

THE EFFECT OF CLIMATE ON POPULATIONS OF GRAPE MOTHS IN THE VINEYARD STEFANESTI-ARGES

Daniela BĂRBUCEANU¹

¹University of Pitești, Faculty of Sciences, Department of Biology, Târgul din Vale Street no. 1, 110040, ROMANIA, tel. 0248218477, fax 0248216448, e-mail daniela_barbuceanu@yahoo.com,

Abstract. In the period 1998-2003, in the vineyard Stefanesti-Arges, observing was carried out, with the help of pheromone traps, of the population of grape moths, *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Den et Schiff. The different climatic preferences of both species, establish that, in accordance with the yearly conditions, one of the two species is dominated by the other. The year 1998 is the only year when the percentages of captures of the two species are nearly: 57% - *L. botrana* and 42,89% - *E. ambiguella*, while in 1999 is the only year when *E. ambiguella* dominated in number the species *L. botrana* - 66,28%. For meeting this situation it needed two years of consecutives optimum climate for the activity of species *E. ambiguella* (like the year 1998 and 1999). In the period 2000-2003, the species *Lobesia botrana* was dominated by *E. ambiguella*, but as a result of very raised temperatures of summers of years 2000, 2002 and 2003, the population of *L. botrana* diminished very much and there was no need for fighting back treatments.

Key words: *Eupoecilia ambiguella*, *Lobesia botrana*, pheromone traps, climatic preferences

INTRODUCTION

Yearly and local climate conditions influence the number of generations and the populations level of the two moths species.

Schmid and Antonin (1977b) point out the fact that in Sweden in years with high temperatures, *L. botrana* had three generations, and her population enlarged, while *E. ambiguella* had two generations and the population was reducing. Moreau and Vinet in 1924 (Galet, 1982) observed that the temperatures higher than 40°C and 41°C interrupt the coming out of butterflies *E. ambiguella* in the period of intense flying, and they are acting on crysalides. The droughty years favor the activity of the species *L. botrana* and a substitution of species *E. ambiguella* by *L. botrana* is expected. Otherwise, *E. ambiguella*, after Feyard, in 1991 (in opinion of Galet, 1982) affect damp vineyards, uncovered and she develops in the cold and rainy years. Bovey (1966) presents the species *E. ambiguella* as dominant in the north viticulture regions, while *L. botrana* replaces that in meridional vineyards.

MATERIAL AND METHODS

In the period 1998-2003, *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Den. et Schiff. were identified and noticed in some vineyards as part of vineyard Stefanesti- Arges, of races Chasslas (*E. ambiguella*) and Aligote (*L. botrana*), on surfaces of 5 ha (each species). In the period 2000-2003, in those vineyards treatments were not applied for fighting the grape moths. Pheromone traps, type atraBOT and atraMBIG, were used, (one trap/ 1 ha) to distinguish the flying curve for both species and the level of populations (Isac, 1989). For surprising better the effect of temperature on population of both moths, starting from biological inferior limit, the same for both species, the average of effective temperature was calculated in locality Stefanesti on a long period of time: 1990-2003 (Săvescu and Rafailă, 1978). Dates of Sprengel (1931) were concordant with the activity of species *E. ambiguella* for optimum temperatures higher than 20°C and relative damp of 40-70%.

RESULTS AND DISCUSSIONS

From thermal stand-point, the period 1990- 2003 can be delimited in two:

- a. The period 1990-1999, characterized by temperate temperatures, the average of temperature effective for this species being placed in the interval 1124-1296°C. As exception are the years 1994 with 1436,2°C and 1997 with only 884,3°C (table 1). In 1994 the highest value is due to temperature of month September which lead to an average of temperature effective 285,2°C while in the year 1997 small values were recorded in the months April, August and September.

