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# THE INSECTS ABUNDANCE MONITORING IN A MEADOW FROM MARITA VILLAGE (VALCEA COUNTY, ROMANIA)

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**Abstract:** I chose this topic because in recent years it happens to be more and more talk about climate change, the effects on biocenoses and implicitly on the distribution and abundance of insect species in all ecosystems. Climatic factors have a great influence on the life and activity of insect populations. Among the most important factors which we have reported in this paper are: light, temperature, humidity, airflow, and the type of soil that had a decisive role in the study of insect populations, the systematic, quantitative and qualitative of a meadow in the village of Marița, crossroads Vaideeni, Valcea.

**Keywords:** insect population, Village Marita, climate changes.

## INTRODUCTION

Insects are considered good indicators of climate change. The most likely organisms affected by climate change are insects, these changes having a strong influence upon their development, reproduction and their survival (Menendez R., 2007). Insects are considered the main pollinators of entomophiles, without which it could not provide plant propagation within the spontaneous flora and the plant culture. Insects are designed to highlight the formation of soil (Karuppaiah, V. and colab., 2012). They are consumed in the decomposition of organic matter, thus fulfilling a vital function for the ecosystem (Sangle P.M. and colab., 2015). Many species of insects can be useful for humans in the biological control of insect pest populations to limit crops (Stancă-Moise C., 2014).

## MATERIALS AND METHODS

The experience was placed in a garden in Marita village, Valcea county, with an area of 2200 $m^2$ (Fig.1). The vegetation is composed of low-class grasses (Fig 2,6). Surface grass was mowed twice a year. In the garden area there are a number of 15 fruit trees, plum the basic species (*Prunus sp*.). For research, the experience took place during the two years of study, which is more exactly during the years of 2017-2018. To capture the insect species it was installed since beginning of April of each year a set of 12 traps. The study was conducted from April until October of each year and it's scientifical evolution intention tried to analyze how was the process of collecting insect species much in the same calendaristic dates (day, month). Was chosen at the center of an area of 981.25 $m^2$ garden corresponding to a circle with a circumference of 12 m.


**Fig. 1.** Map marking the researched region (adaptation after google maps).

Traps were targeted geographically and listed as numbers between 1-12 in the clockwise direction strategy starting from the trap which is in the northeast point of the working area. Each trap was composed of a bowl protector in the bottom of which there were practiced some orifices to avoid the stagnation of

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water from rainfall, and after that, in the water collector, a bowl was introduced with a little capacity of space only to place the water and the detergent.

**Fig. 2.** Placing soil traps within the perimeter of the garden, village Marina, crossroads Vaideeni (orig.).

The two vessels forming the trap (Fig 3.) were introduced into a pit dug in the soil, then, the soil was arranged as well as possible to avoid bypassing the small area by the fauna epigee (Fig 4.), installing on the mouth of each protective bowl a funnel made of thin film of vinyl polychloride.

**Fig. 3.** Placing soil traps within the perimeter of the garden, village Marina, crossroads Vaideeni (orig.).

The collected material was already dead (Fig 5), so it was placed in glass containers leaving them to absorb sanitary alcohol, while determinations are being carried out at the end of the study period.

The diameter of the collection hole is 12 meters, having a possible catching area of 226.08 cm, thus occupying the circle circumference 29.37% of the capture possibilities. The circumscribed area was about 981.25 $m^2$.

A number of statistical calculations were made to make some interpretations, this being just a beginning of other new research fields.

The climatic data analysis of each collection day came from the Horezu Hydrological Plant, Valcea County, with attention to inform related to air temperature, relative humidity and rainfall.

All these results are in Fig. 8 and 9 and are also accompanied by the number of specimens captured.



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**Fig. 4**. The process of collecting entomological material. (orig.).

**Fig. 5.** Fixing the traps and then marking them with a trap presence (orig.).

**Fig. 6.** The floral composition of the fuse in which the experiment was installed (orig.).

The captured material was periodically lifted. Drawn from each trap, the information is elevated and kept safe in little canvas bags with a corresponding ticket attached.

