

Scalone, R., Kolf, M. and Alback, D. C. 2013. Mating system variation in *Veronica* (Plantaginaceae): inferences from pollen/ovule ratios and other reproductive traits. – Nord. J. Bot. 31: 372–384.

Supplementary material

Appendix 1. Further information on the species of *Veronica* used in this study. * = species studied in the botanical garden of Mainz, ^H = studied from herbarium specimens, ^F = studied from field specimens, n_{total} = number of known species belonging to the subgenus, % studied = percentage of the known species that were studied in each subgenus, ^A = in μm , from the literature (Hong 1984, Manukian 1984, Martínez-Ortega et al. 2000, Sánchez Agudo et al. 2009); ^B = in mm, from Martínez-Ortega and Rico 2001; --- = unknown data. BG = botanical garden.

<u>Species</u>	<u>Subgenus</u>	<u>Pollen size^A</u>	<u>Seed size^B</u>	<u>Life history</u>	<u>Origin of population used</u>	<u>Voucher for analyzed specimens</u>	<u>% studied</u>
<i>V. montana</i> ^F	<i>Veronica</i>	30.5 × 30.3	1.95	Perennial	Bonn (Germany)	Albach 1049, MJG	

<i>V. officinalis</i>	<i>Veronica</i>	30.4 × 27.5	1.19	Perennial	Appendix 2	Appendix 2	
<i>V. urticifolia</i> ^H	<i>Veronica</i>	24.6 × 22.2	1.06	Perennial	Salzburg (Austria)	Till 10.6.1993, WU	
<i>V. bellidoides</i> ^H	<i>Veronica</i>	30.9 × 30.5	1.32	Perennial	St Bernard (Italy)	Albach 193, WU	
<i>V. cusickii</i> ^H	<i>Veronica</i>	--- × ---	1.00	Perennial	Chinook Pass (USA)	Albach 290, WU	
<i>V. alpina</i> ^H	<i>Veronica</i>	26.3 × 25.5	0.80	Perennial	Norrboten (Finland)	Schneeweiß et al. 2894, 20.7.99,	14 (n _{total} = 44)
						WU	
<i>V. peregrina</i>	<i>Beccabunga</i>	22.6 × 21.4	---	Annual	Johnson Co. (USA)	Cruden 1977	
<i>V. beccabunga</i> ^G	<i>Beccabunga</i>	28.3 × 23.3	0.50	Perennial	Mainz (Germany)	Albach 1051, MJG	
<i>V. anagalloides</i> ^F	<i>Beccabunga</i>	30.5 × 24.6	0.55	Annual	Tsodeniskari (Georgia)	Scalone 27, MJG	
<i>V. anagallis-aquatica</i>	<i>Beccabunga</i>	30.4 × 24.7	0.60	Perennial	Appendix 2	Appendix 2	
<i>V. scardica</i> ^G	<i>Beccabunga</i>	--- × ---	0.50	Mixed	Bernstein (Austria)	Albach 977, WU	
<i>V. serpyllifolia</i>	<i>Beccabunga</i>	27.1 × 26.6	0.96	Perennial	Appendix 2	Appendix 2	
<i>V. gentianoides</i>	<i>Beccabunga</i>	27.0 × 32.0	1.67	Perennial	Appendix 2	Appendix 2	
<i>V. syriaca</i>	<i>Beccabunga</i>	--- × ---	1.20	Annual	Appendix 2	Appendix 2	
<i>V. bozakmanii</i> ^H	<i>Beccabunga</i>	--- × ---	1.45	Annual	Aragac Mt (Armenia)	Gadrusiev 29.4.1971, WU	27 (n _{total} = 33)

