APPEARANCE AND SPREADING OF COMMON RAGWEED (*AMBROSIA ARTEMISIIFOLIA* L.) IN BOSNIA AND HERZEGOVINA

POJAVLJANJE IN ŠIRJENJE AMBROZIJE (*AMBROSIA ARTEMISIIFOLIA* L.) V BOSNI IN HERCEGOVINI

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http://dx.doi.org/10.3986/fbg0032

ABSTRACT

Appearance and spreading of common ragweed (*Ambrosia artemisiifolia* L.) in Bosnia and Herzegovina

It has been more than seven decades since the first data on the presence of common ragweed (*Ambrosia artemisiifolia)* in Bosnia and Herzegovina was published. The literature data show that this invasive weed species has spread and became naturalized in a major part of Bosnia and Herzegovina, and has a tendency of further spreading. It is believed that was introduced from the north and spread towards the south. Depending on the weather conditions, common ragweed occurs predominantly during the mid-spring and produces inflorescences from July until the first frost. The common ragweed plants can grow to be over 2 meters high. This species is very adaptive to different environmental conditions, and its fast expansion in the area of Bosnia and Herzegovina was favored by the increase of areas under uncultivated and abandoned land after the war. Since common ragweed is harmful both as a weed species and as an allergenic plant dangerous to human health, it is necessary to take all available measures to prevent its further spread, but also to reduce the number of populations in the areas where it is already established.

Key words: common ragweed, invasive weeds, Bosnia and Herzegovina

IZVLEČEK

Pojavljanje in širjenje ambrozije (*Ambrosia artemisiifolia* L.) v Bosni in Hercegovini

Pred več kot 70 leti so bili objavljeni prvi podatki o pojavu ambrozije (*Ambrosia artemisiifolia)* v Bosni in Hercegovini. Literaturni podatki kažejo, da se je ta invazivna vrsta razširila in postala običajna v večjem delu Bosne in Hercegovine in kaže da se bo širila še naprej. Velja prepričanje, da je bila uvedena in se širila od severa proti jugu. Odvisno od vremenskih razmer se ambrozija pojavlja predvsem sredi pomladi in se na njej razvijajo socvetja od meseca julija do prve slane. Rastline ambrozije lahko zrastejo do višine preko 2 m. Vrsta se zelo prilagaja različnim okoljskim razmeram, k njenemu širjenju na območju Bosne in Hercegovine je prispevalo v času vojne tudi širjenje neobdelanih in zapuščenih zemljišč. Ker je ambrozija škodljiva tako kot plevelna rastlina, kot rastlina, ki povzroča alergije in škoduje zdravju ljudi, je nujno izvajati ukrepe za preprečevanje nadaljnjega širjenja. Zelo pomembno pa je tudi zmanjševanje števila rastlin v populacijah, kjer je že razširjena.

Ključne besede: ambrozija, invazivni pleveli, Bosna in Hercegovina

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1 INTRODUCTION

Biological invasions are today considered to be among the major threats to biodiversity, ecosystem functioning, agricultural production and human health.

Common ragweed (*Ambrosia artemisiifolia* L.) originates from North America and is one of the most aggressive invasive plants in Europe. It is highly adaptable and has a wide ecological valence. As a weed species, it causes great economic losses by reducing the yield and the quality of agricultural crops. Because of a fast initial growth and more expressed competition in the spring, it is particularly threatening to wide-row crops (maize, sunflower, soybeans, sugar beets, vegetable crops).

Common ragweed is more common in sunflower than in other arable crops because of their botanical similarity, i.e. belonging to the same family, so that most selective herbicides used for sunflower protection do not affect it strongly enough.

