RESEARCH REGARDING THE RAPE CROP PROTECTION AGAINST THE SPECIFIC PEST ATTACK

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ABSTRACT

As a result of the research works performed at Secuieni Agricultural Research Station, during 1997–1999, it was ascertained that the harmful entomofauna collected from rape crops totalized 3,214 individuals/m^2 during the whole vegetation period and belonged to the following orders: *Coleoptera, Hymenoptera, Heteroptera, Lepidoptera* and *Homoptera.* The greatest abundance of harmful species has been registered during the following phenophases: germination – emergence – leaf rosette formation and blooming – flowering – capsule formation. The chemical seed treatment with the insecticides : Chinook 200 FS, Promet 666 SC, Terrafuran 35 St, Cruiser 350, has ensured a good protection of plants in the first vegetation stages which positively influenced the yield in the winter rape as well as in the spring one. The insecticide Victenon applied by two chemical treatments ensured a good protection of plants against the attack produced by *Meligethes aeneus* and *Athalia rosae* species which determined the obtention of significant yield gains.

Key words: crop protection, rape, specific pests.

INTRODUCTION

At present, the rape occupies an especial place into the world economy, as source of vegetable oils utilized in nourishment and industry.

At the world level as well as in Romania, the progress achieved in rape breeding and in multiple utilization of oils, entirely motivates the reassessment of areas cropped with rape (Muntean et al., 1995).

Although more reduced than during the period 1980–1990, beginning with 1995 the areas cultivated with winter and spring rape have significantly increased, as compared with 1991–1995 and further on, they continue to increase, too (Yearbook, 1998).

The success of rape crop establishment and the yield assurance is conditioned, in the case of a good technology utilization, by the plant protection against the attacks produced by some harmful pests, which frequently diminish the yield till 35% or even compromise it (Ghizdavu et al., 1997; Perju, 1995; Murchie et al., 1997; Ekbom and Borg, 1996; Büchs and Harenberg, 1998).

In this sense, under conditions of Secuieni, a series of experiments regarding the harmful fauna and rape crop protection, have been initiated.

MATERIALS AND METHODS

During 1997–1999, were performed observations and determinations in winter and spring rape crops which consisted of:

– soil drillings using the metric framework of 25/25 cm, before sowing, at emergence and at the leaf rosette formation;

– sampling with entomological net, from the stem elongation till siliquae formation, from ten to ten days;

– collecting inflorescence and siliquae samples, by 100 pieces, in order to obtain the harmful fauna from flowers, siliquae and seeds.

The collected biological material was cleaned from vegetable residues, preserved in alcohol 70% and then determined at binocular magnifying glass.

At the appearance of *Athalia rosae* defoliation larvae, experiments for the attack prevention by seed chemical treatment with different insecticides as well as treatments during vegetation, have been performed.

The experiments were placed in randomized blocks, in four replications and the experimental data were statistically computed by ANOVA test.

The Valesca winter rape cultivar and the spring one Bolero were used.

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RESULTS AND DISCUSSION

From the winter and spring rape crops for seed, on an average, a fauna was collected consisting of 13 harmful species which totalized 3241 individuals.

Analysing the harmful entomofauna, on plant development stages, it has been ascertained that the highest density (533 individuals/m^2) was registered during the emergence and leaf rosette formation stages, and the smallest density (109 individuals/m^2) during the maturity stage (Table 1).

After grouping the plant vegetation stages, depending on their sensibility against the harmful species attack, it was established that:

– the greatest abundance of harmful species (1,420 individuals/m^2 – 43.8%), was registered during the germination – emergence – leaf rosette formation, followed by the blooming – flowering – siliquae formation stage, when the collected entomofauna totalized 1235 individuals/m^2 (38.5% from the total);

– the most reduced abundance of harmful species (283 and 290 individuals/m^2, which represent 8.7% and 8.9% respectively) was collected during the stem elongation and grain formation and maturation stages (Figure 1).

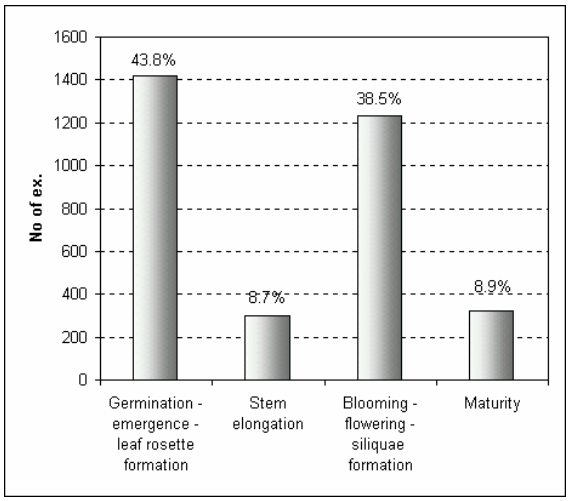

Figure 1. Abundance of harmful species during different plant vegetation stages

Analysing the collected entomofauna, it has been ascertained that they belong to the following orders: *Coleoptera, Hymenoptera, Heteroptera, Lepidoptera* and *Homoptera*, 96.6% out of them representing *Coleoptera* order, the rest representing a percentage between 0.1% and 2.0% (Figure 2).