<i>V. schmidtiana</i>	<i>Pseudolysimachium</i>	23.0 × 25.0	1.00	Perennial	BG Tübingen (Germany)	Albach 1043, MJG	
<i>V. pinnata</i> ^G	<i>Pseudolysimachium</i>	18.2 × 21.1	1.00	Perennial	BG Mainz (Germany)	Scalone A, MJG	
<i>V. longifolia</i> ^G	<i>Pseudolysimachium</i>	17.6 × 20.9	0.95	Perennial	BG Mainz (Germany)	Albach 1047, MJG	
<i>V. kiusiana</i> ^G	<i>Pseudolysimachium</i>	--- × ---	1.00	Perennial	BG Bonn (Germany)	Albach 1040, MJG	
<i>V. spicata</i> ^G	<i>Pseudolysimachium</i>	19.0 × 17.0	0.90	Perennial	BG Mainz (Germany)	Scalone C, MJG	
<i>V. incana</i> ^G	<i>Pseudolysimachium</i>	13.8 × 16.1	0.80	Perennial	BG Mainz (Germany)	Scalone B, MJG	21 (n _{total} = 29)
<i>V. lycica</i> ^H	<i>Cochlidiosperma</i>	34.7 × 30.1	2.25	Annual	Gömbe (Turkey)	Albach 266, WU	
<i>V. cymbalaria</i>	<i>Cochlidiosperma</i>	37.4 × 35.1	2.80	Annual	Appendix 2	Appendix 2	
<i>V. sublobata</i> ^F	<i>Cochlidiosperma</i>	32.1 × 29.4	2.45	Annual	Mainz (Germany)	Albach 1042, MJG	
<i>V. hederifolia</i>	<i>Cochlidiosperma</i>	32.3 × 29.8	2.80	Annual	Appendix 2	Appendix 2	33 (n _{total} = 12)
<i>V. glauca</i> ^H	<i>Pellidosperma</i>	--- × ---	1.65	Annual	Rega Spelagio (Greece)	Albach 404, WU	
<i>V. donii</i> ^H	<i>Pellidosperma</i>	40.4 × 35.9	---	Annual	Yatagan (Turkey)	Albach 239, WU	
<i>V. triphyllos</i> ^H	<i>Pellidosperma</i>	30.7 × 29.3	1.60	Annual	Glaslauterriegels (Austria)	Till 17.3.2007, WU	43 (n _{total} = 7)

<i>V. teucrium</i> ^G	<i>Pentasepalae</i>	34.0 × 31.3	1.75	Perennial	BG Mainz (Germany)	Albach 1052, MJG	
<i>V. cuneifolia</i> ^F	<i>Pentasepalae</i>	--- × ---	1.50	Perennial	Avlan Gölü (Turkey)	Albach 2008/D2-9, MJG	
<i>V. oltensis</i> ^G	<i>Pentasepalae</i>	--- × ---	1.00	Perennial	BG Mainz (Germany)	Scalone E, MJG	
<i>V. orientalis</i>	<i>Pentasepalae</i>	27.6 × 22.7	2.10	Perennial	Appendix 2	Appendix 2	
<i>V. armena</i> ^G	<i>Pentasepalae</i>	32.8 × 30.5	1.50	Perennial	BG Mainz (Germany)	Scalone D, MJG	
<i>V. vendetta-deae</i> ^F	<i>Pentasepalae</i>	--- × ---	2.00	Perennial	Kazbegi (Georgia)	Scalone 9, MJG	
<i>V. caucasica</i>	<i>Pentasepalae</i>	--- × ---	1.25	Perennial	Appendix 2	Appendix 2	
<i>V. peduncularis</i>	<i>Pentasepalae</i>	29.4 × 31.1	1.55	Perennial	Chuasopeli (Georgia)	Scalone 39, MJG	12 (n _{total} = 69)
<i>V. argute-serrata</i> ^H	<i>Pocilla</i>	29.5 × 33.0	2.00	Annual	Coruh (Turkey)	Schneeweiß, Jang 7798, WU	
<i>V. filiformis</i>	<i>Pocilla</i>	30.3 × 28.3	1.50	Perennial	Appendix 2	Appendix 2	
<i>V. polita</i>	<i>Pocilla</i>	25.5 × 22.8	1.25	Annual	Appendix 2	Appendix 2	
<i>V. persica</i>	<i>Pocilla</i>	38.2 × 29.7	1.85	Annual	Appendix 2	Appendix 2	14 (n _{total} = 28)
<i>V. arvensis</i> ^F	<i>Chamaedrys</i>	24.2 × 22.2	1.20	Annual	Mainz (Germany)	Albach 1044, MJG	

