Biological characteristics of common ragweed (*Ambrosia artemisiifolia)* – the most dangerous weed in Hungary

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INTRODUCTION

Common ragweed (*Ambrosia artemisiifolia)* is one of the most dangerous weed species in Europe and especially in Hungary. Common ragweed came from America to Europe and from southern countries to Hungary. It became common and the most important arable weed since 1969, which has strong human allergenic effect.

Seeds start to germinate in spring in cereal fields, and germinate continuously until late summer. Ragweed can supress the other weeds and also crops in consequence of good competition ability and allelopathy. The successful control of this species is determined by its biological characteristics.

Ambrosia artemisiifolia can be found on all soil types, but it multitudinous on brown forest soil and loose sandy soil. Biomass production and seed yield of plants are influenced by nutrient supply, first of all by nitrogen nutrition. Common ragweed is known as a nitrofill plant. According to early researches there are differences between species according to utilization of nitrogen forms, nitrate and ammonium. We had no data's about that how can influence nitrogen forms of growth and biomass production of common ragweed. We made a pot experiment in greenhouse to study how can influence the soil type and different nitrogen fertilizers the early development of common ragweed.

MATERIAL AND METHODS

We collected riped Ambrosia seeds in October and November from fallow round the Keszthely. We took seeds into plastic net and stored them outside in pots filed with weet sand.

We examined the effect of alternating temperature on germination in laboratory. We took seeds into thermostate in Petri dishes.

We collected 3000 pieces of cotiledonous *Ambrosi* plants from fields between 27. Marth and 10. May. Deep of germination was determined by measuring of dug out plants.

Pot experiment was set up on three soil types into pots containing 2 kg air dried soil (Tab. 1.). We worked with four replications so we had 48 pots altogether.

Applied fertilizers: péti-salt (27% N), ammonium-nitrate (34% N) and carbamide (46% N).

Fertilizer dose: 100 mg N kg-1 soil.

We had unfertilized control pots on every three soils.

In every pot were planted 20 pieces common ragweed plants with 1-2 leaves.

Measured parameters:

- leaf areas,
- length of shoots,
- fresh mass and
- dry mass (after air drying).

Results were statistically analyzed with SPSS program.

RESULTS AND DISCUSSION

Common ragweed is summer annual weed with moderate growth. Béres studied the life cycle of plant, and established that seeds are in primary dormancy in autumn for 6-12 weeks. Primary dormancy finishes in January and changes to induced dormancy (Fig. 1.).

The average seed production is 3000, but on a solitary plant may reach 62000. Seed germination shows seasonal nature. The main period is end of Marth and Apryl. We can observe a little decrease in May and June. One part of seeds can set in secunder dormancy from medow of May when temperature is above 25 °C. Germination increases in July again, but doesn't reach the maximum rate which was detected in Apryl. Germination strongly decreases in August, but not stops until freezing. Germination starts when temperature of 5 cm deep soil surface is above 5°C continuously (Tab.2.). 60% of the seeds germinate in spring and 40% in summer and autumn from the 0-6.5 centimetre soil layer, but the bulk of seeds germinate from 2.6-3 centimetre depth. Seedlings don't able to penetrat through the soil surface from 15 cm deep (Tab.3.).

Freshly harvested seeds were in dormancy in autumn. Stratification for 6-12 weeks helped the seeds to overcome primary dormany. Seeds can save their germination ability on the surface for 4 years, while the seeds in deeper soil layer may fit for life until 40 years.

Studying the development of *Ambrosia artemisiifolia* we found strong differences among plants growth on three experimental soils. Common ragweed grew conspicuously poorly on meadow soil, the length of shoot, leaf area and biomass production were behind compared to plants grew on Ramann-brown forest soil and on sandy soil. *Ambrosia* liked sandy soil the best, examined parameters of plants were the biggest on this soil.

Nitrogen fertilizer forms influenced leaf area, shoot length and biomass production differently on three examined soils. (Fig. 2., Tab.4.).

