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OCCURRENCE OF *SITONA* SP. - AN INSECT REDUCING THE NUMBER OF ROOT NODULES IN THE SOIL OF SOUTH-EASTERN POLAND

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A b s t r a c t. Observations were conducted over 5 years (1989-1993) in natural stands in south-eastern Poland. The aim of this research was to examine relations between *Sitona* weevils and wild-growing leguminous plants. In total, 28861 weevils (*Curculionidae*) were collected from which 10425 (36.1%) belonged to the *Sitona* genus. The most common species was *S. lineatus* L., which was collected in each examined stand. Adult forms of this weevil occurred in large numbers especially on *Vicia* sp.. *S. humeralis* Steph. was dominant on *Medicago sativa, S. cylindricollis* Fahrs. grew on *Melilotus albus, S. sulcifrons* Thunbg. was numerous on *Trifolium pratense* and *T. alpestre. S. waterhousei* Walt. occurred on *Lotus corniculatus* whereas *S. suturalis* Steph. was dominant on *Lathyrus pratensis. Coronilla varia* was dominated by *S. languidus* Gyll. and *Ononis arvensis* was dominated by *S. suturalis.* So, we can say that every leguminous plant is accompanied by at least one specialised *Sitona* species, which can essentially reduce the number of root nodules and consequently decreased the quantity of fixed atmospheric nitrogen in soil.

K e y w o r d s: *Sitona,* leguminous plants, root nodules, SE Poland.

INTRODUCTION

Sitona weevils (Col., *Curculionidae*) are insects which larvae stage in the first period of growth feeds on the root nodules of leguminous plants damaging them completely [9]. Because of their unique specialisation as nodule feeders, world-wide distribution, abundance on many legume species, and fungi associated with *Sitona* larvae, these insects may have a substantial effect on physiology and productivity of legumes and global inputs of fixed nitrogen [2-5,7,8). Those processes apply surely not only to cultivated plants but are very important for the natural environment [1,6] of leguminous on natural stands as well. For this reason, in the

years 1989-1993 observations were conducted on the occurrence and numerousness of *Sitona* weevils on wild growing leguminous plants in south-eastern Poland.

MATERIALS AND METHODS

Regular netting collections of the weevils were conducted in natural stands overgrown with restharrow - *Ononis arvensis* L., lucerne - *Medicago sativa* L., sweetclover - *Melilotus albus* Med., clovers - *Trifolium pratense* L. and *T. alpestre* L., birdsfoot-trefoil - *Lotus corniculatus* L., *Coronilla varia* L., vetches - *Vicia tetrasperma* L., *V. cracca* L., *V. villosa* Roth., *V. hirsuta* (L.) S.F. Gray., *V. sepium* L., *V. grandiflora* Scop. and *Lathyrus pratensis* L.; on this basis the relative number, density and frequency of *Sitona* adults was determined on the above wild growing plants.

RESULTS

In total, 28861 weevils (*Curculionidae*) were collected from which 10425 (36.1%) belonged to the *Sitona* genus. A relative number of *Sitona* adults is shown in Table 1.

Table 1. Relative number (%) of *Sitona* adults on natural stands of leguminous plants

