

CONTRIBUTIONS TO THE BIOLOGICAL AND ECOLOGICAL STUDIES OF THE GRAPE MOTH, *LOBESIA BOTRANA* (DEN. ET SCHIFF.) (LEPIDOPTERA: TORTRICIDAE) IN SOUTHERN VINEYARDS OF ROMANIA

CONTRIBUȚII LA STUDIUL BIOLOGIEI ȘI ECOLOGIEI MOLIEI STRUGURILOR, *LOBESIA BOTRANA* DEN. ET SCHIFF. (LEPIDOPTERA: TORTRICIDAE) ÎN UNELE PODGORII DIN SUDUL ROMÂNIEI

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Abstract. *Biology of Lobesia botrana (Den. et Schiff.) was studied comparative in two vineyards from south of Romania: Ștefănești (AG) and Dăbuleni (DJ). There have been used pheromones traps of atraBOT type and the visual control in vineyards. In Ștefănești, where the climate is temperate, the grape moth has two generations, while in Dăbuleni, a dry and warm region, L. botrana has three generations. The butterflies flight is better noticed in Dăbuleni because of the high and more uniformly temperatures as those in Ștefănești and, subsequently, because of the growth of pest population. The microclimate in Ștefănești, which allows the partial development of third generation of L. botrana in autumn, is the first cause of the fact that the population density is low and, in consequence, the damages are insignificant. Thus, most of the second generation pupae will form second generation butterflies instead of forming winter generation butterflies, in spring. In Dăbuleni are necessary the pest control methods.*

Rezumat. *Biologia moliei strugurilor a fost observată în perioada 1998 – 2002 în două podgorii din sudul României: Ștefănești – Argeș și Dăbuleni – Dolj. S-au folosit capcane cu feromoni de tip atraBOT și s-au efectuat observații în teren. În Ștefănești, unde climatul este temperat, specia Lobesia botrana are două generații complete și o a treia generație incompletă, iar în Dăbuleni, climatul cald și uscat, permite dezvoltarea a trei generații complete. Zborul fluturilor este mult mai bine precizat în Dăbuleni, din cauza temperaturilor mai ridicate și mult mai uniforme față de cele din Ștefănești. Microclimatul din Ștefănești, care permite dezvoltarea parțială a celei de-a treia generații, este principala cauză a faptului că specia L. botrana nu prezintă potențial dăunător în această zonă geografică. Astfel, mare parte din pupele generației a doua vor forma fluturii celei de-a doua generații, în loc să dea naștere fluturilor generației hibernante, ceea ce duce la reducerea populației dăunătorului în primăvară. În Dăbuleni, sunt necesare tratamente de combatere a dăunătorului.*

The biology of the grape moth *Lobesia botrana* has been representing for a long time the subject of many researches, as the result of significant damages produced in Romanian vineyards. Depending on the local climate conditions, the species presents 2-3 generations in Moldavia (Ali, 1982), 3 generations in Dobrogea (Filip, 1986), 3 generations in South Oltenia (Măcărău and colab., 1998) etc. In literature (Bovey, 1966), it is know the preference of this species for the areas with warm and dry climate.

The biological knowledge of this pest allows the efficient control of its population by adequate methods.

MATERIAL AND METHODS

Between 1998-2002, *L. botrana* Den. et Schiff. was identified and observed in two vineyards, each one of 2 ha at the Aligote sort, in Ștefănești vineyard (situated in the South-Central part of Muntenia) and between 2000-2001 in a vineyard of approximate 3 ha at the Roșioară sort in Dăbuleni (situated in the South Oltenia).

There have been used pheromones traps of atraBOT type (1/ha) in order to make the first butterflies coming out obvious, the flight peak, the flight ceasing and the number of generations. The visual control in vineyards allowed the approximate knowledge of the development stages appearance moment, of the damage type, of the attack stage etc. There have been made bioclimograms for the appreciation of adult population biological activity in local climate conditions and there has been calculated the effective temperature sum (Săvescu and Rafailă, 1978).

There has been calculated the attack frequency, according to the relation $F(\%) = \frac{n}{N} \times 100$, where n is the attacked organs number, and N is the observed organs number (Săvescu and Rafailă, 1978; Galet, 1982).

