	.	2	14
<i>Erica carnea</i>	E1	.	.	.	.	.	.	.	.	.	.	1	.	+	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 aristata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
Vaccinio-Piceetea																
<i>Picea abies</i>	E3a	.	.	.	.	.	r	.	.	.	.	.	.	.	2	14
<i>Picea abies</i>	E2b	.	.	.	.	.	.	+	+	.	+	.	+	.	4	29
<i>Picea abies</i>	E2a	+	.	.	.	.	.	.	+	.	.	r	+	+	6	43
<i>Picea abies</i>	E1	.	.	.	.	.	.	.	+	.	.	.	.	.	1	7
<i>Rosa pendulina</i>	E2a	.	.	.	+	.	+	+	+	.	.	.	+	.	5	36
<i>Gentiana asclepiadea</i>	E1	.	.	.	.	.	1	+	+	+	1	.	.	.	5	36
<i>Solidago virgaurea</i>	E1	.	+	.	.	.	1	+	1	.	.	.	.	.	4	29
<i>Valeriana tripteris</i>	E1	.	.	.	.	.	r	+	.	.	+	+	.	.	4	29
<i>Homogyne sylvestris</i>	E1	.	.	.	.	.	r	.	+	.	1	.	.	+	4	29
<i>Clematis alpina</i>	E1	.	.	.	+	.	.	.	.	.	.	.	.	+	3	21
<i>Larix decidua</i>	E3a	.	.	.	.	.	r	.	.	.	.	.	+	+	3	21
<i>Larix decidua</i>	E2a	.	.	.	.	.	.	.	.	.	.	.	+	+	3	21
<i>Larix decidua</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7
<i>Lonicera caerulea</i>	E2a	.	.	.	r	.	+	.	.	.	.	.	.	.	2	14
<i>Oxalis acetosella</i>	E1	.	.	.	.	2	.	+	.	.	.	.	.	+	2	14
<i>Veronica urticifolia</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	2	14
<i>Phlegopteris connectilis</i>	E1	.	.	.	.	.	.	.	+	.	.	.	.	1	2	14
<i>Aposperis foetida</i>	E1	.	.	.	.	.	.	.	.	.	+	+	.	.	2	14
<i>Lonicera nigra</i>	E2a	.	.	.	.	.	.	.	.	.	+	.	.	+	2	14
<i>Abies alba</i>	E2a	.	.	.	r	.	.	.	.	.	.	.	.	.	1	7
<i>Luzula luzuloides</i>	E1	.	.	.	.	+	.	.	.	.	.	.	.	.	1	7
<i>Dryopteris dilatata</i>	E1	.	.	.	.	.	.	.	r	.	.	.	.	.	1	7
<i>Gymnocarpium dryopteris</i>	E1	.	.	.	.	.	.	.	r	.	.	.	.	.	1	7
<i>Maianthemum bifolium</i>	E1	.	.	.	.	.	.	.	.	.	+	.	.	.	1	7

VP

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

Tab. 1		Number of relevé														Fr.	
RP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	
ES	Rhamno-Prunetea																
	<i>Rosa canina</i>	E2	r	+	+	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Berberis vulgaris</i>	E2a	r	1	.	.	.	.	.	.	.	.	+	.	.	3	21
ES	Elyno-Seslerietea																
	<i>Betonica alopecuroides</i>	E1	+	+	.	.	+	.	+	+	+	.	+	+	.	8	57
	<i>Festuca calva</i>	E1	+	+	+	1	.	.	.	.	.	.	.	.	.	5	36
	<i>Thymus praecox</i> subsp. <i>polytrichus</i>	E1	.	+	+	+	.	.	.	.	.	.	+	.	.	4	29
	<i>Scabiosa lucida</i> subsp. <i>stricta</i>	E1	.	+	.	.	.	+	.	.	.	+	.	.	.	4	29
	<i>Carduus crassifolius</i>	E1	.	.	+	.	.	+	.	.	.	.	.	.	.	3	21
	<i>Laserpitium peucedanoides</i>	E1	+	.	.	.	.	.	.	.	.	.	.	+	.	2	14
	<i>Myosotis alpestris</i>	E1	.	.	.	+	.	.	+	.	.	.	.	.	.	2	14
	<i>Erigeron glabratus</i>	E1	.	.	.	.	.	r	+	.	.	.	.	.	.	2	14
	<i>Pulsatilla alpina</i> subsp. <i>australpina</i>	E1	.	.	.	.	.	r	.	.	+	.	.	.	.	2	14
	<i>Carex ferruginea</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	+	2	14
	<i>Thesium alpinum</i>	E1	.	.	.	.	.	.	.	r	.	.	.	r	.	2	14
	<i>Hieracium villosulum</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Achillea clavensis</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Aster bellidiastrum</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Campanula vitasekiana</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Gentiana lutea</i> subsp. <i>symphyandra</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
	<i>Leontopodium alpinum</i>	E1	.	.	.	.	.	r	.	.	.	.	.	.	.	1	7
	<i>Soldanella alpina</i>	E1	.	.	.	.	.	r	.	.	.	.	.	.	.	1	7
	<i>Juncus monanthos</i>	E1	.	.	.	.	.	.	.	.	r	.	.	.	.	1	7
	<i>Carduus defloratus</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
	<i>Heliosperma alpestre</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
TG	Trifolio-Geranietea																
	<i>Origanum vulgare</i>	E1	+	1	+	r	.	.	.	.	.	.	.	.	.	5	36
	<i>Calamintha eiselenae</i>	E1	+	+	1	.	.	.	.	.	.	.	.	.	.	3	21
	<i>Digitalis grandiflora</i>	E1	+	.	.	.	.	.	+	+	.	.	.	.	.	3	21
	<i>Iris graminea</i>	E1	.	+	+	r	.	.	.	.	.	.	.	.	.	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

