ECOCYCLES
ISSN 2416-2140

OPEN ACCESS
Scientific journal of the
European Ecocycles Society

Ecocycles, Vol. 8, No. 3, SPECIAL ISSUE, pp. 1-5 (2022)
DOI: 10.19040/ecocycl es.v8i3.241

Tackling ragweed: The International Ragweed Society held its 2022 world conference in Budapest

László Makra

The University of Szeged, Faculty of Agriculture, Hódmezővásárhely, Hungary
makralaszlo@szte.hu

Abstract – The International Ragweed Society held its current conference in Budapest on September 8-9, 2022. The conference is the highest-level international event in the field. The paper, in connection with the event, gives a brief overview of the beginnings of palynology, which is a relatively new science. The paper reports a Hungarian example of the rapid spread of ragweed. It presents the damage caused by ragweed and its pollen, which happens in all areas of life, based on which it is said a serious natural, economic, human, and environmental health problem. Based on model results, the problem will continue to worsen with global climate change. All of this proves the attention paid to the topic and the fact that the conference provides insight and solutions to the environmental and social challenges posed by ragweed and its pollen.

Keywords – ragweed, *Ambrosia* spp., aeropalynology, transport, environmental damages, health damage, climate change, control methods

Received: October 11, 2022 Accepted: October 21, 2022

INTRODUCTION

László Makra, a professor at the Faculty of Agriculture of the University of Szeged, as a board member of the International Ragweed Society, was invited to organize the next conference of the Society, which was held on September 8-9, 2022, in Budapest, Hungary.

The International Ragweed Society encompasses researchers from all continents of the Earth dealing with ragweed and other invasive plants, their pollen, and their environmental relationships.

The world conference is the highest-level international event in the area, which is held every two years in different countries. Speakers from three continents, Europe, America and Africa, came to the conference.

RAGWEED IN EUROPE AND HUNGARY – THE BEGINNINGS

Ragweed is native to the semi-desert areas of Arizona (USA) in the southern part of North America (Bassett and Crompton, 1975). The first record in the USA dates back to 1838 (Wagner and Beals, 1958), while in the eastern part of Canada it was collected for the first time in 1860 (Bassett and Terasmae, 1962; Novák et al. eds, 2011). After the First World War, its seed was transferred to Europe with grain shipments, where it gradually spread due to favourable environmental conditions. Ragweed arrived in Hungary from the southwest in the early 1920s and spread so rapidly that it is now the most common weed in Hungary. Its spread phases can be easily traced (Priszter, 1957; 1960; Béres, 1981).

It should be noted that among the approximately 50 ragweed species, the three most common species in Europe are *Ambrosia artemisiifolia, Ambrosia psylostachia,* and *Ambrosia trifida*.

A. trifida distribution in Europe indicates that this species prefers cooler climate conditions than *A. artemisiifolia* as their population clusters are centred in the United Kingdom, Belgium, Netherlands and northern Germany.

At the same time, *A. psilostachya* is distributed more extensively than *A. trifida*. Their densest population clusters are shown in Belgium, Netherlands and western and southern Germany.

In the network mapping of the flora atlases prepared for Europe (Bullock et al., 2010) and Hungary (Bartha et al., 2019; 2022), the individual grid squares show the distribution of the given areas according to the number of species, thus the species diversity of the areas. Based on the data of these flora atlases, *A. artemisiifolia* is by far the most distributed ragweed species. The estimated distribution rate of *A. artemisiifolia* vs. other ragweed species in Europe is approx. 90:10, while in Hungary approx. 95:5.

