HEALTH IMPACT OF AMBROSIA ARTEMISIIFOLIA REFL ECTED BY ALLERGISTS PRACTICE IN ROMANIA. A QUESTIONNAIRE –BASED SURVEY

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ABSTRACT
Ambrosia artemisiifolia (ragweed) is an invasive weed with pollen representing one of the most potent seasonal aeroallergens. Romania is considered a ragweed infested country, based on field observations performed in different regions, pollen counts done in the West region and some clinical reports from allergists in the West and South parts. The aim of this paper is to evaluate the situation of allergies induced by Ambrosia artemisiifolia from the perspective of allergists practice in Romania and to draw some conclusions regarding consequences and possible measures to reduce this burden. The study was based on a questionnaire addressed to allergists attending the national annual allergology conference in 2013. The answers showed that part of the allergists are aware of the importance of allergies induced by Ambrosia pollen. We concluded that research projects in this field, application of eradication measures and public information are important for increase awareness of people about health impact of Ambrosia pollen in Romania.

KEY WORDS: allergy, Ambrosia artemisiifolia, health impact

INTRODUCTION
Respiratory allergic diseases, mainly allergic rhinitis and asthma represent an important health problem in Europe. It is estimated that about 40% of European population suffer different forms of pollen-induced allergies. Pollen-induced allergies have an increasing trend and significant consequences on quality of life of sensitized population. Climate changes, cultural factors, changes in agricultural practice and intensification of international traffic are contributing to the expansion of some allergenic pollens, such as Ambrosia artemisiifolia (ragweed) in many European countries rise important problems for both national health systems and European authorities (D'Amato et al., 2007). Biodiversity loss, exposure to ozone and air pollution has also been shown to influence allergic disease (Oswalt & Marshall, 2008; Hahtela et al., 2013). Artificial environment with life style in urban areas may contribute to increasing frequency of respiratory allergy and asthma (D'Amato, 2011).

Ambrosia artemisiifolia is one of the most common causes of respiratory allergy in North America. Over 20% of people in the United States are sensitized to
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Ragweed pollen and this percentage is rising (Katz & Care, 2014). The efforts to “eradicate” ragweed from several regions in the United States were unsuccessful (Oswalt & Marshall, 2008).

The expansion of ragweed species into European countries has been well documented. In Europe, the countries with the highest concentrations of ragweed are Hungary, Romania, Serbia, Croatia, Slovenia, Slovakia, Ukraine, France (Rhône-Alpes region and Burgundy), Italy (north-western Milan and south Varese) and the south-western part of the European Russia (Juhasz et al, 2004; Peternel et al, 2006; Reznik, 2009; Šikoparija et al, 2009; Thibaudon et al, 2010; Skjøth et al, 2010; Rodinkova et al, 2012; Bonini et al, 2012; Ianovici et al, 2013). Less extended habitat areas with smaller pollen levels occur in Switzerland (Clot et al, 2002), Germany (Zink et al, 2012), Czech Republic (Rybníček et al, 2000), Poland (Kasprzyk et al, 2011), Bulgaria (Yankova et al, 2000), Austria (Jäger, 2000), Lithuania (Šaulienė & Veriankaitė, 2012), Spain (Fernandez-Llamazares et al, 2012), Sweden (Dahl et al, 1999), United Kingdom, Denmark, Belgium (Bullock et al, 2010). The human health impacts were estimated to affect around 4 million people with total estimated medical costs of €2,136 million per year for European countries (Bullock et al, 2010).

Ragweed is an annual, herbaceous and wind-pollinated plant. This dangerous invasive non-native plant in Europe has a wide ecological tolerance and can colonize a large range of disturbed habitats (Kazinczi et al, 2008). They can reach average densities of up to 16 plants per m² (Simard & Benoit, 2010). It is a prolific producer of pollen and long distance transport is possible and can be a significant source of allergenic pollen at great distances (Makra et al, 2011; Šikoparija et al, 2013). A single plant can generate an average of 3000 to 6000 seeds (D'Amato et al, 2007). Its invasion is also facilitated by its lack of natural enemies (MacKay & Kotanen, 2008) and the high genetic variability of invasive populations (Chun et al, 2010). Ambrosia has less sensitivity to herbicides than other weeds (Patzoldt et al, 2001).