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Tab. 1	Number of relevé																	
FB	<i>Thalictrum minus</i>	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14	
	<i>Verbascum lanatum</i>	E1	.	+	.	+	.	.	.	.	.	.	.	.	.	2	14	
	<i>Valeriana waltherii</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>Arabis pauciflora</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Stachys recta</i>	E1	.	.	.	+	.	.	.	.	.	.	.	.	.	1	7	
	Festuco-Brometea																	
	<i>Carlina acaulis</i>	E1	+	.	.	.	.	.	+	.	.	.	.	.	+	.	3	21
	<i>Koeleria pyramidata</i>	E1	.	.	.	.	r	.	+	r	.	.	.	.	.	.	3	21
	<i>Galium lucidum</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Gentarea triumfettii</i>	E1	+	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
	<i>Gymnadenia conopsea</i>	E1	.	.	.	.	.	.	r	.	.	.	.	.	.	.	1	7
	<i>Gentianella ciliata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
<i>Linum catharticum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7	
PaT	Poo alpinae-Trisetalia																	
	<i>Poa alpina</i>	E1	+	+	.	+	.	+	+	.	.	.	.	.	.	5	36	
	<i>Crocus albiflorus</i>	E1	+	+	1	.	.	.	.	.	.	.	.	.	.	3	21	
MA	Molinio-Arrhenatheretea																	
	<i>Gadium album</i>	E1	+	1	.	+	.	.	.	.	.	.	.	.	.	4	29	
	<i>Angelica sylvestris</i>	E1	.	.	.	.	1	+	.	+	.	.	.	.	.	4	29	
	<i>Vicia sepium</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Vicia cracca</i>	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Deschampsia cespitosa</i>	E1	.	r	.	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Lathyrus pratensis</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Tanaxacum officinale</i>	E1	.	.	r	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Pimpinella major</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	7	
	<i>Dactylis glomerata</i> s.str.	E1	.	.	.	.	.	.	.	+	.	.	.	.	.	1	7	
	SCf	Scheuchzerio-Caricetea fuscae																
		<i>Parnassia palustris</i>	E1	.	.	.	.	.	.	+	.	.	.	.	.	+	2	14
		Thlaspietea rotundifolii																
	TR	<i>Adenostyles glabra</i>	E1	+	+	.	.	+	1	1	.	1	+	.	1	.	9	64
		<i>Festuca nitida</i>	E1	.	.	.	.	.	+	+	+	1	+	+	+	+	7	50

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

Tab. 1 Number of relevé

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Pr.	Fr.
<i>Gymnocarpium robertianum</i>	E1	.	+	.	.	+	.	.	.	.	1	1	2	1	6	43
<i>Dryopteris villarii</i>	E1	.	.	.	.	+	1	+	+	1	.	.	+	.	6	43
<i>Rhodiola rosea</i>	E1	.	.	.	+	.	1	1	2	1	.	.	.	.	5	36
<i>Rumex scutatus</i>	E1	+	+	.	.	.	.	.	.	.	.	.	.	.	3	21
<i>Campanula cespitosa</i>	E1	r	.	.	.	.	.	.	.	.	.	.	+	.	2	14
<i>Trisetum argenteum</i>	E1	+	.	.	.	.	.	.	.	.	.	.	1	.	2	14
<i>Petasites paradoxus</i>	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
<i>Viola pyrenaica</i>	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	2	14
<i>Ligusticum segueri</i>	E1	.	.	+	.	.	1	.	.	.	.	.	.	.	2	14
<i>Arabis alpina</i>	E1	.	.	+	.	.	.	.	+	.	.	.	.	.	2	14
<i>Valeriana montana</i>	E1	.	.	.	.	.	.	.	.	1	.	1	.	.	2	14
<i>Campanula cochlearifolia</i>	E1	.	.	.	.	.	.	.	.	+	.	.	+	.	2	14
<i>Taraxacum laevigatum</i> agg.	E1	r	.	.	.	.	.	.	.	.	.	.	.	.	1	7
<i>Scrophularia juratensis</i>	E1	.	+	.	.	.	.	.	.	.	.	.	.	.	1	7
<i>Leontodon hispidus</i> subsp. <i>hyoseroides</i>	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	1	7
<i>Biscutella laevigata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
<i>Hieracium porrifolium</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
<i>Silene vulgaris</i> subsp. <i>glareosa</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
<i>Festuca laxa</i>	E1	.	.	.	.	.	.	.	.	.	.	.	1	.	1	7
<i>Hieracium bifidum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
<i>Saxifraga caesia</i>	E1	.	.	.	.	.	.	.	.	.	.	.	r	.	1	7
<i>Asrantha carniolica</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7
AT																
<i>Asplenietea trichomanis</i>																
<i>Poa serotina</i> lutea	E1	.	.	.	.	.	+	+	.	+	.	.	+	+	5	36
<i>Sedum album</i>	E1	+	+	1	.	.	.	.	.	.	.	.	.	.	4	29
<i>Asplenium viride</i>	E1	.	.	.	.	.	+	.	.	.	.	+	1	1	4	29
<i>Asplenium trichomanes</i>	E1	.	.	.	.	.	.	.	+	+	.	.	+	+	4	29
<i>Sedum hispanicum</i>	E1	.	.	.	.	.	.	1	+	.	.	.	.	.	3	21
<i>Kernera saxatilis</i>	E1	.	.	.	.	.	+	.	.	.	.	+	.	.	3	21
<i>Sedum maximum</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	2	14
<i>Silene hayekiana</i>	E1	.	.	r	r	.	.	.	.	.	.	.	.	.	2	14
<i>Valeriana saxatilis</i>	E1	.	.	.	.	.	r	.	.	.	.	.	+	.	2	14
<i>Moebria muscosa</i>	E1	.	.	.	.	.	.	+	.	.	.	.	+	.	2	14
<i>Primula auricula</i>	E1	.	r	.	.	.	.	.	.	.	.	.	.	.	1	7

