

## THE EFFECTS OF ALFALFA *MEDICAGO SATIVA* (L.) PLANTATION AGE ON THE OCCURRENCE OF ADULT *CURCULIONOIDEA*

MARTA PISAREK

KRAKÓW AGRICULTURAL UNIVERSITY,  
CHEMIZATION OF AGRICULTURAL PRODUCTION DEPARTMENT,  
RZESZÓW, ĆWIKLIŃSKIEJ 2, 35-601 RZESZÓW, POLAND

**Abstract.** The numbers of *Curculionoidea* showed a growing tendency during the initial four years of alfalfa crop use for green fodder, but in the subsequent years they decreased significantly. The number of species increased with the plantation age.

**Key words:** alfalfa, plantation age, *Curculionoidea*

### I. INTRODUCTION

The species biologically connected with alfalfa crops, known as pests comprise of the following: *Apion tenue* Kirby, *A. pisi* (Fabr.), *A. filirostre* Kirby, *Otiorhynchus ligustici* (L.), *Sitona humeralis* Steph. and *Hypera postica* (Gyll.) (Cmoluch and Minda 1977). Their numbers in the growing period may show significant differentiation and are affected by both biotic and abiotic factors. Research in this sphere applied mainly to biotic factors: pathogens (Quinn and Hower 1985; Verkleij et al. 1992), parasites (Aeschlimann 1975; 1980; Romankow and Dankowska 1991) and predators (Czerniakowski 1996) attacking various developmental stages of those insects. Until now other results have not been raised so broadly in either domestic or foreign literature. Therefore, it seemed advisable to define the quantitative and qualitative relations of *Curculionoidea* and the changes in structure of domination of these insects in conditions of long-term usage of alfalfa for green fodder in south-eastern Poland.

### II. MATERIAL AND METHODS

The effects of alfalfa plantation age on the occurrence of *Curculionoidea* were studied in the period of 1990–1995. The entomological material for the analysis came from the same sites which were the objects of research on species composition, individual dominance and numerical dynamics of *Curculionoidea*. The plantations were grouped into six categories according to the period of their usage. These were: first year crops – Miłocin I, Przybyszówka I, Gać I, Rymanów I; second year crops – Miłocin II, Przybyszówka II, Harta II, Łężany II; third year crops – Miłocin III, Przybyszówka III, Harta III, Miejsce Piastowe III; fourth year crops – Miłocin IV, Zalesie IV, Harta IV, Suchodół IV; fifth year crops – Zalesie V, Sietesz V, Suchodół V, as well as one plantation in its sixth year of production – Zalesie VI.

## III. RESULTS

The analysis of numbers of all the weevils occurring on alfalfa crops in south-eastern Poland showed a rising tendency in the initial four years (Fig. 1). The mean of 6 individuals were caught in the basic sample (25 sweeps of the net) on alfalfa crop in the first year of plantation usage. The third and fourth years of fodder production were a period of peak numbers of weevils. The half of all the weevils was collected in that period. Later, their numbers decreased steadily, reaching again the level as in the first years of alfalfa crop usage (Fig. 1). On the other hand, the number of species found on those plantations increased with plant age (Figs. 1, 2).

Coleopterans, which were most numerous on alfalfa crops in each year of its usage, belonged to *Sitona* spp. species. Their share in the plantation occupation in the initial three years ranged from 81.0 to 89.2%. Smaller numbers of *Sitona* spp. were observed only on older plants. They remained at levels of 72.7% and 29.2% of all the collected *Curculionoidea* in the fifth and sixth year of alfalfa cultivation, respectively (Fig. 3).

The numbers of individuals of *Apion* spp. genus varied in a different way. On younger plants (plantations in first to fourth years of usage) their share remained at a low level: from 5.7 to 8.5% of the collected *Coleoptera* adults. However, in the fifth-year of alfalfa crops usage for green fodder the intensity of occurrence of *Apion* spp. increased to 15.2%. The adults of this genus were most numerous in the oldest alfalfa plantation, reaching the level of 34.2% (Fig. 3).

