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*Peter Tóth, Ján I. Tancik,
Monika Tóthová, Vladimír Pačuta*

Slovak Agricultural University, A. Hlinku 2
949 76 Nitra, Slovak Republic

DISTRIBUTION, HOST PLANTS AND NATURAL ENEMIES OF SUGAR BEET ROOT APHID (*PEMPHIGUS FUSCICORNIS*) IN SLOVAKIA*

ABSTRACT: During 2003—2004, field surveys were realized to observe the distribution of sugar beet aphid, *Pemphigus fuscicornis* (K o c h) (*Sternorrhyncha: Pemphigidae*) in southwestern Slovakia. The research was carried out at 60 different localities with altitudes 112—220 m a. s. l. Sugar beet root aphid was recorded at 30 localities. The aphid was recorded in Slovakia for the first time, but its occurrence was predicted and symptoms and harmfulness overlooked by now. The presence of *P. fuscicornis* was investigated on roots of various plants from *Chenopodiaceae*. The most important host plants were various species of lambsquarters (above all *Chenopodium album*). Furthermore sugar beet (*Beta vulgaris* provar. *altissima*), red beet (*B. vulgaris* provar. *conditiva*) and oraches (*Atriplex* spp.) act as host plants. Infestation of sugar beet by *P. fuscicornis* never exceeded 5% at single locality in Slovakia. Dry and warm weather create presumptions for strong harmfulness. In Slovakia, *Chenopodium album* is a very important indicator of sugar beet aphid presence allowing evaluation of control requirements. During the study, the larvae of *Thaumatomyia glabra* (*Diptera: Chloropidae*) were detected as important natural enemies of sugar beet aphid. The species occurred at each location evaluated.

KEYWORDS: *Pemphigus fuscicornis*, insect, aphids, *Chenopodium*, *Beta vulgaris*, Sugar beet, *Thaumatomyia glabra*, natural enemies

INTRODUCTION

Sugar beet aphid, *Pemphigus fuscicornis* (K o c h, 1857) (*Sternorrhyncha: Pemphigidae*) is important pest of sugar beet in Eastern Europe (Č a m p r a g, 2003). The occurrence is known from Poland (H e i e, 1980), Hungary, Bulgaria, Romania, Serbia, Croatia (Č a m p r a g, 2003), Greece (I o a n i d i s, 1996), Ukraine and Russia (P i s n y a and F e d o r e n k o, 1988). Little is known about distribution in Western Europe (H e i e, 1980). Accounts are available

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only for Germany (Bosch and Duda, 1994), Denmark, Sweden (Heie, 1980) and Finland (Albrecht et al., 1996). Eastward and southward from Europe, there are records from Asian countries like Georgia, Armenia, Kazakhstan (Čamprag, 2003) and Iran (Shadmehri et al., 2001).

The species is similar to *P. bursarius*, but grayish-green, not whitish-yellow (Heie, 1980). The rear portion of the body produces a mass of white, waxy material. The aphids are most readily seen in the white mold-like material that is found on the infested roots and in the surrounding soil. The aphid is associated with fibrous roots rather than the main root.

Over 70 *Pemphigus* species have been described until now, of which, 46 are known to form galls on leaves or twigs of *Populus*. The life cycles of 17 of these gall-formers are known; four are monoecious on *Populus*, the alate sexuparae being produced in the galls and in the other 13 species the alate progeny of the fundatrix migrate to various herbaceous secondary hosts (Blackman and Eastop, 1994).

Although Heie (1980) mentioned that the primary host is unknown, Bosch and Duda (1994) noted that winged adults migrate from roots of secondary hosts (*Chenopodiaceae*) to the cottonwood trees (*Populus* sp.), primary hosts, where they lay their eggs. On the other hand, anholocyclic populations often persist all year on secondary hosts (Čamprag, 2003). Similar species, *Pemphigus betae* Doane occur throughout the major sugar beet growing areas of North America (Hutchinson and Campbell, 1994). *P. betae* is assumed to use cottonwood or poplar trees (*Populus* spp.) as primary hosts (Harper, 1963, Witham, 1978). Although sugar beet is usually the secondary host concerning economic importance, the roots of red beets, lambsquarter (*Chenopodium album*), spinach and alfalfa may also be colonized by *P. betae* (Harper, 1963). Large populations of “sugar beet root aphid”, *Pemphigus populivenae* Fitch were observed to develop on quinoa (*Chenopodium quinoa*) roots in Colorado (Cranshaw et al., 1990).

The aim of this work was to detect the occurrence on host plants and natural enemies of *Pemphigus fuscicornis* in Slovakia.