Table 1. The average of effective temperature [$\Sigma(t_n - t_0)$] of species *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Den. et Schiff. in Ștefănești ($t_0 = 12^\circ\text{C}$)

Year	Temp.	Month								
		March	April	May	June	July	August	September	October	November
1990	Partial	33.4	26.5	136.5	229.5	318.7	300.1	130	52.5	
	Cumulative	33.4	55.9	196.4	425.9	744.6	1044.7	1174.7	1227.2	
1991	Partial	4	2.5	61.2	251	331	245.4	156.9	72.6	
	Cumulative	4	6.5	67.7	318.7	649.7	895.1	1052	1124.6	
1992	Partial	6.6	41.3	107.3	232.9	237.2	387.9	129.3	38.3	
	Cumulative	6.6	47.9	155.2	388.1	625.3	1013.2	1142.5	1180.8	
1993	Partial	10	16.2	157.5	249.9	297.8	282.8	134.5	83.5	
	Cumulative	10	26.2	183.7	433.6	731.4	1014.2	1148.7	1232.2	
1994	Partial	11	39.8	166.1	246.7	320	330.4	285.2	37.1	
	Cumulative	11	50.8	216.9	463.6	783.6	1114	1399.2	1436.2	
1995	Partial	-	35.3	95.1	249	334.9	277.9	108.2	32.1	
	Cumulative		35.3	130.4	379.4	714.3	992.2	1100.4	1132.5	
1996	Partial	-	37.4	228.5	280.5	290	269.5	59.4	15.2	
	Cumulative	-	37.4	265.9	546.4	836.4	1105.9	1165.3	1180.5	
1997	Partial	-	0.1	139	225.1	240.3	208	58.1	13.7	
	Cumulative	-	0.1	139.1	364.2	604.5	812.5	860.6	884.3	
1998	Partial	-	43.4	119	252.5	325.2	335.5	100.4	38	
	Cumulative	-	43.4	162.4	414.9	740.1	1075.6	1176	1214	
1999	Partial	-	23.6	122.8	283.9	355.8	284.1	174.9	50.9	
	Cumulative	-	23.6	146.4	430.3	786.1	1070.2	1245.1	1296	
2000	Partial	0.2	82.3	181.7	290.9	336.3	355	106.9	30.5	
	Cumulative	0.2	82.5	264.2	555.1	891.4	1246.4	1353.3	1383.8	
2001	Partial	3.1	15.9	148.2	178.8	319	335.2	124.5	63.8	0.5
	Cumulative	3.1	19	167.2	346	665	1000.2	1124.7	1188.5	1189
2002	Partial	11.1	31.6	192.7	288.5	395.5	265.1	133.9	12.1	
	Cumulative	11.1	42.7	235.4	523.9	919.4	1184.5	1318.4	1330.5	
2003	Partial	-	16.1	261.2	306.3	316.6	354.8	114	30.7	
	Cumulative	-	16.1	277.3	583.6	900.2	1255	1369	1399.7	

b. The period 2000-2003 characterized by higher temperatures, the average of temperature effective is placed in interval $1339,5^\circ\text{C}$ - $1399,7^\circ\text{C}$ excepting the year 2001 with 1189°C . The reproof done in the period 1998-2003, synthesized in the table 2 and figure 1, remarks the fact that in accordance with yearly climate conditions, one of this species will be more numerous than the other, because of different climate preferences. In the year 1998 it was noticed that *E. ambiguella* presents a percentage of captures near *L. botrana*, 42,89% this year being good in point of climate for the activity of first specie. The more reduced captures of *E. ambiguella*, in comparison with *L. botrana*, in 1998 is due to the presence of a larger population of *L. botrana*, in the previous years (in 1996 and 1997 the collections proved the presence of more *L. botrana* larvae). *E. ambiguella* dominated with a percentage of 66,28% in year 1999, year which was characterized by moderate temperatures and moisture over 70%. Then, if the first flying recorded a maximum of 28 butterflies, on second flying the maximum was 163 butterflies. In exchange, the species *L. botrana* presents on the first flying two maximum and on the second flying the maximum was only 20 butterflies (figure 2).

