

## Seasonal biology of *Melanagromyza albocilia* (Diptera: Agromyzidae) and seasonal patterns of field bindweed infestation, under field conditions in Slovakia

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*Melanagromyza albocilia* Hendel, a stem borer of field bindweed (*Convolvulus arvensis*) was observed at three sites in Slovakia during 1999 and 2000. The insect overwintered as pupa. The first generation adults emerged in May and those of second during June–August. Percentage of infested field bindweed plants varied from 46.7% to 99.2% and number of infested stems from 4.1% to 37.2%. Infested stems contained an average of  $0.84 \pm 0.40$  to  $1.34 \pm 0.50$  specimens (larvae, parasitized larvae, pupae). The population of *M. albocilia* was the highest in 1999, with mean densities of  $1.57 \pm 1.01$  to  $3.21 \pm 2.13$  specimens/plant. All parasitoids emerged from larvae were identified as *Bracon picticornis* Wesmael.

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### 1. Introduction

Field bindweed (*Convolvulus arvensis* Linnaeus) is considered one of the most important weeds in the world. Many scientists have surveyed phytophagous insects associated with *Convolvulus* spp., usually to find and evaluate potential biocontrol agents. Mohyuddin (1969) listed 125 insects and mites known to attack *Convolvulus* spp. and *Calystegia* spp. found by him in Canada and by others throughout the world. In Pakistan, Baloch (1974) found 35 species of insects and 2 species of mites in association with *Convolvulus* spp. The insect fauna noted on the field bindweed in Egypt consisted of 13 species (Awadallah *et al.*

1976). In Mediterranean Europe, 139 species of phytophagous arthropods were collected from *C. arvensis* and its close relatives (Rosenthal & Buckingham 1982). For more details, see Tóth & Cagáň (2005).

During 1996, field surveys of phytophagous insects associated with *Convolvulus* spp. started at various localities of Slovakia. During the study, high numbers of data have been collected, and partly already published (Tóth *et al.* 1997, 1998, 2001, 2003, Tóth 2000, Défago *et al.* 2001, Tóth & Cagáň 2005). *Melanagromyza albocilia* Hendel, 1931 (Diptera: Agromyzidae), a native European stem borer of *C. arvensis*, was considered as a very promising candidate for the biolog-

Table 1. Details of localities weekly checked in southwest of Slovakia for the occurrence of *M. albocilia* (1998–2000). Coord. = coordinates; Alt. = altitude in metres; Temp. = average temperature in °C; Rad. = global radiation; Crop = covering crop species.

Locality	Alt. <sup>a</sup>	Coord. <sup>a</sup>	Relief	Temp. <sup>b</sup>	Rad. <sup>b</sup>	Crop
Čajkov	206	48°17'51"N 18°35'36"E	Plain	9.0	105–110	Sunflower
Malá n / Hronom	103	47°50'45"N 18°41'24"E	Hilly country	10.2	115<	Sunflower
Tehla	194	48°12'16"N 18°21'53"E	Hilly country	9.7	110–115	Sunflower

a Magellan GPS 315

b According to Zatko (2002); Global radiation is expressed in kcal/cm<sup>2</sup>.

ical control of bindweed (Tóth *et al.* 1998, 2000). This was the reason for the intensive study of this species.

Very little information is available about *M. albocilia*. It is a greenish-black species with wing length from 2.1 mm in male to 2.5 mm in female (Hendel, 1938, Spencer, 1966). It is known from Austria and Hungary (Hendel 1938, Soós & Papp 1984), Egypt (Spencer 1973, Awadallah *et al.* 1976), Israel (Spencer 1973, 1974), England, Denmark and Sweden (Spencer 1976), Italy (Rosenthal & Buckingham 1982), Czech Republic (Vála & Černý 1997), Slovakia (Tóth *et al.* 1998) and Serbia (Spasic & Smiljanic 1998). Females of *M. albocilia* insert their eggs under the epidermis of field bindweed leaves. Hatched larvae feed on the leaf tissue and make linear serpentine mines extending to the midribs, where each larva bores downwards towards the base of the stem or even into the root. At this site, pupation takes place after the larva gnaws an oval exit hole through which the emerged adult can find its way out (Awadallah *et al.* 1976). *M. albocilia* has been recorded solely from field bindweed in nature, though Rosenthal and Buckingham (1982) listed also *Convolvulus althaeoides* L. as an alternative host.