According to Genton et al. (2005), *Ambrosia artemisiifolia* was introduced in Europe in the 18th century and has been spreading since then. The rapid spread of this plant in Europe began after the World War II. Chauvel et al. (2006) studied the introduction and spread of common ragweed in France and neighboring countries on the basis of herbarium specimens and have found that, by 1890, this plant was mostly found on arable soils. During the first half of the 20th century, it was described as a weedy plant of arable areas (42%), but was also present around roads (33%) and in other ruderal areas (25%). In the last few decades, road verges and agricultural areas are listed as the main habitat of this species. During the revisions of herbarium collections performed by Csontos et al. (2010) it was found that, around 1922, *Ambrosia artemisiifolia* was already widely present in the territory of Hungary. Bruckner & Molnar (1999) state that the abundance of common ragweed in Hungary was 12 times higher in 1998 than in 1950, and that one of the main reasons for such increase is the allelopathic inhibitory potential and the strong competitive power.

In the territory of the former Yugoslavia, *Ambrosia artemisiifolia* was first recorded and described in the vicinity of Derventa in Bosnia and Herzegovina, where it was nicknamed „the Kraus grass" after the Kraus family on whose property it was growing (Hulina 1998). It was first recorded in Croatia in 1941, in the area of Podravina (Kovačević 1956). Since then, the common ragweed has spread to almost all of Croatia. In Serbia, this species was first recorded in the northern part in 1953 (Božа et al. 2006), but today it is widely distributed throughout the country (Vrbničanin & Janjić 2011).

2 BIOLOGICAL AND MORPHOLOGICAL CHARACTERISTICS OF COMMON RAGWEED (*AMBROSIA ARTEMISIIFOLIA* L.)

2.1 Taxonomic classification

Ambrosia artemisiifolia L. (syn. *A. elatior*) is an annual herbaceous plant of *Asteraceae*, the largest family of flowering plants. It belongs to the subfamily of *Asteroideae*, meaning that the plants do not have milky sap, but do have glandular canals filled with ethereal oils (Hulina 1998).

2.2 Ecological conditions for growth and development of common ragweed

In the territory of Bosnia and Herzegovina, depending on the weather conditions, the common ragweed germinates in late April and early May, when the soil becomes warm enough. This plant is characterized by long floweing period, from mid-July to the first frosts, which makes it a persistent and strong allergen (Šarić 1989, Đikić et al. 2007, Trkulja et al. 2009).

Common ragweed is a thermophilous and heliophilous species, growing in warm and sunny habitats. According to soil requirements, it can be characterized as a plant of moderately humid, neutrophilous, nitrogen-rich and loose soils, and it can also grow in salinizated biotopes (Kojić et al. 1994).

Ambrosia artemisiifolia is mostly found along roads, railroad tracks, streams and rivers, in neglected gardens, uncultivated sites, construction sites, but also in crops. Earlier, it was mainly found in wide-row crops, but in recent years this invasive weed has also been recorded in narrow-row crops.

2.3 Morphological characteristics of common ragweed

The common ragweed seedlings have broadly elliptical cotyledons, purplish on the lower side and resemble the seedlings of French marigold (*Tagetes patula* L.).

The root is short and stalky and does not penetrate deep into the soil, so the plant is able to root even on very shallow and compacted soils. The stem is upright, square on cross section, much-branched and covered with coarse hairs. According to Šarić (1989), *Ambrosia artemisiifolia* grows up to 1,5 m high. However, in optimal conditions the plants can reach the heigth of over 2 m (Trkulja et al. 2009).

The leaves are short-stalked, thin, pinnately lobed and covered in thin hairs. The upper side is dark green, while the reverse side is light green, which is the result of difference in hairiness of epidermis (Basset & Crompton 1975). The back of the leaves is covered with denser hairs, making it lighter and softer. The color intensity of the leaves, the number of lobes and hairiness may vary, depending on the ecological conditions (Šarić 1989).

Common ragweed has small, numerous flowers, grouped in separate male and female flower-heads on different parts of the same plant. The male flower-heads are borne at the tips of the stems and droop from branching spike-like flower clusters. The female flower-heads are located at the base of the uppermost leaves, below the male ones. The pollen produced by male flowers contains proteins (antigens), which are counted among the most powerful allergens discovered so far (Bagarozzi & Travis 1998). The flowers of common ragweed do not contain nectar and do not attract insects, so the wind is the key factor in polination process.