Table 2. Comparative values of moth captures *Lobesia botrana* and *Eupoecilia ambiguella*, in Ștefănești

Year	Values of captures			
	<i>Lobesia botrana</i>		<i>Eupoecilia ambiguella</i>	
	Average	%	Average	%
1998	353	57.11	265	42.89
1999	235	33.72	462	66.28
2000	1069	77.97	302	22.03
2001	1782	75.89	566	24.11
2002	1140	90.48	120	9.52
2003	305	95.02	16	4.98

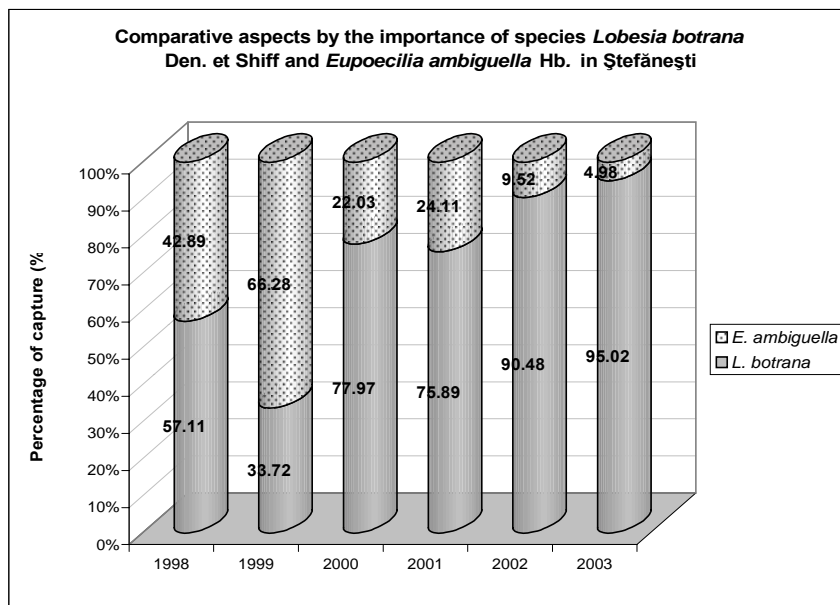


Fig. 1

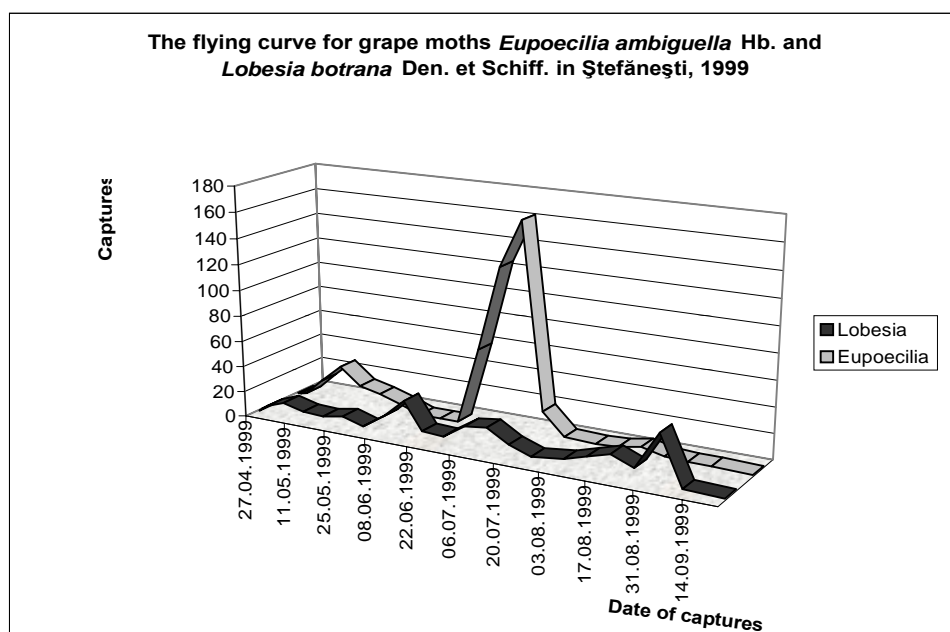


Fig. 2

In the year 2000 characterized by a very raised temperate condition and a small moisture, the population of *E. ambiguella* was reduced again to 22,03%. Otherwise the higher temperature of the summer affected also the second flying of butterflies *L. botrana*.

In the year 2001 with a normal temperate condition and raised moisture were favorable for both species. The value of captures of *E. ambiguella* was almost double and it doubled compared to 2000 (table 2).

In the year 2002 the raised temperatures and the little moisture affected earnestly the value of capture *E. ambiguella* (figure 3), and in the year 2003 these were considerably reduced, the species being neglectful in vineyard Stefanesti (table 2).