MATERIAL AND METHODS

During the autumn seasons 2003—2004, field surveys were conducted to observe the distribution of sugar beet aphid, *Pemphigus fuscicornis* (Koch) (*Sternorrhyncha: Pemphigidae*) in southwestern Slovakia. The research was carried out at 60 different, randomly chosen localities in different geographic and climatic regions. Crops, where the samples were taken were grown according to local farmers' practices. The roots of various species from *Chenopodiaceae* were used for investigation. Above all, lambsquarters (*Chenopodium* sp.), oraches (*Atriplex* sp.), sugar beet (*Beta vulgaris altissima*) and red beet (*B. vulgaris* prov. *conditiva*) were inspected. To record the presence of the sugar beet aphid, 30 lambsquarter plants were inspected at each location. The number reached the maximum of 50 plants per site if sugar beet aphid were not found. In addition, 30 randomly chosen plants of cover crops (sugar beet,

red beet, spinach) were also inspected. Besides sugar beet aphid, natural enemies were detected within the colonies. Recorded species were kept, reared and identified.

RESULTS

The distribution of *P. fuscicornis* in Slovakia is shown in Figure 1. The sugar beet aphid was found at 30 localities of Southwest Slovakia, confirming that it is a common insect in that region and that it is closely related to the distribution of its main host *Chenopodium album*. The species occurred at localities with altitudes 112–220 m a. s. l. Wingless and winged females of *P. fuscicornis* were found during July, September and October 2003 and 2004 at following localities, recorded host plants are shown for each location: Branč (48°13'N 18°09'E; 137 m a. s. l.), *B. vulgaris altissima*, *Chenopodium* sp.; Čeladice (48°20'N 18°15'E; 170 m a. s. l.), *B. vulgaris altissima*, *B. vulgaris conditiv.*; *Chenopodium* sp.; Dolný Štál (47°56'N 17°43'E; 112 m a. s. l.), *B. vulgaris altissima*, *Chenopodium* sp.; Domadice (48°11'N 18°47'E; 168 m a. s. l.), *Chenopodium* sp.; Hontianska Vrbica (48°08'N 18°43'E; 173 m a. s. l.), *Chenopodium* sp.; Hontianske Moravce (48°11'N 18°51'E; 159 m a. s. l.) *Chenopodium* sp.; Host'ová (48°20'N 18°13'E; 198 m a. s. l.), *Chenopodium* sp.; Hurbanovo (47°52'N 18°12'E; 115 m a. s. l.), *Chenopodium* sp.; Jelka (48°09'N 17°31'E; 123 m a. s. l.), *Chenopodium* sp.; Kostolné Kračany (47°59'N 17°35'E; 8071; 119 m a. s. l.), *B. vulgaris altissima*; *Chenopodium* sp.; Ondrochov (48°08'N 18°11'E; 126 m a. s. l.), *Chenopodium* sp.; Maňa (48°09'N 18°17'E; 131 m a. s. l.), *Chenopodium* sp.; Nemčiňany (48°18'N 18°28'E; 7676; 212 m a. s. l.), *Chenopodium* sp.; Nevidzany (48°17'N 18°23'E; 181 m a. s. l.), *Chenopodium* sp.; Nová Dedina (48°17'N 18°40'E; 190 m a. s. l.), *Chenopodium* sp.; Pinkové Kračany (47°58'N 17°35'E; 119 m a. s. l.), *B. vulgaris altissima*, *Chenopodium* sp.; Pribeta (47°54'N 18°19'E; 135 m a. s. l.), *Chenopodium* sp.; Santovka (48°09'N 18°46'E; 162 m a. s. l.), *Chenopodium* sp.; Sokolce (47°51'N 17°50'E; 112 m a. s. l.), *B. vulgaris altissima*, *Chenopodium* sp.; Tehla (48°11'N 18°23'E; 180 m a. s. l.), *Chenopodium* sp.; Tlmače (48°17'N 18°32'E; 220 m a. s. l.), *Chenopodium* sp.; Tomášikovo (48°05'N 17°42'E; 118 m a. s. l.), *B. vulgaris altissima*; Tôň (47°48'N 17°50'E; 112 m a. s. l.), *Chenopodium* sp.; Trávnica (48°09'N 18°20'E; 130 m a. s. l.), *Chenopodium* sp.; Veľké Chyndice (48°17'N 18°18'E; 190 m a. s. l.), *Chenopodium* sp.; Veľký Cetín (48°13'N 18°12'E; 130 m a. s. l.), *Chenopodium* sp.; Vikanovo (47°57'N 18°14'E; 130 m a. s. l.), *Chenopodium* sp.; Vráble (48°15'N 18°19'E; 142 m a. s. l.), *Atriplex* sp., *Chenopodium* sp.; Záhorská Ves (48°22'N 16°51'E; 149 m a. s. l.), *Chenopodium* sp.; Zlaté Klasy (48°07'N 17°25'E; 124 m a. s. l.), *Chenopodium* sp.; Zohor (48°15'N 16°58'E; 146 m a. s. l.), *Chenopodium* sp.

During the study, the larvae of *Thaumatomyia glabra* (Meigen) (Diptera: Chloropidae) were detected as an important natural enemy of sugar beet aphid. The species occurred at each location evaluated.

