OBSERVATIONS REGARDING THE MAIN BIOLOGICAL CONTROL AGENTS OF THE INVASIVE WEEDS FROM A NATURAL PASTURE

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In Romania, the pasture ecosystems have a special importance in agronom economy, because represents the main food for zootehny. Thus, from about 15,000 ha farming surface, about 33% is occupied by natural pastures. Our preliminary research performed in pastures from central region of Moldavia which were exploited in a non-rational and inadequare mode have showed that some plants with small fodder qualities or which have the capacity to synthesize some toxic substances for animals, has been multiplied very much becoming invasive weeds (Lepidium draba, Euphorbia cyparissias, Artemisia sp., etc), wich decrease dramatically the productivity of the ecosystems. The observations were made in year 2008 in a natural pasture from the department of Iassy, norteast of Romania. This paper presents the observations regarding the biological control agents (% attack by gall mite Aceria drabae) which can limitate the Lepidium draba populations.

KEY WORDS: *biological agents, Aceria draba, control, invasive weeds, pastures.*

The observations were made in year 2008 in a natural pasture from the department of Iassy, norteast of Romania.

The site is used as a pasture for peasants' cattle from the neighbouring villages and is heavily overgrazed. We believe cattle avoid grazing *Lepidium draba* and in combination with the disturbance caused by the livestock, this is assumed to favor *Lepidium draba*, which now dominates this site, and may have facilitated its increase to the exceptional current population. 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 the three most promising herbivores can easily be distinguished by external inspection. This will allow an estimate of herbivore impact of each species at the on individual plant level.

MATERIAL AND METHODES

The experiment to have been arranged in a full factorial randomized block design using six blocks of 16 x 32 m each.

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 DISCUSSION

Lepidium draba L. (*Brassicaceae*) is a perennial mustard, indigenous to southwestern (Caucasus region) and central Asia. *Lepidium draba* is an aggressive invader capable of thriving in nearly all types of soil and habitats, but grows particularly well in disturbed and irrigated areas. It is usually avoided by cattle, but if grazed it can be toxic to livestock. *Lepidium draba*L. displaces valuable pasture forage species and reduces native biodiversity.

The site is used as a pasture for peasants' cattle from the neighbouring villages and is heavily overgrazed. We therefore established eight additional 3x3 m plots outside of exclosures in May as comparison. To variant witness (outside), of ground cover vegetation is composed from (*tab. 1*).

Table 1

Estimation of ground cover vegetation

Subplot	Plot No.	% *Lep. draba*	% Other forbs	% Legumes	% Grasses
1	1	40	20	20	20
	2	10	60	10	20
	3	10	60	0	30
Media		20	46,6	10	23,4
2	1	40	40	0	20
	2	50	30	10	20
	3	10	50	0	40
Media		34,4	40	3,3	26,6
3	1	20	60	0	20
	2	50	30	10	10
	3	20	30	20	30
Media		30	40	10	20
4	1	20	20	30	30
	2	30	40	10	20
	3	20	50	10	20
Media		23,4	36,6	16,6	23,4
5	1	10	60	10	20
	2	30	40	10	20
	3	20	40	10	30

Subplot	Plot No.	% Lep. draba	% Other forbs	% Legumes	% Grasses
Media		20	46,6	10	23,4
6	1	30	30	10	30
	2	40	30	10	20
	3	60	20	10	10
Media		43,4	26,6	10	20
7	1	30	40	0	30
	2	20	40	0	40
	3	20	40	10	30
Media		23,3	40	3,4	33,3
8	1	0	60	10	30
	2	30	40	10	20
	3	30	30	10	30
Media		20	43,4	10	26,6

Plot no.: 1 - central 50x50cm plot; 2 and 3 - two additional plots;

One in six blocks, media of ground cover vegetation is composed from:

