The Attack of *Aesculus hippocastanum* L. by *Cameraria ohridella* Deschka and Dimic (Lepidoptera: Gracillariidae) in Greece

Nikolaos Avtzis[1] *and Dimitrios Avtzis*[2]

[1]Technological Educational Institute of Kavala Dep. of Forestry in Drama, 66 100 Drama-Greece
[2]Std. at the Dept. of Forestry, Aristotelian University of Thessaloniki, Greece

Abstract

The horse chestnut leaf miner *Cameraria ohridella* is a relatively new insect in Europe, which was first observed at Lake Ohrid in 1984. Within the framework of the European Community Project "Controcam", in which Greece participates through the TEI of Kavala, Department of Forestry in Drama, we attempted for the first time to study the bio-ecology as well as the spread of this pest in Greece.

By using pheromone traps and visiting different areas with the technical support of the Greek Forest Service, it was possible to reach the following conclusions:

1. *C. ohridella* has at least three generations per year and there is a possibility for a fourth generation
2. It attacks horse chestnut when it occurs as natural stands of trees but it may also infest horse chestnuts that are grown in artificial plantings.
3. *C. ohridella* has not been detected attacking *Acer* species in Greece.

Key words: *Cameraria ohridella*, *Aesculus hippocastanum*, Greece, spread, pheromone traps, *Acer*-host plant

The horse chestnut leaf miner (*Cameraria ohridella)* was observed for the first time in Europe in 1984 when it was reported attacking horse chestnut trees at Lake Ohrid (Simova-Tosic and Filev 1985). In 1986, the leaf miner was identified by Deschka and Dimic as *Cameraria ohridella*, using the name of the area where it was first discovered. In 1989, the insect was observed in Central Austria, about 1000 km north of the first point of attack (Puchberger 1995). Apparently the spread of *C. ohridella* into Central and Eastern Europe occurred very rapidly (Freise and Heitland 1999); it was reported in Germany (Butin/Führer 1994), Hungary (Szaboky 1997) in Czech Republic (Liska 1997) and Slovakia (Sivicek et al. 1997). The spread of this insect in Greece was very slow, probably because of the limited distribution of *Aesculus hippocastanum* (Skuhravy 1999).

Materials and Methods

Within the framework of the European Community Project named "Controcam," in which Greece participates through the Department of Forestry of the Technological Educational Institute of Kavala, we attempted for the first time to study the spread as well as the bio-ecology of this particular leaf miner in Greece. Prior to the start of the "Controcam" Project, the unique information known about the status of *C. ohridella* in Greece was about the appearance of *C. ohridella* on two *A. hippocastanum* ornamental trees at the mountain Pelion in Central Greece (Longitude: E 23° 04. 459, Latitude: 39° 20. 810, Altitude: 605 ml) in1998 (Skuhravy, 1999). In order to satisfy the needs of the Project mentioned above, we initiated a systematic study of this insect in Greece.

Development-Number of Generations

In order to study the development of *C. ohridella* and to determine the number of generations per year, 10 "Delta" traps were set out during the first ten days of April 2001 at Grevena (Central Greece). Traps were placed in the lower crown of 10 *A. hippocastanum* that were growing along a stream at an altitude of 845 meters (Longitude: E 021° 12. 060, Latitude: 39° 58. 073). The

pheromone dispenser was produced at the Institute of Organic Chemistry and Biochemistry, Academy of Sciences of the Czech Republic.

Observations during the first season (2001) started at the beginning of April and finished at the end of September. During this period of observations the dispenser of every trap was changed every fourth week.

Every observation lasted 24 hours. That means that at the beginning of every observation every Delta trap received a new sticky bottom, which was removed the next day, exactly 24 hours after its installation.

In that way the number of the captured moths during the 24-hour observation period provided information about the flight period of the adults as well as the fluctuations of their population intensity.

The dispenser was changed every fourth week and the period of observation lasted for 24 hours. This means that at the beginning of every observation every trap receives a new sticky bottom, which is removed the next day, in exactly 24 hours. Observations took place on the same trees in the same area (Grevena) during 2002.

Spread

The spread of *C. ohridella* in Greece was studied by visiting locations throughout Greece with the assistance of the local Greek Forest Service. Information including photographs and leaf samples were collected from each location for further analysis. This work was conducted in 2001 and in 2002.

Host plants

A number of samples were taken monthly at the area of Grevena and Karitsa (Longitude: E 022° 45. 971, Latitude: 39° 48. 785, Altitude: 705 m), in order to search for evidence of infestation among the different *Acer* species. These obseravtions began in 2001 (April-October) and were repeated in 2002.

The search was conducted in areas adjacent to heavily infested horse chestnut trees and included leaf sampling of the following *Acer* species:

1. *Acer obtusatum* (Grevena)
2. *A. monspessulanum* (Grevena)
3. *A. campestr*e (Grevena)
4. *A. platanoides* (Grevena)
5. *A. pseudoplatanus* (Karitsa)

Results and Discussion

The pheromone trap data indicate that *C. ohridella* has three generations per year at Grevena (Fig. 1).

This result agrees with published literature which suggests that *C. ohridella* has 3-5 generations per year (Deschka and Dimic 1986, Pschorn-Walcher 1994, Skuhravy 1999). Based on observations during the two years (2001-2002), the periodicity of moth capture was similar during the first generation in early May and the second generation that peaked in early July.