Within *Coleoptera* order, the *Phyllotreta* species (*Ph. atra* and *Ph. nemorum*) totalized 1,172 individuals and they registered the maximum percentage of 56.4%, followed by *Meligethes aeneus* species with 37.2%, *Ceutorrhynchus napi* with 2.3%, *Ceutorrhyncus assimilis* 1.6%, *Entomoscelis adonidis* with 1.4%

Table 1. Harmful entomofauna from rape crops (Secuieni, 1997–1999)

Harmful species	Order	Germination -emergence	Emergence	Leaf rosette formation	Stem elongation	Blooming	Flowering	Siliquae formation	Seed formation	Maturity	Total species
Agriotes spp.	*Coleoptera*	6L	6L	5L	-	-	5	-	-	-	17
Opatrum sabulosum	*Coleoptera*	3	2	1	-	-	-	-	-	-	6
Melolontha melolontha	*Coleoptera*	2	-	-	-	-	-	-	-	-	2
Euryderma spp.	*Heleoptera*	7	11	7	2	-	-	-	-	-	27
Phyllotreta atra	*Coleoptera*	287	396	374	147	86	80	54	11	9	440
Phyllotreta nemorum	*Coleoptera*	54	79	84	51	21	9	11	1	-	332
Entomoscelis adonidis	*Coleoptera*	-	5	11	14	10	7	-	-	-	47
Ceutorrhynchus napi	*Coleoptera*	3	7	9	11L	16L	15L	6L	3	3	73
Ceutorrhynchus assimilis	*Coleoptera*	-	-	5	7	7	9	6L	9L	10P	53
Athalia rosae	*Hymenoptera*	-	-	-	6L/P	11L/P	20L/P	27L/P	1/L	-	65
Pieris rapae	*Lepidoptera*	-	-	-	-	2L/P	3L/P	1L/P	-	-	6
Meligethes aeneus	*Coleoptera*	-	27	36	45	250	380	198	140	96	1172
Brevixoryne brassicae	*Homoptera*	-	-	-	-	-	1 col.	-	-	-	1 col.
Total phenophases		354	553	533	283	403	529	303	181	109	3211
		1420			283	1235			290		

and *Agriotes* spp., *Opatrum sabulosum* and *Melolontha* spp. group which occupies together a percentage of 1.0% (Figure 3).

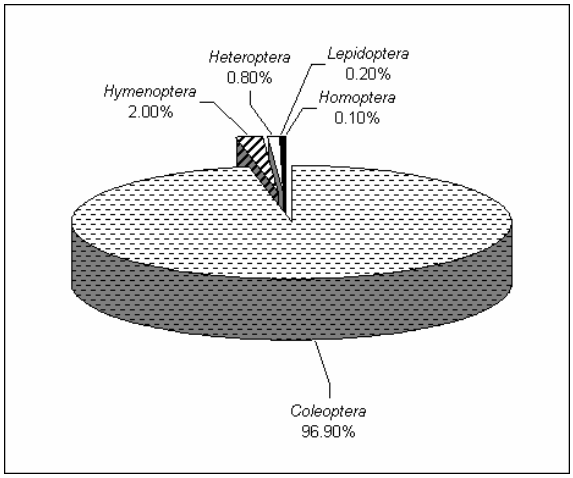

Figure 2. Percentage of harmful orders in rape crops

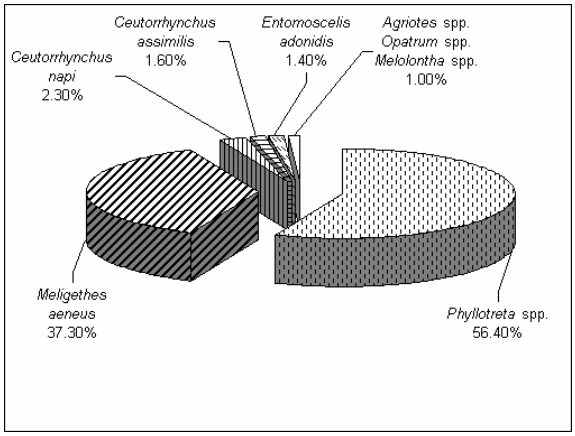

Figure 3. Percentage of harmful species within *Coleoptera* order

The data presented in figure 1 demonstrate that the greatest abundance of harmful species, during the whole rape vegetation stage, have been registered during the seed germination – plant emergence and leaf rosette formation, when plants are very sensitive to the pest attack and the crops can be entirely compromised. In order to prevent the attacks produced by the edaphyc pests (*Agriotes* spp., *Opatrum sabulosum*, *Melolontha* spp., *Phyllotreta* spp., *Entomoscelis adonidis*), under the conditions of Secuieni, an assortment of insecto-fungicides applied in rape seed treatment, was tested.