RESULTS AND DISCUSSIONS

A. Biological cycle

It was established the biological cycle of this species on the climate conditions of these two regions (Fig. 1 and 2).

During the observations period, in Ștefănești, the butterflies of the winter generation appear in the second or third decade of April, when the medium daily temperatures are above the biological inferior edge ($t = 12^{\circ}\text{C}$) and after accumulating the sum of corresponding effective temperature. In Ștefănești, the earlier emerging was registered on 11.04.2001. In Dăbuleni, during 200-2001, the butterflies appeared on 12.04.2000 and on 08.04.2001 (table 1).

As for the sum of the effective temperature necessary for the appearance of the first butterflies, we have noticed that its value is depending on the thermal conditions in spring, but also on the thermal condition in last autumn (table 1).

In Ștefănești, the flight of the butterflies from winter generation is long, starting from the last half of April, in May and June, without existing a clear delimitation from the flight of first generation butterflies; in Dăbuleni it takes place in April and May, being will separate from the next flight (Fig. 3 and 4). The flight peak was registered during observations period the earliest on 27.04.2001 and the latest on 10.05.1999 at Ștefănești, and in Dăbuleni on 19.04.2000 and 09.05.2001.

According to Galet (1982) the larvae development takes place in Central Europe vineyards, from middle or end of May till end of June or beginning of July. In Ștefănești conditions, the larvae development produces in May, June, and in cold years, as for example 1998, in the first half of July; in Dăbuleni, the larvae development takes place in May and the first half of June.

In Ștefănești, the nymphosis takes place in the last part of June and in the first part of July, while in Dăbuleni, in the first and second decade of June, depending of the yearly climate conditions.

The flight of first generation butterflies starts in Ștefănești in the last half of June, beginning of July and is continued in July and August; the flight peak is reached at the first half of July. In Dăbuleni, the second flight takes place in June and the first half of July, with a flight peak in the second or the third decade of June. The second generation larvae will appear in July and August in Ștefănești, in the last half of June and in July in Dăbuleni. Pupae will appear in Ștefănești, starting with August and in Dăbuleni in the last half of July and the first of August.

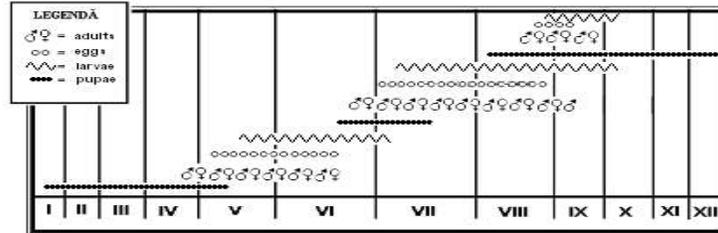


Fig. 1 -Biological cycle of *Lobesia botrana* Den. et Schiff. in Ștefănești-Argeș (original)

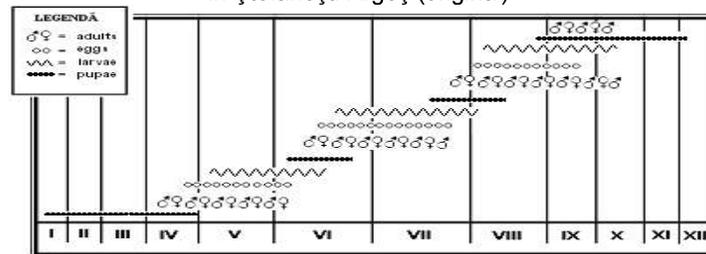


Fig. 2 – Biological cycle of *Lobesia botrana* Den. et Schiff. in Dăbuleni-Dolj (original)

Table 1

Date regarding the first *L. botrana* butterflies appearances in the phemone traps

| Locality | Year | Appearance date of first butterflies | Sum of effective temperature until appearance of first butterflies (°C) |
|------------|------|--------------------------------------|---|
| Ștefănești | 1998 | 20.04 | 39°C |
| | 1999 | 28.04 | 17,2°C |
| | 2000 | 14.04 | 11,9°C |
| | 2001 | 11.04 | 7,4°C |
| Dăbuleni | 2000 | 12.04 | 29,2°C |
| | 2001 | 8.04 | 18°C |

During all five years of observations in Ștefănești we noticed the third flight, more intensive in 2001 (Fig.3), but not with appropriate conditions to a complete development of the third generation.

