

#### Annex 4. Indicator Species of Semi-Natural Grasslands (S. Rūsiņa)

Indicator species of semi-natural grasslands are plant species that indicate the naturalness of the grasslands and long-term extensive management. They are species that have been adapted to nutrient-poor soils and disappear from the grassland as soon as the environmental conditions change, for instance, when the grassland is fertilised or abandoned. The higher the number and abundance of such species in the grassland, the better its condition.

In Latvia 54 plant species are used as indicator species of semi-natural grasslands. The list was created in the late nineties of the 20<sup>th</sup> century on the basis of the Swedish list of semi-natural grassland indicator species (Ekstam, Forshed 1997). It was adapted to the conditions of Latvia based on expert experience.

Many species of mesic and moist areas are found not only in semi-natural grasslands, but in several other habitat types. Some of these, for instance, dry pine forests, fens and river banks are the key habitats for these species, as are semi-natural grasslands, while others serve only as temporary habitats, where these species occur for short periods of time. Habitats suitable in the short term include forest edges, roadsides, tilled hillsides, road verges, ditch edges, dry fallow lands on poor soils.

The authors of the enclosed photographs are

S. Rūsiņa, G. Dolmanis and A. Priede. To facilitate the identification of species, photographs of species similar to indicator species have been included in some cases. The features distinguishing similar species were summarised based on Prieditis (2014) and the experience of the author of this book.

Average height of the plant during the flowering period is indicated by a pictogram:



the plants are very low – from a few cm to 10–15 cm high



the plants are small – approximately from 15 to 20–30 cm high



plants of medium height, approximately 40–60 cm high



plants of large height – approximately 100 cm high.

Table 1 List of indicator species of semi-natural grasslands (according to Rūsiņa 2013b).

Figure number	Scientific name	English name	Distribution in grassland habitats					
			6120*	6210*	6230*	6270*	6410	6510
Species found in various moisture conditions								
1	<i>Briza media</i>	quaking grass	+	+	+	+	+	+
2	<i>Carex flacca</i>	blue sedge		+		+	+	+
3	<i>Galium boreale</i>	northern bedstraw	+	+	+	+	+	+
4	<i>Linum catharticum</i>	purging flax	+	+	+	+	+	+
5	<i>Nardus stricta</i>	matgrass	+	+	+	+		
6	<i>Platanthera chlorantha</i>	greater butterfly-orchid		+	+	+	+	+
6	<i>Platanthera bifolia</i>	lesser butterfly-orchid		+	+	+	+	+
7; 33	<i>Polygala comosa</i>	tufted milkwort	+	+		+	+	+
8	<i>Polygala vulgaris</i>	common milkwort	+	+	+	+	+	+
9	<i>Polygala amarella</i>	dwarf milkwort	+	+	+	+	+	+
10	<i>Scorzonera humilis</i>	viper's-grass		+	+	+	+	+
11	<i>Sesleria caerulea</i>	blue moor grass		+		+	+	
12	<i>Sieglingia decumbens</i>	heath grass	+	+	+	+	+	
13	<i>Stachys officinalis</i>	common hedgenettle				+	+	
Species found in dry and mesic grasslands								
14	<i>Acinos arvensis</i>	basil thyme	+	+	+			
15	<i>Agrimonia eupatoria</i>	common agrimony	+	+	+	+	+	+
16	<i>Antennaria dioica</i>	mountain everlasting	+	+	+	+		
17	<i>Botrychium lunaria</i>	common moonwort	+	+	+	+		
18	<i>Campanula rotundifolia</i>	harebell	+	+	+	+		
19	<i>Carex caryophyllea</i>	spring-sedge	+	+		+	+	
20	<i>Carex ornithopoda</i>	bird's foot sedge	+	+				
21	<i>Cirsium acaule</i>	dwarf thistle	+	+		+		
22	<i>Dianthus deltoides</i>	maiden pink	+	+	+	+	+	+
23	<i>Filipendula vulgaris</i>	fern-leaf dropwort	+	+		+	+	
24	<i>Fragaria viridis</i>	green strawberry	+	+		+	+	+
25	<i>Galium verum</i>	lady's bedstraw	+	+	+	+	+	+
26	<i>Geranium sanguineum</i>	bloody cranesbill	+	+				
27	<i>Helictotrichon pratense</i>	meadow oat-grass	+	+		+		

(continued)

Table 1 (continued)