In Hungary, the first aeropalynological analyses were performed at the Pediatric Clinic of the Medical University of Szeged. In 1966, Pál Osváth, assistant professor at the clinic, placed slides coated with adhesive on one of the open balconies. The pollen grains that landed on the slides were catalogued and analyzed by Pál Simoncsics, palynologist, associate professor of the Department of Botany at József Attila University. These works resulted in two publications (Simoncsics et al., 1970; Osváth et al., 1970). As far as we know, these are the first papers in the Hungarian pollen literature, and their significance is not what was published, but what was not published in them. Namely, at that time i.e. in 1966 ragweed pollen had not yet been detected in the air of Szeged. However, in 1989, ragweed pollen was already the dominant pollen in Szeged (Juhász et al., 1990; Kadocsa et al., 1990).

MEASUREMENTS

The study, examination, and statistical analysis of the relationship between the phenological and quantitative characteristics of the pollen of different taxa on the one hand and meteorological elements on the other is a relatively new scientific field in the literature. This was achieved after the technical and methodological foundations of pollen concentration detection had been developed. The production of pollen sampling devices operating on a uniform measurement principle began with the manufacture of the Hirst-type pollen trap for the 7-day pollen sampler (Hirst, 1952), and then, with their installation, the national aerobiological networks were established [(Hirst-type pollen traps manufactured by Lanzoni Srl (Bologna, Italy) (http://www.lanzoni.it/vpps_2000.html); Burkard Manufacturing Co. Ltd (Rickmansworth, UK) (http://www.burkard.co.uk/7dayst.htm)].

NATIONAL AEROPALYNOLOGICAL NETWORKS

Organization of national aerobiological networks in Europe, and with them, the detections of pollen trapping began only in the early 1960s. The first papers on the topic were published after about three decades (Table 1). At the same time, the first epidemiological data related to hay fever, as an upper respiratory disease partly caused by allergenic pollens, have been collected since 1926 in Switzerland (Frei and Gassner, 2008).

In Hungary, pollen climatology is considered a completely new research area. The first Hungarian aerobiological stations installed in Budapest at Eötvös Loránd University (led by Magda Járainé Komlódi) and Szeged at József Attila University (led by Miklós Juhász) started operating simultaneously in 1989. The first papers on the pollen-climate relationship system appeared in the literature at the beginning of the 2000s (Makra et al., 2004; 2005).

Table 1
The first aerobiological stations and the related publications for Europe

Year	Country	Taxon	Author, year
1961	United Kingdom	Betula	Emberlin et al., 1990
1969	Switzerland	Betula	Peeters et al., 1994
1977	Belgium	all pollen type	de Weger et al., 2021
1982	Spain, Italy	Oleaceae	Declavijo et al., 1988
1989	Hungary	Poaceae	Járai-Komlódi, 1991
		all pollen type	Juhász et al., 1990; Kadocsa et al., 1990

OCCURRENCES AND THE DAMAGE CAUSED

In Europe, the most critical areas of occurrence of ragweed are Lombardy (Italy), the Rhône Valley (France) and the Pannonian Basin (mainly Hungary, Serbia, Croatia and Slovakia). In Hungary, the concentration of ragweed pollen is an order of magnitude higher than in the most polluted regions of France and Italy. At the same time, even higher pollen concentrations were measured in Ukraine and the southwestern part of Russia, but data series of sufficient length are not yet available there.

Ragweed and pollen cause severe damage to the national economy in many areas of everyday life. Outpatient and hospital treatment costs for patients suffering from allergic respiratory diseases caused by ragweed pollen (hay fever, bronchitis, asthma), growing crop losses due to the spread of ragweed habitats, tourism and nature conservation damage, seeds contaminated with ragweed seeds, etc. cause enormous economic damage. The total damage in Hungary can reach 1% of the annual GDP (Makra et al., 2014).

Based on all this, ragweed and its pollen are major natural, economic, human and environmental health problems in countries with increased exposure to it.

CONFERENCE TOPICS AND NEW RESULTS

The topics covered at the conference were the following: Distribution of ragweed species; Agricultural impacts; Economic costs; Authorities and institutions; Aerobiology:

expansion of ragweed, spread of ragweed pollen; Pollen transport; Monitoring (classic and real-time); Forecast; Treatment and control methods (chemical, physical, biological, cultural, integrated, etc.); Ragweed and climate change; and Health aspects (allergen, effect, diagnosis, therapy, etc.).

