

RESULTS OF THE STUDY REGARDING THE DISSEMINATION OF THE INVASIVE SPECIES OF *AMBROSIA ARTEMISIIFOLIA* L. WITHIN BIHOR COUNTY

Nicolae Hodișan*, N. Csép*, A Vușcan**

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea;
Romania, e-mail hodisann@yahoo.com

**Agricultural Research and Development Station Oradea, Calea Aradului No. 1, Roamnia,

Abstract

Ambrosia artemisiifolia L. is a invasive species, which entered from Central and Western Europe and occupied almost entirely Bihor county, excepting the mountain area. The maps made in this direction present a sustained and growing invasion. The presence of the species generalized in the period of study was signaled in localities, in gardens around the households, in the recreation areas, also in the industrial areas, but mostly outside localities in the agricultural areas or moors, with high degree of dominance and a growth intensification. *Ambrosia artemisiifolia* L. species develops almost on any type of soil, its presence was pointed out even at the altitude of 692 m. The waysides constitute a zone in which the species is frequently met, because of a systematic dissemination with seeds, which is favored by transports which cross the territories where the species adapted, forming and installing populations that are well outlined. This study presents the evolution of the *Ambrosia artemisiifolia* L. species spread in Bihor country, for the time period between 2003-2007.

Key words: *Ambrosia artemisiifolia* L., floarea pusteii, allergy, pollen, spread, Romania, Bihor.

INTRODUCTION

The species of plants that belong to the *Ambrosia* type, are known as the most noxious plants in the world, because of the allergies that they produce (RICH 1994).

The *Ambrosia artemisiifolia* L. species is a invasive and allergenic weed, that was included in the official list of quarantine weeds of our country, also in many other states, as is presented by: Gh. Ionescu-Șișești (1955); I. Popescu and colab. (1969); Gh. Anghel and colab. (1972) (Hodișan 2007).

The pollen produced by this species, in the blooming period (August-September) has a high potential of causing allergies, known as „hay fever” and asthmatic reactions (Bohren and colab. 2006).

Taramarcaș and colab. (2005) shows that in the experiments made in Europe and Northern America, approximately 10% of the population is sensitive to the pollen of the *Ambrosia artemisiifolia* L. Species and almost a quarter of these can manifest asthmatic reactions.

The intensification of the commercial relations between Northern states of the American continent and the rest of the world have made possible

that the *Ambrosia artemisiifolia* L. species to invade new territories on the surface of Earth.

In Europe, after the writings of Hegi (1906), the species was identified for the first time in 1863 on the territory Germany, in the areal of the Brandenburg and Pfaffendorf lands. It was still here to be studied since 1865. It was signaled in other land of Central Europe, but it didn't spread in the spontaneous flora because of its weak acclimation, the wet and cold climate from the mentioned lands would not permit the maturation of the seeds (Béres 1981).

The period of the First World War is described as being the most the more favorable in the spreading and multiplication of the *A. artemisiifolia* L. species in Europe, but the explosive massive spread was produced in the Second World War, when there were identified two epicentres, one surrounding the city of Lyon from France and the second one in Croatia, near the border with Hungary (Szigetvari and Benko 2004).

The spread of the species continued in the South – East of Europe, also in the South of Russia, in the Ukraine and in the Balkan peninsula. In Hungary is said that the *A. artemisiifolia* L. species invadaded from the South, in present is spread almost along the whole territory as it is shown by: Jávorka (1910); Thaisz (1910); Lengyel (1923); Moesz (1926); Boros (1938); Ujvárosi (1951, 1958, 1962, 1969 and 1973), Timar (1955); Priszter (1957 and 1960); Héjjas and Borhidi (1960); Gondola (1969); Erdős (1971); Béres (1981); Tóth and Török (1990); Béres and Hunyadi (1991); Pinke and Pál (2005) (Béres and colab. 2006).

Toth and colab. (2004) affirm that in 1986, in Hungary, over 380 thousands of hectares were invadaded by *Ambrosia artemisiifolia* L. and in 2003, the species was identified on 5,4 million hectares, of which 700 thousands hectares massively invadaded.

