



Ragweed in the Czech Republic

Ondřej Rybníček^{1*}, Bronislava Novotná², Eliška Rybníčková³ & Kamil Rybníček³

¹2nd Paediatric Department, University Hospital Brno, Children's Hospital, Černopolní 9, CZ-662 63 Brno, Czech Republic; ²University Hospital Brno, 3rd Dept. of Internal Med., Allergy Unit, Jihlavská 20, CZ-639 00 Brno-Bohunice, Czech Republic; ³Institute of Botany, Czech Academy of Sciences, Palaeoecological Working Group, Poříčí 3b, CZ-603 00 Brno, Czech Republic

(*author for correspondence, e-mail: rybnicek@medea.med.muni.cz; fax: +420-5-574616)

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Abstract

During the last years, a well documented expansion of ragweed (*Ambrosia artemisiifolia* L., *Ambrosia trifida* L.) over the Mediterranean and temperate Europe has been in progress. The current distribution of ragweed plants in the Czech Republic is summarized and the ragweed pollen concentration as monitored by 12 pollen stations in the country is discussed. The present situation in the ragweed pollen sensitization among children and adults with pollen allergy in Brno is described. So far no dangerous expansion of ragweed plants in our country has been observed. Ragweed pollen concentration is occasionally significant in the Brno station only, other pollen stations are reporting insignificant amounts of ragweed pollen during August–September periods, although there has been a steady increase in ragweed pollen concentration in the Prague area over the last five years. Skin prick tests and/or specific IgE measurements with ragweed allergen were performed on 94 children with pollen allergy in the Brno region in 1995 and on 206, 210 and 229 adult allergic patients in 1995, 1996 and 1997, respectively. Positive skin reaction or positive specific IgE to ragweed was found in 22% children and in 25% (1995), 19% (1996) and 25% (1997) adults with pollen allergy. It is concluded that ragweed does not seem to represent any imminent major threat to the allergic population in the Czech Republic until now, however, it remains a potentially very dangerous allergen.

Introduction

During the last decades, ragweed (*Ambrosia artemisiifolia* L., *Ambrosia trifida* L.) has spread rapidly over the South and Central Europe and further on even towards the North and West of the Continent (Nilsson and Spieksma, 1994). It has become a great problem in Hungary, where prevalence of ragweed pollen allergy is on the steady increase (Járai-Komlódi and Juhász, 1993). Importance of ragweed pollinosis also increased in Austria (D'Amato et al., 1998) and Slovakia (Hrubisko, 1998). While the first plants of *Ambrosia artemisiifolia* appeared in our territory (south Bohemia) in the early eighties of the 19th century, the first plant of *Ambrosia trifida* was found

in Brno (south Moravia) in 1960. Since that time both species have spread significantly over the Czech Republic (Jehlík et al., 1998). Therefore, we believe it is important to monitor the ragweed plant distribution, airborne ragweed pollen concentration as well as possible changes in prevalence of ragweed pollen allergy in the Czech Republic.

We present the current and potential future situation in the ragweed (*Ambrosia artemisiifolia* L., *Ambrosia trifida* L.) plant distribution over the Czech Republic, results of aeropalynological monitoring of ragweed pollen concentration in all stations of the Czech Pollen Information Service and the results of 3 year (1995–1997) evaluation of patients with pollen allergy in Brno, the Czech Republic, in terms of skin