The conference presentations showed many new results in the above topics. One presentation drew attention to a new, selective post-emergence herbicide, which offers a unique, versatile tool for the control of ragweed for all traditional and herbicide-tolerant sunflower varieties (Salas et al., 2022). A further lecture reviews the knowledge, from dermatitis caused by plants to food allergies due to many plants, and draws attention to the fact that allergenic effects may increase in the future (Ziska, 2022). A potential biocontrol agent was transferred to Europe in 2013 with the accidental introduction of the ragweed leaf beetle (*Ophraella communa*), native to North America. A speaker reported on the beetle's evolutionary ability to adapt to new biotic (sunflower) and abiotic (climate change) conditions. In addition, he summarized recent findings from ecological and modelling studies on the beetle's current and future distribution and potential benefits and risks associated with non-target plants in Europe (Müller-Schärer et al., 2022).

PERSPECTIVES

The weight and importance of the conference were emphasized by the fact that global climate change increases the environmental risks caused by ragweed and its pollen. As a result, susceptibility to ragweed pollen will more than double in Europe, from 33 million (1986-2005) to 77 million by 2041-2060. Sensitivity to ragweed pollen will also increase in countries where the ragweed problem already exists (e.g. in Hungary by 27%, Croatia by 26% and Serbia by 21%). However, the most significant increases are foreseen in countries where the current sensitivity is rare or negligible (e.g. a 235% increase in Germany, 292% in Poland, and 231% in France) (Lake et al., 2017).

As a result of global climate change, pollen concentrations will increase, pollen seasons will become longer, allergenic taxa and ragweed habitats will expand northward, and more and more people will become sensitive to ragweed pollen. Thus, the number of allergic diseases increases worldwide, and the global public health risk increases parallelly (Ziska et al., 2019). On the other hand, ragweed causes enormous damage to cultivated crops, which (as food shortage is one of the most significant future risks) is an increased challenge for science.

The purpose of the conference was to draw attention to the growing importance of the topic, as well as to provide insight and solutions to the environmental and social challenges posed by ragweed plants and their pollen.

In the framework of the conference, the International Ragweed Society was also renewed, at which the delegates elected Professor László Makra as the organization's president.

OPEN ACCESS STATEMENT

ACKNOWLEDGMENTS

I acknowledge with thanks Dr. Tamás Kőmíves (Plant Protection Institute, ARC, ELRN, Budapest, Hungary) for helpful discussions.

REFERENCES

Bartha, D., Bán, M., Schmidt, D., Tiborcz, V., 2022: Vascular plants of Hungary - online database. Department of Botany and Nature Conservation, Faculty of Forestry, Sopron University
http://floraatlasz.uni-sopron.hu (accessed 24.10.2022)

Bartha, D., Schmidt, D., Tiborcz, V., 2019: Atlas Florae Hungariae. Kitaibelia, 24(2), 238–252.
DOI: 10.17542/kit.24.238

Bassett, I.J., Teresmae, J., 1962. Ragweeds, Ambrosia species, in Canada and their history in postglacial time. Can. J. Bot., 40, 141-150.
DOI: 10.1139/b62-015

Béres, I., 1981. Distribution, biology and control options of ragweed (*Ambrosia elatior* L.) in Hungary (*in Hungarian*). PhD Thesis. University of Agricultural Sciences, Keszthely