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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.
O																
<i>Festuca stenantha</i>	E1	.	.	r	.	.	.	.	.	.	.	.	.	.	1	7
<i>Cystopteris fragilis</i>	E1	.	.	.	.	+	.	.	.	.	.	.	.	.	1	7
<i>Saxifraga hostii</i>	E1	.	.	.	.	.	.	.	+	.	.	.	.	.	1	7
<i>Carex brachystachys</i>	E1	.	.	.	.	.	.	.	.	.	.	+	.	.	1	7
<i>Asplenium ruta-muraria</i>	E1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	7
Other species																
<i>Sorbus aucuparia</i>	E3a	r	.	.	.	.	.	.	.	.	.	.	.	.	2	14
<i>Sorbus aucuparia</i>	E2b	.	.	.	.	.	.	+	.	.	.	.	.	.	2	14
<i>Sorbus aucuparia</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7
<i>Juniperus communis</i>	E2a	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
ML																
Mosses and lichens																
<i>Pseudoskeella catenulata</i>	E0	1	+	1	1	.	+	.	1	1	+	.	.	.	8	57
<i>Tortella tortuosa</i>	E0	.	.	+	+	.	1	+	1	.	+	.	1	1	8	57
<i>Ctenidium molluscum</i>	E0	.	.	.	.	.	1	+	1	+	+	.	2	2	7	50
<i>Schistidium apocarpum</i>	E0	.	.	.	+	.	.	+	+	.	.	.	.	.	3	21
<i>Homalothecium lutescens</i>	E0	+	.	.	.	.	.	+	.	.	.	.	.	.	2	14
<i>Rhyidiadelphus triquetrus</i>	E0	.	.	.	.	.	.	+	.	.	+	.	.	.	2	14
<i>Isoetium alopecuroides</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
<i>Homalothecium philippeanum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
<i>Eurhynchium striatum</i>	E0	.	.	.	.	.	+	.	.	.	.	.	.	.	1	7
<i>Polytrichum formosum</i>	E0	.	.	.	.	.	.	.	+	.	.	.	.	.	1	7
<i>Dicranum scoparium</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7
<i>Hylacomium splendens</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7
<i>Peltigera leucophaea</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	+	1	7

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.

	1	2	3	4	5	6	7	8		
Number of relevé	1	2	3	4	5	6	7	8		
Database number of relevé	243312	243315	243316	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		
Cover of herb layer in %	E1	30	40	60	30	80	80	60		
Cover of moss layer in %	E0	5	5	.	.	.	.	.		
Number of species	51	70	85	66	27	20	22	22		
Relevé area	m ²	100	100	100	200	400	200	200		
Date of taking relevé	5/20/2012	5/20/2012	5/20/2012	8/30/2011	6/19/2009	10/1/2011	10/1/2011	9/28/2011		
Locality	Pl. Leskovca	Pl. Leskovca	Pl. Leskovca	Monštranca (Stol)	Klein Obir - A	Bärenal - A	Bärenal - A	Bärenal - A		
Quadrant	9748/1	9748/1	9748/3	9550/4	9452/4	9550/4	9550/4	9550/4		
Coordinate GK Y (D-48)	m	398456	398675	435243	460165	435694	435665	435694		
Coordinate GK X (D-48)	m	5123799	5123713	5142874	5152114	5144977	5144980	5144977		
Author of relevé	ID	ID	ID	ID	WF	WF	WF	WF		
Diagnostic species of the association									Pr.	Fr.
ScRf <i>Rhamnus fallax</i>	E2b	4	4	4	3	2	4	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	+	+	+	.	.	+	+	6	75
CA <i>Linum julicum</i>	E1	+	1	1	.	.	1	+	5	63
TR <i>Rumex scutatus</i>	E1	.	+	+	1	+	1	.	5	63
Diagnostic species of lower units										
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 carnolicum</i>	E1	+	+	+	.	.	.	.	3	38
QP <i>Convallaria majalis</i>	E1	.	.	.	.	5	1	2	1	4
Differential species of the alliance <i>Seslerio calcariae-Rhamnetum fallacis</i>										
EP <i>Pinus mugo</i>	E2b	.	.	.	1	1	.	1	+	4
MuA <i>Aconitum angustifolium</i>	E1	1	1	1	.	.	.	.	3	38
AF <i>Aremonio-Fagion</i>										
<i>Cyclamen purpurascens</i>	E1	+	+	+	1	.	.	3	3	6
<i>Helleborus niger</i>	E1	.	.	.	.	+	.	1	1	3
<i>Anemone trifolia</i>	E1	+	.	+	.	.	.	.	2	25
<i>Knautia drymeia</i>	E1	.	.	.	+	.	.	.	1	13