<i>V. dillenii</i> ^H	<i>Chamaedrys</i>	30.5 × 27.5	1.25	Annual	Bernhardstal (Austria)	Greimler 95/71 14.5.1995, WU	
<i>V. magna</i> ^F	<i>Chamaedrys</i>	--- × ---	1.35	Perennial	Ayder (Turkey)	Albach 976, WU	
<i>V. chamaedrys</i>	<i>Chamaedrys</i>	34.3 × 31.6	1.37	Perennial	Appendix 2	Appendix 2	31 (n _{total} = 13)
<i>V. thessalica</i> ^G	<i>Stenocarpon</i>	--- × ---	1.15	Perennial	Mt Olympos (Greece)	von Sternburg 270706, WU	
<i>V. fruticulosa</i> ^G	<i>Stenocarpon</i>	35.5 × 32.5	1.38	Perennial	BG Mainz (Germany)	Albach 1048, MJG	6 (n _{total} = 33)

Appendix 2. Intraspecific variation of pollen number, ovule number, and P/O within *Veronica*. n = number of investigated flowers, * = species studied in the botanical garden of Mainz, ^H = studied from herbarium specimens, ^F = studied from field specimens, 4N = tetraploid, 6N = hexaploid, BG = botanical garden, SD = standard deviation; % SD = standard deviation in percentage, Sex. Sys. = mating system as classified by Cruden (1977), --- = missing information, data in italics are data from the literature (Cruden 1977).

Species	Locality	Country	n	Pollen	SD	% SD	n	Ovule	SD	% SD	P/O	Sex. Sys.	Voucher
<i>V. officinalis</i> ^G	Mainz, BG	Germany	2	4500	713	15.8	2	20	0.000	0.00	225.0	F.A.	Albach 1045, MJG
<i>V. officinalis</i> ^G	Mainz, BG	Germany	3	4433	924	20.8	3	19	1.732	9.12	233.3	F.A.	Albach 1046, MJG
<i>V. anagallis-aquatica</i> ^H	Luberegg	Austria	5	2540	691	27.2	5	62	2.966	4.75	40.7	O.A.	Tod and Bauer 12.12.97, WU
<i>V. anagallis-aquatica</i> ^F	Belek (Antalya)	Turkey	9	5989	1199	20.0	9	97	6.164	6.33	61.7	O.A.	Albach D3-1, MJG
<i>V. serpyllifolia</i>	Pueblo Co.	USA	---	---	---	---	---	---	---	---	31.9	O.A.	Cruden, 1977
<i>V. serpyllifolia</i> ^G	Mainz, BG	Germany	8	2250	1119	49.7	6	55	1.032	1.87	40.7	O.A.	Albach 1050, MJG
<i>V. serpyllifolia</i> ^F	Bakuriani	Georgia	10	4355	956	21.9	7	55	1.069	1.95	79.4	F.A.	Scalone 18, MJG
<i>V. gentianoides</i> ^H	Demirkapi	Turkey	6	12683	3390	26.7	3	39	1.154	2.94	325.2	F.X.	Albach 895, WU

	(Bayburt)													
<i>V. gentianoides</i> ^H	Demirkapi	Turkey	5	16040	3578	22.3	1	40	0.000	0.00	401.0	F.X.	Albach 895, WU	
	(Bayburt)													
<i>V. gentianoides</i> ^H	Karabel (Van)	Turkey	5	22660	3110	13.7	5	40	0.000	0.00	566.5	F.X.	Albach 700, WU	
<i>V. gentianoides</i> ^F	Kazbegi	Georgia	6	16550	3408	20.6	9	35	3.741	10.79	477.4	F.X.	Scalone 8, MJG	
<i>V. syriaca</i> ^H	Serik (Antalya)	Turkey	5	12400	738	6.0	5	31	1.788	5.73	397.4	F.X.	Albach 250, WU	
<i>V. syriaca</i> ^F	Side (Antalya)	Turkey	10	10150	2087	20.6		21	1.350			F.X.	Albach 2008/ D3-5,	
										6.55	483.3		MJG	
<i>V. schmidtiana</i> (white) ^G	Mainz, BG	Germany	6	7933	4205	53.0	6	34	4.750	13.97	233.3	F.A.	Albach 1043, MJG	
<i>V. schmidtiana</i> (blue) ^G	Mainz, BG	Germany	8	6975	4501	64.5	8	30	3.370	11.23	232.5	F.A.	Albach 1043, MJG	
<i>V. hederifolia</i> ^G	Mainz, BG	Germany	9	167	71	42.4	5	4	0.000	0.00	41.8	O.A.	Albach 2008/ D2-3, MJG	
<i>V. hederifolia</i> ^H	Wolfsgraben	Austria	5	300	122	40.8	5	4	0.000	0.00	75.0	F.A.	Albach 861, WU	
<i>V. cymbalaria</i> (south-4x) ^H	Perge (Antalya)	Turkey	3	900	436	48.4	3	4	0.000	0.00	225.0	F.A.	Albach 251, WU	