Stand of plants	*Sitona*											
	lineatus	*crinitus*	*suturalis*	*sulcifrons*	*hispidulus*	*flavescens*	*puncticollis*	*cylindricollis*	*humeralis*	*waterhousei*	*languidus*	Others
Vicia villosa	92.7	-	-	-	2.4	4.9	-	-	-	-	-	-
V. hirsuta	59.3	29.6	-	-	3.7	-	-	-	-	7.4	-	-
V. sepium	24.2	-	66.7	-	-	-	-	-	-	-	-	9.1
V. tetrasperma	86.0	-	4.0	5.2	1.6	2.4	-	-	-	-	-	0.8
V. cracca	81.5	0.9	9.8	1.3	2.2	1.1	0.2	-	0.4	0.2	-	2.2
V. grandiflora	87.6	3.9	4.6	0.9	1.0	-	-	-	-	-	-	2.0
Trifolium pratense	5.2	0.2	-	79.7	10.5	3.1	0.4	-	0.2	-	-	0.7
T. alpestre	2.4	-	-	93.5	2.9	1.2	-	-	-	-	-	-
T. repens	30.7	-	-	24.6	44.7	-	-	-	-	-	-	-
Medicago sativa	5.1	-	-	6.7	2.8	-	0.4	-	79.5	1.6	-	3.9
Lathyrus pratensis	6.0	4.8	79.3	0.6	7.6	0.1	-	1.2	-	0.4	-	-
Lotus corniculatus	3.2	-	0.2	1.9	0.7	1.0	0.2	-	0.1	91.0	-	1.7
Coronilla varia	2.0	-	-	6.0	-	-	-	-	-	-	92.0	-
Melilotus albus	8.5	-	0.5	1.7	2.0	1.0	-	78.8	2.5	-	-	3.9
Ononis arvensis	12.5	-	69.6	3.6	1.8	-	-	-	-	10.7	-	1.8

The most common species was *S. lineatus* L., collected in each of the examined stands. This weevil occurred in large numbers especially on *Vicia* sp. On *V. grandiflora* it was observed continuously (frequency was to 99%). Density of the collected weevils ranged from 5.1-13.5 specimen per sample. At the same time, from the turn of June and July, young adults (after pupation) were observed. On the basis of this observation we can conclude that *Vicia* including *V. grandiflora* are the main feeding bases for *S. lineatus* and the place where the insect breeds in a natural stand. The rest of the observed plants play a similar role for other Sitona species. For instance *S. humeralis* Steph. was dominant on *Medicago sativa* (79.5%). Its frequency was to 81.1% and density 4.5 specimen/sample. *S. cylindricollis* Fahrs. grew on *Melilotus albus* (relative number of 78.8%, frequency 73.4%, and density 4.1). *S. sulcifrons* Thunbg. was numerous on *Trifolium pratense* (relative number of 79.7%, frequency 97.5%, and density 12.9) and *T. alpestre* (relative number of 93.5%, frequency 100%, and density 13.7). *S. waterhousei* Walt. occurred on *Lotus corniculatus* (relative number of 91.0%, frequency 76.9%, density 6.7), whereas *S. suturalis* Steph. was dominant on *Lathyrus pratensis* (relative number of 79.3%, frequency 77.4%, and density 5.2). *Coronilla varia* was dominated by *S. languidus* Gyll. (however in smaller degree - relative number of 92.0%, frequency 40.0%, density 4.6) and *Ononis arvensis* was dominated by *S. suturalis* (relative number of 69.6%, frequency 43.8%, density 1.2). On the basis of the above data, we can establish typical and concomitant species of *Sitona* for each plant (Fig. 1).

A laboratory study conducted under compensatory response of the cultivated *Medicago sativa* root-nodule system to nodule herbivore showed that shoot and root biomass were not affected by denodulation [5]. Those authors noted however that in their experiment growing conditions were optimal for nodulations. In fact, especially on natural stands, the compensatory process could be very difficult. So on the grounds of the presented observations, we can say that every leguminous plant is accompanied by at least one specialised *Sitona* species, which can essentially reduced the number of root nodules and consequently decrease the quantity of fixed atmospheric nitrogen in soil on natural stands. Only *Ononis arvensis* and *Coronilla varia* seem to be less threatened by this process.