The negative influence of raised temperatures and little moisture has been manifesting on the population *L. botrana* which was considerably reduced in the last two years.

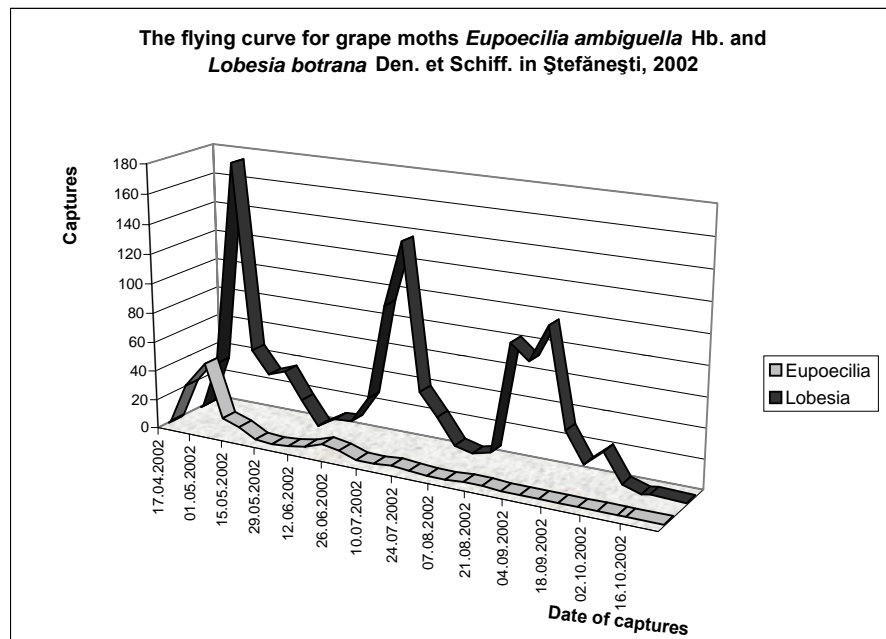


Fig. 3

The effect of raised temperatures and little moisture on the flying of both species in these observations is better reflected in dates gathered in the year 2002 in locality Ștefănești (figure 3). In conditions of this year, while at *L. botrana* the three flying were properly marked (although the second two flying had small values), at *E. ambiguella* drastic reduction of the second flying were ascertained which continued with very small values during the months of July and August.

CONCLUSIONS

As part of vineyard Ștefănești-Arges the different climatic preferences of both species, *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Den. et Schiff., it was determined that with yearly climatic conditions, one of the two species was dominated by the other.

In the period 1998-2003, 1999 was a single year when *E. ambiguella* dominated in number the species *L. botrana*. For meeting this situation it required two years optimum from climatic point of view for the activity of species *E. ambiguella* (for instance the years 1998 and 1999). The microclimate of vineyard Ștefănești -Arges was favorable for the increase of species *L. botrana*. The raised temperatures of summer of years 2000, 2002 and 2003 had a negative action on the population of *L. botrana* which was diminished to much in the absence of treatments for fighting the moth.

BIBLIOGRAPHY

- Bovey, P., 1966 – Super-familie des Tortricoides. În Balachowsky, A.S., Entomologie Appliquee a l'Agriculture, Tom II: Lepidopteres, Ed. Masson & C-ie, Paris, 1: 461-486, 617-631
- Galet, P., 1982 - Les maladies et les parasites de la vigne, Tome II, Montpellier: 1473-1607
- Isac, Gr., 1989 - Tehnologia utilizării feromonilor în viticultură, Lucrări științifice, SCPVV- Ștefănești, Argeș: 293-298
- Săvescu, A., Rafailă C., 1978 - Prognoza în protecția plantelor, Ed. Ceres, București
- Schmid, A., Antonin, P., 1977b – Effects of the exceptional weather conditions in 1976 on the development of grape moths. The distribution of the two species *Clysia ambiguella* and *Lobesia botrana* in French Switzerland, Revue suisse Vitic. Arboric. et Hortic., 9 (3): 131-135
- Sprengel, L., 1931 – Epidemiologische Forschungen über den Traubenwickler, *Clysia ambiguella* Hubn. und ihre Auswertung für die praktische Grossbekämpfung. Zeitschrift für Angewandte Entomologie, 18:505-530