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THE LEPIDOPTERA PEST SPECIES (INSECTA, LEPIDOPTERA) ON CABBAGE CROPS IN THE VILLAGE SIBIEL (SIBIU COUNTY) ROMANIA

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Abstract

This paper is only a part of one two years long study about the knowledge of parasitoide insects that control the populations of the Lepidoptera pest species on the cabbage crops in the inhabitants gardens from the village Sibiel (Sibiel county), Romania. They were analysed some aspects about biology, behaviour and ethology of the phytophagous lepidoptera species on the cabbage crops.The results could help in order to establish a monitoring methodology and management concerning the four Lepidoptera species identified in the cabbage crops: Pieris brassicae (Linnaeus, 1758), Pieris rapae (Linnaeus, 1758), Mamestra brassicae (Linnaeus, 1758), Autographa gamma (Linnaeus, 1758).

***Key words*:** *Lepidoptera*, *capturing, Pieris brassicae (Linnaeus, 1758), Pieris rapae (Linnaeus, 1758), Mamestra brassicae (Linnaeus, 1758), Autographa gamma (Linnaeus, 1758), Sibiel-Sibiu county, Romania*

INTRODUCTION

Pieris brassicae (Linnaeus, 1758), in the climatic conditions of our contry has 2-3 generations in one year [14]. The most numerous damages produced the larva in the second generation, one the autumn cabbage crops. The first butterflies appeared in Mai month, layed down their eggs in group of 50-100. Incubation last till 12 days and the larvar stage 25-30 days, with five times sheding their coats.

In July appeared the second generation of butterflies. Their larvas are major pests in July-August. The young caterpillars attacked in group the inferior face of leaves, gnawing at the epidermis and parenchim tissue; the older ones, in 3-rd and 4-th stages attacked the leaves first in the edge, then they nourished on whole leave, except the nervures. *Pieris rapae* in the studied climatic conditions has 3-4 generations in one year.

Mamestra brassicae [33, 34], has two generations in one year in our country. It attacked the leaves in the larvar stage and the caterpillars are green or gray. Because of their colour they were hided by green leaves of cabbage and they were more difficult to be identified [32, 35-38].

The caterpillars feeding on cabbage could make very extended large holes and so, the leaves became fade and died.

The caterpillars exceeded the larvar stages and they became whitish moths flying around the cabbage.

Autographa gamma is a bivoltin species [15] and hibernate in soil in the complet developed larvar stage or as a nymph or a caterpillar on II_{nd} or III_{rd} stage [13]. Being a poliphagous pest, it could attack not only cabbage but also rape, mustard, cauliflower, peas, beet and tobacco.

Larvas gnawing at the epidermis and parenchim tissue perforated the leaves in form of irregular holes. In case of an serious attack, all leaves could be destroyed. At cabbage, after ist complete development, the caterpillars penetrated inside and let their rests, excrementa and so it could no more be a commercial product [1-3].

The damages could be as much as 70-80%. In this paper I present some biological aspects of these species and also the ecological analysis of these studied lepidoptera populations.

MATERIALS AND METHODS

The observations and collecting the material of study were made during a period of two years: 2015-2016 on the cabbage crops in the different private property plots of the Sibiel village, Sibiu county, Romania (Foto 1). The species *Pieris brassicae* was signaled in 15 plots, *Pieris rapae* in 19 plots, *Mamestra brassicae* in 15 plots, and *Autographa gamma* in 11 plots.

During the period of two years of study they were investigated 547 plants. The Lepidoptera pest species were collected in the stage of eggs, in the larval stages 2-4 and nymphs. Their presence could be identified also on the base of specific parasitoids found on plants. In case of the eggs, the percentage of parasitized ones was of 34,2% at *Pieris brassicae*, 11,5% at *Pieris rapae*, 47,3% at *Mamestra brassicae* and 52,4% at *Autographa gamma*, so we mentioned only the number of possible hatched larvas.

During our investigations on field, the first stage of pest larvas was not collected, but the number of the specimens was noticed. The data obtained by collecting the material on field, were analysed, sinecological, being calculate the abundance, constance, dominance between the ecological analytical indicators and the index of ecological signification and cenotic affinity between the synthetical indicators.

Photo 1. Meadow of 200 m^2 in the village of Sibiel (orig.)

RESULTS AND DISCUSSIONS

On the base of the field observations and of the study of the biological material collected, we identified a number of 4 Lepidoptera species, pest of the cabbage crops: *Pieris brassicae* (Linnaeus, 1758) (Photo 2)., *Pieris rapae* (Linnaeus, 1758) (Photo 5)., *Mamestra brassicae* (Linnaeus, 1758) (Photo 4)., *Autographa gamma* (Linnaeus, 1758) (Photo 3)., some of them producing the important damages.

