



AMBROSIA IN CROATIA – PRESENT SITUATION

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Figure 3. Ragweed, *Ambrosia artemisiifolia* L.: a) inflorescences; b) young plant, (Zagreb; photo M. Mitić)



Fig.2. Flora Croatica Database – Module Alien Plants

INTRODUCTION
 According to the «Inventory & Monitoring Protocol – IAS Programme» we have started with preliminary actions against IAS plants in Croatia (Fig. 1). As the first Survey Level we prepared: national standards (Mitić et al. 2008), preliminary list of IAS plants (Boršić et al. 2008) and the module “Allochthonous plants”, specially developed and incorporated in the Flora Croatica Database – FCD (Nikolić, 2009) as a publicly accessible web service (Fig. 2). As there is no organised efforts in plant IAS monitoring on a national level, we have started with several case studies on invasive alien plants in both continental and mediterranean areas of Croatia. Simultaneously, airborne pollen monitoring is going on throughout Croatia. Those facts make possible data comparison, both about plants distribution and pollen concentrations at the same area. Good sample is the biggest and capital city of Croatia – city of Zagreb (Fig. 1), for which we have data about ragweed distribution and its airborne pollen. Therefore the aim of the present study was to represent:

- presence of *Ambrosia* taxa in Croatia
- preliminary ragweed inventory for Croatia and the city of Zagreb
- airborne ragweed pollen data (2002- 2008) for the city of Zagreb

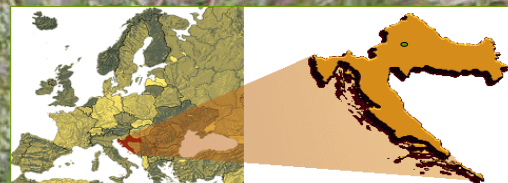


Fig. 1. Position of Croatia and the city of Zagreb

MATERIALS & METHODS
 Phytogeographical and distribution data about *Ambrosia* taxa, collected from literature, herbaria (ZA, ZAHO) and field researches, were incorporated within the special part of the FCD “Allochthonous plants”.
 For pollen counts the standardized aerobiological volumetric method and pollen sampling by a Hirst sampler, as well as statistic analysis were used. , as well as statistic analysis were used.

Table 1. Features of the ragweed pollination period in Zagreb (Croatia), 2002-2008.

Years	% of total pollen count	Peak	Peak day	Day > 30
2002	18%	652	03.09.	34
2003	18%	883	06.09.	46
2004	11%	298	19.08.	29
2005	17%	494	31.08.	31
2006	13%	619	02.09.	33
2007	11%	275	03.09.	28
2008	10%	278	31.08.	31
Average	14%			33

RESULTS

The Genus *Ambrosia* L. (family Asteraceae) in Croatia is represented with the three non-native taxa:

Ambrosia artemisiifolia L. (Fig. 3) - IAS

Ambrosia maritima L. - naturalised

Ambrosia coronopifolia Torr. et Gray - naturalised

Among them, only allergenic *Ambrosia artemisiifolia* is IAS, known in Croatia since 1941. As highly adaptable and resistant plant, it is occurring in almost all habitats in Croatia (Fig. 4a): in dry climate and open fields, along roadsides, waters, railway lines, at embankments, over waste grounds and fallow land, neglected gardens and building sites. Taxon data are available as a standard taxon sheet with automatic generation of distribution map.

In the city of Zagreb (Fig. 1) ragweed is also very common (Fig. 4b). However, last few years plant density and pollen concentrations decrease, probably owing to “Actions against *Ambrosia*”, developed by scientists and forced by city authorities.



Figure 4. Distribution of ragweed : a) in Croatia; b) in the city of Zagreb in 2007

Aerobiological results are expressed as 24-h pollen grain count/m³ air (Tab. 1). The 14% of total annual pollen spectrum is attributable to ragweed pollen. Analysis of data collected during the 2002-2008 period showed that its concentration exceeds the limit of 30 P/m³ air as early as at mid-August (Fig. 5). The peak daily pollen concentrations were recorded at the end of August and in the first week of September. The highest total annual concentration of ragweed was measured in 2003 and the lowest in 2007 (Fig. 6). The average time for indication of allergic symptoms of ragweed pollen concentration (>30 grains/m³ air) was 33 days. The maximal daily ragweed pollen concentration was recorded in 2003. In 2007, a decrease in pollen grain count with the lowest daily peak of 275 P/m³ air was recorded, which probably resulted from the effective preventive actions (plant distribution in some city areas also decrease) and average temperature lower by 1.5 °C than usual.

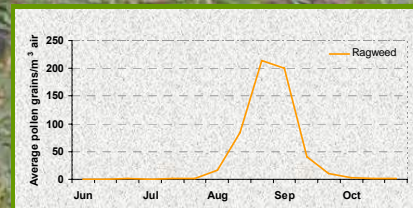


Figure 5. Pollen calendar of ragweed in Zagreb, 2002-2008

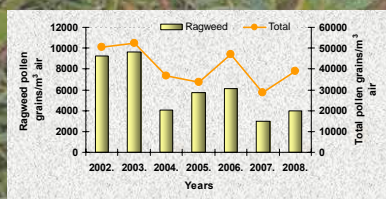


Figure 6. Annual pollen concentrations of ragweed in Zagreb, 2002-2008

Data about ragweed distribution should continuously be revised and updated according to new field observations. For this purpose FCD module “Allochthonous plants” (Figs. 2, 4) is recommended by State Administration as the national database. Simultaneously, ragweed field as well as pollen monitoring allow authorities to plan preventive and eradication actions against this allergenic plant. With such actions (e.g. in the city of Zagreb), the concentration of ragweed pollen grains will probably decrease to a level which does not cause the appearance of symptoms of allergic diseases.

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