Species of the *Hypera* spp. genus had the lowest share in the occupation of plantation in the third year of usage – only 3.6% of the collected *Curculionoidea*, and the highest share in the oldest plantation – 22.6% (Fig. 3).

The total numerical share of weevils belonging to species is as follows: *Tychius* spp., *Otiorhynchus* spp., *Phyllobius* spp. and *Ceutorhynchus* spp. in the individual years of

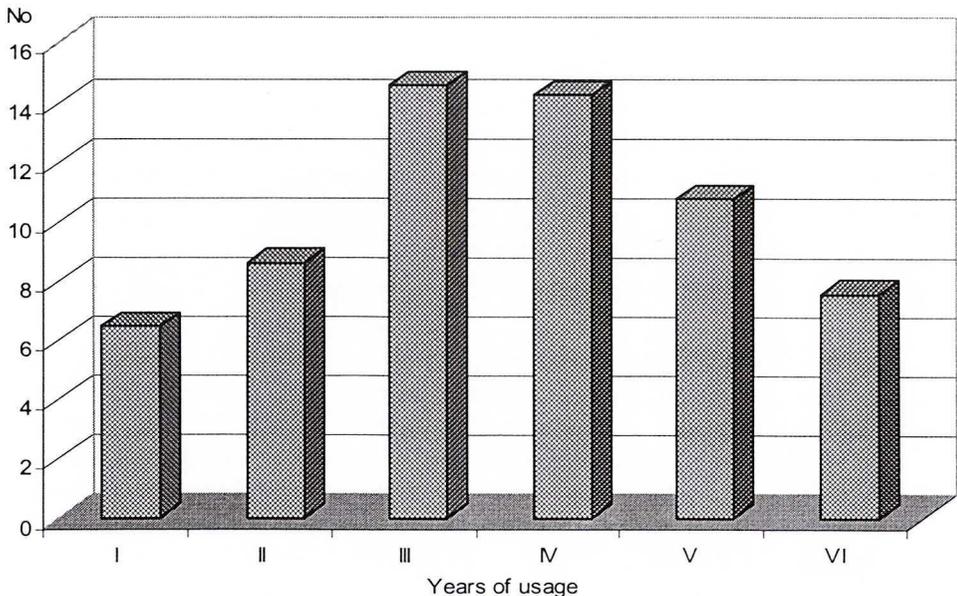


Fig. 1. Mean numbers of weevils collected on alfalfa crops in particular years of usage (I – VI)

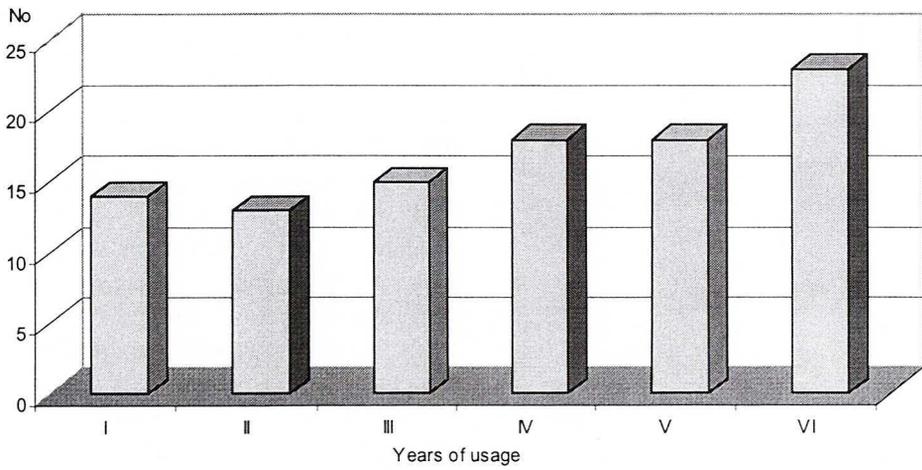


Fig. 2. Mean numbers of weevil species collected on alfalfa crops in particular years of usage (I – VI)