In the 60's and 70's its presence became a real problem for the public health in France where approximately 100.000 people are affected in the Rhone – Alpes region, (Lambelet 2005).

Dickerson and Sweet (1971) shows that *Ambrosia artemisiifolia* L. is the most spreaded, from the type species in Great Britain, this being considered a species with a large variability with different ecotypes (Rich 1994).

Presence of the *Ambrosia artemisiifolia* L. species was also signaled in Switzerland at the end of the 19th, but a massive spread of the species was stopped in the moment that the conditions permitted the species to expand gradually, today becoming a grave danger. In Switzerland, the invasion of the species, is coming from France and Italy migrating along with the excavated construction materials and with the help of agricultural instruments. A study made by the Swiss Agricultural Research Institute (Agroscope Changins – Wädenswil ACW) in 2005, shows the fact that beside the hotbeds already

established on the arable terrains and those along the driveways, the plant grows especially on moors and in gardens of almost entire Switzerland. Pursuant to in 2005, there was initiated a national campaign with the purpose of making this plant known to the population, in view of recognising and destroy the plant by the population (Bohren and colab. 2006).

On the territory of Romania *Ambrosia artemisiifolia* L. species was signaled for the first time in the area of Banat, more precisely in Orșova, in 1908, in that time the area belonged to the apartinând Austro-Hungarian empire , after: Jávorka (1910); Timar (1955); Anghel and colab. (1972); Béres and colab. (2006). Therewith it was signaled in the Cluj region, at Șodorît on the rubble of the flooded everglade of the Someș and on the shore of the Danube, after Flora Romaniae Exicata 1921-1947 (Hodișan and Morar 2008).

Later it was identified in other parts of Romania, in the Moldova to Ungheni region , after Borza and Arvat (1935), in Sighet area, after Topa Em. and Boșcaiu N. (1965), at Huși and Bârlad, after Mititelu D. (1970) and in Muntenia la Ploiești region, after Negrean G. (1971). Ardelean and Karácsony (2002), signal the presence of this species and in Western Field, on the Valley of Ier and Fărcășescu and Laurer (2007) identify the species in many locations in Timiș county, situated in the West of the country (Hodișan 2007).

Recent descriptions signal the spread of the *Ambrosia artemisiifolia* L. species in Bihor county, in North – Western locations of the country, where it is growing on almost all types of soil and it is met until the altitude of 692 meters. (Hodișan and colab. 2003; Hodișan and Morar 2005).

MATERIAL AND METHOD

For the study of the spreading of the *Ambrosia artemisiifolia* L. species in the North-Western field of the country it was established as a study perimeter an areal which situates between the administrative limits of Bihor county. The observations were made in all the 100 locations (commune, cities and town) of the county.

The observations regarding the spread of the *Ambrosia artemisiifolia* L. species were made in public areas inside the localities (parks, public gardens, forests) but also in the limiting area of the localities (agricultural holdings, forests), in the industrial perimeters (sites, quarries), also along the communication paths (communal, county and national roads and railroads).

The determinations were made between 2003 – 2007 in the months of August and September, when the plants can easily be identified as singular individuals or gruped in compact populations.

It was traced the location of the areals on the map, called locations, which contain one or more populations of plants and which lately was noted in the surrounding of the nearest locality. These locations contain the communal administrative limit.

Depending on the number of individuals from a population, the locations were grouped in four areas:

- **area I**, represents those locations in which the species has over 100 individuals grouped in populations, which can cover more dozens of squaremeters;

- **area II**, represents those locations in which the species has less than 10 individuals grouped in populations and the surface which they cover it's only a few squaremeters;

- **area III**. Determines those locations in which there were identified a few individuals, which at the end of the vegetation period (october) couldn't produce mature seeds for reproduction. The reappearance of the species in this area is insured only by annual reseeding after the dissemination insured by the animals and the birds that cross the area or with the occasion of product transports from the area.

- **area IV**. represents the free zone, where it wasn't signaled the presence of the species, but it doesn't exclude the possibility of an emergence of some individuals in this area due to the causes prior presented

There were made pictures and there were written down: type of soil, the form of relief and the altitude of the location where it was identified the presence of the species.

