

DATA ON THE KNOWLEDGE OF INJURIOUS ORGANISMS IN HEMP CROPS FROM THE CENTRAL MOLDAVIA

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Received January 10, 2008

ABSTRACT – The observations and determinations carried out in monoecious hemp crops from Central Moldavia, during 2005-2007, have shown that the injurious entomofauna was made up of 20 species of insects, which summed up each year, on the average, 3164.14 individuals/m². The injurious entomofauna was framed within the orders *Coleoptera*, *Homoptera*, *Heteroptera*, *Diptera* and *Lepidoptera*. The order percent was of 35% for *Coleoptera*, 30% for *Lepidoptera*, 15% for *Diptera* and 10% for *Homoptera* and *Heteroptera*. Analysing the dominance of collected species, according to their spreading, 16 species belonged to class D₁- subrecent species, two species to class D₂- recedent species, one species to class D₃ – subdominant species and two species to class D₅ – eudominant species. According to the number of registered species, the rate of dominance classes was of 75% for class D₁, 10% for classes D₂ and D₅, 5% for class D₃, and no dominant species was registered in class D₄. The hemp crops were also affected by seven pathogenic agents: *Pythium de Baryanum*, *Fusarium oxysporum*, *Xanthomonas campestris* var. *cannabis*, *Septoria cannabis*, *Perenoplasmodium cannabina*, *Sclerotinia sclerotiorum* and *Botrytis infestans*. The mean frequency of the attack produced by these pathogenic agents had values between 0.63% (*Botrytis infestans*) and 16.96% (*Septoria cannabis*).

Key words: hemp, pests, pathogenic agents

REZUMAT - Date privind cunoașterea organismelor dăunătoare culturilor de cânepă din Centrul Moldovei. Observațiile și determinările efectuate în culturile de cânepă monoică din centrul Moldovei, în perioada 2005-2007, au arătat că entomofauna dăunătoare a fost constituită din 20 specii de insecte, care au totalizat, în medie, anual, 3164,14 exemplare/m². Entomofauna dăunătoare a fost încadrată în ordinele *Coleoptera*, *Homoptera*, *Heteroptera*, *Diptera* și *Lepidoptera*, a căror pondere a fost de 35% pentru ordinul *Coleoptera*, 30%

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Lepidoptera, 15% *Diptera* și câte 10% pentru *Homoptera* și *Heteroptera*. Analizând dominanța speciilor colectate, funcție de procentul de răspândire, 16 specii s-au încadrat în clasa D₁-specii subrecedente, două specii în clasa D₂-specii recedente, o specie în clasa D₃ – specii subdominante și două specii în clasa D₅ – specii eudominante. După numărul de specii înregistrate, proporția claselor de dominanță a fost de 75% pentru clasa D₁, 10% pentru fiecare din clasele D₂ și D₅, 5% pentru clasa D₃, iar în clasa D₄ – specii dominante nu s-a înregistrat nici o specie. Culturile de cânepă au fost afectate și de șapte agenți patogeni: *Pythium de Baryanum*, *Fusarium oxysporum*, *Xanthomonas campestris* var. *cannabis*, *Septoria cannabis*, *Perenoplasmopara cannabina*, *Sclerotinia sclerotiorum* și *Botrytis infestans*. Frecvența medie a atacului produs de acești agenți patogeni a avut valori cuprinse între 0,63% (*Botrytis infestans*) și 16,96% (*Septoria cannabis*).

Cuvinte cheie: cânepă, insecte dăunătoare, agenți patogeni

INTRODUCTION

Hemp is affected by various pathogenic agents, which cause plant diseases and specific pests. In the foreign and Romanian literature, they mention 18 diseases in hemp crops and over 35 species of specific and incidental insects (Șandru et al., 1996; Boguleanu, 1994; Rogojanu, 1968).

The knowledge of pathogenic agents and specific pests, which affect hemp crops, according to the growing area, has a special importance in establishing the most efficient measures of the attack control and diminution in crop losses.

This paper shows important data on identifying the injurious organisms from seed hemp crops, under conditions of Central Moldavia.