A related species *M. convolvuli* Spencer, 1971 was found in *C. arvensis* stems in Pakistan (Spencer 1971). Females of *M. convolvuli* puncture *C. arvensis* leaves with their ovipositors and feed on the ensuing exudates (Baloch 1977). Larval feeding of *M. convolvuli* in the stems or lateral branches considerably weakens the plant and in non-irrigated areas of limited rainfall the combined effect of the drought and larval attack

causes the infested branches to dry up (Spencer 1973).

Because of the cryptic behavior of *M. albocilia*, little or no information exists on its occurrence during the growing season and infestation of the host plant. The objectives of this study were to determine the following: (1) occurrence and abundance of *M. albocilia* in cultivated areas in Slovakia; (2) the over-wintering survival and emergence pattern of *M. albocilia*; (3) the seasonal biology of *M. albocilia*; and (4) the infestation rate of field bindweed in the southwest of Slovakia.

## 2. Material and methods

To determine the seasonal occurrence of *M. albocilia* and field bindweed infestation by the agromyzid fly under field conditions in Slovakia, phenologically mature plants from 91 localities were investigated during the growing seasons of 1999 and 2000. Three localities in the southwest of Slovakia (Table 1) were checked weekly, from the end of May until the beginning of October. Crops, where the samples were taken, were grown according to local farmers' practices.

Each week thirty plants per site were randomly selected for dissection. For each selected plant, the number of healthy, dried and infested stems was recorded. The stems were periodically dissected for developmental specimens (larvae, pupae and parasitized larvae). The presence of the larvae and pupae could be detected only when the plants were dissected. The stems and roots were first cut across (a few cm above the root). The in-

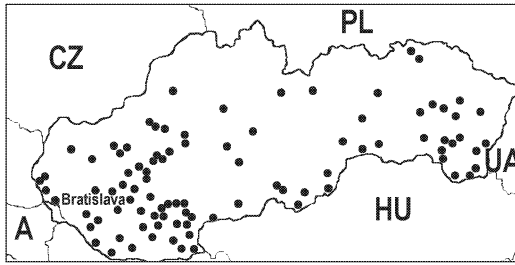


Fig. 1. Occurrence of *Melanagromyza albocilia* Hendel in Slovakia (black dots indicate localities where the species was recorded).

fested stems were clearly visible due to the brown interior or the hole, such stems were separated. The rest of stems were cut across again about ten centimeters higher.

The procedure was repeated along the whole length of the stem to note infestation. The stems with no infestation were considered as health; as well plants without infested stems were marked as health plants. Based on these results, percentage of infested plants and stems was calculated. Separated (infested) stems were split lengthwise. By following the feeding track of the larvae either down or up the stems, the larvae or pupae normally could be found. Pupae obtained in this way were transferred to rearing containers. Within the stems and roots of each plant, the position and number of larvae, pupae and parasitized larvae was recorded. Pupae and parasitized larvae were transferred in plastic tubes to the laboratory.

The material was kept in plastic tubes with a perforated top for aeration in an outdoor insectary to assess the period of adult emergence. Emerged larval parasitoids were collected, counted and submitted for identification. Voucher specimens of parasitoids have been retained in the collection of the first author. Besides the regular observations during 1999 and 2000, pupae and parasitized larvae of *M. albocilia* were collected at the three localities also during the fall season of 1998 to determine its over-wintering behavior.

In addition, 88 further localities were sampled throughout Slovakia, in different geographic and climatic regions, during the fall seasons of 1998–2000 (Fig. 1) to record the presence of the agromyzid fly in the stems. Starting with a sample of 10 plants per site, the number reached a maximum of 30 plants per site if fly larvae and/or pupae were not found within the first 10 plants.

### 3. Results

#### 3.1. Distribution

The distribution of *M. albocilia* in Slovakia is shown in Fig. 1. The fly was found at 91 localities, confirming that it is a common insect in Slovakia and it is closely related to the distribution of its host *C. arvensis*. The species occurred even at colder localities with an altitude more than 400 m a.s.l. and the infestation achieved similar levels to those at lower situated and warmer localities. But larvae were not parasitized at colder localities at higher altitudes (285–435 m a.s.l.). The highest altitude where larval parasites were observed was 240 m a.s.l.