According to Komarova's researches in 1949 (in Bovey, 1966), the generations number is conditioned by photoperiod, a pupae diapauses appearing if the day lasts under 12 hours. Geoffrion (1970) notices that in Loire Valley (France),

the third flight appears only when the conditions allow the early appearance of second generation butterflies and egg position takes places in July. During study period, the third flight began during August, the maximum flight taken place according to yearly climate conditions, in the second and third decade of August and even in September (Fig. 3).

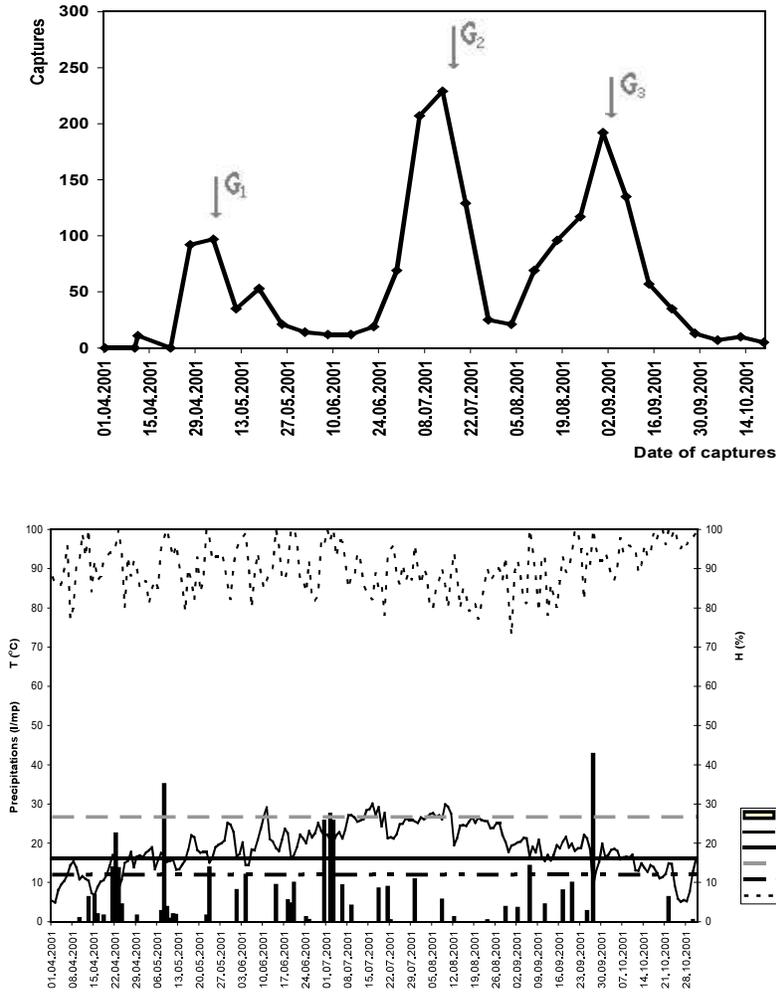


Fig. 3 - The bioclimogram of *Lobesia botrana* species in Ștefănești

As in Ștefănești, during the observation period, the temperatures in August and September during the flight are not sufficient for a complete development of a generation; the egg position should have taken place at the end of July, as mentioned by Geoffrion, situation not encountered.

