# REVIEW OF THE SPREADING OF *HALYOMORPHA HALYS* IN ITALY AND CONFIRMATION OF PRESENCE IN ROMANIA

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***Abstract.*** *The insect known as the marmorated stink bug (Stal, 1855) is part of the Hemiptera order and of the Pentatomidae family. At present, it has become extremely well known in Europe, due to its expansion capacity, both as a surface of ecosystems or agro-ecosystems and as a host plant range. The place of origin is in Asia, from where it has grown rapidly throughout the world. A current spreading picture on the globe shows some extended widespread having limits between latitudes of 75˚N and 55˚S. It is present in the most diverse climatic conditions, from tropical and sub-tropical areas to cold temperate zones. Host plants are among the most diverse crops (corn, soybean), vegetables, fruit trees, orchards in ornamental plants. By this paper we have proposed to look for the cause of enlargement and found that in Europe the expansion was made from the west to the east but without a concrete cause nor the climatic conditions, nor the present plants are not certified factors to justify the extremely rapid spread. In the two countries analyzed, Romania and Italy, the only factor is sitting around the latitude of 45˚N, because the climate conditions are diverse (from the Mediterranean climate to the temperate continental climate). The adult samples analyzed in September and October 2018 and previously collected showed a variable body length between 13.9 and 15.5 mm. There was no color variation among individuals. The proportion of males was higher in samples (60%). Considering the above, limiting enlargement to Europe should be one of the current concerns given the rapidity it is spreading, finding favorable conditions in the European climate.*

***Keywords****: Halyomorpha halys, insect, spread, recognition, Italy, Romania.*

## INTRODUCTION

The species *Halyomorpha halys*, native to Asia, has been present in Europe since 2004, in Switzerland (HAYE ET ALL., 2013; RAPORT EPPO, 2016) and is considered relatively new for the countries analysed in this paper. Later, it also appeared in other European countries (Germany, France, Italy, Greece, Hungary, Romania), especially with the eastern direction (CALLOT AND BRUA, 2013; MAISTRELLO, 2014; VETEK ET AL., 2014; MILONAS AND PARTSINEVELOS, 2014; MACAVEI ET AL, 2015).

In Italy, the first appearance was reported in autumn of 2012 in the north, more precisely in Emilia Romagna region (MAISTRELLO, 2014; RICCUCCI AND MAISTRELLO, 2016). From this first point in Italy, the insect has gradually expanded into other provinces (regions of Italy) such as Tuscany, Marche, Latium, Abruzzo, Campania, Apulia, Lombardy, Piedmont, Veneto, Sicily (MICHELE ET AL., 2014; CIANFERONI AND CECCOLINI, 2016; MASSIMO ET AL., 2016; RAPORT EPPO/19, 2016; CARAPEZZA AND VERDE, 2017).

In Romania, the insect has come to attention relatively recently, 3-4 years ago, when officially reported in a region in the Center of the country (MACAVEI ET AL., 2015). After 2015, the insect spread to other southern, southeast and western areas (CICEOI ET AL., 2017, GROZEA, 2018).

It is a harmful species in crops, which feeds intensely on vegetables, soy, corn and fruit. In Italy, in 2015 species grew great problems through the damage produced in a peri

plantation (MASSIMO ET AL., 2016). In Romania, it was frequently seen eating tomatoes (baked fruits) apples and kiwi (RICCUCCI AND MAISTRELLO, 2016) or ornamental flowers (GROZEA, 2018) and sometimes in goji plantations (CICEOI, 2016).

Through this work we intend to bring to mind an extremely important species through the rapidity with which it expands, adapts and which is common to many European countries.

## MATERIAL AND METHODS

The research, both in the literature and its own contributions (Table 1), by updating the spreading information and morphological findings of the adult form of *Halyomorpha halys*, were mostly done in Laboratory of Diagnosis and Expertize Phytosanitary from BUASVM *King Michael I of Romania* Timisoara, Romania (Figure 1).

Figure 1. Detailed observations on the binocular magnifier on insects by *Halyomorpha halys* collected from wintering areas (work was made in the Diagnosis and Expertize Phytosanitary laboratory from BUASVM Timisoara, Romania)

Part of the referential studies were analyzed in the university library mentioned above (Table 1). To a large extent, the use of electronic bibliographic sources has been of great help in drawing up spreadsheet schemes in the two countries.

*Table 1*

Study materials analyzed in September and October for the development of maps and morphological contributions

| Reference from the library | Electronic sources | Specimens (of insects) collected | Specimens / insects analyzed |
|---|---|---|---|
| 11 | 20 | 25* | 15 |

*only adult form of *Halyomorpha halys*

The samples were collected from the wintering areas by macroscopic observations, without any prior searching of certain habitats. Simply these specimens were observed going through the University Park, on the start of leaves fallen on the ground. Their collection was done in closed glass jars with a cover and then went to the laboratory for identification and morphological study.

The study was short (September and October) with the use of photos released in August by a co-author of this work and involved analyzes only during 2018.

## RESULTS AND DISCUSSION

**About the spread of the species**. Analyzing the enlargement references, we found that *Halyomorpha halys* had quite large boundaries set at a northern latitude of 75 degrees and a southern latitude of 55 degrees (Figure 2). A large amplitude of expansion zones also means a possibility to adapt to various climatic conditions, from the warmest to the coldest. We cannot say exactly what you prefer hot, temperate or cold areas. One thing is certain, most of the areas in which it is present are in temperate areas, as is Europe. The first point of occurrence (Figure 2) is in Asia (China), where the climate is extremely varied, from tropical, subtropical to cold and temperate temperatures. Perhaps this is the explanation for the large variety of areas in which it is located and it seems that *Halyomorpha halys* is expanding.