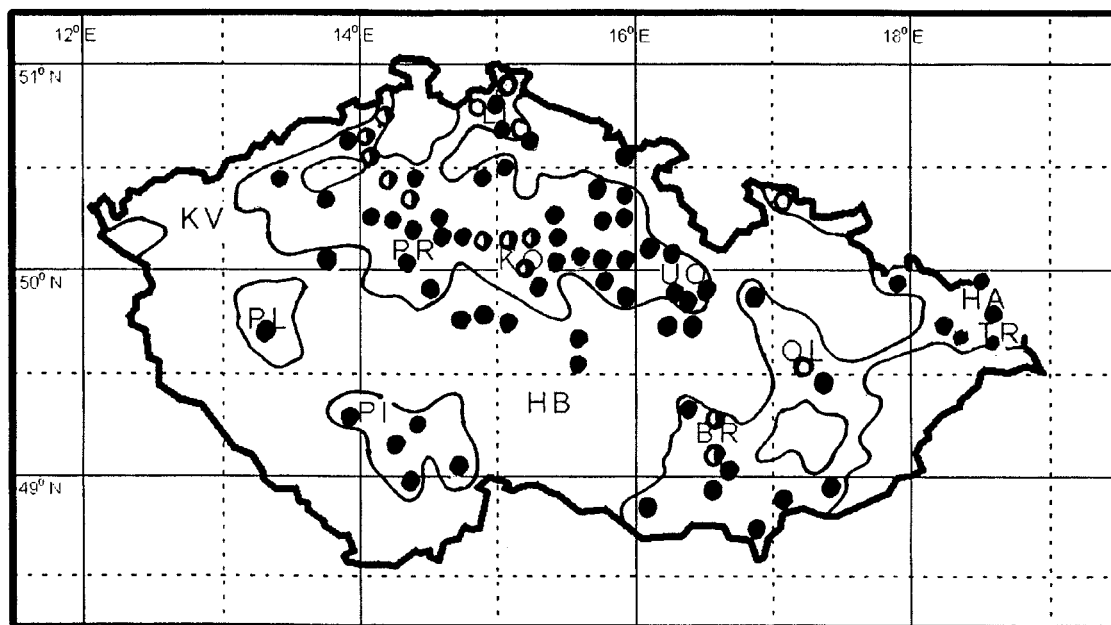


Figure 1. Present occurrence and potential future permanent area of distribution of ragweed species in the Czech Republic.

Black circles: recent findings of *Ambrosia artemisiifolia*

White circles: recent findings of *Ambrosia trifida*

Half black and white circles: both species

Monitoring stations (situation in 1997): BR – Brno, HA – Havířov, HB – Havlíčkův Brod, KO – Kolín, KV – Karlovy Vary, LI – Liberec, OL – Olomouc, PI – Písek, PL – Plzeň, PR – Praha, TR – Třinec, UO – Ústí nad Orlicí

Present distribution of ragweed species – after B. Slavík ex Jehlík et al. (1998).

prick test and/or specific IgE positivity to ragweed allergens.

Materials and methods

Aeropalynological monitoring

Pollen monitoring started in Brno, 1992. In 1997 there were already 12 Burkard 7-day volumetric spore traps in the Czech Republic. Exact distribution of spore traps over the territory of the Czech Republic is shown in Figure 1. All spore traps in the Czech Republic are placed 10–20 m above ground level. The stations in Brno, Havířov, Kolín, Olomouc and Praha are located in the elevation between 225–300 m above sea level, stations in Písek, Plzeň, Třinec and Ústí nad Orlicí in 301–400 m above sea level and stations in Havlíčkův Brod, Karlovy Vary and Liberec in 401–475 m above sea level. Pollen monitoring was performed during the March–October period every year. Years of operation and seasons with incomplete monitoring period are shown in Table 1. The adhesive tape in spore traps was changed every Monday at 8 a.m. Standardized

methods were used for slide preparation and pollen counting (AA, 1995).

Allergological evaluation

All patients over 18 years suggestive of pollen allergy who presented at the Allergy unit of the University Hospital in Brno underwent skin prick testing and/or specific ragweed IgE antibodies measurement in October–April of 1995–1997. Similarly, the same procedures were performed with all children 6–18 years old who appeared with the problems suggestive of pollinosis at the Allergy Unit of the Children's Hospital in Brno during October–December period in 1995. None of the patients has received specific immunotherapy prior to testing. A standardized ragweed pollen extract (ALK Epipharm in adult patients and Stallergenes in children) was used for prick testing. A wheal of 3 mm or more 15 minutes after an application of ragweed extract was considered positive. Positive and negative controls (ALK Epipharm or Stallergenes) were included. In patients where skin testing was not considered appropriate (eczema, cardiac decompensation, decompensated bronchial

Table 1. Yearly totals of ragweed pollen counts in 12 monitoring sites, Czech Republic, 1992–1997

Station/year	1992	1993	1994	1995	1996	1997
Brno	1027	1277	866	1685	572	452
Havířov	*	*	*	*	225	28
Havlíčkův Brod**	*	*	*	*	*	1
Karlovy Vary	*	*	*	381	199	28
Kolín	*	*	*	215	386	491
Liberec	*	*	*	30	16	56
Olomouc**	*	*	*	8	1	*
Písek	*	*	*	*	175	72
Plzeň	*	*	*	65	35	24
Praha	*	45	38	173	219	313
Třinec	*	*	*	788	179	382
Ústí n. Orlicí	*	0	193	623	157	386

* = not in operation.

** = not complete season

Table 2. Skin prick tests (SPT) and specific IgE (*Ambrosia*) measurements – Brno, 1995–1997

Year/evaluation	SPT + specific IgE	No. of posit. results	% of positive results
Adult patients – Univ. Hospital Brno-Bohunice			
1995	206	51	25
1996	210	39	19
1997	229	58	25
Children – Children's Univ. Hospital of J.G.Mendel Brno			
1995	94	21	22

asthma, red dermographism) the evaluation of specific IgE (*Ambrosia artemisiifolia* L. and/or *Ambrosia trifida* L.) was performed with the use of a commercially available ELISA test. The results were considered positive with specific IgE >0,7 IU/ml.