Figure number	Scientific name	English name	Distribution in grassland habitats						
			6120*	6210*	6230*	6270*	6410	6510	
28	<i>Koeleria glauca</i>	blue hair grass	+						
29	<i>Leontodon hispidus</i> incl. <i>Leontodon danubialis</i>	rough hawkbit		+	+	+	+	+	+
30	<i>Phleum phleoides</i>	Boehmer's cat's-tail	+	+					
31	<i>Pimpinella saxifraga</i>	burnet-saxifrage	+	+	+	+	+	+	+
32	<i>Plantago media</i>	hoary plantain	+	+		+	+	+	
34	<i>Primula veris</i>	common cowslip		+		+	+	+	
35	<i>Sedum acre</i>	goldmoss stonecrop	+	+	+	+			
36	<i>Thymus ovatus</i>	broad-leaved thyme	+	+	+	+			+
37	<i>Thymus serpyllum</i>	breckland thyme	+	+	+				
38	<i>Trifolium montanum</i>	mountain clover	+	+		+	+	+	
39	<i>Veronica spicata</i>	spike speedwell	+	+					
40	<i>Viola rupestris</i>	teesdale violet	+	+					
41	<i>Viscaria vulgaris</i>	sticky catchfly	+	+	+	+			+
Species found in moist and wet grasslands									
42	<i>Cardamine pratensis</i>	cuckooflower			+	+	+	+	+
43	<i>Carex hartmanii</i>	Hartman's sedge		+		+	+	+	+
44	<i>Carex panicea</i>	grass-like sedge		+	+	+	+	+	+
45	<i>Dactylorhiza baltica</i>	Baltic marsh orchid		+	+	+	+	+	+
45	<i>Dactylorhiza cruenta</i>	flecked marsh orchid		+	+	+	+	+	+
45	<i>Dactylorhiza incarnata</i>	early marsh orchid		+	+	+	+	+	+
45	<i>Dactylorhiza maculata</i>	heath spotted orchid		+	+	+	+	+	+
46	<i>Epipactis palustris</i>	marsh helleborine				+	+	+	
47	<i>Geranium palustre</i>	marsh cranesbill			+	+	+	+	
48	<i>Lathyrus palustris</i>	marsh pea						+	
49	<i>Ophioglossum vulgatum</i>	adder's-tongue		+		+	+		
50	<i>Parnassia palustris</i>	marsh grass of Parnassus			+	+	+		
51	<i>Primula farinosa</i>	bird's-eye primrose						+	
52	<i>Ranunculus auricomus</i>	goldilocks buttercup			+	+	+	+	+
53	<i>Stellaria palustris</i>	marsh stitchwort						+	

(continued)

Table 1 (continued)

Figure number	Scientific name	English name	Distribution in grassland habitats					
			6120*	6210*	6230*	6270*	6410	6510
Species that are not included in the list of indicatorspecies but they can indicate the presence of indicatorspecies								
54	<i>Succisa pratensis</i>	devil's-bit			+	+	+	+
55	<i>Trollius europaeus</i>	globeflower					+	+
57	<i>Alchemilla spp.</i>	lady's mantle	+	+	+	+	+	+
68	<i>Angelica sylvestris</i>	wild angelica					+	+
58	<i>Anthyllis spp.</i>	kidney vetch	+	+				
56	<i>Artemisia campestris</i>	field wormwood	+	+				
59	<i>Campanula glomerata</i>	clustered bellflower	+	+			+	+
69	<i>Cirsium heterophyllum</i>	melancholy thistle					+	+
60	<i>Euphrasia spp.</i>	eyebright		+	+	+	+	
67	<i>Geum rivale</i>	water avens				+	+	+
70	<i>Inula salicina</i>	willowleaf yellowhead					+	+
73	<i>Listera ovata</i>	common twayblade			+	+	+	+
61	<i>Origanum vulgare</i>	oregano	+	+				
66	<i>Polygonum bistorta</i>	meadow bistort					+	+
71	<i>Potentilla erecta</i>	common tormentil			+	+	+	+
62	<i>Rhinanthus spp.</i>	rattle		+	+	+	+	+
63	<i>Saxifraga granulata</i>	meadow saxifrage		+		+	+	+
65	<i>Selinum carvifolia</i>	Cambridge milk parsley					+	+
72	<i>Silene nutans</i>	Nottingham catchfly	+	+				
64	<i>Tragopogon pratensis</i>	meadow salsify					+	+

### Species found in various moisture conditions.

#### 1 *Briza media*



can be easily recognised by a sparse panicle with flattened spikes on thin stalks, which shake and glisten even at the slightest breeze.