The fruit is a small achene which contains a single seed and has a pointed beak and several small blunt spines. Common ragweed reproduces mainly by seeds, which can be brownish or blackish, with darker stripes or spots (Jovanović et al. 2007). According to Šarić (1989), the seed length varies from 1,5 to 2 mm and the width from 0,7 to 1,5 mm. The same author states that the absolute mass of the seeds is 2,5 g. A single plant can produce between 500 and 3000 seeds, which can remain viable in the soil up to 40 years (Janjić & Kojić 2000). Kazinczi et al. (2008b) state that one plant can produce up to 62,000 seeds, depending on its size, competition and ecological factors.

3 APPEREANCE AND SPREADING OF COMMON RAGWEED IN BOSNIA AND HERZEGOVINA

The first published data on the presence of *Ambrosia artemisiifolia* in the territory of Bosnia and Herzegovina date back to 1939, when this plant was found at the locality of Osojci near Derventa (northeastern part of Bosnia) in the stubble and in fields of corn, beans and potatoes (Maly 1940). The specimens collected from this site by Karlo Maly are stored in the Herbarium of the National Museum of Bosnia and Herzegovina (Šoljan & Muratović 2002).

Two decades later, in 1958, common ragweed was recorded in the urban area of Sarajevo near the railway line (Slavnić 1960). The same author states that the plant probably came from the north and that its establishment as weed in crops is the key moment in its further spread.

A year later, in 1959, several specimens were found in wide-row crops in Gradačac (Beck et al. 1983). Šarić et al. (1992) studied the spread and distribution of this species in Bosanska Krajina in 1986, and recorded the average number of 200-300 plants per square meter in stubbles. When studying the weed vegetation of northeastern Bosnia, Šumatić (1990) registered the mass presence of common ragweed. The significant contribution to the study of presence of common ragweed in the area of Sarajevo was given by Šoljan & Muratović (2000). They have, during the field research performed between 1991 and 1999, found this plant throughout the city, both in its central and peripheral parts.

During the research of changes in weed vegetation and appearance of new invasive weeds, Šarić et al. (2000) found that *Ambrosia artemisiifolia* is aggressively spreading from the north to the central part of Bosnia and Herzegovina.

Šilić & Abadžić (2000) noted the presence of common ragweed in most sites in northern Bosnia in which it was previously recorded, as well as in several new sites in western Bosnia and in the Neretva valley. *Ambrosia artemisiifolia* was also registered near Žitomislić, and in Mostar and its surroundings (Petrović & Tabaković 2003). Herceg (2003) recorded the presence of common ragweed in two sites in Herzegovina (Vitina near Ljubuški and Buna near Mostar), with an average abundance of 52 plants per m2 in the locality of Buna. Following the distribution of this species from year to year, it has been noted that it spreads from north towards the south, along the valleys of large rivers, becomes an aggressive weed and poses a risk to human health (Šoljan & Muratović 2004). Petronić (2006) registered common ragweed in the area of Pale, a small town located between the mountain massifs of Jahorina and Romanija at altitude

above 640 meters, and Suljić (2015) recorded it in Nišić plateau near Sarajevo, at 900 meters a.s.l.

Mataruga (2006) describes common ragweed as an extremely harmful weed species in soybean, maize, cereal crops, medicinal herbs, clover, but also in orchards, and points to the extremely high density of the population of up to 4112 plants per m2 in the area of Kozarska Dubica.

There are some studies in which the concentration of *Ambrosia artemisiifolia* pollen in the territory of Bosnia and Herzegovina was measured (Brkljač et al. 2008, Muhamedagić et al. 2013). According to them, the largest pollen concentration is recorded in late August and early September, depending on weather conditions.

In the first decade of the 21st century, the spread of *Ambrosia artemisiifolia* in Bosnia and Herzegovina was the subject of numerous studies, and it is commonly concluded that it is one of the most noxious weeds in the country, both in ruderal sites and in arable soils (Đikić et al. 2004, Đikić et al. 2005, Gadžo et al. 2008, Šarić et al. 2011, Bašić 2012, Pajazetović 2014, Ademović & Pezer 2015, Suljić 2015).