In according with the grouping of the locations there were made maps of the area.

RESULTS AND DISCUSSIONS

The first observations were made 2003. After fixing the areals in which *Ambrosia artemisiifolia* L. was present, there were identified 36 location (figure 1), zoned this way :

- **Area I** determines an areal situated in the North-West of the county and contains the territory of 7 locations (Curtuișeni, Valea lui Mihai, Tarcea, Șimian, Cherechiu, Săcuieni and Diosig). The area is situated at a altitude between 115 și 160 m, the dominant soils are those from the class of protoils and cernisoils. In these locations the populations of the common ragweed have over 100 grouped individuals.

- **Area II** determines an areal situated in the West of the county and contains the territory of 9 locations (Borș, Sântandrei, Girișu de Criș, Gepiu, Cefa, Nojorid, Sânmartin, Mădăras and Salonta). The area is situated at a

altitude between 100 și 200 m, the dominant soils are those from the class of salsodisols, cernisoils and pelisoils. In these locations the populations of the common ragweed have less than 10 grouped individuals.

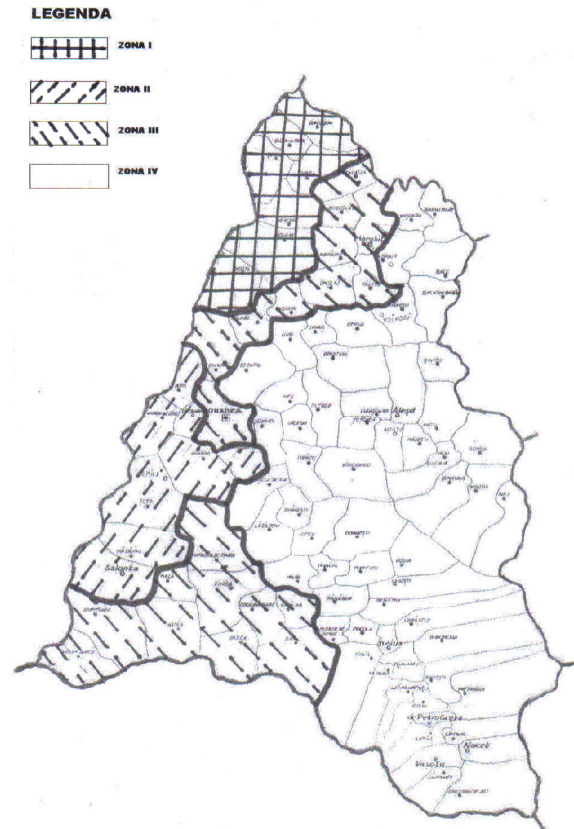


Figure. 1. The widespread *Ambrosia artemisiifolia* L. in Bihor county in 2003

- **Area III** determines an areal situated on the North-South axis of the county and contains the territory of 20 locations (Sălacea, Buduslău, Marghita, Abrămuț, Chișlaz, Tăuteu, Ciuhoi, Sălard, Biharia, Oradea, Husasău de Tinca, Tinca, Olcea, Cociuba Mare, Căpâlna, Șoimi, Tulca, Batăr, Ciumeghiu and Avram Iancu). The area is situated at a altitude between 90 și 200 m, the dominant soils are those from the class of luvosoils and hydrysosils. In these locations were identified a few individuals of the common ragweed, ungrouped.

- **Area IV** represents a free area of common ragweed and it's situated in the Centre and the East of the county where there was no presence of the species.

According to this studies results that in the locations from area I and those from areas II and III, in western part of the country are in the vicinity of the areals that belong to the territory of Hungary. This aspect confirms the fact that the presence of the species in the north-western fields of the country results from this vicinity. From the 100 locations of the studied perimeter, in 36 was recorded the presence of the *Ambrosia artemisiifolia* L. species.

In the following years, 2004 and 2005, the observations continued and it was observed the emergence of the species in new locations, also the expansion and amplification in the pryor locations. In accordance with these observations at the end of 2005 there was made a new map (figure 2).

