

Studying the seasonal pattern of field emergence of ragweed in Hungary

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In 2011 Kazinczi observed the emergence of common ragweed on ruderal fields around Kaposvár (Hungary).

Mini (1x1m²) quadrates were signed, heavily infested with common ragweed. From the end of March until the end of November 2011, emerged seedlings were detected every ten days. After counting the seedlings were removed. Germination peak of common ragweed was in April and first half of May. Last germination occurred at the end of July. Due to the extra dry period, common ragweed seeds failed to germinate after this time. In the first and second decades of July no germination occurred (it is presumed that secondary dormancy was induced in seeds due to the hot summer periods). It is generally believed that after germination peak emergence may be continuous with a decreasing extent until the end of vegetation (Hoffmann et al., 2010; Kazinczi and Novák, 2014). During the experimental period an average of 200 seedlings was counted for a square meter.

References

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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	1682	1284	972	1436	1487	914	349	404	-	-	26
±609	±363	±422	±349	±354	±416	±0	±130	±246			±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	125910	107435	42827	57071	94155	27552	27372	11994	-	-	817
±	±	±	±	±	±	±	±	±			±
88873	58151	96087	15230	33359	58169	0	13841	187			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											
1 7 7 7 8 - 74125	5 0 0 0 - 94900	2 1 2 5 - 50500	8 5 0 - 58493	1 6 8 3 0 - 53625	1 9 3 0 0 - 48200	48375	1 0 2 7 5 - 33857	7 9 2 1 - 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	7/2	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).

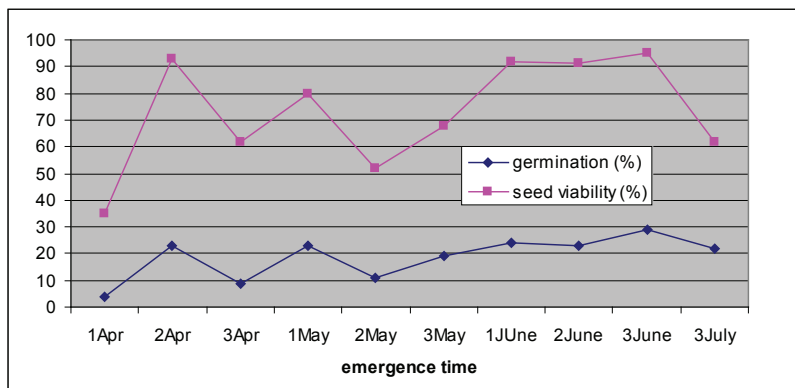


Figure. 1: Germination and viability of common ragweed seeds (KU-HU 2012).

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