

# Supplementary material 1: Detailed information and results of supplementary analyses on the structure of resident plant communities

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Article:

## Effects of invasive *Rosa rugosa* on Baltic coastal dune communities depend on dune age

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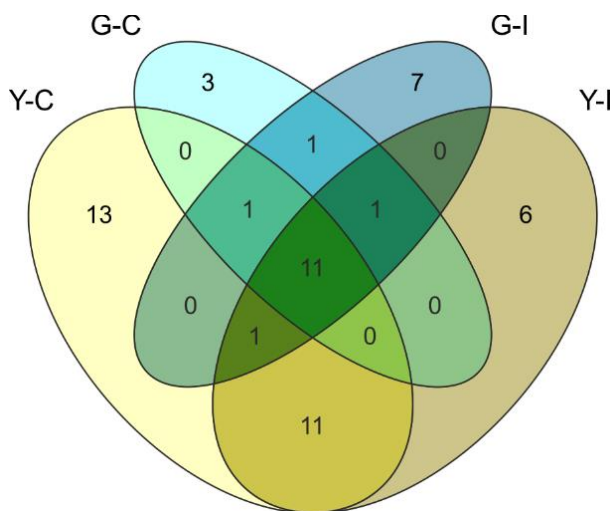
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**Figure S1.** Venn diagram showing the number of species exclusive for and shared between four types of plots: yellow dune control (Y-C) and invasion (Y-I) plots and grey dune control (G-C) and invasion (G-I) plots.

**Table S1.** Species shared between (S) and exclusive for (E) four types of plots – yellow dune control (Y-C) and invasion (Y-I) plots and grey dune control (G-C) and invasion (G-I) plots – with their frequency and average percentage coverage (in parentheses). Species are ordered according to the number of plot types in which they were recorded and their commonness (expressed in frequency and coverage values).

