OBSERVATIONS ON BIOLOGICAL CONTROL AGENTS OF WEEDS OF NATURAL MEADOWS

Nela TĂLMACIU [1], Mihai TĂLMACIU [1], Ramona HUMĂ [1]

[1] University of Agronomy Sciences and Veterinary Medicine of Iaşi

Abstract

The observations were made in the period 2008 – 2010 in natural pastures from the department of Iassy, nort-east of Romania. In majority pasture ecosystems exploited by grazing, it is happening a transformation of flora composition, frequently through adaptation in this surfaces with desirable species (weeds) with low economic value. The researches were done in the pastures invaded bt *Lepidium draba* L. – the result of irrational grazing of livestock respectively cows and horses.

Lepidium draba L. (family *Brasicaceae*), originary from Europe, became a problem plant in many agricultural ecosystems from our country. Three of the most promising biological control agents, the gall-forming weevil *Ceutorhynchus cardariae*, the flea beetle *Psylliodes wrasei*, and the gall mite *Aceria drabae* occur at this site. Attack by gall mite *Aceria drabae* Nal., of inflorescences by *Lepidium draba* L., is based on visual examination of plants, were contained between 15 -47,5% in 2008 and were contained between 18,8 – 43,4% in 2010.

Plant numbers were analysed using repeated measures analysis of variance. The density of *L. draba* was four to five times higher in Iasi, presumably because of the long history of stronger grazing pressure on the associated vegetation. On variant to have beened disturbed (harrowed) and disturbed and cultivated and mixture of grass seeds, significantly reduced the number of *L. draba* plants.

Key words: Lepidium draba, atropodes phytophags, invasive weeds, natural pastures

Fodder production and grazing represents an important activity in zootechny, especially for cattle taking into account, that from production expense, thouse for animal food represents the greatest weight.

The grass of pasture is a complet and balanced fodder, representinga valuable forage which is utilized for animal food in time of vegetative period.

In majority pasture ecosystems exploited by grazing, and their is a change in floristic composition, frequently through adaptation in this surfaces with desirable species with low economic value, both quantitatively and qualitatively.

The control of invasive plants, known with generic name weeds, comunne in all agroecosystems, require height costs, determinating a major cost of production, correlated with a low work productivities in this economyc sector with major importance.

Taking into account that in these ecosystems, usually having a great floristic diversity, the erbicids could not be utilizate because their large action spectrum; the control of these undesirable plants represents a hard and actual problem.

During a literature survey, 196 phytophagous organisms were found associated with *Lepidium draba*, and 80 during field surveys. Six phytophagous insect species were selected as potential biological control agents based on records of their restricted host range (Cripps et al. 2005). Four of these: the gall-forming weevil *Ceutorhynchus cardariae* Korotyaev (*Coleoptera, Curculionidae*), the stem-miner *Ceutorhynchus merkli* Korotyaev, the seed-feeder *Ceutorhynchus turbatus* Schultze, and the flea beetle *Psylliodes wrasei* Leonardi & Arnold (*Coleoptera, Chrysomelidae*), the gall mite, *Aceria draba* Nal. (*Acari, Eriophyidae*), and the root-gall forming weevil *Ceutorhynchus assimilis* Paykull (Hinz. et al. 2007). In Romania of the most promising biological control agents, the *Ceutorhynchus cardariae*, the *Psylliodes wrasei*, and the *Aceria drabae* (Chatened du Gaetan, 1990, Fumanal et al., 2004, Panin, I., 1951).

MATERIAL AND METHOD

The experiment to have been arranged in a full factorial randomized block design using six blocks of 16 x 32 m each. Inside each experimental area, we have delimited three variants:

- a control variant with undisturbed plots-V 1;
- a variant to have beened disturbed (harrowed) – V 2;

- a variant to have beened disturbed and cultivated and mixture of grass seeds – V 3. It was sown the following plants: 3,5 Kg *Dactilis glomerata,* 3 Kg *Festuca valesiaca,* 1 kg *Lolium perene,* 4 kg *Onobrichis viciifolia* and 3,5 kg *Medicago sativa*. At the beginning of May, all blocks were fenced to protect plots against grazing animals to allow the newly sown grass and disturbed plants in cultivated plots to recover (Hinz et all., 2007).

