STUDIES ON THE RANGE HARMFUL TO RAPESEED CROP IN SEVERAL LOCALITIES IN BIHOR COUNTY

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Abstract. *Rapeseed is a profitable crop with economic and energy efficiency and perhaps the best melliferous plant. Besides the advantages, due to the yellow color of the inflorescence, it attracts a large number of insects, many of which are harmful and destroy the plant's organs. Through the present paper, we set out to see what is the range of species of harmful insects found in autumn in several localities in western Romania. The observations were made in the period 2020-2023, in autumn and spring (after sowing, during flowering and silique formation). The results showed the presence of 17 species of different systematic orders, observed in all active and inactive stages (adults, eggs, larvae and/or pupae). The most frequent species were: Phyllotreta nemorum, Phyllotreta atra, Meligethes aeneus, Athalia rosae, Myzus persicae, Ceutorhynchus assimilis, Ceutorhynchus napi, Autographa gamma, Plutella xylostella and Delia radicum, with limits of 3-6 (20/aphid) individuals active, adults or larvae/m^2. Besides these, other species with a medium or low frequency (0.5-5 active individuals/m^2) were also observed: Helicoverpa armigera, Pieris brassicae, Mamestra brassicae, Eurydema ornata, Ceutorhynchus pallidactylus, Agriotes spp. and Dasineura brassicae. In conclusion, rapeseed attracts many pests, many of them causing damage with significant production losses in the absence of effective monitoring and control strategies.*

Keywords*: harmful insects, rapeseed crop, range, frequency.*

INTRODUCTION

In recent years, more and more farmers are turning to rapeseed cultivation (GUPTA, 2016), once due to the high market demand for quality oil and biofuel (GUPTA, 2016; RABOANATAHIRY ET AL., 2021; BRITANNICA, T. EDITORS OF ENCYCLOPAEDIA, 2023), but also because it increases soil fertility and prevents erosion on sloping land. It is considered a plant with economic efficiency (JANKOVSKA-BORTKEVIČ ET AL., 2022). In addition, it has fodder and medical value after processing. It is also a good melliferous plant. All this makes it attractive and profitable for farmers. In addition to harmful insects, it can also attract beneficial insects that can be used in biological control (ALARCÓN-SEGURA ET AL., 2022).

However, rape attracts a number of pests (COOK, 2018) that differ as set in a crop at a given time. Previous research in the Western area of Romania shows a harmful range composed of: *Eurydema ornata, Psylliodes, crysocephala, Calocoris norvegicus, Meligethes aeneus, Athalia rosae, Ceuthorrynchus quadridens* and *Epicometis hirta* (GROZEA ET. AL, 2007; WHALEY, 2019). Both type, specific insects of rapeseed or non-specific polyphagous insects can be present (GROZEA 2006; WILLIAMS, 2010). *Athalia rosae* is one of the most specific and frequent species in this culture (PALAGESIU, 1993; ALFORD, 2003; GROZEA, 2006; FLORIAN and OLTEAN, 2018). As well as *Meligethes aeneus* which can produce significant losses (NILSSON, 1987; WILLIAMS and FREE, 1978) and which damages and is attracted to rape flowers. *Ceuthorhuynchus assimilis* weevil species are also problematic for inflorescences and especially for siliques (WILLIAMS AND FREE, 1978).

Through the observations in the present paper, we aimed to see and update the range of insect pests of rapeseed from several places in western Romania, (this being a favourable area for rapeseed cultivation) and focusing on those that are harmful to plants.

MATERIAL AND METHODS

The observations were made in a county in the western part of Romania (Figure 1) and took into account all the pests found in rapeseed crops. The 13 cultures belonged to 13 localities located in the western wall of the county from south to north. These can be found in the table below (Table 1).