Species	S/E	Y-C	Y-I	G-C	G-I
<i>Hieracium umbellatum</i> var. <i>dunense</i>	S	9 (10.3)	6 (3.1)	8 (1.6)	11 (3.5)
<i>Carex arenaria</i>	S	8 (14.7)	9 (4.7)	6 (1.4)	6 (7.5)
<i>Corynephorus canescens</i>	S	2 (1.4)	2 (0.3)	11 (23.5)	7 (6.8)
<i>Ammophila arenaria</i>	S	3 (3.8)	4 (1.8)	8 (18.1)	6 (3.3)
<i>Festuca villosa</i>	S	9 (35.6)	1 (9.1)	1 (0.2)	9 (11.3)
<i>Artemisia campestris</i> ssp. <i>sericea</i>	S	6 (5.5)	4 (0.9)	4 (0.8)	1 (0.1)
<i>Leymus arenarius</i>	S	8 (9.1)	4 (0.9)	1 (0.1)	1 (0.3)
<i>Lathyrus japonicus</i> ssp. <i>maritimus</i>	S	5 (4.1)	2 (1.5)	3 (0.7)	3 (0.7)
<i>Polypodium vulgare</i>	S	2 (0.2)	2 (0.5)	3 (0.5)	4 (4.2)
<i>Sonchus arvensis</i>	S	2 (0.5)	1 (0.2)	3 (0.5)	2 (0.5)
<i>Hypochoeris radicata</i>	S	2 (0.5)	1 (0.2)	1 (0.2)	1 (0.2)
<i>Rumex acetosella</i>	S	3 (1.5)	1 (0.3)	–	1 (0.2)
<i>Pinus sylvestris</i> juv.	S	1 (0.3)	–	1 (0.1)	1 (0.1)
<i>Jasione montana</i> var. <i>litoralis</i>	S	–	1 (0.2)	4 (0.7)	3 (0.5)
<i>Anthoxanthum odoratum</i>	S	5 (10.5)	5 (1.3)	–	–
<i>Galium verum</i>	S	3 (1.5)	3 (0.5)	–	–
<i>Agrostis vinealis</i>	S	3 (3.8)	2 (0.3)	–	–
<i>Achillea millefolium</i>	S	3 (0.3)	2 (0.4)	–	–
<i>Leontodon autumnalis</i>	S	2 (1.3)	1 (1.2)	–	–
<i>Poa compressa</i>	S	1 (0.3)	1 (0.3)	–	–
<i>Arrhenatherum elatius</i>	S	1 (0.3)	1 (0.3)	–	–
<i>Populus tremulus</i> juv.	S	1 (0.3)	1 (0.3)	–	–
<i>Acer platanoides</i> juv.	S	1 (0.3)	1 (0.2)	–	–
<i>Pinus nigra</i> juv.	S	1 (0.3)	1 (0.2)	–	–
<i>Daucus carota</i>	S	1 (0.1)	1 (0.3)	–	–
<i>Viola tricolor</i> ssp. <i>curtisii</i>	S	–	–	1 (0.2)	2 (0.4)
<i>Aira praecox</i>	E	5 (8.6)	–	–	–
<i>Juncus articulatus</i>	E	2 (0.5)	–	–	–
<i>Matricaria maritima</i> ssp. <i>maritima</i>	E	2 (0.5)	–	–	–
<i>Rosa canina</i> juv.	E	2 (0.4)	–	–	–
<i>Melampyrum pratense</i>	E	2 (0.2)	–	–	–
<i>Cerastium semidecandrum</i>	E	1 (0.3)	–	–	–
<i>Echium vulgare</i>	E	1 (0.2)	–	–	–
<i>Equisetum arvense</i>	E	1 (0.2)	–	–	–
<i>Acer pseudoplatanus</i> juv.	E	1 (0.1)	–	–	–
<i>Betula pendula</i> juv.	E	1 (0.1)	–	–	–
<i>Erigeron ramosus</i>	E	1 (0.1)	–	–	–
<i>Lythrum salicaria</i>	E	1 (0.1)	–	–	–
<i>Salix acutifolia</i> juv.	E	1 (0.1)	–	–	–
<i>Calamagrostis epigejos</i>	E	–	2 (0.5)	–	–
<i>Epipactis atrorubens</i>	E	–	2 (0.2)	–	–
<i>Bromus</i> × <i>pseudothomii</i>	E	–	1 (0.3)	–	–
<i>Phragmites australis</i>	E	–	1 (0.1)	–	–
<i>Plantago lanceolata</i>	E	–	1 (0.1)	–	–
<i>Vicia hirsuta</i>	E	–	1 (0.1)	–	–
<i>Deschampsia flexuosa</i>	E	–	–	–	2 (9.2)
<i>Dactylis glomerata</i>	E	–	–	–	2 (0.5)
<i>Festuca polesica</i>	E	–	–	–	2 (0.5)
<i>Geranium robertianum</i>	E	–	–	–	1 (1.2)
<i>Sorbus aucuparia</i> juv.	E	–	–	–	1 (0.2)
<i>Syringia vulgaris</i>	E	–	–	–	1 (0.1)
<i>Tilia cordata</i> juv.	E	–	–	–	1 (0.1)
<i>Cardaminopsis arenosa</i>	E	–	–	1 (0.3)	–
<i>Calammophila baltica</i>	E	–	–	1 (0.2)	–
<i>Viola hirta</i>	E	–	–	1 (0.2)	–

**Table S2.** Resident plant species that contribute most to the dissimilarity between control (C) and invasion (I) plots according to the SIMPER analysis. For each species, its mean abundances (based on square-root transformed cover-abundance values expressed on the seven-grade Braun-Blanquet scale; see the text) in both plot types and its percentage contributions are shown.