4 THE CAUSES OF COMMON RAGWEED SPREAD IN BOSNIA AND HERZEGOVINA

The rapid expansion of common ragweed is the result of its biological properties, in particular the high reproductive potential. A single plant can produce up to one billion pollen grains, which ensures the effective pollination and the ability to form up to 3000 seeds (Janjić & Kojić 2000), which can remain viable in the soil for over 40 years (Levente et al. 2003). Kazinczi et al. (2008b) state that one plant can produce up to 62,000 seeds, while Šoljan & Muratović (2000) quote the possibility of up to 150,000 seeds being produced by a single plant in optimal conditions.

Another reason for the rapid spread of *Ambrosia artemisiifolia* is the fact that it can inhibit the growth of other plant species, due to its allelopathic and competitive abilities. The allelopathic potential of this species is directed towards other weeds, but also towards the crops. The research by Bruckner & Molnar (1999) shows its inhibitory action on cucumber, soy and amaranth. Kazinczi et al. (2008a) have showed that the presence of 1, 2, 5 and 10 plants per square meter reduces the yield of sunflower by 4, 6, 21 and 33%, respectively. Also, the research carried out by Maryuskina & Didyk (2002) showed that common ragweed may delay the development of several grass species from rhizomes for at least one year.

The anthropogenic factor is one of the main reasons for the fast expansion of common ragweed. The frequent road constructions, abandoning traditional land management and excessive use of nitrogen fertilizers create favorable conditions for growth and development of this species. It has also been noted that the adequate measures for supressing the expansion of common ragweed are not being undertaken during the early stages of its development.

The favorable conditions for expansion of common ragweed in Bosnia and Herzegovina have developed during the last war, when numerous farmers were forced to migrate and abandon the land which became the ideal habitat for this species to thrive.

The climate change that can already be felt in the territory of Bosnia and Herzegovina and the increase of CO_2 concentration in the atmosphere will condition the earlier beginning of the vegetation perod of *Ambrosia artemisiifolia* plants and increase their biomass (Bazzaz et al. 1990). Such changes will result in an increase of its distribution range and pollen production, affecting the health of people allergic to it (Wayne et al. 2002).

5 THE MEASURES FOR CONTROLLING COMMON RAGWEED IN BOSNIA AND HERZEGOVINA

According to Kazinczi et al. (2008c), the control of common ragweed can be implemented, but the integrated protection measures need to be undertaken for at least 4-5 consecutive years. The main goal of all measures is to reduce the soil seed bank. The success in controlling the common ragweed is only possible if all available measures (preventive, mechanical, chemical and biological) are used. The farmers in Bosnia and Herzegovina are trying to prevent the growth and development of this weed in arable land, but the control measures are very rarely undertaken in ruderal and abandoned sites, along roads and railway tracks. In

most countries, including Bosnia and Herzegovina, the legal measures oblige land owners to prevent propagation and spreading of common ragweed in their land, even if they are not using it.

The first Decision on obligatory removal of common ragweed in Bosnia and Herzegovina was issued in Brčko District in 2004. The similar documents were developed by the Government of Republic of Srpska in 2007 and the Government of the Federation of Bosnia and Herzegovina in 2009. Since 2013, the action plan for public awareness, destruction and prevention of the expansion of *Ambrosia artemisiifolia*, developed by the Federal Ministry of Environment and Tourism, is implemented in the area of Federation of Bosnia and Herzegovina. All federal institutions involved in the Action plan are required to fully comply with the foreseen obligations and submit, by the end of the year, the appropriate reports to the Federal Ministry of Environment and Tourism.

According to these decisions, the owners and users of agricultural, forest and construction lands, as well as the managers of water areas, public green areas, neglected and all other areas are required to destroy common ragweed plants and prevent their further spreading, by applying preventive, agrotechnical, mechanical and chemical measures.

