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Ambrosia elatior (L.) in Hungary (1989-1990)

MAGDA JÁRAI-KOMLÓDI, MIKLÓS JUHÁSZ

SUMMARY. Weeds and among them Ambrosia *are probably the most important vascular plants related to pollinosis in Hungary. Sampling was carried out in central (Budapest) and in southern (Paks, Szeged) Hungary. The results of two years (1989-1990) of aerobiological study on* Ambrosia *airborne pollen are reported. The highest percentage of airborne pollen was found in the mid-August to mid-September period, having a good correlation with clinical data on pollinosis. The implications of these results are considered in the context of forecasting and prevention of seasonal ragweed pollinosis.*

Key words: Ambrosia, *pollinosis, ragweed, aeropalynology.*

Magda Járai-Komlódi, Department of Plant Taxonomy and Ecology, L. Eötvös University, Budapest, Ludovika tér 2, H-1083 Hungary.

Miklós Juhász, Department of Botany, A. József University, Szeged, Egyetem u. 2. H-6722 Hungary.

INTRODUCTION

Ragweed can be found quite commonly in Hungary and it occurs in massive quantities in most places. It plays a significant role in triggering allergic reactions from August throughout October. The nationwide elimination of the weed and the continuous control of the *Ambrosia* airborne pollen content in the air are therefore very important in preventing the autumn pollinosis. Here we report some important features of the biology of ragweed and results of a two-year aeropalynological study.

METHOD

Airborne pollen was collected during a two-year period in 1989 and 1990 using the Burkard volumetric traps. Seven-day recording spore traps were located at three different sites, one in Budapest (in 1989) and two in southern Hungary, namely in Paks (in 1990) and in Szeged (in 1989 and 1990).

RESULTS AND DISCUSSION

Vegetative and reproduction growth

Ragweed has only one adventive species in Hungary, *Ambrosia elatior* L. and its dark red form containing athocyan, *Ambrosia elatior* L. forma *atropurpurea* Priszter f. *nova*, although the latter is quite rare.

Light and changing temperature have a positive effect on the germination of ragweed seeds. According to investigations in Hungary, freshly

collected seeds are in primary dormancy until the end of January and neither the method of seed storage nor the presence of light influence the lenght of this period. However, during the succeeding stage, the state of enforced dormancy, which ends approximately in the middle of March, light does have a positive effect on germination occurring in case the temperature of the soil exceeds 6°C. Accordingly, massive germination of ragweed seeds starts at the end of March or at the beginning of April in Hungary. Approximately 70-79% of the freshly selected seeds proved to be capable of germinating (Béres *et al.*, 1980).

Intensive growth of the plants occurs at the end of May and in June. In a favourable habitat the mature plant is 50-120 cm tall and very branchy. Except for the cotyledons, the whole plant is pubescent of hair. It has highly dissected light green leaves, but the first leaves of the seedling and the upper leaves of the mature ragweed are sometimes nondissected.

The flowering peak in Hungary is in August but depending on the weather, ragweed may flower from the second half of July to the end of October. The flowers bloom only if the pollen has already ripened. The timing and manner of pollination depends greatly on meteorological factors, first of all on temperature, humidity and light. Increasing temperature and decreasing humidity enhances pollination. It has been observed that pollination starts around 08.00 a.m. when the temperature is increasing and humidity is decreasing as a result of the sunlight (Bianchi *et al.*, 1959; Jones, 1952) and ends around noon. Measurements using pollen traps also proved that most ragweed pollen can be found in the air during the morning hours (Smith *et al.*, 1954).

Seed production occurs in Hungary at the end of October and at the beginning of November. An average plant has approximately 3000 seeds that are able to survive (Béres *et al.*, 1980). The seeds retain their ability to germinate for a very long time, up to 30 years.

In southern and south-eastern Hungary, there are more favourable habitats, therefore all stages of the life-cycle (germination, growth, flowering, seed production) start somewhat earlier and last somewhat longer than in other parts of the country. It has also been observed that in case of a late summer germination the vegetative phase is shortened, while the generative phase remains unchanged. In Hungary, the latest germination which can still allow seed production is in July. The ragweed that germinates at the end of July is already flowering in early September and, if no frost occurs, it can produce seeds in mid-November.

Ecology

Ragweed plants develop best in loose, acidic soils under warm and humid conditions. In such environment they can be more than 1 meter tall, very branchy, develop plenty of flowers, seeds and spread rapidly.