Bullock, J.M., Chapman, D., Schafer, S., Roy, D., Girardello, M., Haynes, T., et al., 2010. Assessing and controlling the spread and the effects of common ragweed in Europe. Final report: ENV.B2/ETU/2010/0037. Natural Environment Research Council, UK, pp. 456 p,
https://circabc.europa.eu/sd/d/d1ad57e8-327c-4fdd-b908-dadd5b859eff/FinalFinalReport.pdf (accessed 24.10.2022)

de Weger, L.A., Bruffaerts, N., Koenders, M.M.J.F., Verstraeten, W.W., Delcloo, A.W., Hentges, P., Hentges, F., 2021. Long-Term Pollen Monitoring in the Benelux: Evaluation of Allergenic Pollen Levels and Temporal Variations of Pollen Seasons. Frontiers in Allergy, 8(2), 676176.
DOI: 10.3389/falgy.2021.676176

Declavijo, E.R., Galán, C., Infante, F., Domínguez, E., 1988. Variations of airborne winter pollen in southern Spain. Allergologia et Immunopathologia, 16(3), 175–179.

Emberlin, J.C., Norris-Hill, J., Bryant, R.H., 1990: A calendar for tree pollen in London. Grana, 29(4), 301-309.
DOI: 10.1080/00173139009428941

Frei, T., Gassner, E., 2008. Trends in prevalence of allergic rhinitis and correlation with pollen counts in Switzerland. Int. J. Biometeorol. 52, 841–847.
DOI: 10.1007/s00484-008-0178-z

Hirst, J.M., 1952. An automatic volumetric spore trap. Ann. Appl. Biol. 39(2), 257–265.
DOI: 10.1111/j.1744-7348.1952.tb00904.x

Járai-Komlódi, M., 1991. Airborne grass pollen data in Budapest 1991. In: (eds. Jäger, S., Mandrioli, P.) Airborne grass pollen distribution in Europe 1991. Aerobiologia, Special Issue, 7, 7–29.

Juhász, M., Kadocsa, E., Bittera, I., 1990. Skin prick tests based on pollen counting in late summer seasonal allergic rhinitis patients. Proceedings (eds. Hjelmroos, M., Nilsson, S., Gamal El-Ghazaly), 4th International Conference on Aerobiology, 27-31 August 1990, Stockholm, Sweden, Print Book, Scandinavian University Press, Oslo, 1991, Abstracts, p. 23.

Kadocsa, E., Bittera, I., Juhász, M., 1990. Skin prick tests based on pollen counting in late summer seasonal allergic rhinitis patients (in Hungarian). 18th Meeting of the Hungarian Society of Allergology Clinical Immunology, Sopron, 13-15 September, Abstracts, p. 17.

Lake, I.R., Jones, N.R., Agnew, M., Goodess, C.M., Giorgi, F., Hamaoui-Laguel, L., Semenov, M.A., Solomon, F., Storkey, J., Vautard, R., Epstein, M.M., 2017. Climate change and future pollen allergy in Europe. Environ. Health Persp. 125, 385.
DOI: 10.1289/EHP173

Makra, L., Juhász, M., Borsos, E., Béczi, R., 2004. Meteorological variables connected with airborne ragweed pollen in Southern Hungary. Int. J. Biometeorol. 49(1), 37–47.
DOI: 10.1007/s00484-004-0208-4

Makra, L., Juhász, M., Béczi, R., Borsos, E., 2005. The history and impacts of airborne *Ambrosia* (Asteraceae) pollen in Hungary. Grana, 44(1), 57–64.
DOI: 10.1080/00173130510010558

Makra, L., Matyasovszky, I., Deák, Á.J., 2014. Ragweed in Eastern Europe. In Ziska LH, Dukes JS. (eds.) Invasive Species and Global Climate Change. Part II. Case Studies. Chapter 8. CAB International, Wallingford, Boston, pp. 117–128.

Müller-Schärer, H., Sun, Y., Schaffner, U., 2022. When a plant meets its old enemy abroad: new insights for developing sustainable biological control. In: (eds. Thibaudon, M., Magyar, D., Szigeti, T., Kazinczi, G., Kőmíves, T., Botta-Dukát, Z., Orlóci, L., Makra L.) Conference of the International Ragweed Society, 8th-9th September, 2022. Book of Abstracts, pp. 15–16. National Public Health Center, Budapest, Hungary.