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Tab. 2 Number of relevé		1	2	3	4	5	6	7	8	Pr.	Fr.
TA	<i>Tilio-Acerion</i>										
	<i>Acer pseudoplatanus</i>	E3a	.	+	.	.	.	.	.	1	13
	<i>Acer pseudoplatanus</i>	E2b	.	.	r	.	.	.	r	2	25
	<i>Acer pseudoplatanus</i>	E1	.	+	+	.	.	.	r	3	38
	<i>Geranium robertianum</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Hesperis candida</i>	E1	.	.	+	.	.	.	.	1	13
FS	<i>Fagetalia sylvaticae</i>										
	<i>Mercurialis perennis</i>	E1	.	+	.	.	.	+	+	3	38
	<i>Daphne mezereum</i>	E2a	+	.	+	.	.	.	.	2	25
	<i>Lilium martagon</i>	E1	+	.	+	.	.	.	.	2	25
	<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	13
	<i>Mycelis muralis</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Paris quadrifolia</i>	E1	.	.	+	.	.	.	.	1	13
	<i>Dryopteris filix-mas</i>	E1	.	.	.	+	.	.	.	1	13
QP	<i>Quercetalia pubescentis</i>										
	<i>Sorbus aria</i>	E2a	.	+	.	+	+	.	r	4	50
	<i>Fraxinus ornus</i>	E2a	.	.	.	r	.	.	.	1	13
	<i>Ostrya carpinifolia</i>	E2b	r	.	.	.	.	.	.	1	13
QF	<i>Quercu-Fagetea</i>										
	<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	<i>Erico-Pinetea</i>										
	<i>Buphthalmum 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
	<i>Allium ericetorum</i>	E1	.	.	.	+	.	4	.	1	3
	<i>Peucedanum austriacum</i>	E1	.	.	.	+	.	.	1	1	3
	<i>Aquilegia nigricans</i>	E1	.	.	.	.	1	.	.	1	2
	<i>Rhododendron hirsutum</i>	E2a	.	.	+	.	.	.	.	.	1
	<i>Cotoneaster tomentosus</i>	E2a	.	.	.	+	.	.	.	.	1
	<i>Epipactis atrorubens</i>	E1	.	.	.	+	.	.	.	.	1
	<i>Amelanchier ovalis</i>	E2b	.	.	.	.	1	.	.	.	1
	<i>Amelanchier ovalis</i>	E1	.	.	.	.	1	.	.	.	1
	<i>Polygala chamaebuxus</i>	E1	.	.	.	.	1	.	.	.	1
	<i>Erica carnea</i>	E1	.	.	.	.	.	r	.	.	1
	<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	Vaccinio-Piceetea										
	<i>Valeriana tripteris</i>	E1	.	.	+	.	.	1	1	3	4 50
	<i>Picea abies</i>	E3a	.	+	.	+	.	.	.	.	2 25
	<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	Betulo carpaticae-Alnetea viridis										
	<i>Salix glabra</i>	E2a	.	.	.	+	2	.	.	.	2 25
MuA	Mulgedio-Aconitetea										
	<i>Aconitum lycoctonum</i> subsp. <i>nanunculifolium</i> s. lat.	E1	.	+	.	.	.	.	1	1	3 38
	<i>Heracleum pollinianum</i> (incl. <i>H. montanum</i>)	E1	.	+	+	1	.	.	.	.	3 38
	<i>Thalictrum aquilegiifolium</i>	E1	.	+	+	.	.	.	+	.	3 38
	<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 25
	<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	Caricion austroalpinæ										
	<i>Festuca calva</i>	E1	2	2	2	.	.	.	.	.	3 38
	<i>Centaurea haynaldi</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	Elyno-Seslerietea										
	<i>Betonica alopecuroides</i>	E1	1	1	.	+	.	.	1	+	5 63
	<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 clavennae</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 25
	<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	Trifolio-Geranietea										
	<i>Polygonatum odoratum</i>	E1	.	+	+	.	1	.	1	.	4 50
	<i>Libanotis sibirica</i> subsp. <i>montana</i>	E1	+	+	.	+	.	.	.	.	3 38
	<i>Laserpitium siler</i>	E1	+	.	.	+	1	.	.	.	3 38
	<i>Silene nutans</i>	E1	+	+	.	.	.	.	.	.	2 25
	<i>Stachys recta</i>	E1	.	1	.	1	.	.	.	.	2 25
	<i>Valeriana wallrothii</i>	E1	.	+	r	.	.	.	.	.	2 25
	<i>Verbascum lanatum</i>	E1	.	+	+	.	.	.	.	.	2 25
	<i>Origanum vulgare</i>	E1	.	.	+	+	.	.	.	.	2 25
	<i>Achillea distans</i>	E1	.	.	+	.	.	.	.	.	1 13
	<i>Calamintha einseleana</i>	E1	.	.	.	+	.	.	.	.	1 13
RP	Rhamno-Prunetea										
	<i>Rosa canina</i>	E2a	+	+	.	.	.	.	.	.	2 25
TR	Thlaspietea rotundifolii										
	<i>Silene vulgaris</i> subsp. <i>glareosa</i>	E1	.	+	.	1	.	.	r	.	3 38
	<i>Gypsophila repens</i>	E1	1	+	.	.	.	.	.	.	2 25
	<i>Adenostyles glabra</i>	E1	+	+	.	.	.	.	.	.	2 25
	<i>Dryopteris villarii</i>	E1	1	.	+	.	.	.	.	.	2 25
	<i>Biscutella laevigata</i>	E1	1	.	.	1	.	.	.	.	2 25
	<i>Gymnocarpium robertianum</i>	E1	1	.	.	+	.	.	.	.	2 25
	<i>Sedum sexangulare</i>	E1	.	+	1	.	.	.	.	.	2 25
	<i>Valeriana montana</i>	E1	.	.	.	1	+	.	.	.	2 25
	<i>Petasites paradoxus</i>	E1	.	.	.	+	2	.	.	.	2 25
	<i>Athamanta cretensis</i>	E1	.	.	.	+	+	.	.	.	2 25
	<i>Campanula cespitosa</i>	E1	.	.	.	1	.	+	.	.	2 25
	<i>Dianthus sternbergii</i>	E1	.	.	.	.	+	1	.	.	2 25
	<i>Ligusticum seguieri</i>	E1	1	.	.	.	.	.	.	.	1 13
	<i>Trisetum argenteum</i>	E1	.	.	.	1	.	.	.	.	1 13
	<i>Festuca laxa</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Hieracium porrifolium</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Viola pyrenaica</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Rhodiola rosea</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Trisetum distichophyllum</i>	E1	.	.	.	.	.	3	.	.	1 13
FB	Festuco-Brometea										
	<i>Carlina acaulis</i>	E1	.	+	+	.	.	.	+	.	3 38
	<i>Hippocrepis comosa</i>	E1	.	+	.	+	+	.	.	.	3 38
	<i>Galium lucidum</i>	E1	.	.	.	1	.	1	1	.	3 38
	<i>Gymnadenia conopsea</i>	E1	+	+	.	.	.	.	.	.	2 25
	<i>Dianthus monspessulanus</i>	E1	.	+	+	.	.	.	.	.	2 25
	<i>Euphorbia cyparissias</i>	E1	.	+	+	.	.	.	.	.	2 25
	<i>Allium senescens</i>	E1	+	.	.	.	.	.	.	.	1 13
	<i>Polygala amarella</i>	E1	.	+	.	.	.	.	.	.	1 13
	<i>Melica ciliata</i>	E1	.	.	+	.	.	.	.	.	1 13
	<i>Plantago media</i>	E1	.	.	r	.	.	.	.	.	1 13
	<i>Centaurea triumfettii</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Koeleria pyramidata</i>	E1	.	.	.	+	.	.	.	.	1 13
	<i>Gentianella germanica</i> subsp. <i>rhaetica</i>	E1	.	.	.	.	.	r	.	.	1 13
PaT	Poo alpinae-Trisetalia										
	<i>Cardaminopsis ovirensis</i>	E1	.	.	+	.	.	.	.	.	1 13
	<i>Crocus albiflorus</i>	E1	.	.	+	.	.	.	.	.	1 13
	<i>Polygonum bistorta</i>	E1	.	.	+	.	.	.	.	.	1 13
	<i>Trollius europaeus</i>	E1	.	.	+	.	.	.	.	.	1 13