Studies of insect populations have been made over time by various authors, in agricultural (Antonie I., 2014;, Vălean A.M. and colab., 2018) forestry (Moise C. and colab., 2012; Stancă-Moise C., 2014a,b; 2015a,b,c, Stancă-Moise C. and colab., 2018a,b), or grassland ecosystems (Ciochia V. and colab., 1997; Manole T. and colab., 1993; Perju T. and Dănulescu M., 1997; Stancă-Moise C. and Tănase M., 2016).

For determination, we have used cosmic determinants for both Coleoptera and other insect species from within the "Kosmos" Collection and the electron microscope attached to the computer IPM Scope (Fig.7).

In the present study there is no systematic list of the main insect orders (Fig 10), this being the subject of another study and only the number of samples collected with the date when it was collected.


**Fig. 7.** Microscope IPM Scope (orig.).

The information's about the abundance and domination level of every species reported at annually climatic conditions and the technique of how these conditions influenced life and activity of the insects within the studied biocenosis.

## RESULTS AND DISCUSSION

The basic climatic parameters analyzed in the experience of the Marita grassland were the temperature, the relative humidity and rainfall measurements, which are influencing the life of the insects in both ways. Directly and indirectly. Direct influence was observed by limiting the activity of larvae and adults, but also the dispersion of insects into the environment (Tomasz and Jacek, 2013) in our case the number of catches, depending on the bad weather conditions in rainy days and low humidity in sunny ones.

The indirect influence of climatic factors on grassland insect populations included the temperature that was higher in the summer months, which really influenced the environmental conditions in which the insects were active. Temperature is particularly important as the limiting factor of insects activity. Average temperature changes are interdependent with changes in insect phenology (Walther et al., 2002). Temperatures and precipitations have also had an impact on the growth of plants within the meadow, but also on predatory insects, parasites or entomofages (Netherer and Schopf, 2010).

The richness of the entomofauna studied in the grassland in Mariţa village was more numerous in 2018 compared to 2017 due to the favorable weather conditions of this year. From the analysis of the comparative meteorological data of the two years it can be concluded that the year 2017 was characterized by the average annual temperature of 10.2°C and the annual rainfall regime was 600 $mm^3$ in 2017. From the preliminary data of 2017 it can be remembered that the average annual temperature was lower than in 2018 and the rainfall regime was much higher, the number of rainy days was much higher, especially in the last decade of May.

Therefore, the number of specimens captured in 2018 was much higher than those collected in 2017, the activity of the entomofauna in the meadows being influenced in 2017 by unfavorable environmental conditions.

From the analysis of climatic data and the number of specimens of insects caught we can say that climatic factors have had a great influence on the life and on the general activity of insect populations in the meadow analyzed. Of the most important factors can be said that light, temperature, humidity, rainfall, air currents and soil have been instrumental in the present study in the systematic, quantitative and qualitative determination of insect populations.