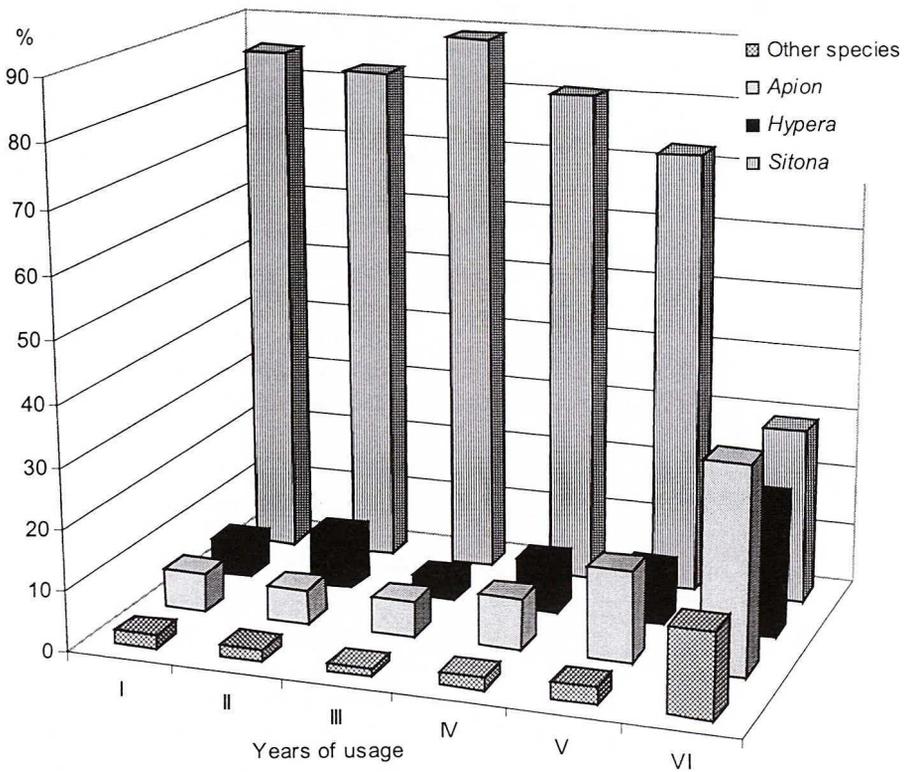


Fig. 3. Percentage shares of *Curculionoidea* species collected on alfalfa crops in particular years of usage (I – VI)

Table

The participation percent of selected species of weevils on alfalfa crops depending on their age of use

Species	Years of usage																			
	I			II			III			IV			V			VI				
	M	P	G	R	M	P	H	Ł	M	P	H	MP	M	Z	H	Sd	Z	S	Sd	Z
<i>S. humeralis</i>	49.0	44.1	55.5	60.2	77.6	63.2	74.2	72.9	91.7	75.7	91.7	67.0	91.7	27.3	87.5	75.4	33.4	74.4	69.6	17.0
<i>S. lineatus</i>	19.7	6.4	20.9	12.5	4.4	4.7	2.2	3.3	1.1	1.9	1.8	0.7	0.8	1.4	2.3	8.7	6.5	4.1	9.1	5.1
<i>S. hispidulus</i>	16.5	7.6	18.8	12.4	4.1	6.2	8.8	3.7	2.1	4.8	2.1	1.4	2.8	0.5	5.7	3.0	1.8	5.9	1.9	3.3
<i>A. apricans</i>	3.2	3.5	1.5	1.1	1.4	0	0.3	1.1	0.1	0.8	0	0.6	0.2	1.6	0	1.2	2.6	1.2	0.5	2.5
<i>A. tenue</i>	0.6	2.5	0.5	1.3	0.05	3.1	2.0	3.7	0.7	1.3	0.9	11.4	0.08	21.6	0.4	1.0	16.2	6.0	3.4	18.5
<i>H. postica</i>	1.8	25.3	3.4	4.6	8.8	13.0	8.3	7.9	0.1	7.3	1.6	11.0	0.9	30.9	2.0	5.4	19.1	3.2	7.8	22.3