#### 3.2. Seasonal biology

Fig. 2 shows seasonal biology of *M. albocilia* in southwestern Slovakia. The insect overwintered as pupa, and the emergence of the first generation adults started in the beginning of May and continued until the end of May in an outdoor insectary. Fifty-two adults were recovered in the spring of

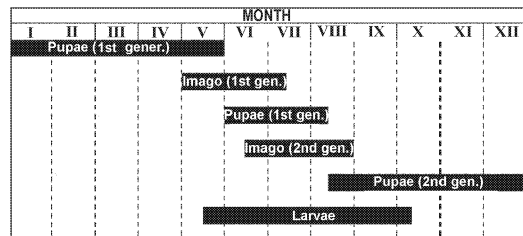


Fig. 2. Seasonal biology of *M. albocilia* Hendel in southwestern Slovakia (based on the data from localities Tehla, Malá n / Hronom and Čajkov; Table 1).

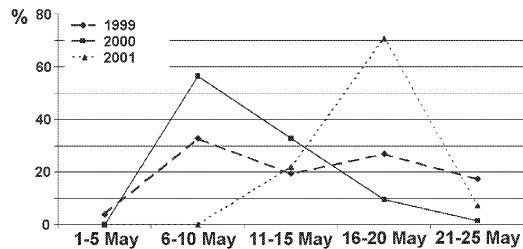


Fig. 3. *M. albocilia* adult emergence in outdoor insectary during the spring 1999–2001 (the ratio (%) from the total adults emerged during spring each year).

Table 2. Population dynamics of *M. albocilia* at three localities in Slovakia in 1999. Numbers of specimens are based on totals for 30 plants each date.

Date	Tehla			Malá n / Hronom			Čajkov		
	L <sup>a</sup>	P <sup>b</sup>	PL <sup>c</sup>	L	P	PL	L	P	PL
1–10 June	0.26±0.09	0.19±0.08	0	–	–	–	–	–	–
11–20 June	0.28±0.27	0.29±0.32	0	–	–	–	–	–	–
21–30 June	–	–	–	–	–	–	–	–	–
1–10 July	0.10±0.09	0.97±0.11	0	–	–	–	–	–	–
11–20 July	0.45±0.50	0.69±0.45	0.03±0.05	0.20±0.24	0	0	0.26±0.31	0.24±0.11	0
21–31 July	0.89±0.11	0.61±0.51	0.19±0.09	0.54±0.09	0.97±0.43	0.08±0.09	0.33±0.09	0.61±0.41	0.16±0.11
1–10 Aug.	1.37±0.75	1.00±0.46	0.41±0.31	1.30±0.44	0.78±0.10	0.55±0.44	0.23±0.11	0.63±0.17	0
11–20 Aug.	1.76±0.73	0.96±0.32	0.51±0.21	1.06±0.38	0.74±0.42	0.57±0.22	0.47±0.30	0.52±0.14	0.21±0.27
21–31 Aug.	2.92±0.24	1.15±0.26	0.64±0.56	1.06±0.15	0.84±0.15	0.41±0.16	0.22±0.01	0.22±0.29	0.18±0.06
1–10 Sept.	2.35±0.78	1.02±0.57	1.58±0.66	0.88±0.41	0.72±0.38	0.30±0.22	0.39±0.22	0.31±0.30	0.22±0.19
11–20 Sept.	1.04±0.11	1.93±0.91	2.10±0.30	0.47±0.14	0.46±0.34	0.60±0.53	0.45±0.28	0.38±0.12	0.18±0.07
21–30 Sept.	1.73±0.24	0.67±0.17	1.64±0.72	–	–	–	–	–	–

a Mean of larvae per 10 evaluated stems ± SEM

b Mean of pupae per 10 evaluated stems ± SEM

c Mean of parasitized larvae per 10 evaluated stems ± SEM

1999, 64 in 2000 and 39 in 2001 from the pupae collected in the fall season. Maximum adult emergence was from 6–10 May 1999 and 2000 (52.0% and 89.1%) but from 16–20 May 2001 (70.7%) (Fig. 3). The first empty pupal cases within the field bindweed stems were found during the second half of June. Second-generation adults occurred during a relatively long period (June–August 1999). The first flies of the second generation emerged from the field collected pupae on 17 June 1999 in an outdoor insectary. The last adult of the second generation emerged on 28 August 1999 during the study. 7.3% of the second-generation adults were collected in June, 30.9% in July, but the majority (61.8%) within August 1999.