#### 2 *Carex flacca*



is easily identifiable by dark, nodding spikes on long (1–4 cm), thin stalks.

#### 3 *Galium boreale*

#### Similar species



There are several similar bedstraw species with white flowers, but northern bedstraw can be recognised by the number of leaves in a whorl – there are four leaves. *Galium palustre* also has four leaves in a whorl, but it is small and procumbent in growth habit.

#### 4 *Linum catharticum*



is well recognised by a characteristic seed capsule. However, it is difficult to notice, because it is a very fine and delicate plant.

5 *Nardus stricta*

is easily recognised by the very dense tuft, with the blades at 90 degrees to the sheaths, and one-sided flower spike, which after blooming resemble a comb.

6 *Platanthera bifolia*, *P. chlorantha*

The flowers of *Platanthera bifolia* are fragrant, the two pollen sacs of the flower are closely adjacent and parallel to each other. The flowers of *P. chlorantha* are not fragrant and the pollen sacs are growing at an angle towards each other – at a distance in the lower part and close to each other in the upper part.

7 *Polygala comosa*

differs from other milkwort species by bluish-purple to pink flowers (however, *Polygala amarella* may also have the same colour) and a bract bunch at the top of raceme. Found mainly in dry calcareous grasslands.

8 *Polygala vulgaris*

has more pronounced blue colour of flowers (however, pinkish flowers are also possible), the leaves do not develop basal rosette, the lateral veins of the bracts are bow-shaped and connected with the midrib. Occur in mesic and moist soils of various acidity. There is no bunch of bracts at the top of the raceme.

9 *Polygala amarella*

The flowers are rich dark blue with a tint of purple, sometimes pinkish. The leaves always develop a basal rosette. The lateral veins of the bracts are not connected with the midrib. Occurs in dry, as well as in wet, calcareous grasslands.

10 *Scorzonera humilis*

- similar to other species of Compositae family (hawkbits, milk thistles, dandelions) with yellow flowers. This species has single stalk with one flower (not branched), leaves are narrowly lanceolate, tapered, parallel-veined.

11 *Sesleria caerulea*

can be easily recognised by the compact, ovate panicle. Leaves are blue-green on the upper side, dark glossy green beneath with abruptly acute apex. Grows in tufts. In the absence of inflorescence can be mistaken for *Helictotrichon pratense* - which also has a bluish lower part of leaf, while the upper part is dark green.

12 *Sieglingia decumbens*

is easily identifiable species by stocky, roundish, ovate awnless, decumbent habit. Grows in low, dense tufts. In the absence of inflorescence can be identified by abruptly acute leaf tip, bright green leaf upper side with sparse hairs. The ligule consists of a ring of hairs.

13 *Stachys officinalis*

is easily identified by the characteristic leaf with densely round-toothed margin and a basal rosette (the leaf of *Stachys palustris* is narrower and not round-toothed, *Stachys sylvatica* leaves are long-stalked, both species lack basal rosettes).

## Species of dry and mesic grasslands

14 *Acinos arvensis*

somewhat resembles *Thymus serpyllum*. Can be distinguished by flowers in leaf axils (thymes inflorescence is a compact umbel composed of axillary whorls).

15 *Agrimonia eupatoria*

Similar species



differs from *A. pilosa* by dense hairs on the lower part of the leaf and dentate margin up to the leaf base, fruit withhooked hairs aligned towards crown (*A. pilosa* only has hairs on veins, the margin in the lower part of the leaf is not dentate, the hairs in the external hairs row of the fruit are rigid, bent inwards).

16 *Antennaria dioica*

has leaf rosettes with spoon-shaped leaves that are covered with silky hairs and therefore having a greyish colour.



17 *Botrychium lunaria*



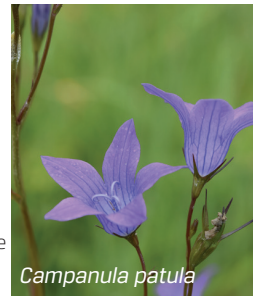
is easily identifiable by typical shape of leaf lobes. Fern, therefore does not have flowers, but the fertile part of leaf with clusters of sporangia, which resembles a flower.

