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The Occurrence of Tortricids (*Lepidoptera*, *Tortricidae*) in Apple Orchards of the Lublin Area

Występowanie motyli zwójkowatych (*Lepidoptera*, *Tortricidae*) w sadach jabłoniowych okolic Lublina

Abstract: The studies were carried out in the years 1999–2001 in three apple orchards in the vicinity of Lublin. The purpose of these studies was to establish the species composition and the dates of occurrence of particular developmental stages of some leaf tortricids colonizing apple orchards. The studies found out the presence of 13 species of leaf tortricids. The presence of the first caterpillars of tortricids was observed at the end of April and those were the larvae of *Spilonota ocellana* (Den. et Schiff.), *Hedya nubiferana* (Haw.) and the caterpillars of *Adoxophyes orana* (Fisch. v. Rösl.) first generation. The shortest flight of moths was observed in the case of *Pandemis cerasana* (Hbn.) and it lasted about 4 weeks, while the longest was found for *Acleris holmiana* (L.) – 7 weeks. The occurrence of the second generation was observed in the case of *Pandemis heparana* (Den. et Schiff.), *Pandemis cerasana* (Hbn.) and *Adoxophyes orana* (Fisch. v. Rösl.). The caterpillars of the second generation were observed between the third 10 days' period of July and the first of August. The flight of the second generation lasted from one to three weeks, depending on the species.

Key words: tortricids, apple orchards, developmental stages

INTRODUCTION

The protection of fruit trees against insects from the families of *Tortricidae* (*Lepidoptera*) constitute a big threat, which is due to a considerable number of harmful species and their occurrence on different cultivations. Studies found out their presence and harmfulness on ornamental plants (Łabanowski and Soika 2000), vegetables (Szwejda 1992), fruit trees and shrubs (Anasiewicz 1963).

They are also pests to forests (Tarwacki 1998) and park trees (Georgiev and Velcheva 1999). They are especially dangerous on fruit trees in early spring, when the caterpillars spin developing flower-leaf rosettes, they eat the leaves and flowers and damage the fruit sets (Olszak and Płuciennik 1997). Learning the biology of particular species of these insects makes it possible to establish the optimum date of their control, in this way limiting their harmfulness.

The purpose of the present studies was to establish the species composition and the dates of occurrence of particular developmental stages of some leaf tortricids colonizing apple orchards in the Lublin area.

MATERIAL AND METHODS

The studies were carried out in the years 1999–2001 in three apple orchards in the vicinity of Lublin. Particular objects differed between each other with the cultivation system, the type of agrotechnical treatments and the intensity of utilization. Site 1 is an orchard without any chemical control situated at Leonów, site 2 is an orchard with a limited program of control at Motycz and site 3 is an orchard with intensive control at Jastków.

45 trees located in different parts of the orchards were randomly selected in each of the studied sites. Five branches were randomly selected on each tree and the flower-leaf rosettes and then the leaf rosettes were observed there, picking up the caterpillars and the pupae of leaf tortricids. These were taken to an insectarium and placed singularly in flasks. The observations were carried out with 7-days' intervals, between the phase of leaf bud breaking and the falling of leaves. The caterpillars kept in the insectarium were fed with the leaves of the host plant every day, and the culture was maintained until a moth imago was obtained.

RESULTS

13 species of leaf tortricids were found out during the studies: *Archips rosana* (L.), *Archips xylosteana* (L.), *Archips podana* (Scop.), *Archips crataegana* (Hbn.), *Pandemis heparana* (Den. et Schiff.), *Pandemis cerasana* (Hbn.), *Adoxophyes orana* (Fisch. v. Rösl.), *Pandemis cinnamomeana* (Treit.), *Acleris holmiana* (L.), *Choristoneura hebenstreitella* (Müll.), *Ptycholoma lecheana* (L.), *Hedya nubiferana* (Haw.) oraz *Spilonota ocellana* (Den. et Schiff).

Figs. 1–3 present the periods of appearance of particular developmental stages (caterpillars, pupae, imago) of 8 most numerous species of leaf tortricids.

The first caterpillars of *S. ocellana*, *H. nubiferana* and the caterpillars of the first generation of *A. orana* were observed as early as at the end of April (Fig. 1). At the beginning of the first 10 days of May the presence of *A. rosana*, *A. xylosteana*, *P. lecheana*, *Ch. hebenstreitella* caterpillars and the first genera-

tion of *P. cerasana* was found. A few days later (at the beginning of the second 10 days' period of May) *A. holmiana*, *P. cinnamomeana* caterpillars and the caterpillars of the first generation of *P. heparana* appeared. The presence of *A. crataegana* and *A. podana* were observed the latest, which was at the end of May.