Larvae were found from the middle of May until the end of growing season. The highest numbers were found during August and in the first half of September. Although the peaks were similar at all three localities evaluated, the numbers of larvae (but also pupae) per 10 stems were markedly lower at Malá n/Hronom and Čajkov (Tables 2–3). From June to the beginning of September, the number of larvae fluctuated from  $0.10 \pm 0.09$  to  $2.92 \pm 0.24$  in 1999 and  $0.10 \pm 0.17$  to  $1.45 \pm 0.41$  (means and standard errors are given here and hereafter) per 10 stems in 2000 at the locality Tehla. At Malá n/Hronom, the maximum

was  $1.30 \pm 0.44$  larvae per 10 stems in 1999, but only  $0.94 \pm 0.35$  at Čajkov in 2000. The occurrence of larvae was constant during the study. The number of larvae decreased sharply during September.

The first pupae were found at the beginning of June and the number reached a maximum from August through September. The number of pupae per 10 stems reached a maximum of  $1.93 \pm 0.91$  from 11–20 Sept. 1999 and  $0.72 \pm 0.20$  from 1–10 Sept. 2000 at Tehla. Nevertheless, the maximum of pupae was recorded in July at Malá n/Hronom each year (Tables 2–3).

The number of pupae was markedly reduced as a result of high larval mortality due to parasitism. Although the first larval parasitoids were observed already during June, the larval parasitization was relatively low. The proportion of parasitized larvae was 22.6% at Tehla, 19.2% at Malá n/Hronom and 16.7% at Čajkov in June 2000. The number of parasitized larvae increased until the end of vegetation in September. During September 2000, the parasitized larvae constituted 60.4%, 57.5%, and 41.2% of the all developmental specimens recorded in Tehla, Malá n/Hronom and Čajkov, respectively. All of the larval parasitoids were identified as *Bracon picticornis* Wesm., 1838 (Hymenoptera: Braconidae). While the larval parasitization was sta-

Table 3. Population dynamics of *M. albocilia* at three localities in Slovakia in 2000. Numbers of specimens are based on totals for 30 plants each date.

Date	Tehla			Malá n / Hronom			Čajkov		
	L <sup>a</sup>	P <sup>b</sup>	PL <sup>c</sup>	L	P	PL	L	P	PL
1–10 June	0.10±0.17	0.05±0.08	0	0.37±0.18	0.32±0.19	0.04±0.07	–	–	–
11–20 June	0.35±0.15	0.24±0.14	0.08±0.07	0.48±0.34	0.49±0.35	0.08±0.07	0.08±0.07	0.16±0.18	0
21–30 June	0.73±0.41	0.30±0.11	0.36±0.32	0.72±0.11	0.44±0.19	0.48±0.12	0.31±0.32	0.13±0.12	0.13±0.12
1–10 July	0.84±0.44	0.41±0.18	0.50±0.10	0.36±0.10	0.88±0.23	0.71±0.40	–	–	–
11–20 July	1.30±0.41	0.48±0.19	0.56±0.47	0.54±0.35	1.20±0.33	0.45±0.04	0.15±0.16	0.44±0.16	0.20±0.18
21–31 July	1.25±0.50	0.37±0.12	0.93±0.19	0.50±0.32	1.08±0.28	0.24±0.22	0.46±0.05	0.26±0.33	0.23±0.09
1–10 Aug.	1.44±0.29	0.34±0.28	0.88±0.34	0.66±0.32	0.72±0.46	0.37±0.22	0.94±0.35	0.38±0.17	0.54±0.37
11–20 Aug.	1.45±0.41	0.40±0.40	1.32±0.33	0.66±0.26	0.63±0.20	0.56±0.50	0.74±0.39	0.65±0.42	0.40±0.29
21–31 Aug.	1.19±0.51	0.55±0.31	1.16±0.47	0.72±0.30	0.53±0.12	0.95±0.39	0.36±0.27	0.50±0.15	0.55±0.26
1–10 Sept.	1.06±0.49	0.72±0.20	1.01±0.20	–	–	–	–	–	–
11–20 Sept.	1.00±0.37	0.66±0.19	1.41±0.51	0.68±0.13	0.62±0.19	1.09±0.16	0.45±0.39	0.91±0.30	0.50±0.44
21–30 Sept.	0.52±0.33	0.66±0.18	1.29±0.36	0.23±0.22	0.39±0.19	0.50±0.10	0.34±0.14	0.35±0.21	0.51±0.29