Timely and well-done agrotechnical measures in the form of adequate crop rotation, soil cultivation, sowing, fertilizing, mulching and stubble ploughing contribute to the direct destruction of common ragweed plants and decrease their number in agricultural soil. Most farmers do not perform shallow stubble ploughing right after the harvest, but wait until autumn to plough. This allows the intensive development of plants, which have enough time to produce seeds, so the stubble sites become the most important sources for the uncontrolled expansion of common ragweed.

The mechanical measures used for the control of *Ambrosia artemisiifolia* include pulling, repeated cutting, soil milling and any other form of mechanical destruction. Previous experiences have shown that the application of mechanical measures is the best way to suppress the growth and development of this plant in non-agricultural land.

The chemical measures for common ragweed control include the application of efficient herbicides that have a trade and application license in Bosnia and Herzegovina, in accordance with the instructions for their use.

The communal, agricultural and phytosanitary inspectors monitor the implementation of measures for prevention of the further spread of common ragweed in the territory of Bosnia and Herzegovina and, in the case of occurrence of this plant, issue an order requiring the owner or land user to remove it within a certain timeframe. In case of non-execution of the order, the owner of the land is fined and the competent institution is employed to remove and destroy the common ragweed plants on the cost of the owner or land user.

Unfortunately, there are no budget funds planned for supressing the development of common ragweed in Bosnia and Herzegovina, so the first task of the government is to provide the financial support in order to enforce the law on removing the common ragweed. It is particularly important to remove common ragweed plants from the ruderal areas and areas owned by the state institutions, as they are among the main sources for expanding this weed to the agricultural land.

The education of general public about the harmful effects of common ragweed is also an important measure and should be implemented continuously in schools and local communities, because it has been noted that, even though this plant has been present in the country for years, a lot of people still can't recognize it and do not know that it poses a hazard to human health.

6 CONCLUSION

The analysis of the presence and distribution of common ragweed in the territory of Bosnia and Herzegovina shows that this invasive species is spreading in agricultural, ruderal and neglected soils. It has also been noted that it is spreading towards the higher altitudes. The plant is aggressively expanding in the northern part of Bosnia and Herzegovina, and is less common in the south, but is spreading there as well. The densest populations develop in stubble sites, where the common ragweed plants almost completely cover the soil. It is also present in ruderal habitats, riverbanks, roadsides and urban green areas.

Given that *Ambrosia artemisiifolia* is a very harmful weed and strong allergen, the maximum attention should be paid to the suppression of its further spread and reduction of the existing populations. The knowledge on morphology, ecological conditions, vegetation cycle and distribution of common ragweed are the prerequisites for its successful control, so the constant education of general public is a necessary measure.

The measures that have been taken so far have not produced the desired effect, so it is necessary to be more effective in reducing its populations in both agricultural and non-agricultural soils.

7 POVZETEK

Ambrozija (*Ambrosia artemisiifolia* L.) zaradi hitre začetne rasti v pomladanskem času ogroža predvsem poljščine, ki jih gojijo na njivah s širokim medvrstnim razmikom (koruza, sončnice, soja, sladkorna pesa, zelenjadnice). Posebej pogosta je med sončnicami, saj pripada isti družini in je zato herbicidi, ki se jih uporablja na njivah sončnic, dovolj ne prizadenejo.