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	<i>Molinio-Arrhenatheretea</i>										
	<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	<i>Asplenietea trichomanis</i>										
	<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>Moehringia muscosa</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Silene hayekiana</i>	E1	.	.	.	+	.	.	.	1	13
	<i>Erysimum sylvestre</i>	E1	.	.	.	.	1	.	.	1	13
EA	<i>Epilobietea angustifolii</i>										
	<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	Other species										
	<i>Juniperus communis</i>	E2a	.	+	+	.	.	.	.	2	25
	<i>Alchemilla</i> sp.	E1	.	.	+	.	.	.	.	1	13
	<i>Poa</i> sp.	E1	.	.	+	.	.	.	.	1	13
	<i>Salix purpurea</i>	E2b	.	.	.	1	.	.	.	1	13
ML	Mosses										
	<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 Dakschobler

WF – Wilfried Franz

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

Number of relevé	1	2	3	4	5	6	7				
Database number of relevé	244292	244293	244294	244296	244295	244297	244416				
Elevation in m	830	845	960	1100	1040	1010	650				
Aspect	NEE	SEE	E	W	SW	E	NE				
Slope in degrees	25	30	30	35	30	25	35				
Parent material	D	D	D	D	D	D	D				
Soil	R	R	R	R	R	R	R				
Stoniness in %	5	2	20	10	5	20	20				
Cover of tree layer in %	E3	.	5	5	20	20	.				
Cover of shrub layer in %	E2	80	90	80	70	60	80	60			
Cover of herb layer in %	E1	80	80	60	60	30	30	50			
Cover of moss layer in %	E0	5	5	5	5	0	5	0			
Number of species	36	27	33	32	30	27	19				
Relevé area	m²	100	100	100	100	100	100	100			
Date of taking relevé		8/10/2012	8/10/2012	8/10/2012	8/10/2012	8/10/2012	8/20/2012				
Locality		Govci-Poldanovec	Govci-Poldanovec	Govci-Poldanovec	Govci-Orleici	Govci-Orleici	Govci-Poldanovec	Nemškarica			
Quadrant		9949/3	9949/3	9949/3	9949/3	9949/3	9949/3	0049/2			
Coordinate GK Y (D-48)	m	409800	409798	409706	410953	410903	410603	419457			
Coordinate GK X (D-48)	m	5097512	5097433	5097320	5096528	5096456	5096532	5090516			
Diagnostic species of the association								Pr.	Fr.		
AF	<i>Rhamnus fallax</i>	E2b	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>Aremonio-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>Fagetalia 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	+	71
	<i>Fagus sylvatica</i>	E2a	.	+	1	1	1	2	.	71
	<i>Fagus sylvatica</i>	E1	+	1	.	.	+	1	1	71
	<i>Acer pseudoplatanus</i>	E3a	.	.	.	.	+	.	1	14
	<i>Acer pseudoplatanus</i>	E2	.	.	+	1	.	1	.	43
	<i>Acer pseudoplatanus</i>	E1	+	+	.	+	+	+	.	71
	<i>Polystichum aculeatum</i>	E1	+	+	.	+	+	.	+	71
	<i>Mercurialis perennis</i>	E1	+	.	1	.	1	1	.	57
	<i>Lonicera alpigena</i>	E2a	.	+	1	+	.	+	.	57
	<i>Actaea spicata</i>	E1	.	.	+	+	.	+	.	43
	<i>Galium laevigatum</i>	E1	+	.	1	.	.	+	.	43
	<i>Galeobdolon flavidum</i>	E1	.	+	.	.	+	.	.	29
	<i>Melica nutans</i>	E1	+	.	.	.	+	.	.	29
	<i>Euphorbia amygdaloides</i>	E1	.	.	+	.	+	.	.	29
	<i>Dryopteris filix-mas</i>	E1	.	+	.	.	.	.	1	14
	<i>Epilobium montanum</i>	E1	.	.	.	.	.	.	+	14
	<i>Mycelis muralis</i>	E1	.	.	.	.	.	+	.	14
	<i>Prenanthes purpurea</i>	E1	.	.	.	.	r	.	.	14
	<i>Sambucus nigra</i>	E2	.	.	.	.	.	.	+	14
	<i>Fraxinus excelsior</i>	E1	.	.	.	.	.	.	+	14
	<i>Epipactis helleborine</i>	E1	.	.	.	+	.	.	.	14
QP	<i>Quercetalia pubescentis</i>									
	<i>Sorbus aria</i>	E2	+	.	.	.	.	.	.	14
	<i>Sorbus aria</i>	E1	.	.	+	.	.	.	.	14
QF	<i>Quercus-Fagetea</i>									
	<i>Carex digitata</i>	E1	+	.	.	.	.	.	+	29
	<i>Hepatica nobilis</i>	E1	.	.	+	.	.	.	.	14
BcAv	<i>Betulo carpaticae-Alnetea viridis</i>									
	<i>Salix glabra</i>	E2	+	2	+	+	+	.	.	71
	<i>Salix glabra</i>	E1	.	.	.	+	.	.	.	14
	<i>Salix appendiculata</i>	E2	.	.	.	+	.	.	.	14
	<i>Salix appendiculata</i>	E1	.	.	.	+	.	.	.	14
MuA	<i>Mulgedio-Aconitetea</i>									
	<i>Senecio ovatus</i>	E1	+	1	+	.	+	.	.	57
	<i>Aconitum lycoctonum</i> subsp. <i>nanunculifolium</i> s. lat.	E1	.	+	.	.	.	.	.	14
	<i>Athyrium filix-femina</i>	E1	+	.	.	.	.	.	.	14
EA	<i>Epilobietea angustifolii</i>									
	<i>Eupatorium cannabinum</i>	E1	3	3	1	1	1	+	3	100
	<i>Rubus idaeus</i>	E2a	.	.	+	+	+	+	1	71
	<i>Atropa bella-donna</i>	E1	.	.	.	.	.	1	1	29
	<i>Verbascum thapsus</i>	E1	.	.	.	.	.	r	+	29
	<i>Cirsium vulgare</i>	E1	.	.	.	.	r	.	.	14
	<i>Solanum dulcamara</i>	E1	.	.	.	.	.	+	.	14
EP	<i>Erico-Pinetea</i>									
	<i>Calamagrostis varia</i>	E1	2	3	2	2	2	1	1	100
	<i>Cirsium erisithales</i>	E1	+	+	1	1	1	+	.	86
	<i>Carex alba</i>	E1	2	1	3	3	+	.	.	71
	<i>Molinia arundinacea</i>	E1	3	1	+	.	.	.	.	43
	<i>Buphthalmum salicifolium</i>	E1	.	.	+	+	+	.	.	43
	<i>Rhododendron hirsutum</i>	E2a	1	.	.	.	.	.	.	14
VP	<i>Vaccinio-Picetea</i>									
	<i>Polystichum lonchitis</i>	E1	.	.	r	+	.	.	.	29