18 *Campanula rotundifolia*

Similar species



differs from other campanula species by hanging, blue coloured bell-shaped flowers(not purple and erect like *C. patula*) and basal rosette with kidney shaped, rounded leaves.



19 *Carex caryophylla*

Similar species



differs from similar sedges in dry habitats by short and stiff, outward-curving leaves. Achene hairy, equal in size with the scale, and the bract of the lower spike is not membranous. *C. ericetorum* has reddish-brown leaf sheaths, a very short bract, which is brown and has a membranous tip and awny thorn tip, *C. pilulifera* has a ball-shaped spike and a bract that is grassy and not membranous.

20 *Carex ornithopoda*

Similar species



is similar to *C. digitata* which usually grows in forests. *C. ornithopoda* all the flower spikes originate from almost the same point and are not clearly separated from the one above it. Achene is longer than scale (and not equal in size).



21 *Cirsium acaule*

is easily distinguished by the low height and stemless habit (the flower head emerges barely above the ground just above the leaf rosette). A hybrid with *C. oleraceum* is not rare (it has a stem and greyish yellow flowers) – it is not considered to be an indicator species.

22 *Dianthus deltooides*

## Similar species



*Cerastium arvense* – flower, leaves and stem with hairs pointing downward



can be easily identified by flowers resembling carnation and having purple-red flowers. Can be found also in dry fallow lands. It is similar to a very rare species in Latvia – *D. campestris*, which occurs in wastelands and on railways. *D. deltooides* has only 2 sepals, while *D. campestris* has 4 or 6 sepals. While not in bloom, can be mistaken for *Stellaria graminea* and *Cerastium arvense*. *D. deltooides* has straight or rigid shoots, densely leaved, *C. arvense* – grows in a form of creeper and is sparsely covered with leaves.

23 *Filipendula vulgaris*

## Similar species



*Filipendula ulmaria*

is distinguished from *Filipendula ulmaria* by narrow leaves with 10 – 30 pairs of pinnate-lobed leaflets, pronounced basal rosette and 6 petals of the flower (*F. ulmaria* has 2 – 5 pairs of broad leaflets on a petiole and 5 petals of the flower).

24 *Fragaria viridis*

## Similar species



*Fragaria vesca*



*Fragaria vesca* (the tip of middle leaflet)

differs from *Fragaria vesca* by berry (it is larger, the sepals tightly cling to the berry, and, upon picking of the berry, a characteristic cracking sound occurs) and by tooth at the tip of margin of middle leaflet which is smaller than others (for *F. vesca*, it is longer).

25 *Galium verum*

leaf edges are slightly rolled under

differs from other species of bedstraw by yellow colour of flowers and narrow, revolute, needle-like leaves with shiny upper surface and white-haired lower surface. Can be found also in dry fallow lands. Can create a hybrid with *Galium album* (pale yellow flowers, features of both species). It is not considered to be an indicator species.

26 *Geranium sanguineum*

differs from other cranesbill species found in grasslands by smaller leaves (4 – 8 cm wide instead of 6 – 12 cm) and narrower lobes. Most commonly it occurs in sunny, warm forest edges, where it can dominate.

27 *Helictotrichon pratense*

## Similar species



*Helictotrichon pubescens*

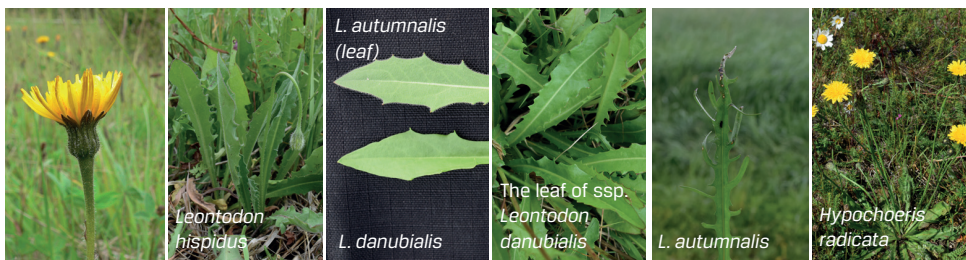
differs from *H. pubescens* by bare leaves with blue-green underneath, dense tuft and 1 – 2 primary panicle branches of the inflorescence (instead of hairy leaves, sparse tuft and 3 – 5 primary panicle branches in the inflorescence). The *Helictotrichon pratense* tends to develop large tufts in abandoned grasslands.