This time the presence of the species was noticed in 62 locations. De această dată prezența speciei a fost semnalată în 62 de locations:

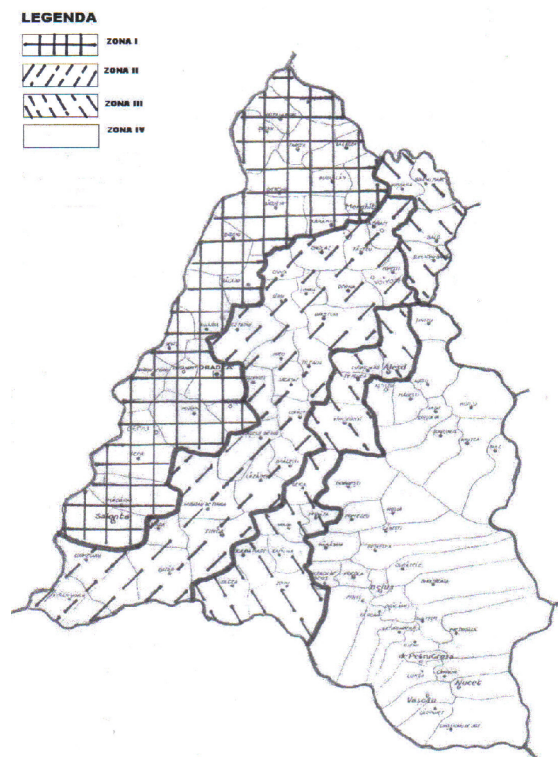


Figure 2. The widespread *Ambrosia artemisiifolia* L. in Bihor county in 2005

- **Area I** determines an areal situated in the North-West and West of the county and contains the territory of 23 locations (Curtuișeni, Valea lui Mihai, Sălacea, Buduslău, Tarcea, Șimian, Marghita, Abrămuț, Cherechiu, Săcuieni, Diosig, Sălard, Biharia, Oradea, Borș, Sântandrei, Girișu de Criș, Gepiu, Cefa, Nojorid, Sânmartin, Mădăras and Salonta). The area is situated

at a altitude between 100 și 185 m, the dominant soils are those from the class of protosoils, cernisoils, salsodisoils and pelisoils.

- **Area II** determines an areal situated in the Centre and South-West of the county and contains the territory of 24 locations (Abram, Chișlaz, Tăuteu, Ciuhoi, Spinuș, Derna, Popești, Sârbi, Brusturi, Cetariu, Ineu, Tileagd, Oșorhei, Săcădat, Copăcel, Hidișelul de Sus, Drăgești, Lăzăreni, Husasău de Tinca, Tinca, Tulca, Batăr, Ciumeghiu și Avram Iancu). The area is situated at a altitude between 90 și 200 m, the dominant soils are those from the class of luvosoils and hydryoils

- **Area III** determines an areal situated on the North-South axis of the county and contains the territory of 15 locations (Vișoara, Boianul Mare, Balc, Suplacul de Barcău, Aleșd, Lugașu de Jos, Țețchea, Vârciorog, Ceica, Sâmbăta, Holod, Cociuba Mare, Căpâlna, Olcea și Șoimi). The area is situated at a altitude between 200 și 400 m, the dominant soils are those from the class of luvosoils and protisoils.

- **Area IV** represents a free area of common ragweed and it's situated in the East and the South-East of the county where there was no presence of the species.

Comparing the two maps made in 2003 and 2005 we can specify the fact that comparing to 2003 *Ambrosia artemisiifolia* L. expanded in the North-Western fields of the country, preempting the territory of 62 locations, over only 36 in 2003, recording a growth in the studied perimeter. Expansion wasn't only towards new territories, we observe a growth of populations and of the number of individual in the locations, modifying significantly the areal delimitation. So in 2005, area I expanded a lot to south and towards east completely occupying the ex-area II and some territories of the ex-area III. Area II moves to the Centre and South-East, occupying almost completely the ex-area III and significant territories in the ex-free area. Area III forms a cordon on the North-South axis, occupying almost entirely the ex-free zone, excepting the South of this area where it maintained on the territory of 4 locations. The free zone from 2003 loses a lot terrain in favour of the expansion of this species, thus from 64 free locations, by 2005 remained only 38, recording a loss of 84 % of the free zone from the studied perimeter.