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Tab. 3 Number of relevé

		1	2	3	4	5	6	7	Pr.	Fr.
	<i>Picea abies</i>	E2a	.	.	.	+	.	.	+	2 29
	<i>Valeriana tripteris</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	<i>Elyno-Seslerietea</i>									
	<i>Carduus crassifolius</i>	E1	.	.	.	+	1	.	2	29
	<i>Betonica alopecuroides</i>	E1	+	.	.	.	.	.	1	14
TG	<i>Trifolio-Geranieta</i>									
	<i>Digitalis grandiflora</i>	E1						+	1	14
TR	<i>Thlaspietia rotundifolia</i>									
	<i>Gymnocarpium robertianum</i>	E1	1	1	1	2	1	+	+	7 100
	<i>Adenostyles glabra</i>	E1	1	2	1	1	2	1	.	6 86
	<i>Petasites paradoxus</i>	E1	.	+	.	.	.	.	1	14
	<i>Hieracium porrifolium</i>	E1	r	.	.	.	.	.	1	14
	<i>Arabis</i> sp.	E1	.	.	.	.	.	+	1	14
AT	<i>Asplenietea trichomanis</i>									
	<i>Paederota lutea</i>	E1	+	+	+	.	.	.	3	43
	<i>Asplenium viride</i>	E1	+	.	.	.	.	.	1	14
	<i>Asplenium ruta-muraria</i>	E1	.	.	.	.	r	.	1	14
ML	Mosses									
	<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.

		1	2	3	4		
Number of relevé		1	2	3	4		
Database number of relevé		245786	245787	245789	245788		
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 ²	50	50	50	50	
Date of taking relevé			5/11/2012	5/11/2012	7/2/2012	5/11/2012	
Locality			Javorski vrh	Golaki-Javorski vrh	Golaki-Javorski vrh	Golaki-Javorski vrh	
Quadrant			0049/1	0049/1	0049/1	0049/1	
Coordinate GK Y (D-48)		m	414894	414873	415177	414834	
Coordinate GK X (D-48)		m	5092152	5092171	5091926	5092221	
Diagnostic species of the association							Pr. Fr.
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
Differential species of the alliance <i>Lonicero-Rhamnion fallacis</i>							
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	<i>Aremonio-Fagion</i>						
	<i>Dentaria enneaphyllos</i>	E1	1	+	.	1	3 75
FS	<i>Fagetalia sylvaticae</i>						
	<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	<i>Tilio-Acerion</i>							
	<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	<i>Quercus-Fagetea</i>							
	<i>Corylus avellana</i>	E2b	.	.	+	r	2	50
	<i>Stellaria holostea</i>	E1	.	+	.	.	1	25
MuA	<i>Mulgedio-Aconitetea</i>							
	<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 degonii</i> subsp. <i>paniculatum</i>	E1	1	.	.	+	2	50
	<i>Ranunculus plataniifolius</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	<i>Epilobietea angustifolii</i>							
	<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	<i>Erico-Pinetea</i>							
	<i>Calamagrostis varia</i>	E1	.	.	.	+	1	25
MA	<i>Molinio-Arrhenatheretea</i>							
	<i>Angelica sylvestris</i>	E1	.	.	+	.	1	25
AT	<i>Asplenietea trichomanis</i>							
	<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	Mosses and lichens							
	<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 Dinarides**Table 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
Diagnostic species of the syntaxa					
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>nanunculifolium</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	0
Diagnostic species of the order <i>Rhamnetalia fallacis</i>					
BcAv	<i>Salix appendiculata</i>	E2	50	57	14
BcAv	<i>Salix appendiculata</i>	E1	0	0	14
Differential species of the alliance <i>Seslerio calcariae-Rhamnion fallacis</i>					
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
Differential species of the alliance <i>Lonicero-Rhamnion fallacis</i>					
	<i>Lonicera alpigena</i>	E2a	0	21	57
	<i>Lonicera xylosteum</i>	E2	13	29	0
AF	<i>Aremonio-Fagion</i>				
	<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	<i>Fagetalia sylvaticae</i>				
	<i>Mercurialis perennis</i>	E1	38	71	57