MATERIALS AND METHODS

Investigations were conducted during 2005-2007, at the Agricultural Research and Development Station of Secuieni, Neamț County, on monoecious hemp crops. The observations and determinations consisted in soil samples, entomologic mowing nets and plant notations, by using the notation scale from 0 to 6 for the pathogenic agents. Sampling, determination and notation were carried out by decades, every year, from sowing until hemp harvesting. The gathered samples were analysed in laboratory at binocular eyeglass and the collected insects were identified and divided on species.

For each species, we have calculated the mean density/m² on the entire vegetation period, the dominance and species framing within dominance classes.

The dominance of species was calculated from the formula:

$$D_A = \frac{N_A \times 100}{N_1}$$

N_A – total number of individuals from A species

N₁ – total number of individuals from all the gathered species

The dominance classes include species, which spreading percentage is found within the following values:

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- D₁- subrecedent species – spreading percent P< 1.1%
D₂- recedent species – spreading percent P=1.2-20%
D₃- subdominant species – spreading percent P=2.1-5.0%
D₄- dominant species – spreading percent P=5.1-10.0%
D₅- eudominant species – spreading percent P > 10.1%

RESULTS AND DISCUSSION

Observations and determinations carried out in monoecious hemp crops from Central Moldavia have shown that the injurious entomofauna was made up of 20 species, which summed up an annual mean of 3164.14 individuals/m². The mean density/determination was comprised between 0.01 colonies/m² in *Aphis fabae* and 154 individuals/m² in *Psylliodes attenuata* (Table 1).

Table 1 - Injurious entomofauna from monoecious hemp crops

Species	Order	Density/m ²		Dominance of species P%
		Mean	Annual total	
<i>Agriotes ustulatus</i>	<i>Coleoptera</i>	2.7	37.8	1.19
<i>Agriotes obscurus</i>	"	1.4	19.6	0.62
<i>Opatrum sabulosum</i>	"	3.6	50.4	1.59
<i>Atomaria linearis</i>	"	1.5	21	0.66
<i>Mordellistena parvula</i>	"	1.0	14	0.44
<i>Psylliodes attenuata</i>	"	154	2156	68.0
<i>Chaetocnema concinna</i>	"	43	602	19.0
<i>Dolycorys baccarum</i>	<i>Heteroptera</i>	1.4	19.6	0.64
<i>Lygus pratensis</i>	"	1.1	15.4	0.49
<i>Phorodon cannabis</i>	<i>Homoptera</i>	0.2 col	2.8	0.08
<i>Aphis fabae</i>	"	0.01	0.14	0.01
<i>Delia platura</i>	<i>Diptera</i>	1.0	14	0.44
<i>Delia florilega</i>	"	0.6	8.4	0.27
<i>Liriomiza cannabis</i>	"	0.8	11.2	0.35
<i>Vanessa cardui</i>	<i>Lepidoptera</i>	0.3	4.2	0.13
<i>Ostrinia nubilalis</i>	"	0.9	12.6	0.40
<i>Amathes c-nigrum</i>	"	1.2	16.8	0.53
<i>Scotia segetum</i>	"	1.1	15.4	0.48
<i>Autographa gamma</i>	"	0.8	11.2	0.35
<i>Grapholitha deliæana</i>	"	9.4	131.6	4.16
Total			3164.14	

Analysing the percentage of orders according to the number of gathered species, we found out that the *Coleoptera* order had a percent of 35%, *Lepidoptera* 30%, *Diptera* 15%, while *Homoptera* and *Heteroptera* had 10%, each (Figure 1).