CONCLUSIONS

1. Each of the observed wild growing leguminous plant is accompanied by at least one specialised *Sitona* species.

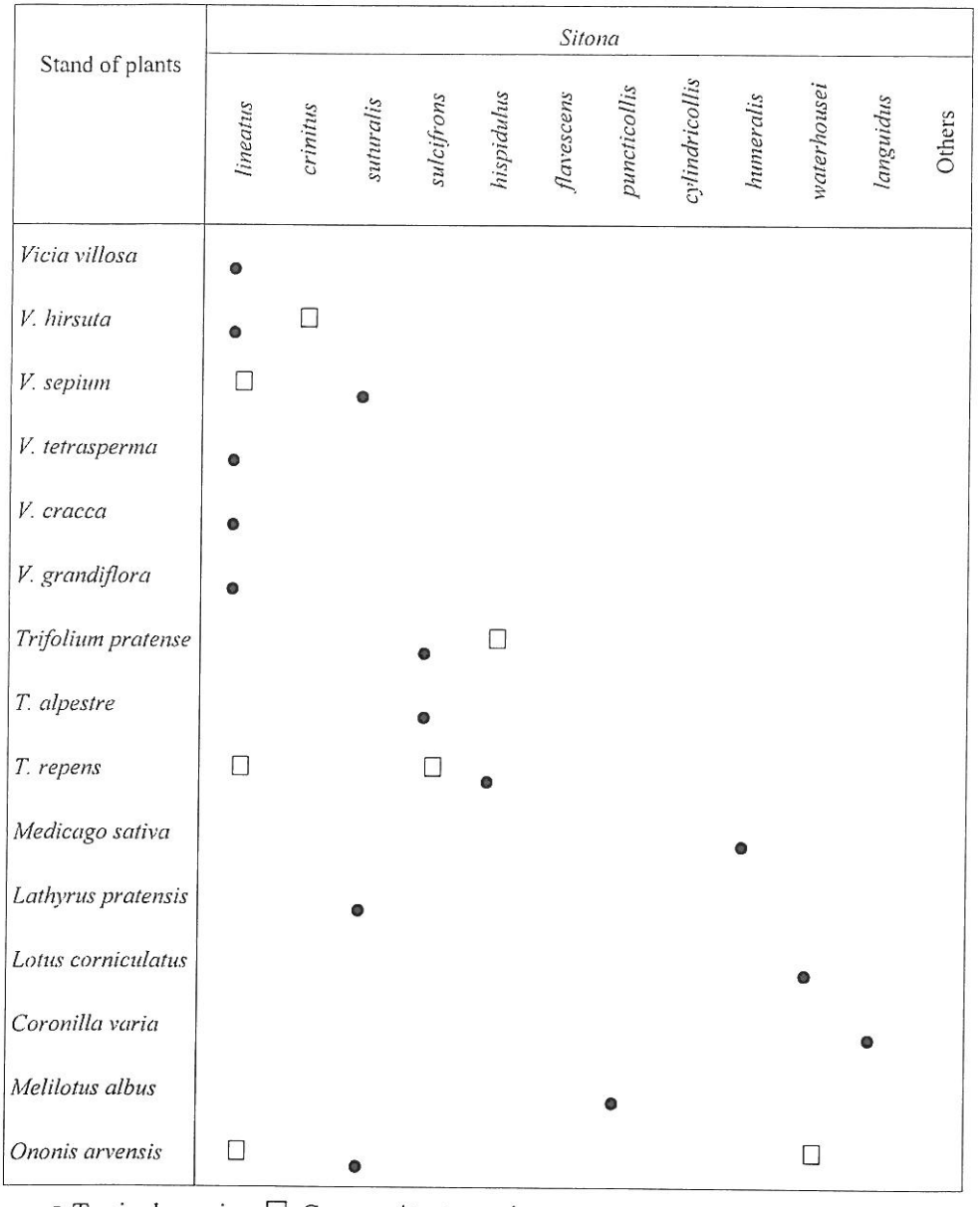

Fig. 1. Feeding preferences of *Sitona* weevils on wild growing leguminous plants.

2. The presence of *Sitona* weevils could influence (decrease) the quantity of fixed atmospheric nitrogen in the soil on natural stands.

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