

ASPECTS REGARDING THE INFLUENCE OF CLIMATIC FACTORS IN DYNAMIC EVOLUTION OF SOME PESTS SPECIFIC TO APPLE CULTURE FROM M R CINENI AREA BETWEEN 2014-2015

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ABSTRACT

*In 2014 and 2015, during the researches, was evidenced the direct influence of meteorological parameters variation on the eco-biology of the pests analyzed in this paper: *Cydia pomonella*, *Phyllonorycter blancardella* and *Quadraspidiotus perniciosus*.*

For instance, the temperature variation between 2014 and 2015, in the same date range, led automatically to the accumulation of different degree amounts until the same date. In these conditions, the same stage in the life cycle of a pest, appeared at different data in the two years, considering the first capture, or the adults fly period (start, maximum and end), in the successive generations.

INTRODUCTION

Knowing the biology of each pest and changes therein due to varying weather parameters is an important aspect in monitoring them. Continuous observation of this aspect helps us to take the most right decisions about the pests control in the apple culture, in each plant phenophase.

New data regarding the dependence of main pests eco-biology from apple culture to climatic conditions are brought every year by many researchers. Using pheromones traps and the latest monitoring stations improved the track of pests activity, thus establishing the best moments for the insecticides treatment application.

In Romania, studies regarding using pheromones in monitoring process of *Cydia pomonella* are found in the paper published by Sumedrea et. all., 2012. Also, studies regarding the ways of capture and control for *Cydia pomonella* are detailed in paper elaborated by Drosu S., and colab., 2007, Mitrea I. and colab., 2010.

Data about the influence of abiotic factors on *Phyllonorycter blancardella* development are present in the work paper published by Drosu et. all., 1995.

Aspects on *Quadraspidiotus perniciosus* bio-ecology are mentioned in the paper written by Simeria Gh. and Nicorici M. in 1999. Results regarding warn and combat of this pest were obtained by Belea R. et. all., in 2006, at S.C.D.P. Iași.

MATERIAL AND METHOD

The observations on pests-target behaviour were made during 2014-2015 at ICDPP-M r cineni, area which, climatically, belongs to the second climatic zone, moderately warm, semi-humid.

The annual average temperature is between 8,0 and 10,5°C, solar radiation of 114-128 Kcal/cm², the temperature sum, higher than 0 °C, is between 3400-4100 °C while of those higher than 10 °C is 2800-3500 °C.

The average annual rainfall is between 450-700 mm, in April-October 325-475 mm, in drier years, in the same time, the hydric deficit being of 220-391 mm.

Inside this area, the territory occupies the fourth subzone and subclass of weak hydroclimatic with a hydro climatic index of 91-105 and aridity index of 28-38.

The observations and determinations were done in an apple culture, on Idared variety, trees planted in 1992, at a distance of 3,5 x 2,5 (1842 trees/ha).

Data regarding the adults pests fly at each generation were extracted using WATCHDOG station, dedicated soft and IRFAN VIEW (Freeware).

RESULTS AND DISCUSSIONS

In 2014 the rainfall exceeded the multiannual average, especially during April, May, June and July, while the temperatures were closely to the values recorded in the last years.

Table 1

The evolution of meteorological parameters in 2014

Month	T. max *C	T. min *C	T. med *C	Day* Degree	Cold hours	PP. mm	Leaves humectation h	Wet days	Days with pp.
January	13.7	-15.9	-0.1	2.1	321.3	27.9	0.0	25.0	11.0
February	18.3	-15.2	1.7	6.0	416.0	47.2	0.3	24.0	15.0
March	21.3	-2.7	8.1	45.7	477.3	69.3	6.3	15.0	10.0
April	23.7	1.4	10.9	72.3	342.0	174.3	44.3	24.0	15.0
May	28.3	3.2	14.6	156.0	146.3	156.4	154.3	30.0	19.0
June	30.8	8.2	18.1	242.0	10.0	118.7	167.5	29.0	15.0
July	32.0	10.1	20.8	335.0	0.0	157.8	163.3	30.0	14.0
August	32.8	9.4	20.9	334.4	4.0	34.6	150.8	25.0	5.0
September	27.6	2.7	15.8	187.9	118.8	50.6	124.5	25.0	9.0
October	25.6	0.6	10.5	74.2	326.0	60.2	123.8	28.0	14.0
November	22.7	-3.1	4.7	9.5	481.5	35.2	13.0	27.0	14.0
December	17.9	-21.7	1.1	4.8	37.3	100.5	0.0	24.0	13.0
Total				1469.9	2680.5	1032.7	948.1	306.0	154.0

In 2014 the monthly average temperature was 8.1  C in March, 10.9  C in April, 16.6 C in May and 17.6 in June (figure 1).