Ambrozija je po literaturnih podatkih (Genton et al. 2005), prišla v Evropo in se začela širiti v 18. stoletju. Posebej hitro se je začela širiti po drugi svetovni vojni. Avtorji Chauvel et al. (2006) so raziskovali pojavljanje in širjenje ambrozije v Franciji in sosednjih deželah s pomočjo herbarijskih primerkov in ugotovili, da je bila do leta 1890 največkrat najdena na preoranih zemljiščih. Tekom prve polovice 20. stoletja je bila največkrat (42 %) opisana na njivah, ob cestah (33 %) in na drugih ruderalnih območjih (25 %). V zadnjih desetletjih so robovi cest in kmetijska zemljišča opisana kot najpogostejša nahajališča. Pri pregledu herbarijskih zbirk so Csontos et al. (2010) ugotovili, da je bila ambrozija okoli leta 1922 že široko prisotna na območju Madžarske. V letu 1998 je bila ambrozija na Madžarskem 12 krat bolj razširjena kot leta 1950 (Bruckner & Molnar 1999). Tako hitro širitev so pripisovali alelopatskim učinkom ambrozije na druge rastline in velikim sposobnostim tekmovanja. Na ozemlju nekdanje Jugoslavije so ambrozijo najprej našli in opisali na območju Dervente v Bosni in Hercegovini, kjer je dobila vzdevek „Krausova trava“ po imenu lastnika posestva, kjer je rasla (Hulina 1998). Na Hrvaškem se je najprej pojavila leta 1941 v Podravini (Kovačević 1956). Od tedaj se je ambrozija razširila praktično po vsej Hrvaški. V Srbiji je bila najprej opisana na severu leta 1953 (Božа et al. 2006), toda sedaj je razširjena praktično po vsej državi (Vrbničanin & Janjić 2011).

Na ozemlju Bosne in Hercegovine, v odvisnosti od vremenskih razmer, ambrozija vzkali konec aprila ali v začetku maja, ko so tla dovolj topla. Za to rastlino je značilno dolgo obdobje cvetenja, od srede julija do prve slane, kar povzroča, da je ta rastlina izrazit vir alergenov (Šarić 1989, Đikić et al. 2007, Trkulja et al. 2009).

Ambrozija raste najpogosteje ob cestah, železniških progah, rekah in drugih vodotokih, na zanemarjenih vrtovih, neobdelanih zemljiščih, gradbiščih, pa tudi med poljščinami. V prejšnjih časih je rastla prevsem na njivah s poljščinami s širokimi medvrstnimi razdaljami, sedaj pa jo najdejo tudi v gostih posevkih.

Prvi objavljeni podatki o ambroziji v Bosni in Hercegovini so iz leta 1939, ko so jo našli v Osojci pri Derventi (severovzhodna Bosna) na strniščih in na poljih koruze, fižola in krompirja (Maly 1940). Vzorci zbrani na tej lokaciji so spravljeni v herbariju Narodnega muzeja Bosne in Hercegovine (Šoljan & Muratović 2002). Dve desetletji kasneje, leta 1958, so ambrozijo našli v urbanem delu Sarajeva pri železniški progi (Slavnić 1960). Naslednje leto so več primerkov našli v poljščinah z velikimi medvrstnimi razdaljami v Gradačcu (Beck et al. 1983). Šarić et al. (1992) so raziskovali razširjenost ambrozije leta 1986 v Bosanski Krajini in ugotovili na strniščih povprečno 200-300 rastlin na kvadratni meter. Šumatić (1990) je pri raziskavah vegetacije v severovzhodni Bosni ugotovil množično pojavljanje ambrozije. Pomemben prispevek k raziskovanju razširjenosti ambrozije v okolici Sarajeva sta prispevala Šoljan & Muratović (2000), v letih 1991 do 1999 sta rastlino našla po vsem mestu, tako v osrednjih predelih kot na obrobju.

Pri raziskavah sprememb plevelne vegetacije in pojavljanja novih invazivnih vrst so Šarić et al. (2000) ugotovili, da je ambrozija agresivno razširjena od severa proti osrednjim delom Bosne in Hercegovine. Ambrozijo so našli blizu kraja Žitomislić, in v Mostarju ter okolici (Petrović & Tabaković 2003). Herceg (2003) je ugotovil prisotnost ambrozije v dveh krajih v Hercegovini (Vitina pri Ljubuškem in Buna pri Mostarju) s povprečno gostoto 52 rastlin na kvadratnem metru v Buni.

Raziskovali so tudi koncentracijo peloda ambrozije na območju Bosne in Hercegovine (Brkljač et al. 2008, Muhamedagić et al. 2013). Po teh raziskavah je največja koncentracija peloda avgusta in v začetku septembra, odvisno od vremenskih razmer.