a Mean of larvae per 10 evaluated stems ± SEM

b Mean of pupae per 10 evaluated stems ± SEM

c Mean of parasitized larvae per 10 evaluated stems ± SEM

ble among populations at different localities annually, there were apparent differences in 1999 and 2000. The parasitization was higher during 2000 and reached 51.9% at Čajkov, 55.8% at Malá n/Hronom and 56.0% at Tehla. On the other hand, during 1999 it reached only 35.2%, 35.2% and 38.3% respectively. Besides parasitization, a generally high percentage of dead larvae within the stems was found, especially from the second

half of August to the end of the season. Dead larvae amounted sometimes up to 90% of fall larval populations.

The positions of larvae, pupae and parasitized larvae recorded inside the field bindweed stems are summarized in Fig. 4. The highest number of larvae was found in the middle and in the lower thirds of the stems, this proportion amounted to 35.7% and 49.7% respectively. The number of larvae in hypocotyles and roots was smaller (2.6% and 2.1%). Although the pupae were distributed more uniformly within the stems, the majority of pupae were recorded in the lower third of stems and in the roots. It was clear, that larvae generally moved to the lower parts of the plant for pupation. The positions of parasitized larvae were similar to those of uninfested larvae (= healthy larvae) (Fig. 4).

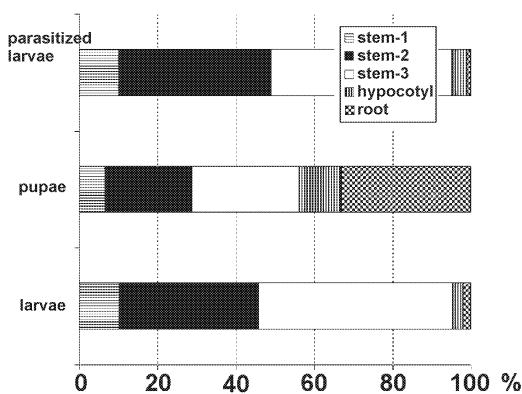


Fig. 4. Distribution of *M. albocilia* developmental specimens within the field bindweed stems (expressed in%) at the Tehla, Malá n/Hronom and Čajkov localities in 1999 and in 2000, where stem-1 means upper third, stem-2 middle third and stem-3 lower third of stems.

### 3.3. Infestation of host plant

During the period of 1999–2000, a total of 2160 *C. arvensis* plants were sampled at the three weekly checked localities of Slovakia. From these, 1,492 plants (69.0%) were infested by *M. albocilia* (having one or more specimens in the stems). Altogether 17.0% of the 18,063 evaluated stems were attacked.

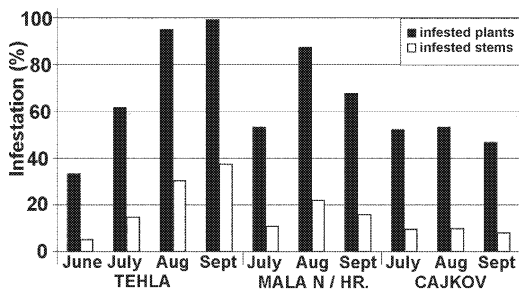


Fig. 5. Field bindweed infestation by *Melanagromyza albocilia* under the field conditions of three weekly sampled localities in Slovakia in 1999. The data are based on totals for 30 plants sampled each date.

*M. albocilia* generally infested field bindweed throughout the season (Figs. 5–6). The infestation was initially low, reaching only 33.3% of infested field bindweed plants in June 1999 and 37.3% in June 2000 at Tehla locality. Similarly, only 28.3% of infestation was recorded at Čajkov during June 2000. An exception was found at Malá n/Hronom with 56.7% of infested plants in June 2000. The infestation reached its peak from August through September. The percentage of infested plants was very high at Tehla. It reached 99.2% in 1999 and 96.0% in 2000. During the same period, infestation rates reached a maximum of 87.5% at Malá n/Hronom and 71.7% at Čajkov (Figs. 5–6).

At all three localities, the number of field bindweed stems infested by *M. albocilia* increased generally from June to September. The percentage of infested stems was the highest at Tehla, where it rose from 5.1% in June to 37.2% in September 1999 and from 7.3% to 25.2% in 2000. The lowest infestation was recorded at Čajkov, reaching the maximum of 9.7% in September 1999 and 16.1% in September 2000 (Figs. 5–6).