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Tab. 5 Successive number

Tab. 5	Successive number		1	3	2	4
	<i>Melica nutans</i>	E1	13	57	29	0
	<i>Heracleum sphondylium</i>	E1	13	0	0	75
	<i>Daphne mezereum</i>	E2a	25	71	86	25
	<i>Galeobdolon flavidum</i>	E1	25	43	29	100
	<i>Myosotis sylvatica</i>	E1	25	36	0	0
	<i>Lilium martagon</i>	E1	25	7	0	25
	<i>Dryopteris filix-mas</i>	E1	13	86	14	100
	<i>Fagus sylvatica</i>	E3	0	14	29	0
	<i>Fagus sylvatica</i>	E2b	0	21	71	0
	<i>Fagus sylvatica</i>	E2a	0	7	71	0
	<i>Fagus sylvatica</i>	E1	13	14	71	25
	<i>Mycelis muralis</i>	E1	13	36	14	25
	<i>Campanula trachelium</i>	E1	13	29	0	50
	<i>Paris quadrifolia</i>	E1	13	29	0	50
	<i>Euphorbia amygdaloides</i>	E1	13	7	29	0
	<i>Fraxinus excelsior</i>	E3a	13	7	0	0
	<i>Lathyrus vernus</i> subsp. <i>vernus</i>	E1	13	7	0	0
	<i>Lathyrus vernus</i> subsp. <i>flaccidus</i>	E1	13	0	0	0
	<i>Salvia glutinosa</i>	E1	0	14	86	0
	<i>Actaea spicata</i>	E1	0	43	43	75
	<i>Galium laevigatum</i>	E1	0	21	43	0
	<i>Epilobium montanum</i>	E1	0	29	14	75
	<i>Prenanthes purpurea</i>	E1	0	14	14	0
	<i>Sambucus nigra</i>	E2	0	0	14	25
	<i>Fraxinus excelsior</i>	E1	0	0	14	0
	<i>Epipactis helleborine</i>	E1	0	0	14	0
	<i>Corydalis cava</i>	E1	0	29	0	50
	<i>Poa nemoralis</i>	E1	0	29	0	50
	<i>Asarum europaeum</i> subsp. <i>caucasicum</i>	E1	0	21	0	0
	<i>Brachypodium sylvaticum</i>	E1	0	21	0	0
	<i>Pulmonaria officinalis</i>	E1	0	21	0	0
	<i>Dentaria bulbifera</i>	E1	0	14	0	75
	<i>Dentaria pentaphyllos</i>	E1	0	7	0	0
	<i>Ranunculus lanuginosus</i>	E1	0	7	0	0
	<i>Scrophularia nodosa</i>	E1	0	7	0	0
	<i>Symphytum tuberosum</i>	E1	0	7	0	0
	<i>Polygonatum multiflorum</i>	E1	0	0	0	50
TA	Tilio-Acerion					
	<i>Acer pseudoplatanus</i>	E3a	13	21	14	0
	<i>Acer pseudoplatanus</i>	E2	25	64	43	75
	<i>Acer pseudoplatanus</i>	E1	38	14	71	0
	<i>Geranium robertianum</i>	E1	13	43	0	75
	<i>Hesperis candida</i>	E1	13	14	0	50
	<i>Polystichum aculeatum</i>	E1	0	36	71	0
	<i>Phyllitis scolopendrium</i>	E1	0	14	0	0
	<i>Adoxa moschatellina</i>	E1	0	0	0	50
	<i>Acer platanoides</i>	E3a	0	7	0	0
	<i>Aruncus dioicus</i>	E1	0	7	0	0
	<i>Tephrosieris pseudocrispa</i>	E1	0	7	0	0
	<i>Ulmus glabra</i>	E3a	0	7	0	0
QP	Quercetalia pubescentis					
	<i>Sorbus aria</i>	E2	50	29	14	0
	<i>Sorbus aria</i>	E1	0	0	14	0
	<i>Arabis turrita</i>	E1	0	14	0	0
	<i>Peucedanum schottii</i> var. <i>petraeum</i>	E1	0	7	0	0
QF	Quercu-Fagetea					
	<i>Carex digitata</i>	E1	25	0	29	0
	<i>Listera ovata</i>	E1	25	0	0	0

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

Tab. 5		Successive number	1	3	2	4
BcAv	<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
	<i>Betulo carpaticae-Alnetea viridis</i>					
	<i>Salix glabra</i>	E2	25	36	71	0
	<i>Salix glabra</i>	E1	0	0	14	0
MuA	<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
	<i>Mulgedio-Aconitetea</i>					
	<i>Thalictrum aquilegifolium</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	<i>Epilobietea angustifolii</i>					
	<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

Tab. 5	Successive number	1	3	2	4	
	<i>Eupatorium cannabinum</i>	E1	0	14	100	0
	<i>Atropa bella-donna</i>	E1	0	0	29	0
	<i>Verbascum thapsus</i>	E1	0	0	29	0
	<i>Cirsium vulgare</i>	E1	0	0	14	0
	<i>Fragaria vesca</i>	E1	0	29	0	0
	<i>Cuscuta europaea</i>	E1	0	14	0	0
	<i>Geum urbanum</i>	E1	0	14	0	0
	<i>Salix caprea</i>	E3a	0	14	0	0
	<i>Bromus benekenii</i>	E1	0	7	0	0
	<i>Cirsium palustre</i>	E1	0	7	0	0
	<i>Tussilago farfara</i>	E1	0	7	0	0
	<i>Hypericum hirsutum</i>	E1	0	0	0	25
EP	Erico-Pinetea					
	<i>Buphthalmum salicifolium</i>	E1	100	36	43	0
	<i>Calamagrostis varia</i>	E1	88	36	100	25
	<i>Cirsium erisithales</i>	E1	63	64	86	0
	<i>Allium ericetorum</i>	E1	38	21	0	0
	<i>Peucedanum austriacum</i>	E1	38	14	0	0
	<i>Aquilegia nigricans</i>	E1	25	7	0	0
	<i>Rubus saxatilis</i>	E1	13	43	0	0
	<i>Erica carnea</i>	E1	13	14	0	0
	<i>Amelanchier ovalis</i>	E2	13	0	0	0
	<i>Polygala chamaebuxus</i>	E1	13	0	0	0
	<i>Carex ornithopoda</i>	E1	38	7	0	0
	<i>Cotoneaster tomentosus</i>	E2a	13	0	0	0
	<i>Epipactis atrorubens</i>	E1	13	0	0	0
	<i>Carex alba</i>	E1	0	0	71	0
	<i>Molinia arundinacea</i>	E1	0	0	43	0
	<i>Juniperus sibirica</i>	E2a	0	36	0	0
	<i>Rhodothamnus chamaecistus</i>	E1	0	14	0	0
	<i>Asperula aristata</i>	E1	0	7	0	0
	<i>Genista radiata</i>	E1	0	7	0	0
VP	Vaccinio-Piceetea					
	<i>Valeriana tripteris</i>	E1	50	29	14	0
	<i>Picea abies</i>	E3a	25	14	0	0
	<i>Picea abies</i>	E2b	13	29	0	0
	<i>Picea abies</i>	E2a	13	43	29	0
	<i>Picea abies</i>	E1	13	7	0	0
	<i>Solidago virgaurea</i>	E1	25	29	0	0
	<i>Rosa pendulina</i>	E2a	13	36	0	0
	<i>Clematis alpina</i>	E1	13	21	0	0
	<i>Veronica urticifolia</i>	E1	13	14	14	0
	<i>Aposeris foetida</i>	E1	0	14	14	0
	<i>Phegopteris connectilis</i>	E1	0	14	14	0
	<i>Gentiana asclepiadea</i>	E1	0	36	0	0
	<i>Homogyne sylvestris</i>	E1	0	29	0	0
	<i>Hieracium murorum</i>	E1	0	0	14	0
	<i>Lonicera caerulea</i>	E2a	0	14	0	0
	<i>Lonicera nigra</i>	E2a	0	14	0	0
	<i>Oxalis acetosella</i>	E1	0	14	0	0
	<i>Abies alba</i>	E2a	0	7	0	0
	<i>Luzula luzuloides</i>	E1	0	7	0	0
	<i>Maianthemum bifolium</i>	E1	0	7	0	0
	<i>Dryopteris dilatata</i>	E1	0	7	0	0
	<i>Gymnocarpium dryopteris</i>	E1	0	7	0	0
ES	Elyno-Seslerietea					
	<i>Betonica alopecuroides</i>	E1	63	57	14	0
	<i>Achillea clavennae</i>	E1	25	7	0	0