- Plot no cultivation (undisturbed): % lepidium were contained between 16,6 – 46,7; % Other forbs were contained between 8,43 – 26,7; % Legumes were contained between 6,6 – 50%; % Grasses were contained between 33,3 – 41,7%.
- Plot cultivation no sowing (disturbed): % lepidium were contained between 11,6 – 33,3%; % Other forbs contained between 13,4 - 36,6%; % Legumes contained between 13,4 - 46,6%; % Grasses contained between 8,4 - 48,4%.
- Plot cultivation and sowing (disturbed and cultivated) % lepidium were contained between 11,6 - 26,6%; % Other forbs contained between 8,4 – 36,6%; % Legumes contained between 11,7 – 43,3%; % Grasses contained between 8,4 – 43,4%.

In Iasi, sowing of a grass-legume mixture increased percent cover of legumes.

Attack of shoots and root crowns, which were visible from the outside, was low at both sites. However, attack by *Ceutorhynchus cardariae* and *Psylliodes wrasei* were likely underestimated because plants were only visually inspected for attack.

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, and the number of *Lepidium draba* plants (ramets) was recorded. 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*).

Table 2

Percent attack of inflorescences by Aceria drabae

Block	Plot	Subplot	% Attack of infl by Aceria drabae		
			V1	V2	V3
I	1	1	60	40	40
		2	20	15	10
		3	40	60	40
		4	10	5	5
	3	1	40	60	40
		2	15	15	20
		3	40	40	50
		4	10	15	10
	2	1	30	50	20
		2	20	5	10
		3	40	40	30
		4	5	5	10
II	2	1	40	40	50
		2	20	10	10
		3	80	70	80
		4	10	10	5
	1	1	40	40	30
		2	10	10	0
		3	60	70	70
		4	15	5	10
	3	1	70	40	50
		2	15	5	10
		3	70	40	70
		4	10	10	10
III	1	1	40	40	30
		2	10	5	10
		3	70	80	60
		4	10	15	15
	2	1	50	50	40
		2	15	5	10
		3	50	60	40
		4	10	5	0
	3	1	10	10	10
		2	10	0	5
		3	30	40	40
		4	10	5	10

Block	Plot	Subplot	% Attack of infl by Aceria drabae		
			V1	V2	V3
IV	1	1	40	50	30
		2	10	0	5
		3	50	40	50
		4	10	0	5
	3	1	60	60	70
		2	5	0	0
		3	70	60	60
		4	5	5	10
	2	1	30	50	60
		2	0	10	5
		3	40	40	30
		4	0	10	10
V	2	1	80	80	80
		2	20	15	5
		3	80	80	50
		4	30	30	20
	1	1	50	70	70
		2	10	10	10
		3	15	60	70
		4	15	5	15
	3	1	20	20	60
		2	5	10	0
		3	60	70	60
		4	20	10	10
VI	1	1	80	80	50
		2	30	10	5
		3	50	40	30
		4	5	10	10
	2	1	70	80	80
		2	0	0	5
		3	10	10	10
		4	60	30	20
	3	1	10	20	10
		2	20	5	5
		3	30	30	60
		4	0	0	10

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

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

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

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

CONCLUSIONS

Lepidium draba is an aggressive invader capable of thriving in nearly all types of soil and habitats. Three of the most promising biological control agents, the *Ceutorhynchus cardariae*, the *Psylliodes wrasei*, and the *Aceria drabae.*

Attack by *Ceutorhynchus cardariae* and *Psylliodes wrasei* were likely underestimated because plants were only visually inspected for attack. Attack by gall mite *Aceria drabae* of inflorescences by *Lepidium draba*, is based on visual examination of plants, were contained between 0 – 80%.

However, due to management practices, most privately or commonly used pastures are now frequently overgrazed. Increased disturbance by livestock, coupled with increased nitrogen input in turn facilitates weed infestations, especially of plants that are unpalatable to cattle.

In consequence, the diversity and abundance of desirable plant species decreases, and sites become dominated by one or few invasive species, leading to a degradation of these grassland ecosystems.

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