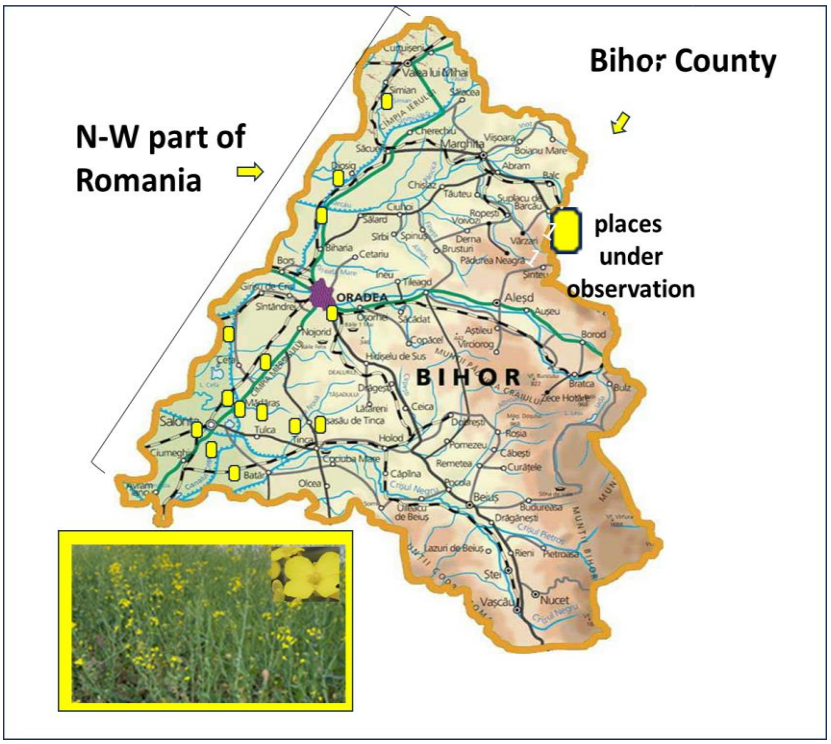

Figure 1. Marking of the 13 localities in Bihor County, Western Romania) with rape crops under observation (the map taken from: https://harta.biz/judetul-Bihor and adapted accordingly this study)

The readings were made through direct observations or with the entomological net and tools suitable for field monitoring. These were done at various intervals, in the spring and autumn, over 4 years (2020-2023), sometimes the autumn readings were extended into the summer and also the autumn ones started earlier, in the summer (Table 1).

All crops were managed independently of the work's target, the observations being made on plots already sown.

The observation months were divided into 2 categories to cover the period after sunrise and the period during flowering and silique formation**.**

All specimens were subjected to the morphological recognition study and detailed photographs were taken using the necessary equipment.

The obtained data were centralized and interpreted using graphics and statistics in the field.

Table 1

The research locations in Bihor County and the intervals of readings in rape crops, in the period 2020-2023

Places under observation	Place coding	Spring (or later in summer) reading /Study intervals	Autumn (or early in summer) reading /Study intervals
Madaras	P1	30.05-10.04	13.09-08.10
Batar	P2	17.03-24.04	23.09-11.10
Oradea	P3	02.04-20.05	20.09-08.11
Diosig	P4	26.03-21.06	20.09-10.10
Roit	P5	02.04-20.05	11.10-30.10
Arpasel	P6	03.04-27.04	23.09-10.10
Ianosda	P7	20.03-24.05	23.09.-13.10
Gepiu	P8	03.04-23.04	20.09-08.11
Tinca	P9	14.03-29.06	20.09-08.11
Inand	P10	22.02-07.07	17.08-20.09
Tamaseu	P11	03.03.21.04	17.08-20.09
Salonta	P12	31.05-08.07	17.08-20.09
Sanicolau Roman	P13	14.03-10.05	20.09-08.11

RESULTS AND DISCUSSION

The results show that in all 13 localities located along Bihor County from south to north (in the western part of the county), at least one of the species listed in the table below was present (Table 2). For each species, all stages were taken into account (egg, larva/nymph, adult) for insects with incomplete development or (egg, larva, nymph and adult) for those with complete development.