Within each block, one plot of the surface 16 x 23 m to have beened disturbed (harrowed), one plot of the surface 16 x 23 m to have beened disturbed and cultivated and mixture of grass seeds and *Lotus* and one plot of the surface 16 x 23 m, to leted undisturbed. Within each disturbed and undisturbed half-block, 4 (3 x 3 m) plots, separated by 2m buffer zones, will be established, resulting in 72 plots per site.

In each 3 x 3m plot, a smaller (0,5 x 0,5m) sub-plot will be established, which in ten plant of *Lepidium draba*, to have beened individually marked.

The following traits to have beened regularly recorded for each plant between May: phenological stage (seedling, rosette, bolting, flowering,etc), the number of shoots per plant, their height and any signs of insect or mite damage.

RESULTS AND DISCUSSIONS

This paper presents the observations regarding the biological control agents (% attack by gall mite *Aceria drabae* Nal.*)* of species *Lepidium draba* L. (*fig.1*). Attack is based on visual examination of plants (Hinz et all., 2007).

The gall mite, *Aceria drabae* (Nal.) (*Acari, Eriophyidae*), overwinters in dormant shoot buds of *Lepidium draba*. In spring, the mite is passively carried up in the developing shoot where it feeds on meristematic tissue. The wind-dispersed mites have several generations per year and can reduce or completely prevent seed production. *Aceria drabae* causes galls, erineum and especially flower deformation leading to sterility.

In each 3x3 m plot, smaller 0,5x0,5 m subplots were established during April, the number of *Lepidium draba* plants (ramets) was recorded (*tab.1*).

In block I in the variant V 1 (undisturbed) the number of *Lepidium draba* plants were contained between 32-52 plants in 2008, 12-20 in 2009 and 6-10 in 2010; in the variant V 2 (disturbed) the number of plants were contained between 16-38 plants in 2008, 7-13 in 2009 and 0-26 in 2010; in the variant V 3 (disturbed and cultivated) the number of plants were contained between 6-52 plants in 2008, 7-12 in 2009 and 0-7 in 2010.

It May be noted that following the measures applied (disturbed, disturbed and cultivated with mixture of grass seeds, isolation areas) the number of *Lepidium draba* plants decreased in the period 2008-2010, thus resulting in increased the quality and quantity of fodder production.

During May, plant traits (phenological stage, number of shoots and height of each shoot) were recorded for a maximum of 10 plants per subplot, chosen along two diagonal lines. In addition, any foliage damage, visible from the outside, was noted and, as far as possible, attributed to specific herbivore species.

This paper presents the observations regarding the biological control agents (% attack by gall mite *Aceria drabae)* of species *Lepidium draba*. Attack is based on visual examination of plants (*tab.2*).

In the central plot C 1, in the variant V 1 (undisturbed), percent attack of inflorescences by *Aceria drabae* were contained between 10-80%, plot C 2 (V 2 disturbed) were contained between 0 – 70%, plot C 3 (V 3 disturbed and cultivated) were contained between 5 – 60%.

In the additional plot C 2, in the variant V 1 (undisturbed), percent attack of inflorescences by *Aceria drabae* were contained between 5-80%, in V 2 (disturbed) were contained between 0-80%, in V 3 (disturbed and cultivated) were contained between 5-70%.