Being a ruderal plant, ragweed is as frequent on roadsides, railway-embankments, waste places as in cultivated fields. It can overgrow alfalfa and purple clover entirely; e.g. in the western part of Hungary, in Transdanubia, seed-corn cultivation species of them had to be given up. Ragweed is also the most dangerous weed of lupine sowings and causes severe damages in potato fields and occurs frequently in sunflower and cornfields, as well. It appears in large quantities among stubbles in the plain between the Danube and the Tisza (Erdós, 1971).

Ragweed is characteristic of plant communities of the Chenopodio-Scleranthea group (Soó, 1970):

a. Plough-land: Aphani-Matricarietum ambrosietosum

b. Fluviatile deposit: Echinochloa-Polygonetum lapathifolii ambrosietosum.

Besides, ragweed can be found in several other plant communities e.g.: on waste grounds (Poetum annuae), among reeds (Scirpo-Phragmitetum), in bogs (Fraxino pannonicae-Alnetum) and even on nativesodic soil (Achilleo-Festucetum pseudovinae).

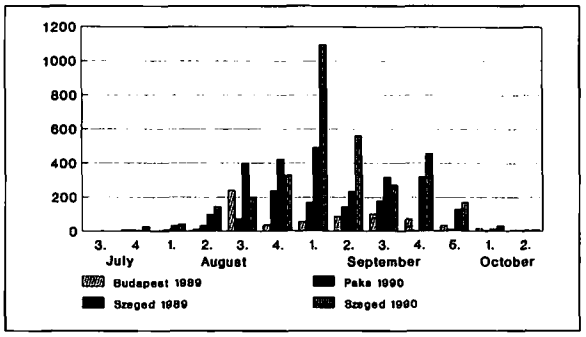

Figure 1. Weekly ragweed pollen count in Hungary, 1989-1990.

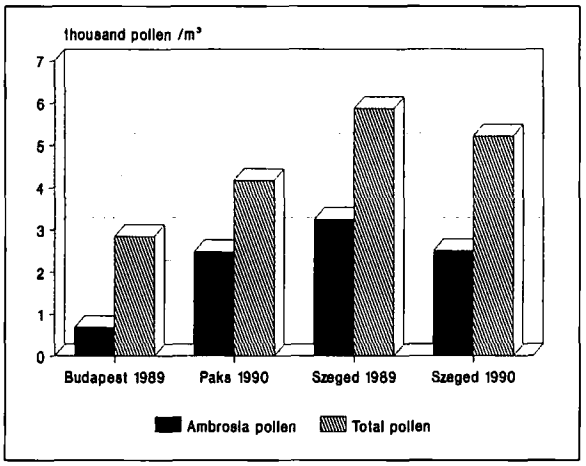

Figure 2. Annual sums of daily ragweed pollen in Budapest, Paks and Szeged.

Origin and distribution

Ambrosia has some 18 species, native of North-America and Canada. Four species were transferred to Europe from their countries of origin with clover seed shipments. In Europe there is only one native species, *A. Maritima.* There are reports on its earliest colonisation in Dalmatien where it was an endemic plant on sandy seashores in the Ragusa and Budua area and on the islands already in 1842 (Visiani, 1842). *Ambrosia* first temporary colonisation in Western Europe was reported to be in Brandenburg in 1863 (Priszter, 1960).

Ragweed reached Hungary from the south, most probably from Serbia and Croatia. One of the popular names of *Ambrosia* in Hungary, serbian grass, also refers to its place of origin. Because of its ecological requirements and origin it appeared first in southern Transdanubia where its most massive and rapid colonisation took place. Later it spreaded in other parts of the country and, although its invasion on the Great Hungarian Plains was slowed down because of ecological reasons, nowadays the ragweed is basically everywhere in the country.

The first reports on its colonisation in Southern-Hungary were those of Jávorka (1910) who found it in Orsova in 1908. During the following 20 years it spread throughout the western part of the country and after an additional 20 years it also invaded the Great Hungarian Plains (Priszter, 1960).

By 1980 *Ambrosia* was widespread. In the western territories its colonisation was massive, while in the eastern part of Hungary it was still less frequent (Béres *et al.*, 1980). Nowadays, however, it is present in quite significant amounts even in the latter regions.

Aeropalynological results

10% of the Hungarian population suffers from pollinosis and the majority of it is sensitive to the pollen of *Ambrosia.* Our aeropalynological data, collected on a daily basis for two years, prove that ragweed pollen occurs in the atmosphere of Hungary from mid-July to mid-October. The peaks of the ragweed pollen concentration are in August and September

coinciding with the largest numbers and the most severe cases of pollen allergy (Mezei *et al.*, 1991).

In 1990 the peaks of ragweed pollen concentration appeared somewhat later (because of meteorological reasons) and the average pollen count were remarkably higher — especially in Szeged — than in the previous year.

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