The aim of this paper is to evaluate the situation of allergies induced by Ambrosia artemisiifolia from the perspective of allergists practice in Romania.

MATERIALS AND METHODS

A questionnaire with 20 questions was addressed to the 150 allergists attending the annual National Allergology Conference in 2013. We obtained a number of 50 completed questionnaires, representing a 30% response rate. The gender and age distribution was 78% women and 22% men. Regarding the place of work, 22% of allergists worked in hospitals, 44% in ambulatory and 34% in both hospital and ambulatory. The monthly patient population is equally represented by adults and children for almost half of the allergists.
RESULTS AND DISCUSSIONS

The most frequent diseases encountered in allergists practice are allergic rhinitis for all responders, followed by conjunctivitis and urticaria for 98%, asthma for 84% and dermatitis for 62% of allergists (Fig.1).

Regarding the importance of respiratory allergies induced by *Ambrosia artemisiifolia* pollen, 94% of respondents considered it important or very important (Fig.2) and 84% considered *Ambrosia* a health problem in Romania (Fig.3).

Regarding the number of patients with hypersensitivity and/or allergy to *Ambrosia* in their current recordings, 64% of responders had more than 20 patients and 36% had less than 10 patients (Fig.4).

The proportion of pollinosis induced by *Ambrosia* was considered to be 20% by 52% of responders, more than 30% by 34% and less than 10% by 24% of allergists (Fig.5).

Referring to the regions of Romania where *Ambrosia* is mostly spread, 62% of allergists considered the West, 30% the South, 24% the North and 10% the East (Fig.6). The distribution between rural and urban areas was considered equal by 52% and predominantly rural by 36% of responders (Fig.7).

To the question about factors that have influenced the spread of *Ambrosia artemisiifolia* in Romania, 40% of responders considered first the abandoned land and buildings, followed by pollution by 20% and climate change by 24%, while 16% did not know (Fig.8).

The diagnosis of allergies induced by *Ambrosia* pollen is based on skin prick tests for 72% of allergists, on anamnesis for 8% and on serum specific IgE for 5% (Fig.9). The recommended treatment is mainly antihistamines for 60% and immunotherapy for 22% of responders (Fig.13).

The answer to the question regarding prevention of allergies induced by *Ambrosia* revealed that 64% of allergists did not know any measure, while 20% agree some eradication measures and 8% mentioned public information (Fig.11).

The factors responsible for reducing health impact of *Ambrosia* in Romania are equally considered Health Ministry, allergy clinics and doctors by 32% responders for each (Fig.12).

Referring to research projects in the field of allergy to *Ambrosia*, 96% of allergists considered them useful and important (Fig.13) and 62% expressed their interest to be involved in such projects (Fig.14).
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![Diagram 1](image1.png)

**FIG. 1** Recorded answers to the question “How many patients with allergic diseases do you see monthly?”

![Diagram 2](image2.png)

**FIG. 2** Recorded answers to the question „How do you consider the importance of allergies induced by *Ambrosia artemisiifolia* pollen in Romania?”

![Diagram 3](image3.png)

**FIG. 3** Recorded answers to the question “Do you believe that *Ambrosia artemisiifolia* represents a real danger for human health in Romania?”
FIG. 4 Recorded answers to the question “How many patients with hypersensitivity or clinical allergy to *Ambrosia* do you have in medical recordings?”

FIG. 5 Recorded answers to the question “What percentage of the patients with pollinosis do you attribute to *Ambrosia* pollen in Romania?”

FIG. 6 Recorded answers to the question “In what regions of Romania do you think that *Ambrosia* pollen is more prevalent?”
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**FIG. 7** Recorded answers to the question “How do you appreciate the spread of *Ambrosia* in rural versus urban environment in Romania?”

**FIG. 8** Recorded answers to the question “What factors do you consider that may influence the spread *Ambrosia* in Romania?”

**FIG. 9** Recorded answers to the question “What diagnostic tools do you currently use to confirm hypersensitivity / allergy induced by *Ambrosia* in your practice?”
FIG. 10 Recorded answers to the question “How you treat patients with allergies induced by *Ambrosia* in your current clinical practice?”