Table 2

The status of harmful species in each locality subject to observation, throughout the analysed period

Pest	Pest status (+/-) in the 13 study sites*												
	**P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
Autographa gamma	-	x	x	x	x	x	-	x	-	x	-	-	-
Phyllotreta spp.	-	-	-	x	-	-	x	-	-	-	x	x	-
Athalia rosae	x	x	x	x	x	x	x	x	x	x	x	x	x
Meligethes aeneus	x	x	x	x	x	x	x	x	x	x	x	x	x
Ceutorhynchus assimilis	-	-	-	-	-	-	-	x	x	x	x	x	-
Ceutorhynchus napi	-	x	-	-	x	-	x	x	-	x	-	x	x
Ceutorhynchus pallidactylus	x	x	x	x	x	x	x	x	x	x	x	x	x
Eurydema ornata	x	x	x	x	x		x	x	x	x		x	x
Dasineura brassicae	x	x	-	x	x	x	-	x	x	x	-	x	x
Delia radicum	-	x	-	x	x	-	x	x	x	x	-	-	x
Plutella xylostella	-	x	-	x	x	-	x	x	-	x	-	-	x
Helicoverpa armigera	-	x	-	x	x	-	-	x	-	x	-	-	x
Pieris brassicae	-	x	-	x	-	-	-	-	-	-	-	-	-
Myzus persicae	x	x	x	x	x	x	x	x	x	x	x	x	x
Mamestra brassicae	x	-	-	x	-	-	-	x	-	-	-	-	-
Agriotes sp.	-	-	-	-	-	-	x	-	-	-	-	-	-
Psylliodes chrysocephala	-	x	-	x	x	-	x	-	-	x	x	-	x

*(+) at least one stage is present; (-) no stage present

**Madaras-P(Place)1; Batar-P2, Oradea-P3; Diosig-P4; Roit-P5; Arpasel-P6; Ianosda-P7; Gepiu-P8; Tinca-P9; Inand-P10; Tamaseu-P11; Salonta-P12; Sanicolau Roman-P13

The behaviour of the active stages (adults and larvae) was different, in some cultures/places only the adults of certain species were observable and in others only the larvae (Figure 2) of those species. It is not possible to clearly conclude what their abiotic preference is and if there is a common point between the localities, it is certain that 4 species (*Meligethes aeneus*, *Athalia rosae*, *Ceutorhynchus pallidactylus* and *Myzus persicae*) were present in both stages in all 13 localities (Table 2).

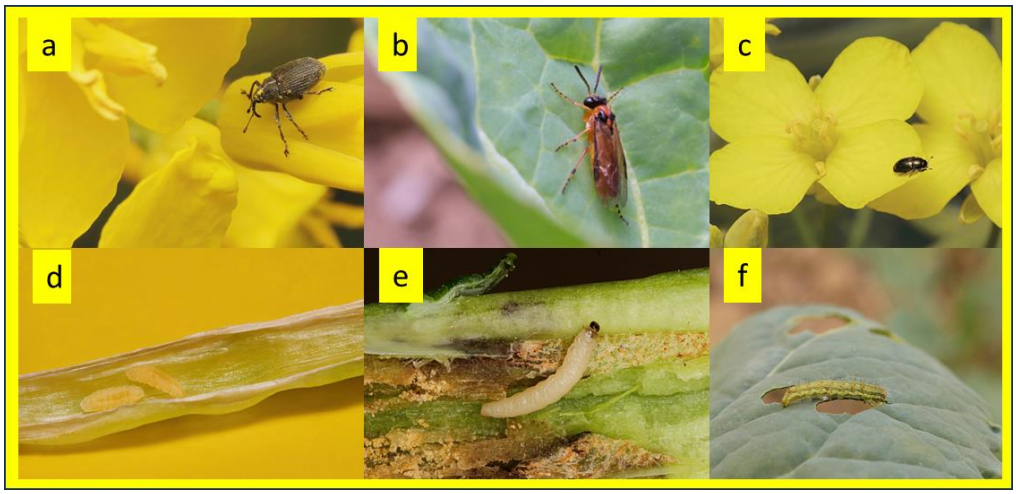

Figure 2. Pest insects observed in rapeseed crops in various stages: a. *Ceutorhynchus assimilis* (adult); b. *Athalia rosae* (adult); c. *Meligethes aeneus* (adult); d. *Dasineura brassicae* (larva); e. *Psylliodes chrysocephala* (larva); f. *Helicoverpa armigera* (larva); photos were taken by Veres JZ

From those extracted, only the active stages, i.e. those that are mobile and observable in cultures, were quantified in the analysis of the average density on a surface of $1m^2$.