Populations of *M. albocilia* in the samples taken from the three regularly checked sites were highest in 1999, with mean densities of  $3.21 \pm 2.13$ ,  $2.21 \pm 1.56$ , and  $1.57 \pm 1.01$  larvae or pupae per infested plant at Tehla, Malá n/Hronom and Čajkov, respectively. Numbers declined in 2000, with an average of only  $2.23 \pm 1.55$ ,  $1.75 \pm 0.92$ , and  $1.51 \pm 0.89$  specimens per plant. The highest population was found at Tehla. During 1999 and 2000, there were about 3.7 times more specimens

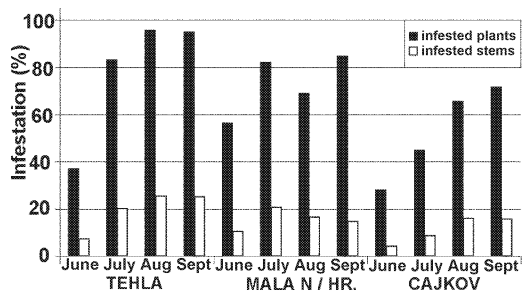


Fig. 6. Field bindweed infestation by *Melanagromyza albocilia* under the field conditions of three weekly sampled localities in Slovakia in 2000. The data are based on totals for 30 plants sampled each date.

at Tehla locality than it was at Čajkov and two times more than at Malá n/Hronom. The results also revealed that the number of specimens in the stems infested by *M. albocilia* varied from  $0.84 \pm 0.40$  to  $1.34 \pm 0.50$ . The numbers were stable within each locality and year (Figs. 7–8).

#### 4. Discussion

From our results it is clear that *M. albocilia* is widely distributed in the plains and foothills of Slovakia. It was present at all sites checked (Fig. 1) with mean infestation range from  $1.51 \pm 0.89$  to  $3.21 \pm 2.13$  specimens per plant (Figs. 7–8). Such a distribution had not been observed earlier, supposedly because of its hidden biology.

The stem borer was apparently more rare in hilly areas. Probably in such conditions only one generation of the insect develops even under lower press of parasites.

Although *M. albocilia* infested field bindweed throughout the season, the difference between early (June) and later attack (August–September) was evident. The clear maximum of infestations generally occurred in late summer and fall. The similar species, *M. convolvuli*, completed a generation within 26–39 days in Pakistan (Baloch 1977). *Melanagromyza sojae* (Zehntner, 1900) developed in about three weeks on soybeans in Indonesia (van der Goot 1930), and *M. socolena* developed similarly on tomatoes in Colombia (Zenner de Polania 1995). But, all these three species live in subtropical or tropical climate where development is influenced not only

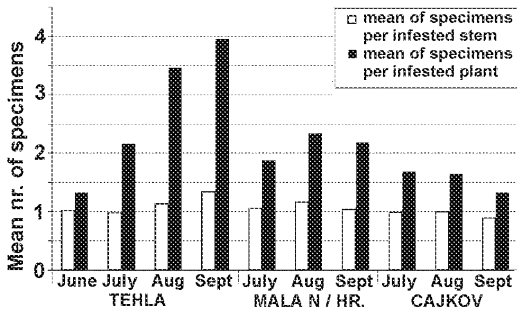


Fig. 7. Mean number of *M. albocilia* specimens (larvae, pupae, parasitized larvae) per infested stems and plants of field bindweed under the field conditions of three weekly sampled localities in Slovakia in 1999. Numbers of specimens are based on totals for 30 plants evaluated for each date.

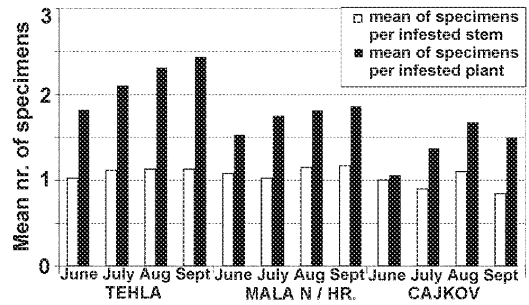


Fig. 8. Mean number of *M. albocilia* specimens (larvae, pupae, parasitized larvae) per infested stems and plants of field bindweed under the field conditions of three weekly sampled localities in Slovakia in 2000. Numbers of specimens are based on totals for 30 plants evaluated each date.

by temperature but also other factors influencing diapause. In the case of *M. albocilia* we assume that it has two overlapping generations per year in Slovakia. Prolonged emergence of the second generation adults might indicate that partial third generation could occur. Larvae and pupae were found side by side throughout the season.