In *Quadraspidiosus perniciosus* case, first capture was recorded at 29 April, after 273 day degree calculated. G1 fly had a maxim at 13 May and the end recorded at 02 June.

In G2 case, the fly time was between 05-28 July (table 2).

Tabel 2

Eco-biology of *Quadraspidiosus perniciosus* in 2014

Year	Date	Day degree necessary	Day degree calculated	Event
2014	04 January	0	0	
2014	29 April	269	273	first capture
2014	13 June	368	369	maxim fly G1
2014	02 June	556	563	end fly G1
2014	05 July	962	968	start fly G2
2014	28 July	1304	1313	end fly G2

Specware 9.0 Pro

On 24 March was the first capture for *Phyllonorycter blancardella*. G1 had a maxim fly on 14 April and on 22 May was its end. For G2, the start fly was on 05 June, with a maxim on 30 June. G3 began the fly on 01 August, with the maxim on 13 August (table 3).

Table 3

Eco-biology of *Phyllonorycter blancardella* in 2014

Year	Date	Day degree necessary	Day degree calculated	Event
2014	04 January	0	0	
2014	24 March	97	104	first capture
2014	14 April	183	184	maxim fly G1
2014	22 May	434	441	end fly G1
2014	05 June	590	594	start fly G2
2014	30 June	891	903	maxim fly G2
2014	23 April	1224	1233	end fly G2
2014	01 August	1370	1375	start fly G3
2014	13 August	1571	1575	maxim fly G3
2014	03 September	1854	1856	end fly G3

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For *Cydia pomonella* were recorded the maxim fly for the two generations, these taking placed at 17 May, after 181 day degree calculated respectively 27 July, after 812 day degree calculated (table 4).

Table 4

Eco-biology of *Cydia pomonella* in 2014

Year	Date	Day degree necessary	Day degree calculated	Event
2014	06 January	0	0	
2014	17 May	181	181	maxim fly G1
2014	27 July	817	812	maxim fly G2

Specware 9.0 Pro

The adults fly dynamic for *Cydia pomonella*, in the untreated, is observed in figure 1.

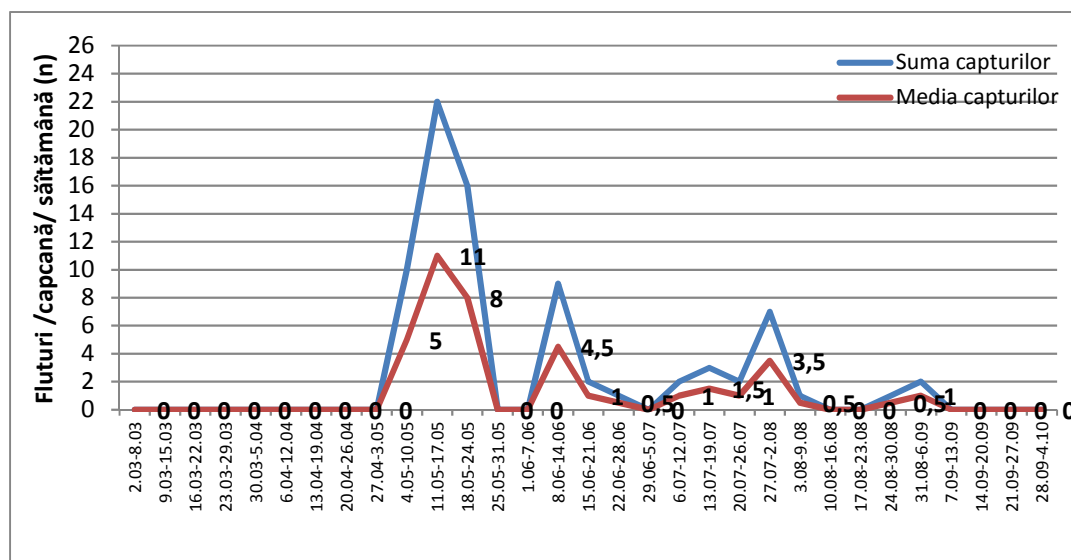


Figure 1. The adults fly dynamic for *Cydia pomonella*, in the untreated, in 2014

In 2015 the average temperature was 5.5°C in March, 10°C in April, 16.7°C in May and 19.1°C in June.