Novák R., Dancza I., Szentey L., Karamán J., (eds.) 2011. The Fifth Weed Survey of Hungary. Ministry of Agriculture of Hungary, PrimaPrint Kft., Budapest, 570 p. ISBN: 978-963-08-1580-2

Osváth, P., Balázs, I., Simoncsics, P., 1970. Changes in the pollen content and number of fungi in the air. Relationships with the occurrence of asthma attacks (*in Hungarian*). Rheumatológia-Balneológia-Allergológia, 11, 178–183.

Peeters, A.G., Frei, T., Wuthrich, B., 1994. Comparison between airborne pollen and frequency of pollinosis at 2 climatologically different locations in Switzerland (Zurich and Locarno). Allergologie, 17(11), 501–504.

Priszter, Sz., 1957. Ecological-areal-geographical conditions of the adventive plants of Hungary (*in Hungarian*). PhD Thesis, Budapest.

Priszter, Sz., 1960. The spread of our adventive weeds (*in Hungarian*). Keszthelyi Mezőgazdasági Akadémia Kiadványai. Mezőgazdasági Kiadó, Budapest, 15-16.

Salas, M., Lukács, D., Lucas, F., 2022. ViballaTM - an indispensible tool for ragweed (Ambrosia artemisiifolia) control in Europe. In: (eds. Thibaudon, M., Magyar, D., Szigeti, T., Kazinczi, G., Kőmíves, T., Botta-Dukát, Z., Orlóci, L., Makra L.) Conference of the International Ragweed Society, 8th-9th September, 2022. Book of Abstracts, S4 – O6, pp. 55–56. National Public Health Center, Budapest, Hungary.

Simoncsics, P., Osváth, P., Balázs, I., 1970. Qualitative analysis of the pollen content of the air (*in Hungarian*). Rheumatológia-Balneológia-Allergológia, 11, 117–122.

Thibaudon, M., Magyar, D., Szigeti, T., Kazinczi, G., Kőmíves, T., Botta-Dukát, Z., Orlóci, L., Makra, L. (eds.), 2022. Ecocycles, 8(3), SPECIAL ISSUE, pp. 5-60. FINAL PROGRAM AND BOOK OF ABSTRACTS OF THE WORLD CONFERENCE OF THE INTERNATIONAL RAGWEED SOCIETY. 8-9 SEPTEMBER, 2022, BUDAPEST, HUNGARY.
DOI: 10.19040/ecocycles.v8i3.242

Wagner, W.H., Beals, T.F., 1958. Perennial ragweeds (Ambrosia) in Michigan, with the description of a new intermediate taxon. Rhodora, 60, 178-204.

Ziska, L.H., 2022. Carbon dioxide, climate change and human health: through a botanical lens. In: (eds. Thibaudon, M., Magyar, D., Szigeti, T., Kazinczi, G., Kőmíves, T., Botta-Dukát, Z., Orlóci, L., Makra L.) Conference of the International Ragweed Society, 8th-9th September, 2022.

Book of Abstracts, pp. 17. National Public Health Center, Budapest, Hungary.

Ziska, L.H., Makra, L., Harry, S.K., Bruffaerts, N., Hendrickx, M., Coates, F., Saarto, A., Thibaudon, M., Oliver, G., Damialis, A., Charalampopoulos, A., Vokou, D., Heiđmarsson, S., Guđjohnsen, E., Bonini, M., Oh, J-W., Sullivan, K., Ford, L., Brooks, G.D., Myszkowska, D., Severova, E., Gehrig, R., Ramón, G.D., Beggs, P.J., Knowlton, K., Crimmins, A.R., 2019. Temperature-related changes in airborne allergenic pollen abundance and seasonality across the northern hemisphere: a retrospective data analysis. The Lancet Planet. Health, 3(3):e124-e131. DOI: 10.1016/S2542-5196(19)30015-4