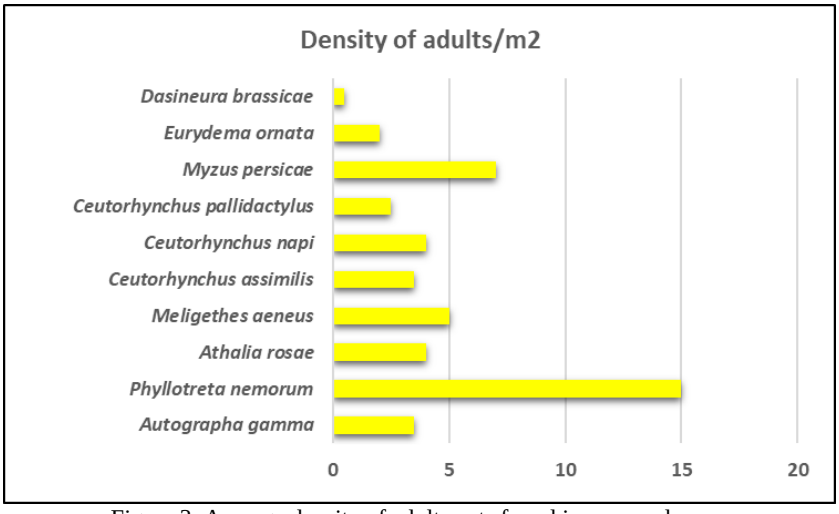

Figure 3. Average density of adult pests found in rapeseed crops

Thus, in Figure 3 it can be seen that average values of adults higher than 3 individuals/m^2 were recorded at species from genus Phyllotreta, Meligethes, Athalia, Myzus, Ceutorhynchus (n), Autographa, Plutella and Delia. With an average value of medium or low density, species of the genus Ceutorhynchus (p), Eurydema and Dasineura were found, with values between 0.5 and 2.5 individuals/m2.

Regarding the density of larvae/m^2 (Figure 4) we found that those from the genus Delia, Plutella and Myzus exceeded the level of 3 individuals/m^2, the others from the genus Helicoverpa, Pieris, Agriotes and Psylliodes had values between 0.5 and 2.5 larvae/m^2. In the case of Myzus aphids, the average density was high (13 individuals/m^2), but as in the case of adults, the aphids were at higher values, which does not mean that they are more harmful than those of Helicoverpa, which although had 2, 5 larvae/m^2 can still be placed on the same damage line.

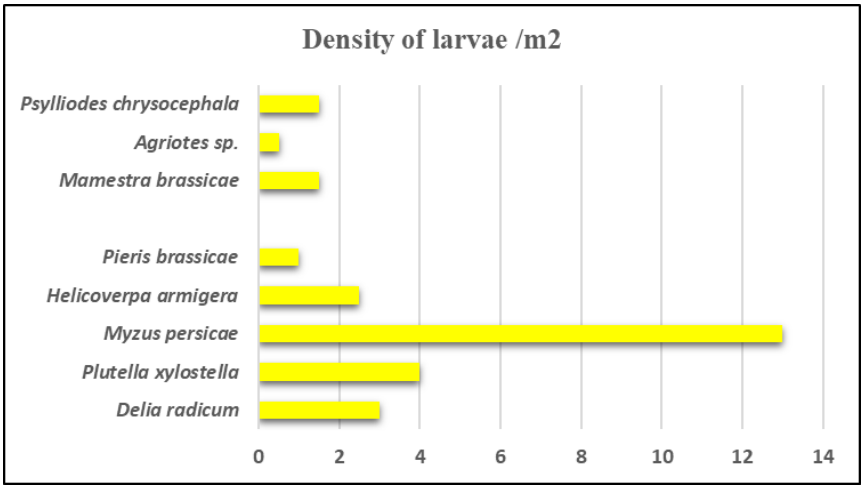

Figure 4. Average density of harmful larvae found in rapeseed crops

CONCLUSIONS

In rapeseed crops from the western part of Romania there is diversity demonstrated by the current study and also variations in density from one crop/place to another (which probably depend on the reserve in the soil, the preceding plant and other abiotic factors). Through the current study, we only wanted to draw attention to the range of existing pests and we would conclude conclusively that there are 4 species from the genera Meligethes, Athalia, Ceutorhynchus (p) and Myzus that predominate in all the places analysed. For continuity, probably another future study will try to assess the damage and find efficient management solutions.

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