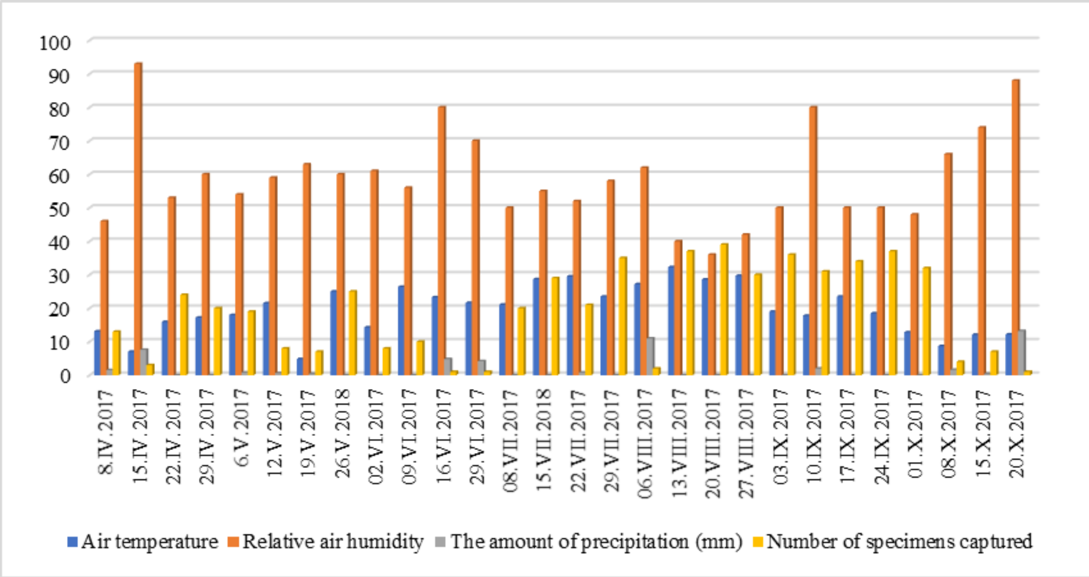


**Fig. 8.** Characteristics of meteorological conditions reported on the number of specimens captured in 2017.

It is known that metabolic processes are generally chemical and any temperature change that occurred during the months of the present study has led to the modification of insect activity or resulted in the cessation of total insect population activities when the temperature of the insect go below the normal limits of the months studied. A decisive influence was the temperature of the year 2017 and the duration of the post-bridging stages under normal conditions.

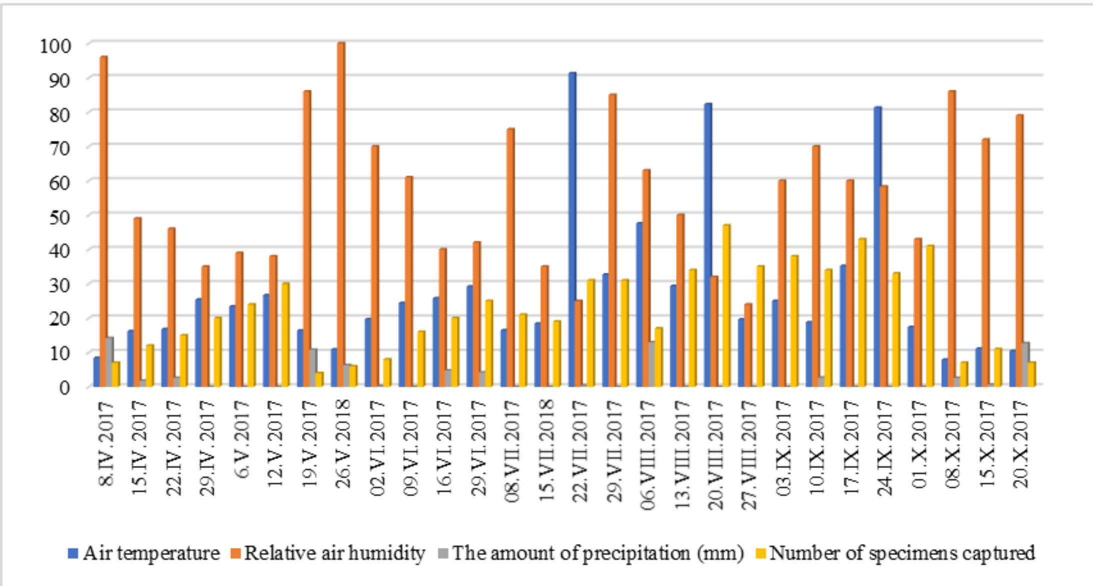


**Fig. 9.** Characteristics of meteorological conditions reported on the number of specimens captured in 2018.

From the datas obtained by comparing the number of specimens collected in the two years, 534 specimens in 2017 and 636 specimens in 2018 can be mentioned to be drought-loving insects and others that love periods of richer precipitation, hence greater abundance in year 2018.