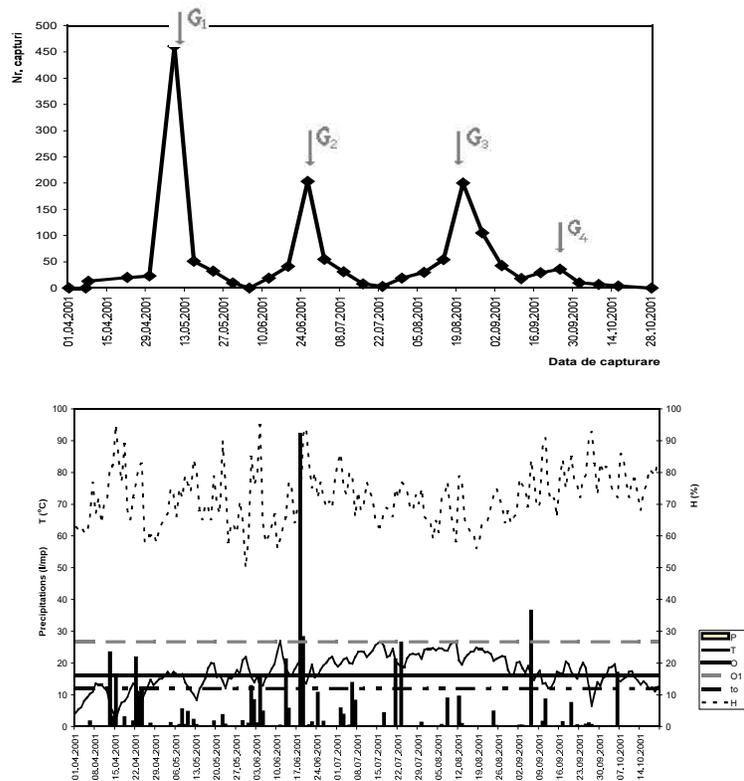


Fig. 4 -The bioclimogram of *Lobesia botrana* species in Dăbuleni

Because of the longer flight of first generation butterflies, in the last half of August and in September, second generation mature larvae and third generation young larvae are encountered.

In Dăbuleni, the third flight begins at the end of July and because of high temperatures of August (Fig.4), continuing to lower intensity till the end of September or the beginning of October. In 2001 in Dăbuleni we could notice a fourth flight, but reduced in intensity (Fig. 4) The second and third generation larvae are the most damaging, and in the wetting autumns they make conditions for development of *Botrytis cinerea*.

B. The attack frequency

Ștefănești

In 2000-2002 we observed the attack of *L. botrana* first and second generation larvae (table 2). We noticed small values of the attack even the years in which the treatments were absent. The reason is the small population of this pest.

Dăbuleni

In this south region, the Mediterranean climate, favorable to the development of pest, determined the increase of population and a lot of pest control methods have been used (Măcărau and co., 1998). In 2000 and 2001 we observed the attack of *L. botrana* larvae in the vineyard with three series of treatment (table 2).

Table 2

The attack frequency of *Lobesia botrana* (Den. et Schiff.) larvae

| Dăbuleni | | | | | Ștefănești | | |
|---------------------|------|-------------------------------|----------------|----------------|------------|---------------------------|----------------|
| Treatment | Year | The attack frequency F (%) | | | Year | The attack freq. F (%) | |
| | | G ₁ | G ₂ | G ₃ | | G ₁ | G ₂ |
| Reldan 40 0,125% | 2000 | 2,1 | 0 | 1,7 | 2000* | 5,1 | 3,7 |
| | 2001 | 2,3 | 2,2 | 3,2 | | | |
| Dipel WP 0,1% | 2000 | 3,3 | 1,8 | 1,7 | 2001 | 2,3 | 3 |
| | 2001 | 2,5 | 3,4 | 3,1 | | | |
| Foray 0,1% | 2000 | 4,1 | 1,3 | 1,3 | 2002 | 3,4 | 1,2 |
| | 2001 | 3,2 | 4,7 | 4 | | | |

) treatments with pesticides

We noticed low frequency of attach at Roșioară sort and this is because of the treatments done in the three larvae generations. The most efficient pesticide is Reldan 40 EC 0,125%, followed by Dipel WP 0,1%.

CONCLUSIONS

In Ștefănești, with temperate climate, *Lobesia botrana* has two complete generations and a third, incomplete, and in Dăbuleni, the hot and dry climate permits the development of a third complete generation.

The sum of effective temperature necessary the appearance of winter generation butterflies in spring depends on climate conditions of last autumn. The butterflies flight is better noticed in Dăbuleni because of the high and more uniformly temperatures as those in Ștefănești and, subsequently, because of the growth of pest population.

The microclimate in Ștefănești, which allows the partial development of third generation of *L. botrana* in autumn is the first cause of the fact that the population of these species remains reduce and doesn't present a damaging potential. Thus, most of the second generation pupae will form second generation butterflies instead of forming winter generation butterflies in spring.

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