Effect of emergence time on life cycle, shoot dry weight, pollen and seed production

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In another experiment emerged common ragweed seedlings within the same observation period (every ten days) were signed similarly in the experimental area. In order to get informations about the real biological potential of common ragweed inter- and intraspecific competition was excluded by continuous hand weeding during the experimental period (from March until November).

Emergence time obviously had some influence on final shoot dry weight, measured at the end of the vegetation period (November 2011, Table. 1).

When seeds emerged later, shoot dry weight of *A. artemisiifolia* plants considerably reduced.

Table. 1: Final shoot dry weight (means and standard deviation in g/individual) of common ragweed depending on the emergence time (months/decades e.g. 4/1: first decade of April)

Emergence time											
4/1	4/2	4/3	5/1	5/2	5/3	6/1	6/2	6/3	7/1	7/2	7/3
Shoot dry weight (g/plant)											
1840 ±609	1682 ±363	1284 ±422	972 ±349	1436 ±354	1487 ±416	914 ±0	349 ±130	404 ±246	-	-	26 ±15

Emergence time obviously also has serious influence on pollen production (number of male heads/plant: considering a mean of 17 male flowers per head and of 7148 pollen/male flower; see Reisinger and Szemenyei (2006), Table. 2, and on seed production (number of seeds per individual, Table 3). The later common ragweed germinated the quicker the individuals developed from seedling to flowering plants. Even common ragweed plants that emerged by end of July produced seeds until end of September (Table 4).

Table. 2: Number of male heads per individual of common ragweed depending on the emergence time (months/decades); average estimated pollen number per individual in green

Emergence time											
4/1	4/2	4/3	5/1	5/2	5/3	6/1	6/2	6/3	7/1	7/2	7/3
Number of male capitula/plant											
137531 ± 88873	125910 ± 58151	107435 ± 96087	42827 ± 15230	57071 ± 33359	94155 ± 58169	27552 ± 0	27372 ± 13841	11994 ± 187	-	-	817 ± 340
over 16 milliard pollen											~0.1 milliard pollen

Table 3: Total number of seeds (min-max in black; means in red) and number of viable seeds (green) per individual of common ragweed depending on the emergence time (months/decades)

Emergence time											
4/1	4/2	4/3	5/1	5/2	5/3	6/1	6/2	6/3	7/1	7/2	7/3
Seed number for a plant											
17778-74125	5000-94900	2125-50500	850-58493	16830-53625	19300-48200	48375	10275-33857	7921-31938	-	-	225-1700
av.	av.	av.	av.	av.	av.	av.	av.	av.			av.
33230	46185	26118	17059	32630	37100	48375	25272	19502			1144
11630	42952	16193	13647	16967	25228	44505	22998	18527			708

Table 4: Changes in phenological stages of common ragweed plants that emerged at different times; date of emergence and measurement in decades of months; developmental stages following the BBCH-scale (Hess et al., 1997; Meier, 2001).

Observation time	Emergence time									
	4/1	4/2	4/3	5/1	5/2	5/3	6/1	6/2	6/3	7/3
4/1	09									
4/3	12-14	14-16	09							
5/2	22	19	16	12-14	09-12					
6/1	32-39	26-35	16-26	20-22	18-19	16-18	10			
6/3	51-55	49-51	39-51	39-51	26-39	26-30	18	14-16	09-12	
7/2	65-69	49-61	49-61	49-51	49-51	45-48	39	26-32	19-22	
8/1	65-70	51-65	51-65	52-55	51-55	51-55	51	32-39	32-39	09-12
8/3	69-79	68-70	66-69	68-78	68-69	68-78	69	68-69	68-69	32-51
9/2	79-81	71-75	69-71	71-78	71-78	78-81	75	69-75	75-79	71-78
10/1	81-88	81-85	81-85	81-87	81-87	81-85	85	81-85	81-87	78-81
10/3	97	97	97	97	97	97	97	97	97	97

It is concluded that data of biomass production (including, shoot dry weight, pollen- and seed production for an individual plant) considerably varied between individuals (high values of standard deviations!) even inside the same emergence period. This suggests that emergence time is only one factor determining biomass (shoot dry weight, pollen, seed) production of common ragweed (Hoffmann et al., 2010).

Emergence time greatly influenced seed viability, but – irrespectively to emergence time – autumn collected common ragweed seed samples (stored in paper bags at room temperature for a half year) were in strong dormancy in spring of next year (germination percentages (4-29%) were far below to those of viability (35-95%) (Figure 1).

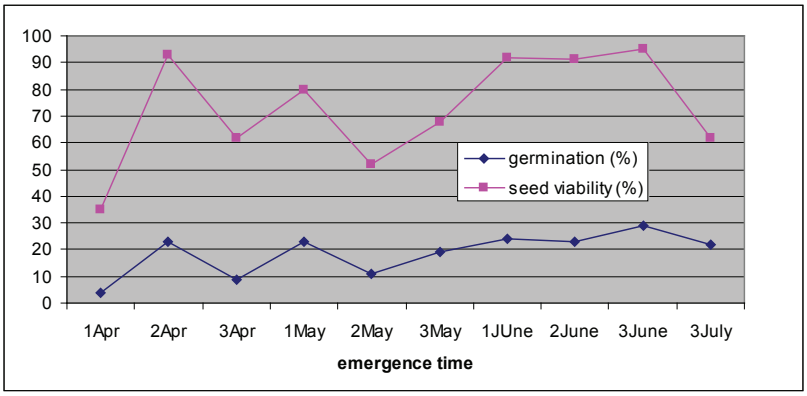

Figure. 1: Germination and viability of common ragweed seeds (KU-HU 2012).

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