28 *Koeleria glauca*

differs from other grasses by bluish leaves and a characteristic panicle.

29 *Leontodon hispidus*; *Leontodon danubialis*

Similar species



Both species are very similar. The stalk of *Leontodon danubialis* is glabrous, with mostly hairless leaves, the stalk of the same width over its length (stalk of *L. hispidus* is wider under the flower head). Differs from *L. autumnalis* by pinnate and lobular (instead of incised) leaves, downward bending flower bud and single stalk with one flower (autumn hawkbit has pinnately incised rosette leaves and several stalks closely to the ground). Differs from *Hypochoeris radicata* by leaf-free stalk (*Hypochoeris radicata* has a branching stalk) and downwards bending flower bud (*Hypochoeris radicata* has erect buds) and Y shaped hairs on leaves (*Hypochoeris radicata* does not have hairs of such shape). *Leontodon hispidus* is the first indicator species that enters extensively used fallow lands and semi-improved grasslands, especially, if they are grazed.

30 *Phleum phleoides*

Similar species



differs from *Phleum pratense* by individual spikelets in the panicle (well visible, when the inflorescence is bent).

31 *Pimpinella saxifraga*

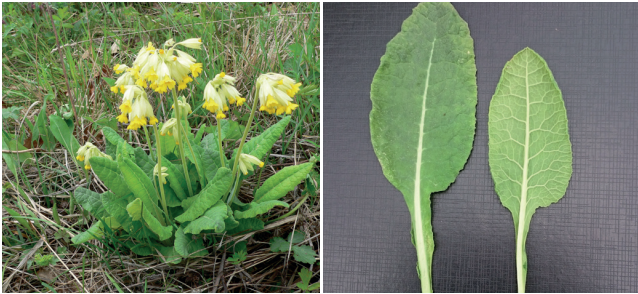
is easily distinguished from other umbellates by the characteristic leaf shape – leaflets are ovate. One of the first indicator species of semi-natural grasslands, which establish in extensively used fallow lands and improved grasslands.

32 *Plantago media*

differs from other plantains by densely haired widely lanceolate leaves (*Plantago major* has bare and widely ovate leaves; *Plantago lanceolata* has lanceolate, almost linear leaves). Occurs in dry lawns as well, because the species tolerates frequent mowing.

33 *Polygala comosa*

is similar to other species of milkworts. See No. 7 to 9.

34 *Primula veris*

can be easily identified even in the absence of inflorescence by its light coloured leaves of characteristic shape, which are retained up to the autumn. Commonly occurs in dry and gravelly road verges and fallow lands, because the plant blooms in spring, while there is no competition for light.

35 *Sedum acre*

differs from the similar introduced species *S. sexangulare* by irregular arrangement of leaves on stem (*S. sexangulare* has leaves in 6 clear rows). Commonly occurs not only in dry semi-natural grasslands, but also in dry road verges, on railway embankments, dry pine forest edges and quarries.

36 *Thymus serpyllum*37 *Thymus ovatus*

*Thymus ovatus* is taller (up to 25 cm) and has a four edged stem, only hairy along edges. *Thymus serpyllum* is up to 15 cm high and its stem is round and evenly covered with hairs.

38 *Trifolium montanum*

differs from *T. repens* by a higher growth and straight, woolly stems, larger leaflets with a pointed end and without a white spot. *T. hybridum* is semi-erect, glabrous, leaves are blunt-tipped, flowers are white-reddish (*Trifolium montanum* has white or greenish-white flowers – without the pink colour).

39 *Veronica spicata*

## Similar species



is easily distinguished from *V. longifolia* by considerably lower height, unbranched flower stalk (only one terminal raceme per stalk) and by leaves opposite composed shallowly serrated-with rounded teeth. *V. longifolia* grows in wet places, its flower stem is branched with several terminal racemes, the leaves are densely and deeply serrated, whorled.

40 *Viola rupestris*

is distinguished from other violets by a wide, ovate leaf with a bent, flat, cordate base and fine hairs on the leaves.

41 *Viscaria vulgaris*

## Similar species



differs from *Lychnis flos-cuculi* by the sticky stalk under the inflorescence, dark-red flowers and entire petals (instead of light pink flowers with split petals). May dominate dry fallow lands for short periods of time.