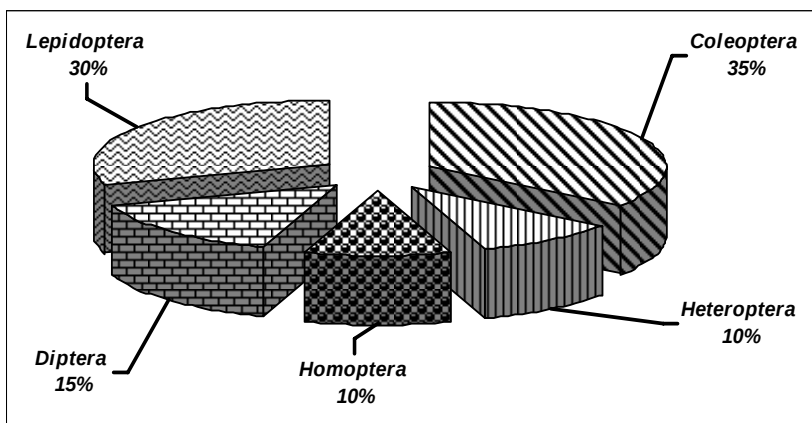


Fig. 1 – Orders percentage according to the number of species

The *Coleoptera* order had the maximum percent of 91.6%, taking into account the number of gathered individuals, while the other orders *Heteroptera*, *Homoptera*, *Diptera* and *Lepidoptera* had percentages comprised between 0.09% and 6.08% (Figure 2).

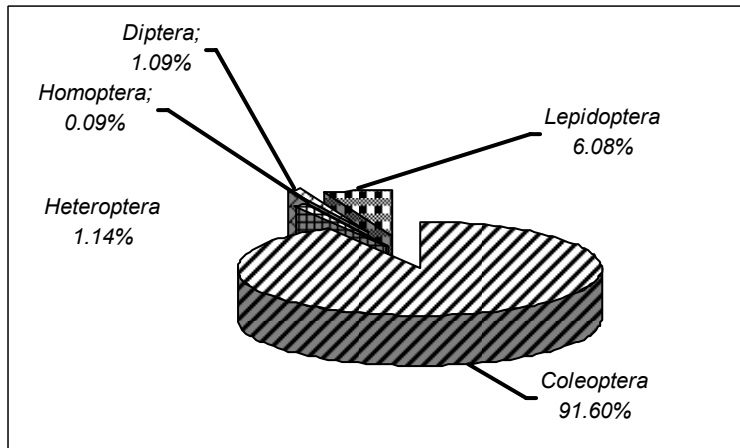


Fig. 2 - Orders percentage according to the number of gathered individuals

As concerns the dominance of gathered species, we found out that they were framed within four dominance classes out of five, as it follows:

- 15 species were found within the class D₁- subprecedent species, where the spreading percentage for each species was lower than 1.1%;

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- Two species belonged to the class D₂- recedent species, where the spreading percentage for each species was lower than 2.0%;
- One species belonged to the class D₃- subdominant species, which spreading percentage for each species was lower than 5.0%;
- Two species belonged to the class D₅ - eudominant species with a spreading percentage higher than 10% (*Table 2*).

Table 2 - Framing the injurious entomofauna from monoecious hemp crops within dominance classes

D ₁ subrecedent species <1.1%	D ₂ recedent species 1.2-2.0%	D ₃ subdominant species 2.1-5.0%	D ₄ dominant species 5.1-10%	D ₅ eudominant species >10%
<i>Agriotes obscurus</i>	<i>Agriotes ustulatus</i>	<i>Grapholitha delineana</i>		<i>Psylliodes attenuata</i>
<i>Atomaria linearis</i>	<i>Opatrunm sabulosum</i>			<i>Chaetocnema concinna</i>
<i>Mordellistena parvula</i>				
<i>Dolycorys baccarum</i>				
<i>Lygus pratensis</i>				
<i>Phorodon cannabidis</i>				
<i>Aphis fabae</i>				
<i>Delia platura</i>				
<i>Delia florilega</i>				
<i>Liriomiza cannabidis</i>				
<i>Vanessa cardui</i>				
<i>Ostrinia nubilalis</i>				
<i>Amathes c-nigrum</i>				
<i>Scotia segetum</i>				
<i>Autographa gamma</i>				
15 species	2 species	1 species	-	2 species

Studying the percentage of dominance classes, according to the number of gathered species, we found that in monoecious hemp crops, class D₁ –subrecedent species had the maximum percentage of 75%, classes D₂ –recedent species and D₅ – dominant species had 10% each, class D₃ –subdominant species, 5%, and no species was found in class D₄ –dominant species (*Figure 3*).