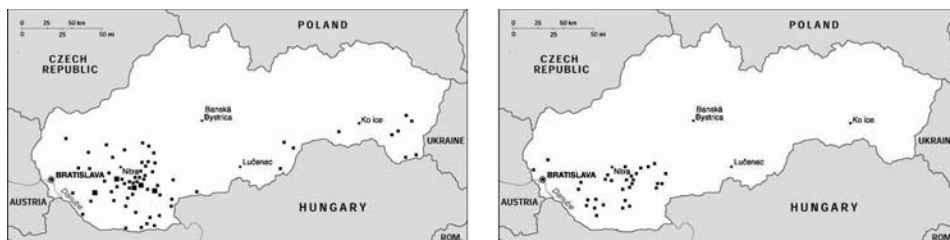


Figure 1. Distribution of sugar beet root aphid (*Pemphigus fuscicornis*) in Slovakia during 2003–2004

DISCUSSION

P. fuscicornis lives on roots of *Matricaria* sp., *Tripleurospermum* sp. (Albrecht et al., 1996) and wild and cultivated species from *Chenopodiaceae* family, including sugar beet (*Beta vulgaris* provar. *altissima*) (Pisnyá, 1986). We recorded lambsquarters (*Chenopodium* sp.), oraches (*Atriplex* sp.), sugar beet and red beet (*B. vulgaris* provar. *conditiva*) as host plants in Slovakia. The most important reservoir and indicators of *P. fuscicornis* presence were lambsquarters allowing evaluation of possible control requirements.

Although Heie (1980) mentioned that the primary host is unknown, Bosch and Duda (1994) noted that winged adults migrate from roots of secondary hosts (*Chenopodiaceae*) to the cottonwood trees (*Populus* sp.), primary hosts, where they lay their eggs. Sugar beet aphid was not found on cottonwood trees in Slovakia. On the other hand, anholocyclic populations often persist all year on secondary hosts (Čamprag, 2003), what was confirmed during our research as well.

The results show that *P. fuscicornis* is a usual insect in Southwest Slovakia with high potential to become an important sugar beet pest. The attack of sugar beet aphid reduced significantly sugar yields and sugar content as well as the other technological values of the root. In seemingly healthy plants, the presence of the root aphid reduced the yield by 7,6%, while the sugar content declined by 2,4% (Sekulić et al., 2001).

During the study, the larvae of *Thaumatomyia glabra* (Meigen) (Diptera: Chloropidae) were detected as the only important natural enemies of sugar beet aphid. *T. glabra* is known as common predator of root aphids (Cole, 1969). Larvae and pupae of the chloropid predator *T. glabra* were also found among the aphid colonies on the roots of quinoa (*Chenopodium quinoa*) in Colorado (Cranshaw et al., 1990).

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РАСПРОСТРАЊЕНОСТ, БИЉКЕ ДОМАЋИНИ
И ПРИРОДНИ НЕПРИЈАТЕЉИ РЕПИНЕ КОРЕНОВЕ ВАШИ,
PEMPHIGUS FUSCICORNIS КОСН., У СЛОВАЧКОЈ

Петер Тот, Јан Ј. Танцик, Моника Тотова, Владимир Пачута
Словачки пољопривредни универзитет у Њитри,
А. Хлинку 2, 94976 Њитра, Словачка

Резиме

Током 2003. и 2004. године праћена је распрострањеност репне коренове ваши, *Pemphigus fuscicornis* (Косн) (*Sternorrhyncha: Pemphigidae*), у југозападној Словачкој. Посматрања су урађена на 60 локалитета на надморским висинама од 112 до 220 m. Репна коренова ваш је регистрована на 31 локалитету. То је уједно био и први налаз ова ваши у Словачкој. Претпостављамо да је ова врста ваши у овом региону присутна већ дуже време али њено присуство и симптоми на биљкама хранитељкама остали су незапажени. Присуство ове ваши смо пратили на разним врстама биљака из фамилије *Chenopodiaceae*. Најчешће нападнуте биљке биле су разне врсте пепељуга, највише обична пепељуга, *Chenopodium album*. Затим је ваш налажена на шећерној репи (*Beta vulgaris* provar. *altissima*), цвекли (*B. vulgaris* provar. *conditiva*) и лободи (*Atriplex* spp.). Напад на шећерној репи ни на једном локалитету није био већи од 5%. Но, у будућности суво и топло време може допринети масовном размножавању ове штеточине а тиме и повећању штетности. Обична пепељуга је у условима Словачке значајан индикатор репине коренове ваши и омогућава лакше праћење бројности ове штеточине а тиме и потребу њене регулације. У току праћења појаве ове ваши констатовали смо скоро на сваком локалитету и њеног природног непријатеља — ларве врсте *Thaumatomyia glabra* (*Diptera: Chloropidae*).