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STUDY ON THE FURTHER SPREAD OF *PSEVDAULACASPIS PENTAGONA* (HOMOPTERA: COCCOIDEA: DIASPIDIDAE) IN CENTRAL EUROPE

F. KOZAR, DIAA A.F. SHEBLE AND M.A. FOWJHAN
Plant Protection Institute, Hungarian Academy of Sciences,
P.O. Box 102, H-1525 Budapest, Hungary

ABSTRACT

The northward expansion of the white peach scale, *Pseudaulacaspis pentagona* (Targioni Tozzetti, 1885) has been observed in Hungary during the last 20 years. In the present study of the wider distribution of this universally important polyphagous pest, we conducted visual observations on ornamental plants, especially such preferred ones as *Morns, Sophora, Syringa,* etc. The survey included Austria, Bulgaria, Hungary, Romania and Slovakia and it covered 119 sites during 1990-1993. By visual survey we found 60 sites infested by this pest. The density was usually very high (3-4 on a 0 to 4 scoring system) and showed great variation in different years. Fifty-nine sites were visually free from the pest. By the help of pheromone traps we found that 17 of these sites were also infested, while 15 remained free. In addition to Hungary, the species was also found in Slovakia.

KEY WORDS: Homoptera, Coccoidea, Diaspididae, *Pseudaulacaspis pentagona,* distribution, pheromone.

INTRODUCTION

There are few accurate maps available of the distribution of diaspidid species. The Commonwealth Institute of Entomology has published several maps (Anonymous, 1955,1981, 1985, etc.) on the basis of literature sources that show the global distribution of important noxious species. Regional maps for several species were published by Kozar (1990). Determination of the possible distribution area of newly introduced species that are mostly declared quarantine pests would be very useful.

The problems related to new insect pests in Central Europe were analysed earlier by Kozar and Nagy David (1986), Kozar (1992) and Stollar et al. (1993). During the last 20 years, several other insect species also substantially increased their northward distribution in Central Europe at an average speed of 20-50 km per year (Kozar, 1992). In some cases the expansion was rapid and insects spread 700 km within a very short time. Some of them occupied the whole territory, while others showed a discontinuous distribution picture. According to long-term mathematical climatic models for Central Europe, mild winters and colder summers will appear in the future

(Gavin and Kuhla, 1989). This warming trend for winters could change the present distribution of animals and plants. One of the best examples of the northward expansion of insects in Central Europe is *Pseudaulacaspis pentagona* (Targioni Tozzetti, 1885).

P. pentagona first appeared in southern Hungary in 1923, then slowly spread northwards and in 1929 it was already found in several southern counties of the country. After this initial phase the spreading stopped for a long period. In 1976 this pest was found in the southern part of the Hungarian Great Plain and also in the surroundings of Budapest. The spreading continued and *P. pentagona* was found in several places in the central part of the country in 1983. Shortly afterwards it was also found in some other places of the country; this spread was associated with mild winters in the region (Kozár and Nagy Dávid, 1986). During recent years, northward spread was found in France and Switzerland, too (Baggiolini et al., 1993).

The present paper deals with the distribution and the methods of survey of this pest.

MATERIALS AND METHODS

During 1990–1993 we conducted visual observations on the presence of *P. pentagona* on ornamental plants, especially preferred ones such as *Morus, Sophora, Syringa,* etc. The survey was conducted at 119 sites and included Austria, Bulgaria, Romania, Slovakia and Hungary.

A further method to study the distribution was to place pheromone traps at 32 sites, which were visually free from infestation. The traps used were the Hungarian tent trap (10 × 10 cm) with tanglefoot. The pheromone component was kindly presented to us by Dr. B. Kovalev, Kishinev, Moldavia, by Trifolio-M GmbH, Lahnau, Germany (this compound also originated from Dr. B. Kovalev) and by Dr. J.H. Tumlinson, Gainesville, USA. Traps were used during the second flight of the males, except at one site (Kerepestarcsa). In *P. pentagona* the numbers of males in the second flight are usually about ten times higher than in the first flight, which is favourable for surveys.

RESULTS AND DISCUSSION

In the visual survey we found 60 sites infested by the pest, with density usually being very high (3–4 on a 0 to 4 scoring system). Fifty-nine sites appeared to be free from the pest. With the help of pheromone traps we found that 17 of these sites were also infested and that 15 sites were free altogether. In repeated visual surveys of these 15 sites, we later located infestation in two of them.

Six sites outside Hungary were free from infestation according to the visual survey, but using pheromone traps we found two infested sites in Slovakia in 1993. In the places where infestation could only be found with traps, we collected 12–1,679 males for one flight period, and in a heavily infested place one trap collected 11,460 males (Table 1).

Some males of other scale insect species were sometimes found together with *P. pentagona* males in the traps. Because of this fact and of the identification problems with males we decided that wherever the traps collected less than ten males, we could not consider infestation proved. The number of males in different years and places shows contradictory trends. For example, in Budapest and Debrecen the density trend was decreasing, but in Kecskemét it was increasing.