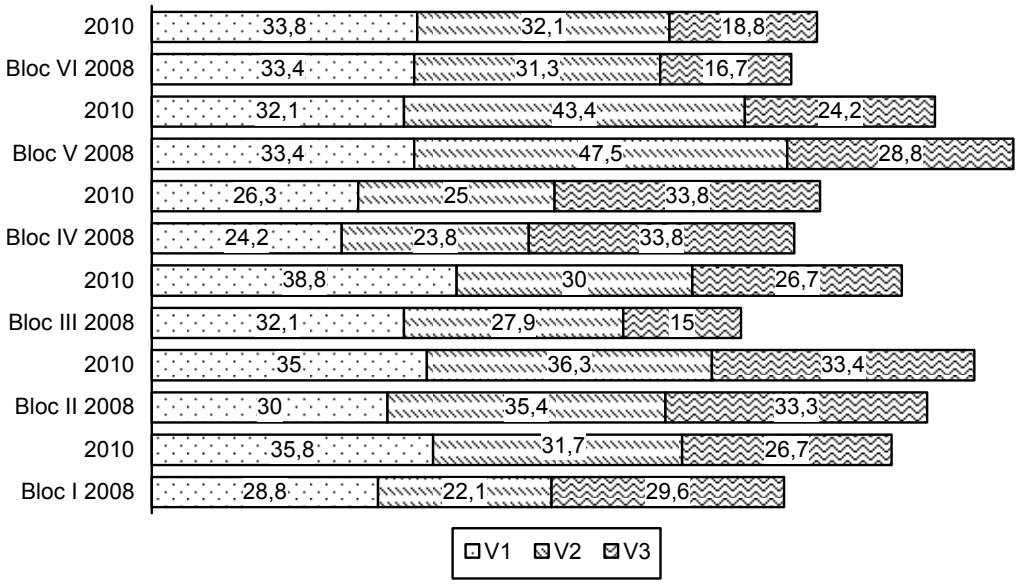
In the additional plot C 3, in the variant V 1 (undisturbed), percent attack of inflorescences by *Aceria drabae* were contained between 0-70%, in V 2 (disturbed) were contained between 0-80%, in V 3 (disturbed and cultivated) were contained between 0-60%.

In the department of Iassy**,** in 2008 (*fig. 2*), in the undisturbed plot (V 1), the percentage media attack of inflorescences by *Aceria drabae* were contained between 24,2-33,4%,

In the disturbed plot (V 2), the percentage media attack of inflorescences by *Aceria drabae* were contained between 22,1-47,5%.

In the disturbed and cultivated plot (V 3), the percentage media attack of inflorescences by *Aceria drabae* were contained between 15-33,3%.

Figure 1 **The gall mite *Aceria drabae* Nal. of inflorescences**



V 1 – undisturbed plot; V 2 – disturbed plot; V 3 – disturbed and cultivated plot

Figure 2 **Percent attack of inflorescences by *Aceria drabae* in the department of Iassy in period 2008-2010**

CONCLUSIONS

After conducting research inventory bodies fitofage of invasive plants in ecosystems pratico (pasture and meadow) area Moldovenesc Central Plateau, in 2008, shows clearly that this species is a very important factor in limiting nature of these plants.

The number of *Lepidium draba* plants decreased in the period 2008-2010, thus resulting in increased the quality and quantity of fodder production

Attack by gall mite *Aceria drabae* Nal., of inflorescences by *Lepidium draba* L., is based on visual examination of plants, were contained between 15 -47,5% in the department of Iassy.

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Table 1

The number of *Lepidium draba* plants was recorded in the experimental plot

Block	Plot	Subplot	Number of plants		
			2008	2009	2010
I	1	1	52	15	9
		2	32	20	6
		3	35	13	10
		4	33	12	8
	2	1	38	13	23
		2	24	10	26
		3	19	12	10
		4	16	7	0
	3	1	52	12	0
		2	42	10	7
		3	6	7	2
		4	22	10	7
II	1	1	37	21	35
		2	13	14	16
		3	20	16	30
		4	14	20	19
	2	1	21	13	17
		2	13	9	14
		3	32	5	8
		4	16	11	23
	3	1	6	11	17
		2	6	9	27
		3	6	10	31
		4	15	15	11
III	1	1	15	14	8
		2	26	6	15
		3	21	5	6
		4	31	13	15
	2	1	34	13	8
		2	21	17	20
		3	24	7	28
		4	1	10	12
	3	1	18	16	34
		2	45	18	16
		3	38	17	5
		4	16	11	24
IV	1	1	21	8	3
		2	60	15	4
		3	5	24	4
		4	36	14	0
	2	1	39	21	6
		2	28	3	6
		3	60	12	0
		4	6	11	4
	3	1	14	4	2
		2	30	17	7
		3	52	19	5
		4	37	33	0
V	1	1	44	15	7
		2	26	7	21
		3	25	4	6
		4	31	11	15
	2	1	20	14	5
		2	44	19	7
		3	36	6	10
		4	21	9	0
	3	1	44	4	23
		2	37	6	14
		3	35	3	3
		4	12	9	10
VI	1	1	53	12	5
		2	20	15	10
		3	26	21	10
		4	17	7	8
	2	1	45	4	32
		2	35	15	5
		3	20	12	12
		4	37	14	25
	3	1	23	11	23
		2	38	6	12
		3	14	9	22
		4	49	15	14