<i>V. cymbalaria</i> (south-4x) ^G	Mainz, BG	Germany	9	833	357	42.8	9	4	0.000	0.00	208.3	F.A.	Albach 2008/ D4-3, MJG
<i>V. cymbalaria</i> (west-6x) ^H	Pergamon (Izmir)	Turkey	3	1300	100	7.7	3	4	0.000	0.00	325.0	F.X.	Albach 230, WU
<i>V. orientalis</i> ^G	Mainz, BG	Germany	4	5800	1611	27.8	4	16	0.000	0.00	362.5	F.X.	Scalone F, MJG
<i>V. orientalis</i> ^F	Cakirdaba Pass	Turkey	5	10958	1391	12.7	5	14	0.000	0.00	782.7	F.X.	Albach 943, MJG
<i>V. orientalis</i> ^F	Tbilisi	Georgia	10	7779	2032	26.1	8	6	1.851	30.86	1296.7	F.X.	Scalone 1, MJG
<i>V. caucasica</i> ^G	Mainz, BG	Germany	2	13000	2546	19.6	---	---	---	---	---	---	Scalone G, MJG
<i>V. caucasica</i> ^F	Mleta	Georgia	9	11206	4973	44.4	7	11	1.069	9.85	1032.1	F.X.	Scalone 2, MJG
<i>V. filiformis</i> ^G	Mainz, BG	Germany	10	11600	4587	39.5	5	10	1.673	17.43	1208.3	F.X.	Scalone S65, MJG
<i>V. filiformis</i> ^F	Batumi	Georgia	5	11140	3035	27.2	5	12	0.000	0.00	928.3	F.X.	Scalone S118, MJG
<i>V. filiformis</i> ^F	Kazbegi	Georgia	10	12810	2788	21.8	10	12	1.265	10.90	1104.3	F.X.	Scalone S42, MJG
<i>V. polita</i> ^G	Mainz, BG	Germany	4	1766	472	26.7	4	17	1.914	11.61	107.0	F.A.	Scalone H, MJG
<i>V. polita</i> ^F	Kazbegi	Georgia	5	4038	748	18.5	5	16	1.673	10.20	246.2	F.A.	Scalone 12, MJG
<i>V. persica</i> ^G	Mainz, BG	Germany	9	2800	1362	48.6	7	14	1.154	8.25	200.0	F.A.	Albach 2008 / D2- 9, MJG

<i>V. persica</i> ^G	Light treatment	Germany	50	6956	2470	35.5	50	21	3.000	15.90	329.0	F.X.	Greenhouse experiment
<i>V. persica</i> ^G	Control treatment	Germany	47	5581	2262	40.5	47	15	1.000	9.50	383.0	F.X.	Greenhouse experiment
<i>V. persica</i> ^F	Kashuri	Georgia	6	4338	680	15.7	4	12	0.000	0.00	361.5	F.X.	Scalone 13, MJG
<i>V. arvensis</i>	Dickinson Co., KS	USA	---	---	---	---	---	---	---	---	18.1	O.A.	Cruden, 1977
<i>V. arvensis</i>	Johnson Co., IA	USA	---	---	---	---	---	---	---	---	25.0	O.A.	Cruden, 1977
<i>V. arvensis</i>	Douglas Co, KS	USA	---	---	---	---	---	---	---	---	28.3	O.A.	Cruden, 1977
<i>V. arvensis</i> ^G	Mainz, BG	Germany	5	520	110	21.1	5	18	1.000	6.06	28.9	O.A.	Albach 1044, MJG
<i>V. chamaedrys</i> ^G	Mainz, Oberolmer	Germany	2	3350	778	23.2	---	---	---	---	---	---	Albach 1026, MJG
<i>V. chamaedrys</i> ^G	Mainz, BG	Germany	1	6700	0	0.0	---	---	---	---	---	---	Albach 1025, MJG
<i>V. chamaedrys</i> ^G	Mainz, MPI	Germany	5	6340	3145	49.6	10	14	1.632	11.66	452.9	F.X.	Albach 1025, MJG
<i>V. chamaedrys</i> ^F	Bakuriani	Georgia	9	12101	4070	33.6	6	13	1.032	8.15	955.4	F.X.	Scalone 19, MJG