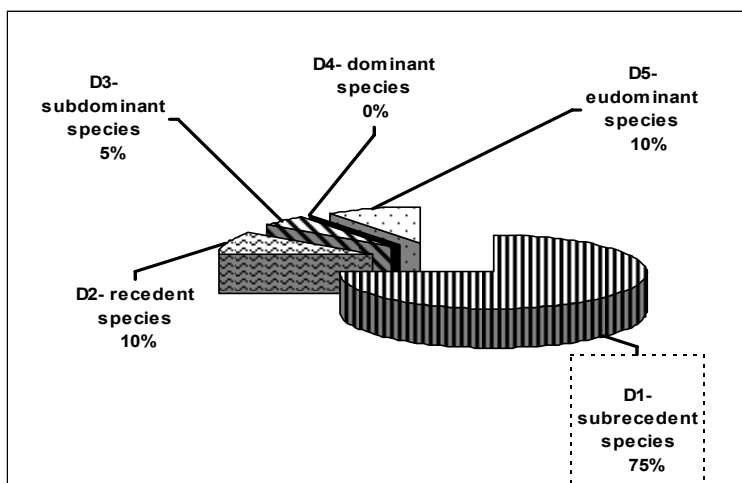


Fig. 3 – Percentage of dominant classes according to the number of species

Next to the inventoried injurious entomofauna, the monoecious hemp crops from Central Moldavia have been affected by many pathogenic agents, which summed up seven species causing diseases, from the stage of seed germination until plant ripeness.

The mean frequency of the attacks during 2005-2007 was of 0.63% in *Botrytis infestans* until 16.96% in *Septoria cannabidis* (Table 3).

Table 3 - Frequency of the attack produced by some pathogenic agents in monoecious hemp crops

Pathogenic agent	Parts of the attacked plant	F% attack			F% Mean attack
		2005	2006	2007	
<i>Pithium de Baryanum</i>	Plant at the stage of cotyledonous leaves	1.4	1.2	0.8	1.13
<i>Fusarium oxysporum</i>	Seed from soil, plant at the stage of 2-3 leaves	0.8	1.5	1.8	1.36
<i>Xanthomonas campestris cannabidis</i> var.	Leaf apparatus	12.6	23	10.5	15.36
<i>Septoria cannabidis</i>	Leaf apparatus	16.4	26	8.5	16.96
<i>Perenoplasmopara cannabina</i>	Leaf apparatus	3.4	3.2	3.0	3.2
<i>Sclerotinia sclerotiorum</i>	Stem base	1.6	1.6	1.0	1.4
<i>Botrytis infestans</i>	Stem, branches	1.0	0.8	0.1	0.63

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Our data have shown that for the monoecious hemp crops from Central Moldavia, injurious entomofauna within the dominance class D₅ – eudominant species, pathogenic agents *Septoria cannabis* and *Xanthomonas campestris* var. *cannabis*, which need specific measures of crop protection, had an economic importance, by their attack.

CONCLUSIONS

The injurious entomofauna from monoecious hemp crops was made of 20 species, summing up each year 3164.14 individuals/m².

The inventoried injurious species were framed in the systemic orders *Coleoptera*, *Homoptera*, *Diptera*, *Lepidoptera* and *Heteroptera*.

According to the number of species and the number of gathered individuals, the *Coleoptera* order had the highest percentage, followed by *Lepidoptera*, *Diptera*, *Heteroptera* and *Homoptera*.

The injurious species were framed within four dominance classes out of five: D₁- subrecedent species, D₂- recedent species, D₃- subdominant species and D₄-dominant species.

The percentage of dominance classes was of 75% for subrecedent species, 10% for recedent and eudominant species and 5% for subdominant species.

The pathogenic agents, which caused diseases in monoecious hemp crops, summed up seven species.

The mean frequency of the attacks was comprised between 0.63% and 16.96%.

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