Table 2

Percent attack of inflorescences by Aceria drabae

Block	Plot	Subplot	% Attack of infl by Aceria drabae					
			C1		C2		C3	
			2008	2010	2008	2010	2008	2010
I	1 (V1)	1	60	80	40	10	40	50
		2	20	10	15	25	10	30
		3	40	50	60	70	40	40
		4	10	20	5	25	5	20
	3(V3)	1	40	0	60	30	40	40
		2	15	10	15	10	20	30
		3	40	50	40	60	50	40
		4	10	20	15	20	10	10
	2(V2)	1	30	80	50	20	20	10
		2	20	90	5	10	10	20
		3	40	40	40	50	30	30
		4	5	0	5	20	10	10
II	2	1	40	30	40	50	50	40
		2	20	30	10	20	10	20
		3	80	70	70	60	80	80
		4	10	20	10	10	5	5
	1	1	40	30	40	40	30	50
		2	10	20	10	25	0	5
		3	60	70	70	60	70	60
		4	15	30	5	10	10	20
	3	1	70	30	40	30	50	50
		2	15	20	5	10	10	20
		3	70	70	40	40	70	60
		4	10	20	10	30	10	20
III	1	1	40	60	40	50	30	40
		2	10	20	5	15	10	25
		3	70	70	80	80	60	50
		4	10	20	15	15	15	20
	2	1	50	40	50	50	40	50
		2	15	25	5	10	10	10
		3	50	50	60	60	40	35
		4	10	15	5	10	0	5
	3	1	10	10	10	15	10	5
		2	10	40	0	40	5	50
		3	30	40	40	50	40	35
		4	10	20	5	10	10	5
IV	1	1	40	30	50	50	30	20
		2	10	10	0	10	5	5
		3	50	60	40	40	50	50
		4	10	0	0	5	5	4
	3	1	60	50	60	60	70	80
		2	5	10	0	5	0	5
		3	70	70	60	50	60	50
		4	5	0	5	5	10	20
	2	1	30	60	50	40	60	60
		2	0	5	10	10	5	5
		3	40	0	40	40	30	40
		4	0	10	10	10	10	20
V	2	1	80	80	80	60	80	70
		2	20	20	15	20	5	10
		3	80	70	80	50	50	70
		4	30	0	30	50	20	20
	1	1	50	50	70	50	70	70
		2	10	20	10	10	10	20
		3	15	20	60	40	70	50
		4	15	25	5	10	15	20
	3	1	20	25	20	30	60	50
		2	5	10	10	10	0	5
		3	60	50	70	70	60	40
		4	20	20	10	5	10	20
VI	1	1	80	60	80	50	50	80
		2	30	40	10	20	5	10
		3	50	50	40	50	30	20
		4	5	10	10	10	10	5
	2	1	70	70	80	50	80	80
		2	0	20	0	0	5	5
		3	10	40	10	10	10	20
		4	60	30	30	30	20	30
	3	1	10	30	20	20	10	10
		2	20	30	5	5	5	10
		3	30	20	30	30	60	50
		4	0	10	0	0	10	10

C 1 - central 50x50cm plot; C 2 and C 3 - two additional plots;

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