Observations regarding the spread of the species in Bihor county continued in 2006 and 2007. At the end of the observations, in 2007 a new map was made (figure 3) which this time total a number of 80 locations:

- **Area I** determines an areal situated in the North-West and West of the county with an extension towards the and contains the territory of 33 locations (Curtuișeni, Valea lui Mihai, Sălacea, Buduslău, Tarcea, Șimian, Marghita, Abrămuț, Cherechiu, Săcuieni, Diosig, Sălard, Biharia, Oradea, Borș, Sântandrei, Girișu de Criș, Gepiu, Cefa, Nojorid, Sânmartin, Ciuhoi,

Sârbi, Cetariu, Ineu, Tileagd, Săcădat, Oșorhei, Husasău de Tinca, Tinca, Tulca, Mădăras și Salonta). The area is situated at a altitude between 100 și 200 m, the dominant soils are those from the class of protosoils, cernisoils, salsodisoils and pelisoils.

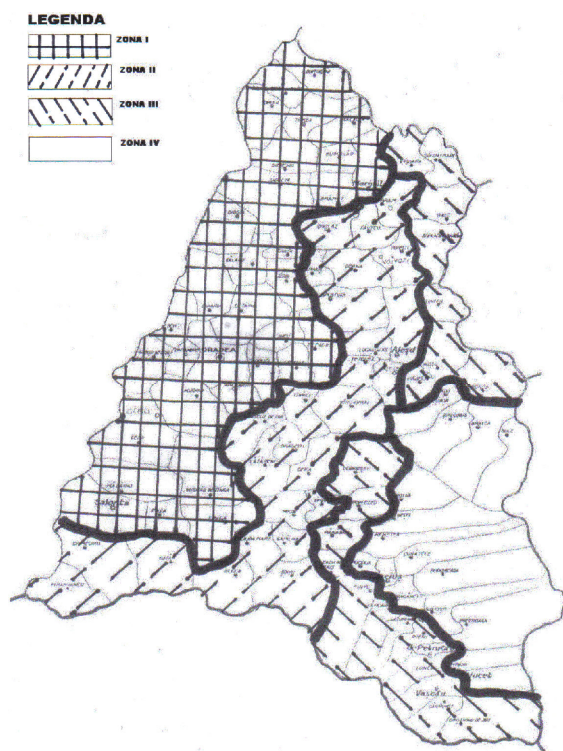


Figure 3. The widespread *Ambrosia artemisiifolia* L. in Bihor county in 2007

- **Area II** determines an areal situated in the Centre and South-West of the county and contains the territory of 26 locations (Abram, Chișlaz, Tăuteu, Spinuș, Derna, Popești, Brusturi, Aleșd, Lugașu de Jos, Țețchea, Aștileu, Vârciorog, Copăcel, Hidișelu de Sus, Drăgești, Ceica, Lăzăreni, Holod, Sâmbăta, Cociuba Mare, Căpâlna, Batăr, Ciumeghiu, Avram Iancu, Olcea și Șoimi). The area is situated at a altitude between 90 și 400 m, the dominant soils are those from the class of protosoils, luvosoils and hydrysosils.

- **Area III** determines an areal situated on the North-South axis of the county and contains the territory of 21 locations (Viișoara, Boianul Mare, Balc, Suplacul de Barcău, Șinteu, Aușeu, Măgești, Borod, Dodrești, Pomezueu, Răbăgani, Uileacu de Beiuș, Finiș, Târcaia, Lazuri de Beiuș, Rieni, Ștei, Lunca, Vașcău, Cărpinet și Criștioru de Jos). The area is situated

at a altitude between 400 și 700 m, the dominant soils are those from the class of luvisols, protisols and antrisol.

- **Area IV** represents a free area it's situated in the East and the South-East of the county representing 20 locations where there was no presence of the species.

Comparing the map made in 2007 with the maps made in 2003 and 2005 we can observe that the spread of species continues. In 2007 it was observed the presence of the species in 80 locations, with 111% more than 2003 and with 64% more than 2005. The free zone represents in 2007 20 locations with 320% less than 2003 when it was represented by 64 locations and with 190% less than 2005 when the free zone was represented by 38 de locations.