Results and discussion

Current distribution of *Ambrosia artemisiifolia* L. and *Ambrosia trifida* L. is shown in the map together with possible future distribution of ragweed plants in the Czech Republic (Figure 1). The map has been compiled using data published by Hejný et al. (1973), Dostál (1989) and Jehlík et al. (1998). It shows the existing sites of the ragweed occurrence in the country. Although no dangerous spread of ragweed in the Czech Republic has been observed so far, local or

regional expansions (e.g. Kubátová, 1994; Jehlík op. cit.) indicate inclination of both species to spread over the sites very expansively. Therefore, the potential future distribution of ragweed plants in the Czech Republic is delimited in the same map. These hypothetical areas cover those parts of the Czech Republic which have similar climate and similar pattern of economic exploitation and, consequently, good conditions for permanent occurrence of ragweed species.

Total yearly counts of ragweed pollen from all pollen stations in the Czech Republic for 1992–1997 are shown in Table 1. Although only Brno station has completed all 6 years of monitoring and the precise comparison of the pollen counts among pollen stations is not possible, no threatening increase in ragweed pollen counts in the Czech Republic has been observed. Significant ragweed pollen concentrations were occasionally reported from the Brno station with

the highest values typically under the SE wind situation. This suggests pollen is not from local sources. We believe it comes mainly from SW Slovakia or even from Hungary. There does not seem to be any trend towards higher ragweed pollen counts in Brno. On the contrary, in Central Bohemia (Praha, Kolín) the total ragweed pollen count has to increased over the last few years, which might be the result of local spread of ragweed plants.

Skin prick tests with ragweed allergen extract and ragweed specific IgE measurements performed on 206, 210 and 229 adult allergic patients in 1995, 1996 and 1997 showed 25%, 19% and 25% of positive reactions, respectively. These results correlate well with the data found in 94 pollinotic children from Brno tested in 1995. They showed the total of 22% positive reactions (Table 2). This is a short period for drawing any conclusions about trends but, as the percentage of positive reactions is quite high, it is essential to monitor possible changes in the positive reactions and clinical problems to ragweed allergens among allergic patients from Brno and its surrounding regions.

Conclusions

Until now, ragweed pollinosis has not seemed to represent any major threat to the allergic population in the Czech Republic. In spite of quite low ragweed pollen counts measured at the pollen monitoring stations in the Czech Republic, quite a high sensitization (over 20% of latent and/or clinically manifested ragweed allergy) of allergic population to ragweed has occurred. This is a pool of individuals from which the patients with clinically apparent ragweed allergy would probably quickly recruit in case of a permanent increase of airborne ragweed pollen concentration in the Czech Republic. Because of that, it is necessary to monitor the aerobiological and allergological situation as well as distribution of ragweed plants in the Czech Republic.

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References

- AA: 1995, Methodology for routinely performed monitoring of airborne pollen – recommendations. *Aerobiologia* **11**, 69.
- D'Amato G. et al.: 1998, Pollen-related allergy in Europe. *Allergy* **53**(6), 567–578.
- Dostál J.: 1989, Nová květena ČSSR 2 (The new flora of Czechoslovakia, part 2). Academia, Praha, 1548 pp.
- Hejtný S., Jehlík V., Kopecký K., Kropáč Z. and Lhotská M.: 1973, Karanténny plevele Československa (Quarantine weeds of Czechoslovakia). Studie CSAV. Academia, Praha, 156 pp.
- Hrubíško M.: 1998, Polinóza – aktuálny problém aj v XXI. storočí. Časť III: poradie a skrížené reaktivity alergénnych druhov stromov, tráv a bylín podľa ich klinického významu (Pollinosis – actual problem also in the XXIst century. Part III: Sequence and cross reactivity of pollinotic trees, grasses and weeds according to their clinical importance). *Klinická imunológia a alergológia* **2**, 9–17.
- Járai-Komlódi M. and Juhász M.: 1993, *Ambrosia elatior* L. in Hungary (1989–1990). *Aerobiologia* **9**, 75–78.
- Jehlík V. et al.: 1998, Cizí expanzivní plevele České republiky a Slovenské republiky (Alien expansive weeds of the Czech Republic and the Slovak Republic). Academia, Praha, 506 pp.
- Kubátová D.: 1994, *Ambrosia artemisiifolia* a *Iva xanthifolia* (*Ambrosia artemisiifolia* and *Iva xanthifolia*). Severočeskou Přírodou, Litomeřice **28**, 87.
- Nilsson S. and Spieksma, F.T.M. (eds.): 1994, Allergy Service Guide in Europe. Stockholm, Swedish Museum of Natural History, p. 92.