400-450	0,2	0,6	0,2	0,2		
450-500	0,2	4,1	0,2	0,2		
500-550	0,8	5,0				
550-600	0,7	5,9				

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Table 2 Nitrate degradation in the different soil type profiles during incubation experiment (NO_3^- mg/dm^3/28 days)

Layer (cm)	Calcareous chernozem (control)	Calcareous chernozem (treated)	Meadow (control)	Meadow (treated)	Layer (cm)	Blownsand
0-20	23,27	29,01	28,29	31,21	0-30	25,91
20-40	14,97	23,98	20,09	26,47	30-50	20,47
40-60	12,40	12,47	21,75	12,50	50-70	2,02
60-80	4,37	2,04	2,16	11,83	70-100	1,85
80-100	3,25	7,40	6,73	6,39	100-130	4,24
100-120	5,71	2,04	3,97	5,27	130-160	0,86
120-140	4,71	4,44	3,24	9,58	160-190	0,43
140-160	3,59	7,65	5,35	2,08	190-215	0,65
160-180	6,96	2,04	6,65	1,86	215-240	0,13
180-200	4,76	7,15	2,29	2,63	240-290	2,16
200-225	6,83	5,31	2,21	9,93	290-350	0,43
225-250	10,50	7,22	2,21	7,60	350-400	0,26
250-275	8,51	6,78	1,66	13,90	400-450	0,26
275-300	8,12	10,67	1,17	5,78	450-500	0,56
300-350	5,79	5,49	7,34	4,06	500-550	1,47
350-400	8,10	2,09	6,64	5,78	550-600	2,07
400-450	8,90	2,17	8,46	9,24		
450-500	7,30	1,94	9,24	22,36		
500-550	6,74	2,47				
550-600	5,84	3,42				

IMPORTANCE OF *OROBANCHE* SPECIES IN AGRICULTURAL CROPS IN SLOVAKIA

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Summary

In 2000-2001, regular surveys of agricultural plants, supposed as potential hosts of *Orobanche* spp., were done in Slovakia. *Orobanche cumana* Wallr. was not found at 26 sunflower fields checked for its occurrence. Together 8 tobacco fields and 6

tomato fields were checked for *Orobanche ramosa* L.. From those, four tobacco fields (at localities Bešeňov - 48°03´N 18°16´E, Dolný Ohaj - 48°04´N 18°15´E, Veľké Lovce - 48°02´N 18°21´E and Demandice - 48°08´N 18°47´E) and one tomato field (at locality Branovo - 48°02´N 18°18´E) were attacked by *O. ramosa*. The survey shows that *O. cumana* it not real agronomic problem in Slovakia and *O. ramosa* is very important parasitic weed.

Key words: *Orobanche cumana*, *Orobanche ramosa*, distribution, Slovakia

Introduction

Jehlík et al. (1998) mentioned three *Orobanche* species as invasive in Czech and Slovak Republic. They were *Orobanche cumana* Wallr., *Orobanche minor* Smith in Smith and *Orobanche ramosa* L.. Few localities were mentioned in the case of *O. cumana* and *O. minor* in Slovakia. On the other hand high number of *O. ramosa* localities were mentioned in the book. Chemical control was recommended for the control of *O. ramosa* in Slovakia (Danko, 1991, 1993).
The aim of this paper was to identify how important are parasitic weeds in the agriculture of Slovakia. The information will be used in the study of potential biocontrol agents.

Material and methods

In 2000, regular surveys of agricultural plants, supposed as potential hosts of *Orobanche* spp., were done in Slovakia. Together 26 sunflower fields (the districts are mentioned in results and discussion), 8 tobacco fields and 6 tomato fields were checked for *Orobanche ramosa* (for identification of localities please see table 1).
Tobacco & tomato plantations were regularly checked every week for *O. ramosa* occurrence from the beginning of June until the middle of October. Sunflower fields were checked three times – in the middle of July, middle of August and in the middle of September.

Table 1 Localities checked for the occurrence of *Orobanche ramosa*. in Slovakia during 2000.

Locality	Coordinates	Crop
Bešeňov	48°03´N 18°16´E	Tobacco +
Dolný Ohaj	48°04´N 18°15´E	Tobacco +
Veľké Lovce	48°02´N 18°21´E	Tobacco +
Demandice	48°08´N 18°47´E	Tobacco +
Malé Vozokany	48°18´N 18°26´E	Tobacco -
Kamenica nad Hronom	47°49´N 18°44´E	Tobacco -
Gbelce	47°50´N 18°31´E	Tobacco -
Bíňa	47°54´N 18°38´E	Tobacco -
Branovo	48°02´N 18°18´E	Tomato +
Štúrovo	47°48 N 18°43´E	Tomato -
Dvory nad Žitavou	48°00 N 18°16´E	Tomato -
Imeľ	47°54´N 18°09´E	Tomato -
Svätý Peter	47°49´N 18°16´E	Tomato -
Vráble	48°12´N 18°19´E	Tomato -