FIG. 11 Recorded answers to the question “What measures should be taken to prevent allergies caused by *Ambrosia*?”

FIG. 12 Recorded answers to the question “What are the main responsible factors for reducing the *Ambrosia* impact on human health (listed in descending order of responsibility)?”
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The answers highlight some gaps in knowledge about this aeroallergen, in the evaluation of the role of the allergens in sensitisation, in the orientation of specific prophylaxis measures, in the directing of immediate and long term therapeutic plans, including specific immunotherapy with allergens vaccine.

Romania is considered a ragweed infested country, based on field observations performed in different regions and some clinical reports from allergists in the West, North-West and South parts (Ianovici *et al*, 2009; Bocsan *et al*, 2010; Popescu & Tudose, 2011; Bocsan *et al*, 2012; Ianovici *et al*, 2013; Panaitescu *et al*, 2014; Florinescu-Gheorghe *et al*, 2014). Till now it has indicated from all Romanian provinces. The spreading of the *Ambrosia artemisiifolia* has been studied by a high number of romanian biologists and many articles have been written on this topic (Sirbu, 2008; Ianovici, 2009; Ianovici, 2011; Andrei & Ianovici, 2011). Ragweed is common along roadsides, railway embankments, cultivated fields, vacant lots, construction sites and pastures. The infestations on waste land or roadsides are rarely controlled. The pollination season in Romania begins in July and ends in October, with
maximum in August and September. Increasing concentrations of pollen in the atmosphere has been reported since 2000 (Faur et al, 2001; Faur & Ianovici, 2001; Juhasz et al, 2001; Ianovici & Faur, 2001). The annual pollen counts show an increasing tendency, indicating an increased local population (Ianovici & Sirbu, 2007; Ianovici, 2014).

*Ambrosia artemisiifolia* is an invasive weed with pollen representing one of the most potent seasonal aeroallergens. There are 22 known allergens, with 6 considered major (Laaidi et al, 2003; Gadermaier et al, 2008). *Ambrosia* and *Artemisia* plants are flowering nearly at the same time of the year. *Ambrosia* pollen cross react with almost all other Asteraceae, especially with *Artemisia* pollen (Faur et al, 2001; Asero et al, 2014). Throughout the pollen season, winds can carry pollen for many miles and produce high concentrations in urban areas, far from their rural and suburban sources. In another train of thoughts, the literature contains data that there are racial inequities in the allergenic impact of this taxa (Wegienka et al, 2012). Research is needed to determine which is the real prevalence of this allergy in the population of our country. It is also necessary to determine which are the protein fractions responsible for producing pollen allergy symptoms (Kanter et al, 2013). It requires the intensified public information through media channels. It is necessary to create a system to monitor pollen concentrations in the atmosphere since the only station belonging West University of Timisoara is not enough. The use of temporary stations has indicated high allergenic load for other areas of the country (Ianovici et al, 2013b).

*Ambrosia* pollen is the aetiological agent in about half of cases of pollinosis in late summer-autumn. The sensitization rate for ragweed in Timisoara was 34% in 2009 (Ianovici et al, 2013a). The number of sensitized individuals might significantly increase in the near future. Prevention of ragweed allergy depends on informing and educating the public through reports and updates. Anthropogenic influence in the last 25 years has allowed excessive spread of this species in our country. But it is possible that the influence of topography (latitude) and the climatic factors to be equally important. *Ambrosia* plants are very widespread in Romania where having encountered ideal conditions for their expansion (Ianovici, 2011; Ianovici & Sirbu, 2013; Ianovici, 2015).

At present, *Ambrosia* pollen constitutes a serious allergological threat in Romania. Limiting the expansion is made possible by plucking and repeated mechanical cutting on public and private lands. Realizing the danger, must be the urgent need for legislative action and to introduce anti-*Ambrosia* campaigns under the control of the national and local authorities.

**CONCLUSIONS**

Our study showed that most of the allergists are aware of the importance of allergies induced by *Ambrosia* pollen and of the danger represented by this invasive
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weed. The real prevalence of sensitization and allergy to *Ambrosia* in Romania is not known, the number of specialists and allergy centers is significantly lower than in other European countries and there are no coherent measures to reduce its health impact. Research projects in this field are considered useful and important and increase awareness at national level looks imperative.

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