Species	Contribution (%)	Mean abundance	
		C plots	I plots
Yellow dune sites (average dissimilarity = 62.8%)			
<i>Leymus arenarius</i>	7.15	1.25	0.56
<i>Hieracium umbellatum</i> var. <i>dunense</i>	7.02	1.43	0.87
<i>Anthoxanthum odoratum</i>	6.57	0.95	0.76
<i>Artemisia campestris</i> ssp. <i>sericea</i>	6.52	0.96	0.57
<i>Lathyrus japonicus</i> ssp. <i>maritimus</i>	6.36	0.86	0.34
<i>Carex arenaria</i>	6.26	1.38	1.34
<i>Aira praecox</i>	5.46	0.90	0.00
<i>Festuca villosa</i>	5.23	1.86	1.75
Grey dune sites (average dissimilarity = 60.1%)			
<i>Festuca villosa</i>	13.90	0.13	1.48
<i>Corynephorus canescens</i>	11.84	2.08	0.98
<i>Ammophila arenaria</i>	10.76	1.49	0.93
<i>Carex arenaria</i>	9.27	0.85	0.88
<i>Hieracium umbellatum</i> var. <i>dunense</i>	7.36	1.08	1.63

**Table S3.** Resident plant functional trait categories (means  $\pm$  standard deviations) for the control (C) and invasion (I) plots within the yellow and grey dune sites, and the effects of site type, plot type and their interaction on these properties, as shown by *F*-values derived from the LME analysis. Significant effects are marked with asterisks: \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .

Variable	Yellow dune sites		Grey dune sites		Effects		
	C plots	I plots	C plots	I plots	Site type	Plot type	Interaction
Forbs	3.8 $\pm$ 2.1	2.4 $\pm$ 1.6	2.4 $\pm$ 2.0	2.4 $\pm$ 1.6	0.4	2.4	4.4*
Graminoids	4.3 $\pm$ 1.7	3.8 $\pm$ 1.9	2.5 $\pm$ 0.7	3.2 $\pm$ 1.3	2.3	0.0	1.9
C (competitors)	2.7 $\pm$ 1.2	2.0 $\pm$ 1.3	0.3 $\pm$ 0.5	1.5 $\pm$ 1.0	14.2	5.5*	19.0***
CR (competitive ruderals)	1.0 $\pm$ 1.5	0.3 $\pm$ 0.6	0.3 $\pm$ 0.5	0.2 $\pm$ 0.4	1.1	3.4	1.4
CS (stress-tolerant competitors)	3.5 $\pm$ 1.3	3.0 $\pm$ 1.7	4.0 $\pm$ 1.3	3.8 $\pm$ 1.2	3.1	1.0	0.5
CSR (mixed strategists)	1.6 $\pm$ 1.2	1.4 $\pm$ 1.6	0.6 $\pm$ 0.8	0.5 $\pm$ 0.8	1.2	1.5	0.3
Geophytes	2.1 $\pm$ 0.8	2.1 $\pm$ 1.2	1.5 $\pm$ 0.7	1.3 $\pm$ 0.6	4.9	0.5	0.2
Hemicryptophytes	7.1 $\pm$ 2.2	4.6 $\pm$ 2.8	3.5 $\pm$ 2.0	4.4 $\pm$ 1.1	5.6	1.5	9.9**
Insect-pollinated	3.3 $\pm$ 2.2	2.0 $\pm$ 1.6	2.0 $\pm$ 1.5	2.3 $\pm$ 1.0	0.2	1.0	5.8*
Self-pollinated	1.5 $\pm$ 1.0	1.3 $\pm$ 0.8	1.8 $\pm$ 1.3	2.1 $\pm$ 0.5	1.4	0.6	2.6
Wind-pollinated	5.2 $\pm$ 1.9	4.1 $\pm$ 2.2	2.3 $\pm$ 0.9	2.9 $\pm$ 1.2	6.2	0.2	4.3
Anemochores	8.7 $\pm$ 2.6	6.5 $\pm$ 3.2	5.2 $\pm$ 2.3	5.8 $\pm$ 1.3	5.4	1.1	5.6*
Autochores	1.3 $\pm$ 1.0	1.1 $\pm$ 0.5	1.6 $\pm$ 0.7	1.4 $\pm$ 0.7	0.8	0.3	0.9
Zoochores	2.5 $\pm$ 1.1	1.2 $\pm$ 1.1	0.4 $\pm$ 0.5	1.0 $\pm$ 0.9	3.1	0.8	13.1**