Table 5

The evolution of meteorological parameters in 2015

Month	T. max °C	T. min °C	T. med °C	Day* Degree	Cold hours	PP. mm	Leaves humectation h	Wet days	Days with pp.
January	15.2	-20.9	0.4	1.7	437.8	60.2	0.0	25.0	14.0
February	15.2	-13.3	1	1.7	438.3	36.7	0.3	27.0	14.0
March	18.7	-5.6	5.5	11.5	542.5	73.6	1.5	22.0	12.0
April	25.6	-2.2	10	75.6	346.0	44.8	32.8	17.0	10.0
May	29.1	5.3	16.7	213.4	68.0	42.6	101.0	27.0	8.0
June	32.8	8.2	19.1	272.3	11.3	81.5	112.8	25.0	12.0
July	35.3	9	23.3	399.2	2.3	38.2	61.3	19.0	8.0
August	35.3	10.9	21.5	346.3	0.0	53.5	86.8	17.0	7.0
September	35.3	7.1	18.1	239.3	27.3	204.0	213.8	24.0	12.0
October	22.9	-1.7	9.6	49.2	398.0	59.5	50.0	27.0	17.0
November	21.7	-5.1	6.9	34.4	480.3	98.7	11.8	22.0	11.0
December	19.4	-13.3	2.4	9.4	413.3	1.5	0.0	26.0	5.0
Total				1654.0	3165.1	794.8	672.1	278.0	130.0

For *Quadrasspidiosus perniciosus* first capture was recorded at 06 May, after 274 day degree calculated. G1 fly had a maxim at 16 May and the end recorded at 01 June.

In G2 case, the fly period was between 03-23 July (table 6).

Table 6

Eco-biology of *Quadrasspidiosus perniciosus* in 2015

Year	Date	Day degree necessary	Day degree calculated	Event
2015	03 January	0	0	
2015	06 May	269	274	first capture
2015	16 May	368	371	maxim fly G1
2015	01 June	556	557	end fly G1
2015	03 July	962	975	start fly G2
2015	23 July	1304	1321	end fly G2

Specware 9.0 Pro

First capture of *Phyllonorycter blancardella* took place on 12 April. G1 had a maxim fly at 26 April while on 21 May was its end. For G2, start fly was on 04 June, with a maxim on 27 June, the fly end being on 19 July. G3 began the fly on 26 July with a maxim on 07 August and the end on 26 August (table 7).

Table 7

Eco-biology of *Phyllonorycter blancardella* in 2015

Year	Date	Day degree necessary	Day degree calculated	Event
2015	03 January	0	0	
2015	12 April	97	104	first capture
2015	26 April	183	185	maxim fly G1
2015	21 May	434	436	end fly G1
2015	04 June	590	599	start fly G2
2015	27 June	891	896	maxim fly G2
2015	19 July	1224	1242	end fly G2
2015	26 July	1370	1375	start fly G3
2015	07 July	1571	1582	maxim fly G3
2015	26 August	1854	1858	end fly G3

Specware 9.0 Pro

In *Cydia pomonella* case the maxim fly for G1 was recorded at 16 May, after 187 day degree calculated. In G2 case the maxim was on 19 July, after 817 day degree calculated (table 8).

Table 8

Eco-biology of *Cydia pomonella* in 2015

Year	Date	Day degree necessary	Day degree calculate	Event
2015	11 January	0	0	
2015	16 May	181	187	maxim fly G1
2015	19 May	817	808	maxim fly G2

Specware 9.0 Pro

In figure 2 is observed the adult fly dynamic for *Cydia pomonella* at the untreated level.