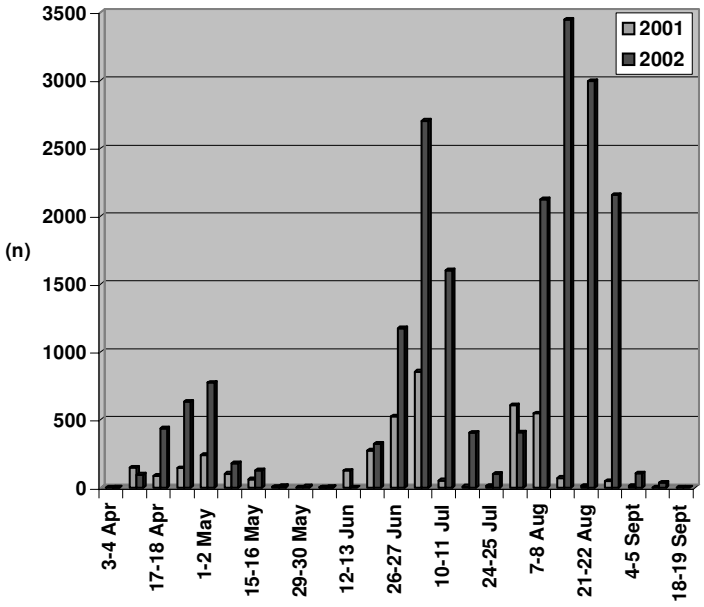

Figure 1.—Total number of captures of *C. ohridella* from ten pheromone traps at Grevena

However the peak flight period for the third generation in 2002 was delayed by approximately two weeks.

The explanation for the approximately five times greater number of insects captured in 2002 (19,828 moths) as compared to 2001 (3,938 moths) may be related either to the weather conditions or to the complex of natural enemies that occurred at the observation sites. Both of these parameters will be investigated in future years at Grevena.

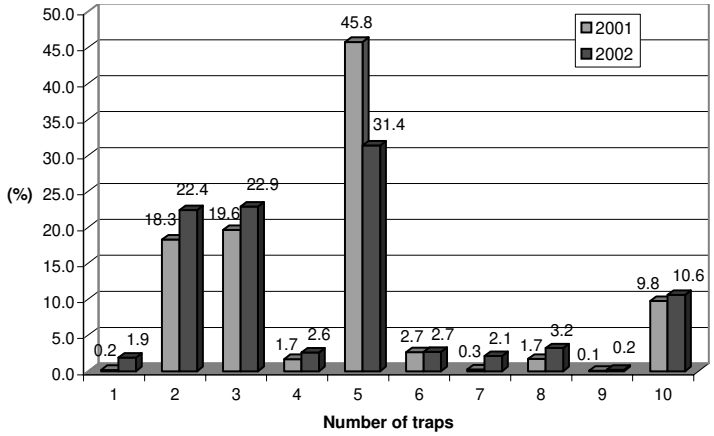

Figure 2.—Captures (%) of *C.ohridella* from ten pheromone traps at Grevena

There was an observed variation in the number of *C. ohridella* that were captured among the 10 trees at Grevena. In both years, significantly more insects were captured on the same four trees (2,3,5,10) even though all trees were growing under the same site conditions on a line of about 1,800 across the stream (Fig. 2). We have no explanation for this, however we will continue to monitor populations in future years.

For the distribution of *C. ohridella* in Greece, results from two years of observations indicate that the insect occurs at 36 locations. Among the 36 locations, 18 consisted of wild trees/stands and 18 were ornamental plantings. The majority of those sites were located across the main mountain region of Greece on a north-south axis as illustrated in Figure 3. All of the sites occurred at an Altitude of 520 to 1370 meters above sea level, at a Longitude from E 020°51 100 to E 023° 10.444, and at a Latitude from N 38° 37 751 till 40° 50 683.

Observations to date indicate that:

1. The insect attacks wild as well as ornamental horse chestnut trees in parks, gardens and along roads.

2. No difference was observed in the intensity of attacks from *C. ohridella* between wild and ornamental trees. The infestation level after the flight of the adults of the second generation may vary from a few mines per compound leave (0-5%) up to almost complete infestation of leaflets with mines (more than 80% of the photosynthetic area per leave).

3. All the wild *A. hippocastanum* trees, wherever they were found in Greece, were attacked by *C. ohridella*.

It has been suggested that second generation moths of *C. ohridella* may occasionally infest species of *Acer* if there is a shortage of healthy *A. hippocastanum* foliage. Other authors reported development of *C. ohridella* on the leaves of *A. platanoides* and *A. pseudoplatanus* (Krehan 1995, Pschorn-Walcher 1997, Skuhravy 1999). However, we did not find any infestation by *C. ohridella* on *Acer* foliage from Grevena and Karitsa even if the infestation level on the adjacent *A. hippocastanum* trees was very high (more than 80% of the total surface of the leaves). Other authors reported development of *C. ohridella* on the leaves of *A. platanoides* and *A. pseudoplatanus* (Krehan 1995, Pschorm-Walcher 1997, Skuhravy 1999).

So far, *C. ohridella* is not a serious problem in Greece because of the limited presence of *A. hippocastanum.* However this situation may change in the future because in recent years, the horse chestnut tree seems to be one of the most popular species for plantings in parks, gardens and along avenues in many areas of Greece. In order to prevent this problem from worsening in the future, use of the most resistant species (e.g. *carnea*) in plantings should be encouraged.

Figure 3.—Localities in Greece where *C. ohridella* was found attacking *A. hippocastanum* as of September, 2002

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