## Species of moist and wet grasslands

42 *Cardamine pratensis*

is differentiated from *Cardamine amara* by yellow anthers (instead of purple) and larger flowers with petals of up to 1-1.5 cm long (instead of 0.5 – 1 cm).

43 *Carex hartmanii*

differs from other sedge species by up to 5 spikes in the raceme, with three upper spikes closer to each other.

44 *Carex panicea*

differs from *C. vaginata* by bluish-green (not yellow-green) leaves and the lowest spike of female flowers, the bract during the flowering is longer than the spike (not shorter).

45 *Dactylorhiza* spp.

have leaves along the entire stem, the middle lobe of lip has a single part, while *Orchis* spp. have leaves in a distinct rosette in the lower part of the stem, the lip is bipartite.

46 *Epipactis palustris*

## Similar species

*E. helleborine* (leaves)*E. helleborine* (flowers)

is similar to *E. helleborine*, however, the later occurs in different habitats, mainly in forest edges, scrub, road verges. *Epipactis palustris* has white, bare perianth with pink veins (instead of light reddish-brown).

47 *Geranium palustre*

## Similar species

*Geranium sylvaticum**G. sylvaticum* has erect glandular hairs on flower stalk and sepals*Geranium pratense*

narrow leaf lobes

differs from *G. pratense* by wider, rhomboid leaf lobes and purple-red, smaller flowers (instead of narrower sharp-pointed lobes and blue flowers). Differs from *G. sylvaticum* by hairs that cling to flower stalk, without glands (instead of stiff erect glandular hairs). One of the most common indicator species of semi-natural grasslands. Frequently occurs in partially drained, as well as abandoned moist grasslands that overgrow with *Filipendula ulmaria*, therefore its indicative value is low.

48 *Lathyrus palustris*

## Similar species



Only *L. pratensis* (yellow flowers and much lower height, leaf is composed of two leaflets) occurs in similar habitats. *L. palustris* differs from *Lathyrus sylvestris* by shallow stem wing (instead of wide wing), its leaf has 4 or 6 leaflets (instead of 2).

*L. pratensis*49 *Ophioglossum vulgatum*50 *Parnassia palustris*

There are no similar species.

There are no similar species.



51 *Primula farinosa*

There are no similar species. While not in flower, can be easily distinguished by the mealy lower surface of the rosette leaf.

52 *Ranunculus auricomus*

## Similar species



can be easily distinguished from other buttercup species by leaf shape. The leaf of *R. acris* is 3-5 lobed and leaflets are rhomboid. The leaf of *R. polyanthemos* is divided in deeply narrow-lobed leaflets. The leaf of *R. repens* is divided into three leaflets, shallowly or deeply lobed, each of which is stalked.

53 *Stellaria palustris*

## Similar species



differs from *S. graminea* by rigid, bluish leaves, rigid stem and petals, which are twice as long as the sepals. The leaves of *S. graminea* are soft, thin and are of grass-green colour, the stem is limp-ascending, the petals and the sepals are of equal length.

54 *Succisa pratensis*

## Similar species



is distinguished from *Knautia arvensis* by entire leaves, equal size of all flowers in the inflorescence, blooms in the second half of July and August. *Knautia arvensis* blooms in mid-June and July; at least some stem the leaves are pinnately lobed, lobes narrow, the lateral flowers in the inflorescence are larger than rest.

55 *Trollius europaeus*

## Similar species

*Ranunculus repens**Ranunculus acris**Geranium palustre*

while not in flower can be mistaken for *Geranium* spp. and *Ranunculus* spp. Differentiated by smooth, coriaceous leaves that are 5-lobed, lobes pinnatifid large-toothed. For the species identification, leaf hairs and the proportion of length to width must be taken into consideration.

**Species that often occur in semi-natural grasslands (not included in the list of indicator species, but can indicate the presence of indicator species)**

56 *Artemisia campestris*57 *Alchemilla* spp.58 *Anthyllis* spp.59 *Campanula glomerata*60 *Euphrasia* spp.61 *Origanum vulgare*62 *Rhinanthus* spp.63 *Saxifraga granulata*64 *Tragopogon pratensis*

65 *Selinum carvifolia*66 *Polygonum bistorta*68 *Geum rivale*69 *Angelica sylvestris*70 *Cirsium heterophyllum*71 *Inula salicina*72 *Potentilla erecta*73 *Silene nutans*74 *Listera ovata*