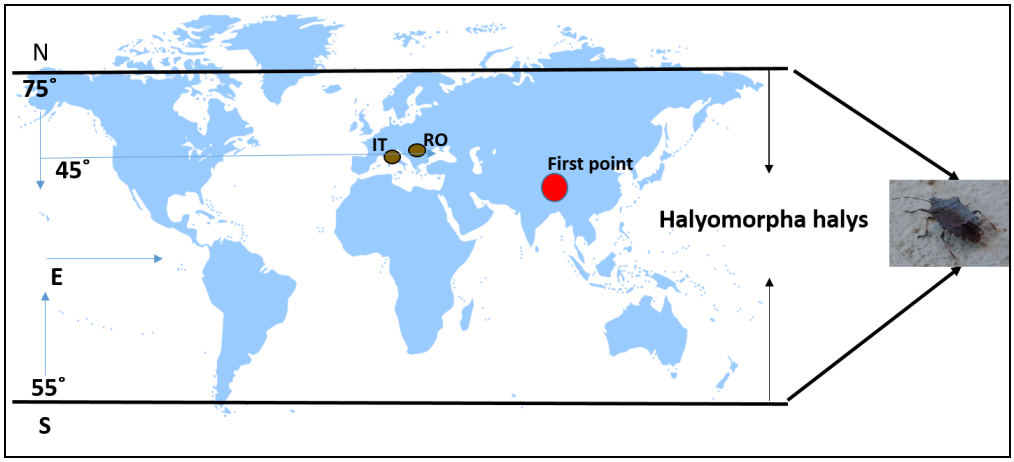


Figure 2. The spreading limits of the species *Halyomorpha halys* between 75˚N and 55˚S (original representation on the map in the public domain); Photo of insect by Grozea, 28 September, 2018

In Italy the species ranged across the country, presently being present in the north but also above, as well as the central areas (Figure 3). If we analyze the specific climate, the Mediterranean climate prevails, but in the northern areas it is colder than in the southern ones. However, the insect is present both in the south and in the north.

In Romania, the situation is similar to the fact that the species was discovered later and is not yet present in all areas of the country. If we look at the points on the map in Figure 3, it can be seen that *Halyomorpha halys* is present everywhere except for the northern area. With the ability to expand, it is only a matter of time that it will expand in this area. The specific climate of Romania is temperate continental and it seems that the species found excellent conditions as long as in a very short period of 3-4 years covered almost the whole country.

Both European countries analyzed from the point of view of the species present are located around the 45˚N latitude (Figure 2), so it can be concluded that this coordinate may constitute an area where the species grows in excess.

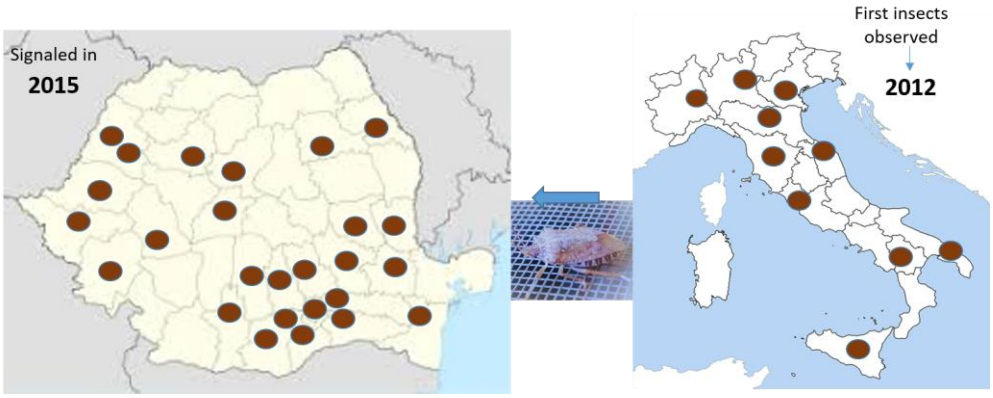


Figure 3. The presence of the species *Halyomorpha halys* in Italy and Romania (points marked on maps in the public domain, based on information from the literature and personal observations); Photo of insect by Grozea, 4 October 2018

**About the morphological identifying of the species**. Out of the 15 specimens (which were collecting in time of preparing for wintering) analyzed we found that 9 were males and 6 were females. The specimens ranged between 13.9 – 15.5 mm.

Body shape is flattened as well as other pentatomide species. The color of the font is a mixture of brown with violet and small light points. On the lateral sides (pronounced) there are 5 uniform white spots, very visible from a distance. Scutellum is well-acclaimed but does not differ in color from the rest of the body. The antennas have brown segments alternating with white segments. The legs are brown with white tarsum.

Figure 4. *Halyomorha halys* as an adult form to help identify her in the areas where it was observed (heading for the winters); Photos by Grozea, 10 August 2018 (left) and 4 September 2018 (right)

## CONCLUSIONS

The species *Halyomorpha halys* is one of the most current and invasive insects in Europe. It has a broad spread spectrum with very large expansion potential in almost all regions of the world. It cannot be concluded whether climate conditions are responsible for this expansion, but probably the food present in an area may be the cause that can ensure survival and expansion. Limiting enlargement to Europe should be one of the current concerns given the rapidity with which it is spreading, finding favorable conditions in the European climate.

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