The later attack of the stem borer fly, considered as the second generation, caused the heaviest infestation of field bindweed plants (up to 100%) and increased also the number of stems attacked (Figs. 5–6). Similarly, *M. convolvuli* infested up to 63% of field bindweed plants in Pakistan (Baloch 1977).

In contrast to *M. sojae*, which reached maximally 1.35 specimens per plant in Sumatra (van den Berg et al. 1995), the densities of *M. albocilia* were considerably higher in Slovakia. Peak densities generally occurred through August and September with  $3.95 \pm 2.03$ ,  $2.34 \pm 1.65$ , and  $1.68 \pm 1.13$  live specimens per plant recorded at Tehla, Malá n/Hronom and Čajkov, respectively (Figs. 7–8). Van der Goot (1930) reported that several eggs were deposited per plant but only one or sometimes two larvae of *M. sojae* were found in the same feeding tunnel, suggesting that intraspecific competition was important. Similarly, the number of specimens in the stems infested by *M. albocilia* varied from  $0.84 \pm 0.40$  to  $1.34 \pm 0.50$ . Nevertheless, we sometimes found up to 5 specimens per stem what does not indicate strong intraspecific competition of the species.

Parasitism of *M. albocilia* larvae in Slovakian

fields by *B. picticornis* was important in limiting of the species. *B. picticornis* showed the ability to forage effectively for larvae even in a relatively lower population level of *M. albocilia* (for example, Čajkov locality). It is a generalist larval ectoparasitoid. It has been reared for instance from *Euphranta connexa* (F.) (Diptera: Tephritidae) (Solbreck 2000), leafrollers in the family Tortricidae (Lepidoptera) (Diaconu & Lozan 2000), and *Pontania proxima* (Lepeletier) (Hymenoptera: Tenthredinidae) (Al-Saffar & Aldrich 1997). *M. albocilia* is a new host for *B. picticornis*.

In addition to parasitism, high larval mortality was observed through August and September. Similarly, Wang (1979) noted high larval mortality of *M. sojae*, the actual reason for this mortality remains to be investigated.

Feeding by *M. albocilia* larvae in stems apparently did not impede the supply of water and nutrients to the upper parts of the plant. During the larval period infested plants looked healthy from the outside. The stems started to become weak and dry after pupation, which takes place directly within the stems, probably because the larva gnaws an oval exit hole cutting off water and nutrients flow to the upper part.

Larvae of *M. albocilia* bore only in stem and roots of plant within the genus *Convolvulus* (Spencer 1973, Awadallah et al. 1976, Rosenthal & Buckingham 1982). The species appears to be highly host specific. Spencer (1965) mentioned: "When a species from the family Agromyzidae is feeding within stems or seeds there is a high de-

gree of probability that such species will be strictly monophagous". Before ovipositing, females puncture field bindweed leaves and feed on the ensuing exudates (Awadallah *et al.* 1976). Spencer (1973) suggested three reasons for such behavior: firstly, to confirm that the host is correct; second, to ingest proteins from the host which are necessary for maturation of the ovaries; and third, the actual feeding on the available carbohydrates. Baloch (1977) found that freshly emerged females of *M. convolvuli* that had not fed on leaf juices of field bindweed laid only infertile eggs when feeding on sweet potato (*Ipomoea batatas* Linnaeus). Based on our data (unpubl.), it is clear that *M. albocilia* does not attack *I. batatas*. We propose that *M. albocilia* may be a promising biological control agent of field bindweed not only in this respect. This species might also be a promising candidate for its primary damage: its stem-boring feeding after pupation results in weakness and dryness of stems, as shown by Tóth (2000). In addition, it probably causes secondary damage e.g. by "opening the door" to several pathogens, such as fungi and bacteria, which can in turn increase the total damage and even cause deaths of the target weed. Mines formed during larval feeding increase the risk of infection (Tóth *et al.* 2000). Based on all of the aforementioned, together with a high infestation of the host plant, we conclude that *M. albocilia* can be an important biological control agent of *C. arvensis*, especially if it is imported to places where *C. arvensis* is an invasive plant without associated insect fauna (e.g. in North America). There is also the presumption that *M. albocilia* will not experience high parasitism rates in such areas.

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