From the analysis of the data in Fig 8 and 9, the characteristics of the meteorological conditions and the number of the captured specimens can be distinguished by a superior limit of the activities of the analyzed population. The months with the largest number of captured species having their place between June-August in 2017 and June 2018 when the air temperature was between 20-30°C.

**Fig. 10.** Morphology of collected insect species, images from the IMP Scope microscope (orig.).

## CONCLUSIONS

Based on the actual experience, the following conclusions can be drawn: on rainy days the activity of the insects was reduced. Also, in May-October the number of specimens captured was higher, the insects being more active. This depended on the cycle of development, the number of generations per year, the order they belong to. Many of the captured insects have short periods of time as adults (only a few weeks), others have longer life cycles. Regarding the systematic classification of the collected species, reference will be made in a future scientifical paper.

Analyzing the position of the experience, it is located approximately 400-500 m of agricultural crops and hay fields, the orientation being towards N and other meadows towards E and S. The special traps 44,39% were in traps from S and 25,34% in E and in the area of N 19.02% and 10.24% to V. Interpreting within this aspect, we can say that the insects were moving in their daily activity from S and E to N and less towards V, also in the journeys that they make after a certain route they keep, because that is the only available explanation who can say clearly why the capture was reduced in the north and west. Insects going to N or V were racing, not having the chance to get back on the traps track.

The insects in the studied area are poikilotherms, they adjust their body temperature to ambient temperature. Their activity began in April 2017, 2018 (both years at the same time) after they left the hibernate dispose and when the air temperature exceeded $8^oC$ (Fig.8 and 9). Under these limits, since September 2017 and October 2018, their activity has ceased, insects have died or dialed at different stages of development specific to each order. I also noted that the ambient temperature of 5-$27^oC$ allowed the capture of 534 samples between April-September in 2017 and 636 samples in April-October 2018 which contributed to the ecological descriptive study (abundance, dominance, gender, density, dynamics) of evidenced insect populations.

The closer the temperature was to the optimum, the shorter the development was, and vice versa, which we noticed from the number of examples captured from July-August to September in 2018 that represented the number of the specimens captured from the second generation of polyvoltine species.

Like the temperature, *humidity* has had a determining role in the life and activity of the studied insect population, which allowed the insects to develop normally in their natural way. From the analysis of the data that is representing the relative air humidity values it is observed that the ones between 45-85% were optimal for the activity of studied a. Beyond these limits, since October, vital insect activities have been slowed down or even stopped. The sudden decline in soil humidity since November 2017 has led to the entry into hibernating diapause mode of many insect species from the specific grasslands, results in the lack of captured specimens (Fig. 8 and 9).

*Light* has also acted as a physicochemical factor on the metabolism of insect populations by helping to develop the species of the families and orders reported. From the systematic analysis of the captured species we noticed that the light acted on the photoreceptor organs and caused the coloration of many species (Coleoptera, Odonate, Lepidoptera).

*The air currents* in the meadows also played an important role in the activity of insects, we specified that there were no obstacles except some plums which allowed the air currents to circulate freely with an important role in spreading the population of insects from the analyzed perimeter. They have also contributed to lowering humidity by creating favorable conditions for the growth and development of the insect population.

Another environmental factor that influenced the number of captured specimens was the amount of precipitated rainfall that is specified on each day of collection. From the analysis of the data from the two years of collection it can be noticed that in the rainy days within the 12 collecting traps number of the captured specimens was 1 (Fig. 8 and 9). According to the *nature of the soil* in which the experience was assembled, it can be said that most of the species collected are the most important indifferent species. But more important were the plant species that formed the trophic baserom laboratory analysis to soil sampling, physico-chemical properties of the studied soil (pH-7, acidity-normal, podzolic soil composition) we have noted the great importance it has had in the development of insect species. Some species carry out their entire life or part of the development cycle in soil, such as elaterid and scarabaei species. These soil characteristics have influenced not only the development but also the quantitative and qualitative composition of the studied entomofauna.

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