Plantation location: M – Miłocin; Ł – Łęczany; P – Przybyszówka, MP – Miejsce Piastowe; G – Gać; Z – Zalesie; R – Rymanów; Sd – Suchodół; H – Harta; S – Sietesz

alfalfa crop usage remained at the level of 2% (Fig. 3). Only in the oldest cultivation their numbers increased to 14,1 % including, in particular, the undetermined individuals of the *Ceutorhynchus* spp. genus (8.8%). This phenomenon was caused by a gradual decay of alfalfa plants and then the appearance (in empty places) of other plants which were a source of food for the *Ceutorhynchus* spp. or enabled their development.

It was observed that the age of alfalfa had an influence on the number of *S. humeralis*. Its occurrence on young plants was intensified and ranged from 44.1 to 60.2%. Particularly great number was observed in the third / fourth year of alfalfa usage. The number of pest decreased in older plantations (Tab.).

In the youngest plantations *S. lineatus* and *S. hispidulus* occurred in particularly high numbers. In the first year of alfalfa usage, the share of *S. lineatus* in plant infestation ranged from 6.4 to 20.9%, and that of *S. hispidulus* from 7.6% do 18.8%. The characteristic feature of these species was their second increase in numbers in older plantations, i.e. those in their fifth and sixth year of usage (Tab.).

Similar numerical composition as in the two former species was observed for *A. apricans* Herbst. Depending on the age of alfalfa plantation, it was either subdominant or a receding species. Its numbers were higher on younger plantations (Miłocin I, II, Przybyszówka I, Gać I, Rymanów I), or on those at the end of their productivity (Zalesie IV – VI, Suchodół IV, Sietesz V). On the other hand, in objects with alfalfa in the 2<sup>nd</sup> and 3<sup>rd</sup> year of crop use the intensity of *A. apricans* was low or it was not caught at all (Tab.).

The effects of alfalfa plantation age on the numbers of *A. tenue* were still different. Its intensity on younger plants was low: from 0.5 to 2.5% on alfalfa crop in its first year of usage for

green fodder and from 0.05 to 3.7% in the following year. However, in older plantations it was observed mainly among dominating species (Zalesie, Suchodół, Miejsce Piastowe) (Tab.).

The numbers of *H. postica* varied considerably in the individual years of observation. This weevil belonged to dominating species in all plantations which were in the second and sixth year of their mowing use (7.9 – 13.0% and 22.3 % of the collected weevils, respectively). In the remaining plantations *H. postica* occurred in varied intensities (Tab.).

The analysis of numerical composition of weevils during the alfalfa growing time showed that the variation curves were primarily of two-peak type. During the first four years of alfalfa crop usage the numerical dynamics had more than two peaks only in few plantations, including, invariably, one in the spring. The exception was the course of changes in weevil numbers in Miejsce Piastowe, where two out of three peaks were in the spring time.

On the other hand, the curves of changes in weevil numbers in all older plantations (in 5<sup>th</sup> and 6<sup>th</sup> year of crop use) had a multippeak character.

Spring catches with maximum numbers of insects were invariably collected in May. In the following three years, the peaks attained at that time were characterised by higher and higher values. Despite this, the late-summer or autumn rise in weevil numbers on alfalfa crops of the first to third year of their usage was always higher than that in May. Still in older plantations the summer and winter peaks in numbers were almost equal or the autumn peak was clearly lower than the spring peak.

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Marta Pisarek

### WPŁYW WIEKU PLANTACJI LUCERNY SIEWNEJ NA WYSTĘPOWANIE CHRZĄSZCZY Z NADRODZINY CURCULIONOIDEA

#### STRESZCZENIE

Liczebność *Curculionoidea* miała przez pierwsze cztery lata użytkowania lucerny na zielonkę tendencje wzrostowe, ale w kolejnych latach wyraźnie zmniejszała się, natomiast liczba stwierdzonych gatunków zwiększała się wraz z wiekiem plantacji.