In the climatological conditions from county Sibiu, we identified at *Pieris brassicae* (Linnaeus, 1758), three generations. The first generation developed from Mai month till July; the second generation was in July-August and during the September-Octomber appeared partial the third generation, their nimphs hibernating.

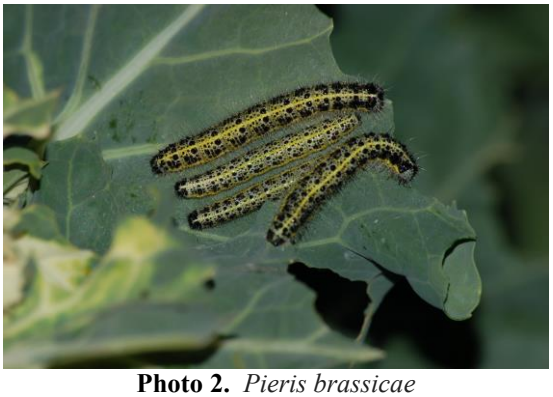

Photo 2. *Pieris brassicae* (https://www. Pieris+brassicae&biw=1829)

For the species *Mamestra brassicae* [33] in the conditions of the years 2015-2016, we identified two generations. The first one evoluated from Mai to July, followed by the second generation that flyed from August till in the spring time, next year. Hibernating was in form of a nymph in the soil. The observations on field showed us that the adults of the first generation appeared in Mai month, in the moment when was the biological development threshold of 9^{o}C.

The freqvency of the attacks in case of the four Lepidoptera species on the cabbage crops in the village Sibiel (Sibiu county) registered a medium of 57% for the all studied periods with less values in the year 2016 comparative with the year 2015.

Photo 3. *Autographa gamma*
(https://www. aphotofauna)

Table 1. Dynamics of the Lepidoptera populations, the data obtained were processed by mean of synecological analysis

Nr. Crt	Pest species	Abundance	Dominance	Constance	Index of ecological semnification
1	*Pieris brassicae*	275	32.4	50	14.8
2	*Pieris rapae*	121	23.7	72.4	11.7
3	*Mamestra brassicae*	105	16.5	64.3	7.8
4	*Autographa gamma*	97	13.2	32.5	0.5

In the majority of the plots we observed a mixt attack with some dominante species. The most important weight among the four pest Lepidoptera species was of *Pieris brassicae* with 37,8% in 2015 and 73,6% for the year 2016, followed by *Pieris rapae* with 24,3%. *Mamestra brassicae* and *Autographa gamma* registred 4,2% and respectively 0,5%.
Concerning the ratio between the attacked plants by the pest species, on could observe that the mixt attack of the four mentioned species in 2015 was relative compact, with a majority of plants attacked by *Pieris rapae.*

Photo 4. *Mamestra brassicae*
(https://www. Mamestra+brassicae&biw=1829&bih)

In order to follow the dynamic of the Lepidoptera populations (Table 1), the data obtained were processed by mean of synecological analysis [4-12, 16-31].

Photo 5. *Pieris rapae*
(https:// Pieris+rapae&biw=1829&bih)

The abundance hierarchy of the studied pest species during two years represents the sum of the more or less oscillations of this index, registered in the studied period.

CONCLUSIONS

After the centralization of the results, on can conclude that Lepidoptera captured and studied are eudominant species in the cabbage crops in our studied zone. The species of *Pieris brassicae, Mamestra brassicae, Pieris rapae*, represent 64% from the total species and 87,9% from the total specimens. Species *Autographa gamma* is a recedent species with a percent of 17.6% from the total species and 1.3 % from the total specimens collected.
In comparison with the constance of species in the studied plots, *Pieris rapae* were euconstante, *Mamestra brassicae*-constante, and *Autographa gamma* and *Pieris brassicae* are only an accessory species in the studied zone.
The index of the ecological significance emphasized as characteristic species for the studied crop on *Pieris brassicae, Mamestra brassicae* [33,34] and *Pieris rapae.* The species *Autographa gamma* is only an accessory, accompanying species.
This ecological analysis permit afterwards the establishing of the relations between the pest dynamic and the parasitoids species that intervennes in their limitation and facilitate the complex interpretation of the parasitoide bio cenosis and their role in the control in the natural way of the Lepidoptera populations studied in the cabbage crops in the village Sibiel.

In order to have a biological control of these pests, we recommend that in the plots, where the attacked plants are not very numerous, the pest could be limited by periodical control, by collecting and destroying the eggs and larvas. The pest populations also could be limited by mean of some beetles of pray species from *Carabidae* Family and also by the parazitation of eggs, lervas and nymphs from the species of Family: *Ichneumonoidae, Braconidae* and *Trichogrammatidae.*

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