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Tab. 5 Successive number

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

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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	<i>Poo alpinae-Trisetalia</i>				
	<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	<i>Molinio-Arrhenatheretea</i>				
	<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</i> s. str.	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	<i>Rhamno-Prunetea</i>				
	<i>Rosa canina</i>	E2	25	21	0
	<i>Berberis vulgaris</i>	E2a	0	21	0
SCf	<i>Scheuchzerio-Caricetea fuscae</i>				
	<i>Parnassia palustris</i>	E1	0	14	0
TR	<i>Thlaspietea rotundifolii</i>				
	<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>Trisetum 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

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Tab. 5		Successive number		1	3	2	4
AT	<i>Astrantia carniolica</i>	E1	0	7	0	0	0
	<i>Hieracium bifidum</i>	E1	0	7	0	0	0
	<i>Leontodon hispidus</i> subsp. <i>hyoseroides</i>	E1	0	7	0	0	0
	<i>Saxifraga caesia</i>	E1	0	7	0	0	0
	<i>Taraxacum laevigatum</i> agg.	E1	0	7	0	0	0
	<i>Asplenietea trichomanis</i>						
	<i>Erysimum sylvestre</i>	E1	13	0	0	0	0
	<i>Sedum maximum</i>	E1	38	14	0	0	0
	<i>Primula auricula</i>	E1	38	7	0	0	0
	<i>Saxifraga hostii</i>	E1	38	7	0	0	0
	<i>Sedum album</i>	E1	25	29	0	0	0
	<i>Moehringia muscosa</i>	E1	13	14	0	0	25
	<i>Silene hayekiana</i>	E1	13	14	0	0	0
	<i>Saxifraga crustata</i>	E1	13	0	0	0	0
	<i>Cystopteris regia</i>	E1	13	0	0	0	0
	<i>Paederota lutea</i>	E1	0	36	43	0	0
	<i>Asplenium viride</i>	E1	0	29	14	0	0
	<i>Asplenium ruta-muraria</i>	E1	0	7	14	0	25
	<i>Asplenium trichomanes</i>	E1	0	29	0	0	25
	O	<i>Kernera saxatilis</i>	E1	0	21	0	0
<i>Valeriana saxatilis</i>		E1	0	14	0	0	0
<i>Cystopteris fragilis</i>		E1	0	7	0	0	25
<i>Carex brachystachys</i>		E1	0	7	0	0	0
<i>Festuca stenantha</i>		E1	0	7	0	0	0
<i>Polypodium vulgare</i>		E1	0	0	0	0	50
Other species							
<i>Juniperus communis</i>		E2a	25	7	0	0	0
<i>Alchemilla</i> sp.		E1	13	0	0	0	0
<i>Poa</i> sp.		E1	13	0	0	0	0
<i>Salix purpurea</i>		E2b	13	0	0	0	0
<i>Sorbus aucuparia</i>		E3a	0	14	0	0	0
<i>Sorbus aucuparia</i>		E2b	0	14	0	0	0
<i>Sorbus aucuparia</i>		E1	0	7	0	0	0
<i>Arabis</i> sp.		E1	0	0	14	0	0
ML		Mosses and lichens					
	<i>Schistidium apocarpum</i>	E0	38	21	14	0	100
	<i>Homalothecium lutescens</i>	E0	38	14	0	0	100
	<i>Tortella tortuosa</i>	E0	25	57	14	0	75
	<i>Ctenidium molluscum</i>	E0	13	50	43	0	100
	<i>Pseudoleskeella catenulata</i>	E0	0	57	0	0	75
	<i>Isoetecium alopecuroides</i>	E0	0	7	0	0	50
	<i>Polytrichum formosum</i>	E0	0	7	14	0	0
	<i>Rhytidiadelphus triquetrus</i>	E0	0	14	0	0	0
	<i>Dicranum scoparium</i>	E0	0	7	0	0	0
	<i>Eurhynchium striatum</i>	E0	0	7	0	0	0
	<i>Homalothecium philippeanum</i>	E0	0	7	0	0	0
	<i>Hylocomium splendens</i>	E0	0	7	0	0	0
	<i>Peltigera leucophlebia</i>	E0	0	7	0	0	0
	<i>Cladonia pyxidata</i>	E0	0	0	0	0	50
	<i>Peltigera canina</i>	E0	0	0	0	0	50
	<i>Thamnobryum alopecurum</i>	E0	0	0	0	0	25

LIRf – *Laserpitio latifolii*-*Rhamnetum fallacis*PIRf – *Polysticho lonchitis*-*Rhamnetum fallacis*LaRf – *Laburno alpini*-*Rhamnetum fallacis*LiRf – *Lunario redivivae*-*Rhamnetum fallacis*

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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	2	3	4
Sign for syntaxa	ScRf	PlRf	LaRf	LrRf
<i>Aremonio-Fagion</i>	6	5	12	5
<i>Fagetalia sylvaticae</i>	7	15	28	30
<i>Tilio-Acerion</i>	2	4	6	10
<i>Quercetalia pubescentis</i>	3	1	9	0
<i>Quercio-Fagetea</i>	2	2	1	4
<i>Mulgedio-Aconitetea, Betulo carpaticeae-Alnetea viridis</i>	8	16	6	13
<i>Epilobietea angustifolii</i>	2	5	8	9
<i>Erico-Pinetea</i>	12	7	11	0
<i>Vaccinio-Piceetea</i>	4	10	4	0
<i>Elyno-Seslerietea</i>	17	7	3	0
<i>Trifolio-Geranietea</i>	8	4	0	0
<i>Festuco-Brometea</i>	6	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>Thlaspietea rotundifolii</i>	11	8	7	0
<i>Asplenietea trichomanis</i>	4	5	2	8
Other species	1	0	0	0
Mosses and lichens	2	5	3	19
Total	100	100	100	100

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