Table 1: Parameters of experimental soils

Soil type	Place	K_A	Humus %	pH $_{H2O}$	P_2O_5 mg kg^{-1}	K_2O mg kg^{-1}
meadow soil	Bonyhád	52	2,11	6,2	128	122
sandy soil	Tarany	31	1,46	5,87	134	266
Ramann-brown forest soil	Keszthely	39	2,28	7,26	210	334

Table 4: Length of shoots, leaf area, fresh and dry mass of common ragweed on different soils influenced by nitrogen treatments

Soil	Treatment	Length of shoots (mm $plant^{-1}$)	Leaf area (cm^2 $plant^{-1}$)	Fresh mass (g 10 $plant^{-1}$)	Dry mass (g 10 $plant^{-1}$)
meadow soil (Bonyhád) (soil 1.)	Control	70,73	14,91	5,06	0,94
	Péti-salt	91,87	18,68	5,86	1,24
	Ammonium-nitrate	81,07	16,19	5,34	1,05
	Carbamide	65,7	11,69	4,06	0,73
sandy soil (Tarany) (Soil 2.)	Control	159,88	42,51	13,17	2,24
	Péti-salt	166,48	44,13	12,98	1,78
	Ammonium-nitrate	170,38	52,92	15,36	1,89
	Carbamide	175,25	56,87	16,6	2,1
Ramann-brown forest soil (Keszthely) (soil 3.)	Control	128,08	32,32	10,39	1,55
	Péti-salt	128,45	34,08	10,63	1,31
	Ammonium-nitrate	127,25	33,38	9,86	1,36
	Carbamide	131,9	38,83	10,74	1,34
	$LSD_{5\%}$	15,39	6,86	1,91	0,38

Tab.2. Effect of temperature on germination of seeds

Temperature (^{0}C) min./max.	Germination %	±SE	Number of days required to start germination
3/4	0.00	0.00	–
3/5	2.00	1.12	28
3/6	17.32	4.71	20
4/8	19.14	5.32	13
4/9	37.26	8.14	13
4/10	34.41	4.35	8
5/10	39.04	7.43	7
5/11	41.26	5.61	7
5/12	57.12	6.36	6
10/23	**83.02**	**4.24**	**5**
20/30	81.64	5.16	4
30/40	5.00	0.89	4

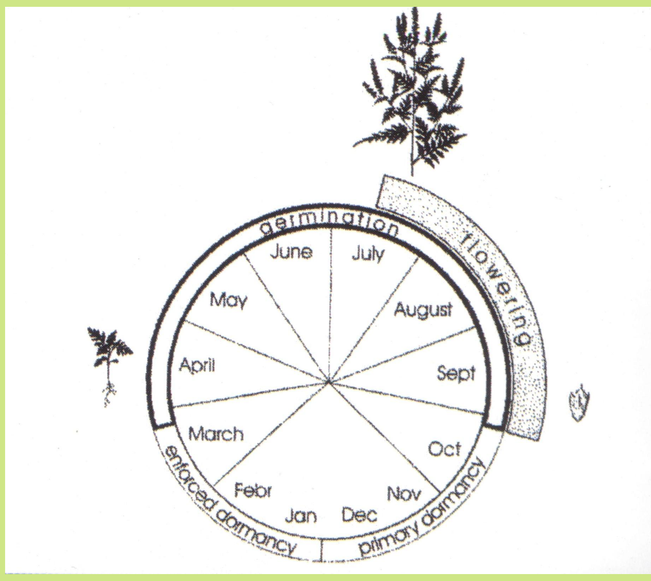

Fig. 1. Life cicle of Ambrosia (Béres- Bíró 19)

Tab. 3.Germination deep of Ambrosia in field (from 3000 plant)

Deep of germination (mm)	Sprouted plants (pieces)
0-5	0
6-10	243
11-15	249
16-20	273
21-25	477
26-30	606
31-35	240
36-40	384
41-45	117
46-50	174
56-60	120
61-65	93
66-70	24
71-75	0
76-80	0
81-85	0
86-90	0
91-95	0
96-100	0

Fig.2. Ambrosia artemisiifolia plants on meadow -, sandy-, Ramann-brown forest soil

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