The data show that *P. pentagona* is very sensitive to changes in weather conditions and could be used as an indicator for climatic changes. The distribution map (Fig. 1) shows that this pest

TABLE 1
Number of males of *Pseudaulacaspis pentagona* in the second flight collected in pheromone traps at different locations in Central Europe

Town	Number of males in different years		
	1991	1992	1993
Budapest	11460	1043	2656
Tokod	341	444	–
Dunaalmás	–	4	12
Szöny	–	1	0
Tata	–	3	1
Lábatlan	–	0	5
Kecskemét	201	555	1375
Békéscsaba	0	0	3
Szarvas	6	8	–
Szentes	–	333	–
Kondoros	–	0	1
Hatvan	0	0	0
Gyöngyös	0	51	–
Eger	4	0	0
Miskolc	0	2	0
Debrecen	99	15	0
Nyíregyháza	1	0	0
Pápa	–	12	0
Veszprém	4	6	2
Mosonmagyaróvár	–	0	0
Balatonakarattya	0	42	0
Szántód	–	973	–
Székesfehérvár	384	–	–
Szolnok	468	–	–
Szarkás	–	–	657
Kerepestarcsa	–	69	–
Varna (Bulgaria)	–	0	–
Orosháza	68	–	–
Arad (Romania)	–	0	–
Komarno (Slovakia)	–	–	557
Horkovce (Slovakia)	–	–	1679
Zurmdorf (Austria)	–	0	0

– = There was no trap.

is now distributed all over the central part of Hungary. Thus, the spread of this insect in Central Europe continued.

These results show that the insect could be effectively surveyed visually, but that pheromone traps could help to locate very low infestations. It would be important to follow up the process of the expanding distribution of this species by using pheromone traps in other countries of Europe as well.

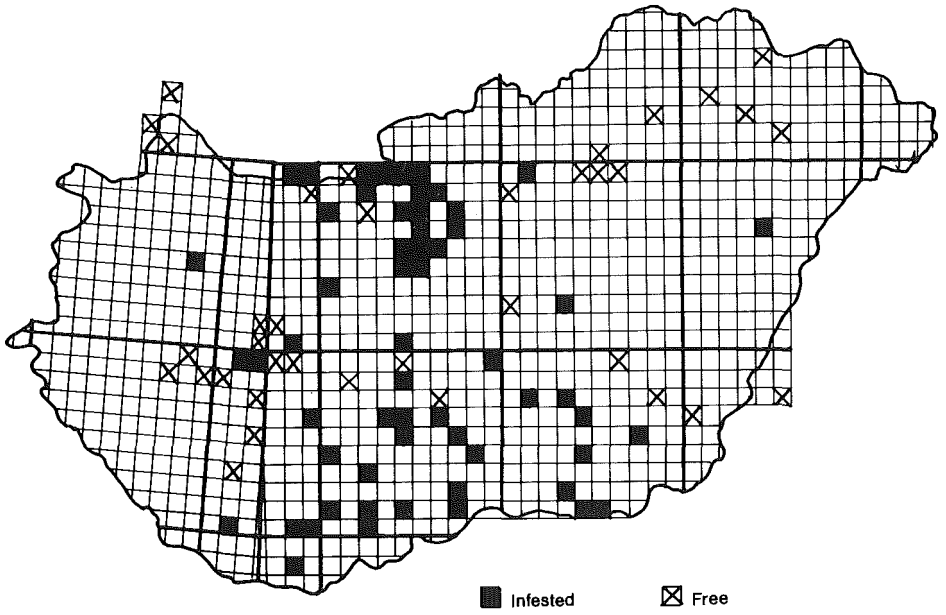

Fig. 1. Distribution of *Pseudaulacaspis pentagona* in Hungary and surrounding countries.

REFERENCES

Anonymous. 1955. *Pseudaulacaspis pentagona.* Distribution Maps of Insect Pests. Map no. 58. Commonwealth Institute of Entomology, London.

Anonymous. 1981. *Melanaspis sacchari.* Distribution Maps of Insect Pests. Map no. 420. Commonwealth Institute of Entomology, London.

Anonymous. 1985. *Aulacaspis madiunensis.* Distribution Maps of Insect Pests. Map no. 468. Commonwealth Institute of Entomology, London.

Baggiolini, M., Guignard, E. and Bloesch, B. 1993. Foyers de cochenille du murier, *Pseudaulacaspis pentagona* Targ. (Homoptera, Diaspididae), observés dans la région de la Côte lémanique. *Revue Suisse de Viticulture, Arboriculture et Horticulture* 25(3):161–165.

Gavin, J. and Kuhla, G. 1989. Sulphate aerosols and climate. *Nature (London)* 340:438.

Kozár, F. 1990. Deciduous fruit trees. In: World Crop Pests. Vol. 4B. Armoured Scale Insects, Their Biology, Natural Enemies and Control. Edit. D. Rosen. Elsevier, Amsterdam-Oxford-New York-Tokyo. pp. 593–602.

Kozár, F. 1992. Recent changes in the distribution of insects and the global warming. Proceedings of the Fourth European Congress of Entomology. Hungarian Natural History Museum, Budapest. pp. 406–413.

Kozár, F. and Nagy Dávid, A. 1986. The unexpected northward migration of some species of insects in Central Europe and climatic changes. *Anzeiger für Schädlingskunde, Pflanzenschutz und Umweltschutz* 59:90–94.

Stollár, A., Dunkel, Z., Kozár, F. and Sheble, D.A.F. 1993. The effects of winter temperature on the migration of insects. *Időjárás* 97(2):113–120.