Tudi v prvih desetih letih 21. stoletja so v številih študijah poročali o razširjenosti ambrozije in ugotovili, da je to ena najbolj nevarnih plevelnih vrst, tako na ruderalnih območjih kot na obdelanih zemljiščih (Đikić et al. 2004, Đikić et al. 2005, Gadžo et al. 2008, Šarić et al. 2011, Bašić 2012, Pajazetović 2014, Ademović & Pezer 2015, Suljić 2015).

Hitro širjenje ambrozije je posledica bioloških lastnosti, predvsem velikega reproduktivnega potenci-

ala. Na posamezni rastlini lahko nastane do 3000 semen (Janjić & Kojić 2000), ki lahko ostanejo v tleh sposobna za kalitev tudi preko 40 let (Levente et al. 2003). Kazinczi et al. (2008b) ugotavljajo, da na posamezni rastlini lahko nastane do 62.000 semen, medtem ko Šoljan & Muratović (2000) omenjata možnost, da v optimalnih razmerah lahko nastane na posamezni rastlini do 150.000 semen. Drugi razlog je, da ambrozija z alelopatijo lahko zavira rast drugih rastlin.

Tudi antropogeni dejavniki so eden poglavitnih razlogov za hitro širjenje ambrozije. Pogoste obnove cest, opuščanje tradicionalne pridelave ter preobsežna uporaba dušičnih gnojil so dejavniki, ki ustvarjajo razmere, ugodne za hitro širjenje ambrozije. Problem je tudi, da se v začetku razvoja ambrozije ne izvaja ustreznih ukrepov. Ugodne razmere za širjenje ambrozije v Bosni in Hercegovini so nastale v času zadnje vojne, ko so bili številni kmetje prisiljeni zapustiti svoje kmetije, kar je ustvarilo ugodne habitate za širjenje ambrozije.

Na ozemlju Bosne in Hercegovine se čuti tudi vplive klimatskih sprememb in povečana koncentracija CO_2 v atmosferi, ki bo omogočila zgodnejši začetek rasti ambrozije in povečanje njene biomase (Bazzaz et al. 1990). Take spremembe bodo omogočile povečanje obsega in produkcije peloda, kar bo škodovalo ljudem alergičnim na pelod ambrozije (Wayne et al. 2002).

Po ugotovitvah Kazinczi et al. (2008c) se kontrolo ambrozije lahko izvaja, vendar je potrebno integrirane ukrepe za zatiranje ambrozije izvajati vsaj 4-5 zaporednih let. Glavni cilj mora biti zmanjšanje zaloge semen v tleh. Kmetje v Bosni in Hercegovini se trudijo izvajati ustrezne ukrepe na svojih njivah, vendar je problem, da se to le redko izvaja na neobdelanih in zapuščenih območjih, ob cestah in železnicah. Kot v večini držav so tudi v Bosni in Hercegovini lastniki zemljišč zakonsko obvezani izvajati ustrezne ukrepe, tudi na zemljiščih, ki jih morda ne obdelujejo.

Pravočasni agrotehnični ukrepi, vključno ustrezno vrstenje poljščin, obdelava tal, setev, gnojenje, mulčenje in obdelava strnišča omogočajo neposredno uničevanje rastlin ambrozije in zmanjšujejo število rastlin na zemljišču. Številni kmetje ne želijo preorati strnišč takoj po žetvi temveč čakajo na jesen. To omogoča razvoj semen ambrozije, strnišča so pomemben vir semen tega plevela.

V novejšem času se ambrozija širi tudi na višje nadmorske višine.

Glede na to, da je ambrozija škodljiv plevel in vir močnega alergena je treba posebno pozornost usmeriti na preprečevanje njenega razširjanja in zniževanje števila osebkov v obstoječih populacijah. Poznavanje morfologije, ekoloških razmer, vegetacijskega cikla in načinov širjenja ambrozije so osnove za uspešno preprečevanje rasti in širjenja ambrozije.

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