+ *Orobanche ramosa* was found; - *Orobanche ramosa* was not found

Results and discussion

Orobanche cumana was not found at 26 sunflower fields checked for its occurrence. Sunflower field were checked in the districts of Komárno, Nové Zámky, Nitra, Topoľčany, Levice, Veľký Krtíš, Lučenec, Rimavská Sobota, Košice and Trebišov. Special attention was paid at the localities, where this species was already mentioned before (Jehlík et al., 1998). They were localities Búč and Iža (saline Bokroš) in western Slovakia, and localities Čierna nad Tisou, Veľké Trakany, Malé Trakany and Somotor in eastern Slovakia. It seems that *O. cumana* does not exist at this time in Slovakia. And more, climatic conditions seem to be more important for the distribution of the weed than host plant variety. According to Jehlík et al. (1998), *O. cumana* was found only in a very warm areas of Slovakia (average yearly temperature of 10°C). But, sunflower is grown at relatively cold localities with average yearly temperature less than 9°C.
From 8 tobacco plantations, 4 were attacked by *Orobanche ramosa* L. They were locality Bešeňov, Dolný Ohaj, Veľké Lovce and Demandice (Table 1). *Orobanche* plants were found from June 15 at all four localities. Very high number of *O. ramosa* was found especially at the localities Demandice and Veľké Lovce. At these localities the number of *O. ramosa* plants achieved 2.4 per one attacked tobacco plant in average. From six tomato plantations were checked for *O. ramosa*, one was attacked by *O. ramosa* (Branovo). The first *O. ramosa* plants were found on June 22. The number of *O. ramosa* plants achieved only 0.2 per one tomato plants at the area of *O. ramosa* distribution.
During the study, only tobacco and tomato were the host plants of *O. ramosa* in Slovakia. Similarly, the spread of *O. ramosa* was studied in numerous horticultural crops and tobacco in Italy (Zonno et al. 2000). In France, *O. ramosa* was found as an

important weed in rape (Collin, 1999). In Slovakia, rape is a very important and widespread crop and, in spite of this, there is no information about the interaction of rape – *O. ramosa*. It is difficult to say if the reason is different *O. ramosa* strains, or resistant varieties of rape. Ranking tomato cultivars for *Orobanche* resistance indicated the existence of different resistance mechanisms in these cultivars (Qasem, Kasrawi 1995).

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SPREAD OF DODDER (*CUSCUTA* SPP.) IN THE AGROECOSYSTEMS OF SLOVAKIA: IS IT AN EMERGING PROBLEM?

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Summary

During 2000, field surveys of dodder (*Cuscuta* spp.) occurred at cropland were done in Slovakia. From among 150 localities surveyed, 96 have been found infested by dodder. The existence of four dodder species was revealed: *Cuscuta campestris* Yuncker, infested vegetable crops (potato, sugar beet, alfalfa and tobacco) and variety of weeds (together 18 species, especially *Polygonum* spp.), *C. epithymum* (L.) Murr., parasited exclusively on alfalfa and accidentally on weeds growing in this crop, *C. europaea* L. and *C. lupuliformis* Krocker occurred only at field margins, along rivers and roads, where *Urtica dioica* L. and *Rubus* spp. served as hosts. Dodders were distributed throughout south of Slovakia, with maximum occurrence in the western part of state. *C. campestris* was not found in cold climatic regions with altitude higher than 240 m, while *C. epithymum* was recorded up to 398 m and *C. europaea* up to 720 m a. s. l.

Key words: *Cuscuta campestris*, *Cuscuta epithymum*, *Cuscutaceae,* dodder, host plants, distribution

Introduction

Dodders (*Cuscuta* spp.; Cuscutaceae) are annual stem parasites with leafless, thread-like, orange or yellow stems that twine over other plants. They can be problematic in agricultural crops, especially alfalfa, tomatoes, potato and sugar beet. In addition, dodder seed is difficult to exclude from commercial alfalfa, clover, or flax seed (Parker & Riches 1993).
Cuscuta spp. are distributed worldwide (Holm et al. 1979) and have very low host specificity attacking many different host plants simultaneously. Although dicots are preferred, attack on monocots has been observed also. (Erdös 1971, Nikitin 1983).
There is five species from Cuscutaceae known in Slovakia. *Cuscuta epithymum* L., *C. epilinum* Weihe, *C. europaea* L. and *C. lupuliformis* Krocker are native (Dostál & Červenka 1992). Only invaded species is *C. campestris* Yuncker, which was introduced from North America to Europe in 1883 (Jehlík 1998).
Biological control is a particularly attractive means of suppressing dodders in crop because, owing to their intimate relationship with the host plant, it is difficult to apply chemical herbicides in such a way the crop is not adversely affected (CAB, 1987). Hence, it is surprising that little effort has been made to achieve biological control of these weeds worldwide. This study is the first step to biological control of dodders in Slovakia. The aim of this work was to determine the infestation and its extension, the dodder species composition as well as their host range.

Material and methods

During the growing season 2000 the occurrence of *Cuscuta* spp. was observed in the agroecosystems of Slovakia following the natural phenology of dodders. 150 localities were chosen in different geographic and climatic regions. Collections were