In winter rape crops, the mean density of *Phyllotreta* adults was between 179–218 individuals/m^2, so that, the mean frequency of the attacked plants F had values between 20 and 28% in treated variants as compared with 59% in untreated control.

The attack degree (AD) varied between 0.83 and 1.33% in treated variants, in comparison with 9.1% in untreated control, and as regards the attack degree between treated variants and untreated control, significantly negative differences were registered.

The efficiency (E) of insecticides utilized in winter rape treatment in order to prevent the attack of *Phyllotreta* spp. ranged between 85 and 91% (Table 2).

During all years of experimentation, it has been ascertained that the density of *Phyllotreta* spp. adults was greater in spring, registering values between 355 and 410 individuals/m^2, so that the frequency of plants attacked in spring rape, varied between 32 and 42% in treated variants and 97% in untreated control. The attack degree had values between 1.32 and 1.96% in treated variants, in comparison with 22.52% in untreated control. As regards the attack degree, significantly negative differences were registered between the treated variants and untreated control.

The efficiency of utilized insecto-

Table 2. Influence of some insecticides applied in rape seed treatment on soil insect pest attack (Secuieni, 1997–1999)

Experimental variants	Rate l, kg/t	Winter rape (Valesca)				Spring rape (Bolero)			
		F %	I %	AD %	E %	F %	I %	AD %	E %
Chinook 200 FS	20.0	20	4.16	0.83°°°	91	41	4.12	1.32°°°	94
Promet 600 SC	7.5	26	5.10	1.33°°°	85	37	3.56	1.93°°°	91
Terrafuran 35 ST	8.0	21	3.94	0.83°°°	91	32	3.94	2.81°°°	88
Cruiser 350 FS	8.0	28	4.71	1.32°°°	85	42	3.97	1.96°°°	91
Untreated control		59	15.42	9.10	-	97	22.79	22.52	-
			LSD 5% =	0.91%				8.33%	
			1% =	0.99%				10.14%	
			0.1% =	1.20%				12.94%	

fungicides in spring rape seed treatment varied between 88 and 94% (Table 2).

The insectofungicides applied in winter and spring rape as seed treatment had in view their influence on germination and plant growth.

It was established that, in winter rape, the emerged seed percentage had values between 94 and 97% in treated variants and 96% in untreated control; in spring rape the emerged seed percentage had values between 95 and 99% (Figure 4).

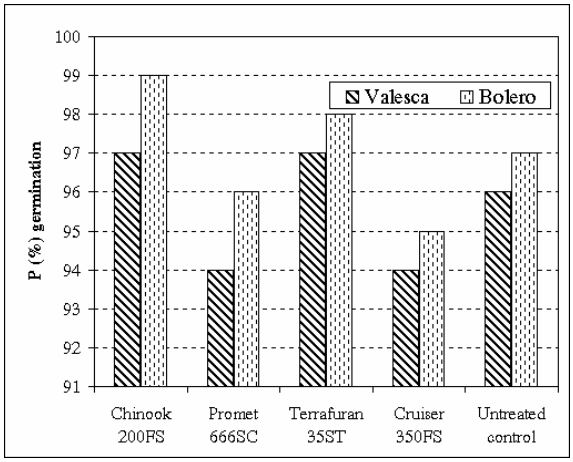

Figure 4. Influence of some insecticides applied as seed treatment on germination

The average time of germination was between 3.09 and 3.43 days in all variants of the two rape cultivars (Figure 5).

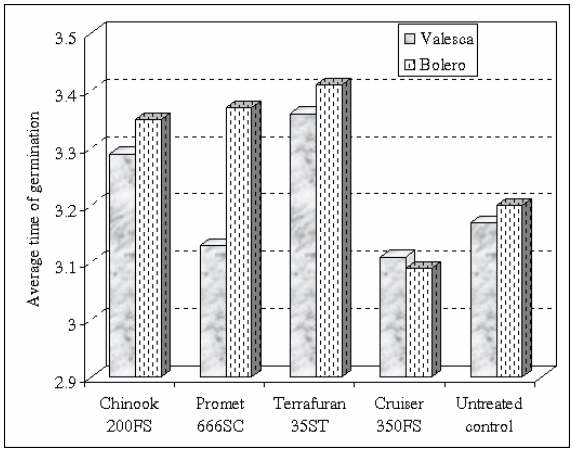

Figure 5. Influence of some insecticides applied as seed treatment on the average time of germination

The plant mean height, at 25 days from emergence, was between 6.6 and 7.5 cm in winter rape and 10.0 and 11.0 cm in spring rape. The differences vs untreated control were not statistically ensured (Figure 6).