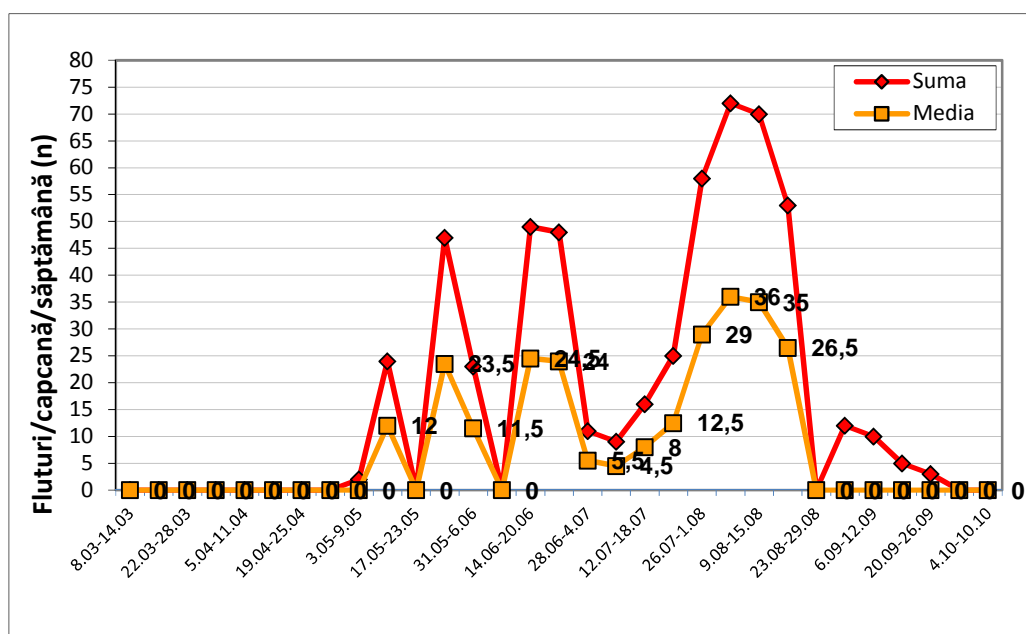


Figure 2. The adult fly dynamic for *Cydia pomonella* in 2015, in the untreated

CONCLUSIONS

Because of different climate conditions in the two years, the pests biology also varied, the correlation being visible in all stages from the lyfe cycle.

In *Quadraspidiotus perniciosus* case, first capture in 2014 took place on 29 April, with one week earlier than 2015 (06 May), being necessary seven more days to reach the 273 day degree calculated.

For the first capture of *Phyllonorycter blancardella* the difference was 19 days between 2014 (24 March) and 2015 (12 April), date when recorded the 104 day degree calculated.

Cydia pomonella recored a maxim fly in G1 case almost in the same period, on 17 May in 2014 and 16 May in 2015, at 181 respectively 187 day degree calculated. Maxim fly for G2 recorded a difference of 8 days between 2014 (27 July) and 2015 (19 July), at 812 respectively 808 day degree calculated.

BIBLIOGRAPHY

1. **Beleaș R., Georgescu T., Cârdei E.**, 2006. *Rezultate privind avertizarea and combaterea p ducheului estos din San Jose (Quadraspidiotus perniciosus Comst.), in planta iile de m r de la SCDP la i.* Lucr ri tiin ifice, vol 1(49), Edit. Ion Ionescu de la Brad, Ia i.
2. **Drosu S., Teodorescu G.**, and colab., 2007. *Studies on the attract and kill method to control the codling moth (Cydia pomonella) in Romanian apple orchards*, European Society for New Methods in Agricultural Research, XXXVII ESNA Annual Meeting, JINR Dubna, Russia Book of abstracts ISBN 5-9530-0159-2.
3. **Drosu S., Hondru N., Pa ol N.**, 1995 – *Influen a factorilor abiotici asupra dezvolt rii moliei marmorate – Phyllonorycter blancardella.* Analele I ICDP, vol XXVII.
4. **Mitrea I., Mitrea Rodi, uc O., Stan C.**, 2010. Studies regarding the biological control of the *Cydia pomonella* L. in the conditions of the Oltenia central area. South Western Journal of Horticulture, Bilogy and Environment. Vol.1No.1, 1-8.
5. **Simeria Gh., Nicorici M.**, 1999 – *Contribu ii la cunoa terea bioecologiei and combaterii p ducheului estos din S-V rii.* Revista S n tatea Plantelor, nr. 14. Bucure ti.
6. **Sumedrea M., Marin F.C., C linescu M., Iorgu A., Sumedrea D.**, 2012. *Researches regarding the use of mating disruption pheromones in control of apple codling moth - Cydia pomonella L.*, International Conference of The University of Agronomic Sciences and Veterinary Medicine Agriculture For Life, Life for Agriculture, June 4-16, 2015 Bucharest Romania <http://agricultureforlife.usamv.ro>; Agriculture and Agricultural Science Procedia 6 (2015) 171–178.
<http://www.sciencedirect.com/science/article/pii/S2210784315001886>;