The species spreaded from the fields to a altitude of 692 m becoming a vegetal species met in the majority of agricultural cultures, but also in the recreation areas and public places, also along the communication paths, railroads and driveways.

REFERENCES

1. Ardelean, G., Karácsony, C. (2002): Flora și fauna Văii Ierului (înainte și după asanare), Ed. Bion, Satu Mare.
2. Anghel, Gh., Chirilă, C., Ciocârlan, V., Ulinici, A. (1972): Buruienile din culturile agricole și combaterea lor. Ceres: 221-222.
3. Béres, I. (1981): A parlagfű (*Ambrosia elatior* L.) hazai elterjedése, biológiája és a védekezés lehetőségei. Kandidátusi értekezés. Agrártudományi Egyetem, Keszthely.
4. Béres, I., Novák, R., Hoffmanné, P. Zs., Kazinczi, G. (2006): Az ürömlevelű parlagfű elterjedése, morfológiája, biológiája, jelentősége és a védekezés lehetőségei. Agroforum Extra 16, 4 – 24.
5. Bohren, C., Mermillod, G., Delabays, N. (2006): Common ragweed (*Ambrosia artemisiifolia* L.) in Switzerland: development of a nationwide concerted action. Jurnal of Plant Diseases and Protection Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz Special Issue/ Sonderheft XX, 497-503.
6. Fărcășescu, A. M., Lauer, K.F. (2007): *Ambrosia artemisiifolia* L. a segetal species with a tendency to expansion in the Timis county. Scientific papers Faculty of Agriculture Timișoara, 477-482.
7. HODIȘAN, N., (2007): Study of biology and control of the *Ambrosia artemisiifolia* L. extend in north-western country, Doctor thesis, The University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca.
8. Hodișan, N., Csep, N., Bara, V., Daroczi, C. (2003): The occurrence of species *Ambrosia artemisiifolia* L. on the territory of Bihor country, Third International Plant Protection Symposium at Debrecen University, 283 – 287.
9. Hodișan, N., Morar, G. (2005): Research regarding apparition and extension of *Ambrosia artemisiifolia* L. specie in North- West of our country. Buletin Universitatea de Științe Agricole și Medicină Veterinară Cluj-Napoca, 61/2005 (228-230).
10. Hodișan, N., Morar, G. (2008): Floarea pusteii „*Ambrosia artemisiifolia* L.”, Ed. GrafNet, Oradea.

11. Keimer, C. (2003): personal message. Groupe Ambroise, DIAE – Agriculture, Ch. Du Pont-du – Centenaire 109, CH 1228 Plan – les- Ouates. E-mail: christian.keimer@etat.ge.ch
12. Lambelet, C. (2005): L'ambrosie a feuilles d'armoise, petite herbe a poux. Conservatoire et jardin botaniques, CP 60, CH 1292 Chambesy, GE.
13. Rich, T. C. G. (1994): Ragweeds (*Ambrosia* L.) in Britain. – Grana 33: 38-44. ISSN 0017-3134.
14. Szigetvári, Cs., Benkő, Zs. R. (2004): Üromlevelű parlagfű (*Ambrosia artemisiifolia* L.). In: Mihály B. - Botta-Dukát Zoltán (szerk.): Biológiai inváziók Magyarországon. Özönnövények. Természetbúvár Alapítvány Kiadó, Budapest, 337-370.
15. Tamarcaz, P., Lambelet, C., Clot, B., Keimer, C., Hauser, C. (2005): Verbreitung von *Ambrosia* (Gotterspeise) und das damit verbundene Gesundheitsrisiko: Wird die Schweiz dieser Invasion standhalten? Schweizerische Ärztezeitung 86: Nr. 35, 2062.
16. Tóth, Á., Hoffmanné, P. Zs. – Szentey, L. (2004): A parlagfű (*Ambrosia elatior*) helyzet 2003-ban, Magyarországon. A levegő pollenszám csökkentésének nehézségei. Növényvédelmi Tudományos Napok, Budapest, Öszefoglalók. 69.