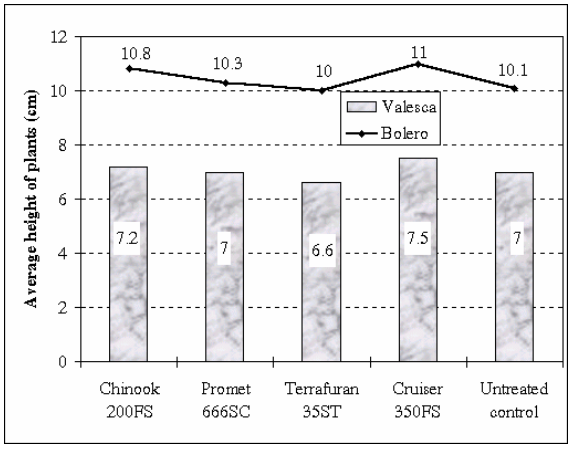

Figure 6. Influence of some insecticides applied as seed treatment on plant growth

None of the tested products in rape seed treatment, negatively influenced the seed germination, the average time of germination and plant growth. The good protection ensured by the rape seed chemical treatment against the pests which affect the crop during the first vegetation stages, positively influenced the rape yield. Between the treated variants and untreated control, significantly and distinctly yield gains were registered (Table 3). However, the rape crops are affected by specific pests during the blooming – flowering – siliquae formation phenophases, which represent 38.5% from the total collected individuals during the whole vegetation period and which under certain conditions can entirely compromise the yield. During these phenophases, a great danger present *Athalia rosae* which can entirely defoliate the plants and *Meligethes aeneus* which in adult and larva stages, diminishes the yield till 40%.

In order to prevent and control these species, under conditions of Secuieni, good results were obtained by the application on vegetation, of two chemical treatments with Victenon, in two rates.

It has been ascertained that the efficiency (E) of Victenon insecticide was of 90 and 96% respectively, in *Meligethes aeneus* control and of 92 and 98% respectively, in *Athalia rosae* control. The yield differences between treated variants and untreated control, were statistically ensured (Table 4).

Table 3. Influence of some insecticides applied in rape seed treatment on yield (Secuieni, 1997–1999)

Experimental variants	Rate l, kg/t	Valesca			Bolero		
		Yield kg/ha	Diff. vs. control kg/ha	Signif.	Yield kg/ha	Diff. vs. control, kg/ha	Signif.
Chinook 200 FS	20.0	3,050	1,080	***	2,460	780	***
Promet 600 SC	7.5	2,980	1,010	***	2,400	720	**
Terrafuran 35 ST	8.0	2,900	930	***	2,350	670	**
Cruiser 350 FS	8.0	3,010	1,030	***	2,400	720	**
Untreated control		1,970	-	-	1,680	-	-
		LSD 5% =	442 kg/ha			442 kg/ha	
		1% =	621 kg/ha			536 kg/ha	
		0.1% =	876 kg/ha			780 kg/ha	

Table 4. Influence of some insecticides applied o n vegetation in rape pest control

Experimental variants	Rate l, kg/t	Efficiency, %		Yield kg/ha	Signif.
		Meligethes aeneus	*Athalia rosae*		
Victenon	1.0	96	98	2,440	***
Victenon	0.75	90	92	2,310	***
Fastac (standard)	0.150	75	78	2,012	**
Untreated control		-	-	1,714	-
	LSD 5% =	185 kg/ha			
	1% =	264 kg/ha			
	0.1% =	366 kg/ha			

CONCLUSIONS

The harmful entomofauna collected from rape crops totalized 3,241 individuals/m^2 during the whole vegetation period.

From the total collected pests, the *Coleoptera* order prevailed.

The greatest abundance of harmful species was registered during the germination – emergence – leaf rosette formation and blooming – flowering – siliquae formation phenophases.

The rape seed chemical treatment with insectofungicides ensured a good plants protection during the first vegetation stages and positively influenced the yield in winter as well as in spring rape.

Victenon insecticide applied in two chemical treatments, ensured a good plant protection against *Meligethes aeneus* and *Athalia rosae* attack, which determined significant yield gains.

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