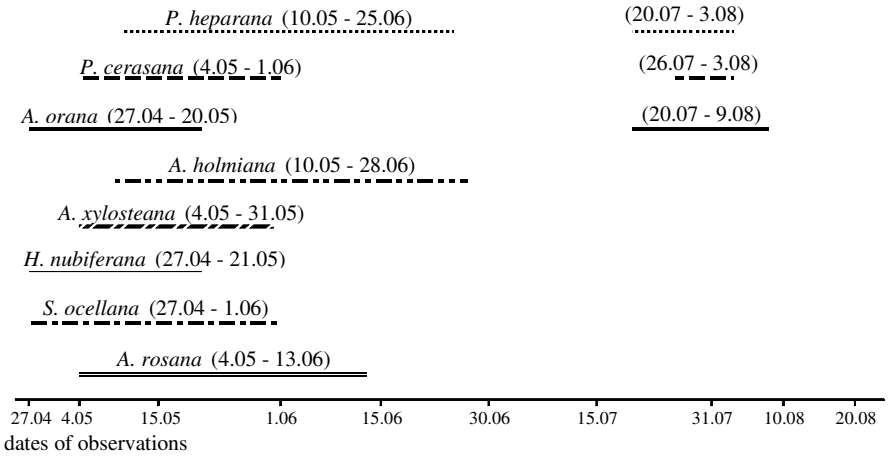

Fig. 1. The periods of appearance of some caterpillars leaf tortricids in studied apple orchards in the years 1999–2001

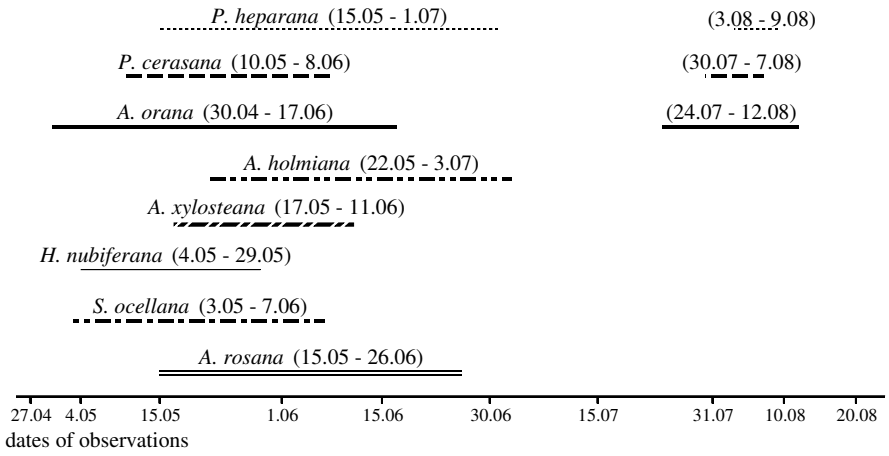

Fig. 2. The periods of appearance of some pupae leaf tortricids in studied apple orchards

in the years 1999–2001

The pupation of scarce caterpillars of *A. orana* first generation was observed already at the end of April (Fig. 2). On the first 10 days of May the first pupae of *S. ocellana*, *H. nubiferana* and *P. cerasana* were observed. *A. holmiana* caterpillars underwent the process of pupation the latest, namely in the third 10 days' period of May.

Because of unequal development of caterpillars the appearance of adult forms of particular species was also extended in time. The moths of *H. nubiferana* appeared the earliest, on the first 10 days of May. The last imagines of this species were found in the first 10 days' period of June (Fig. 3). The flights of the first moths of the overwintering generation of *A. orana*, lasted about 6 weeks, and also took place on the first 10 days of May. The emergence of the moths of the other species of *Tortricidae* were most frequently observed in the third 10 days' period of May or during the first 10 days of June.

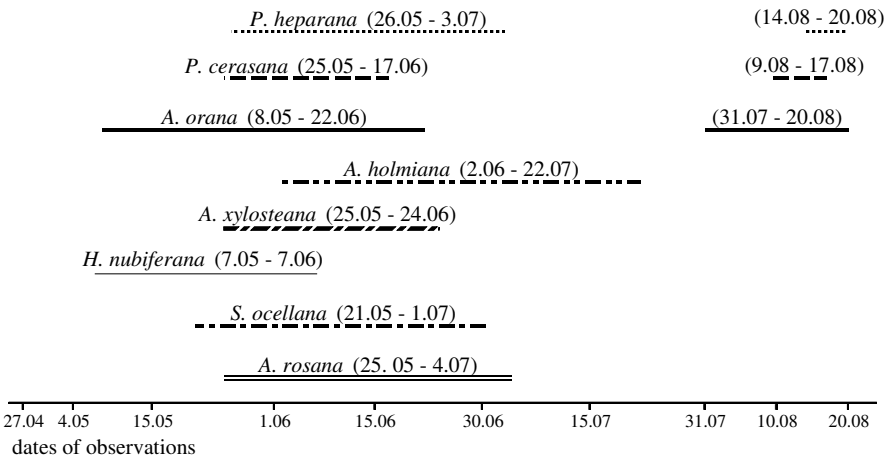

Fig. 3. The periods of appearance of some imago leaf tortricids in studied apple orchards in the years 1999–2001

The flight of the moths of *P. cerasana* first generation lasted about 4 weeks, while the flight of *A. xylosteana* lasted 5 weeks. The flights of *A. rosana*, *S. ocellana* imagines and the first generation of *P. heparana* lasted about 6 weeks. It was found out that the flight of *A. holmiana* lasted the longest – 7 weeks.

The occurrence of the second generation was observed in three species of leaf tortricids, namely *P. heparana*, *P. cerasana* and *A. orana*, the latter being

the most numerous species in the second generation. The dates of occurrence of particular developmental stages of the enumerated species were similar. The first caterpillars of the second generation were observed in the third 10 days' period of July, while the last ones were picked at the end of the first 10 days of August (Fig. 1). The earliest and the longest flight of summer generation moths was found for *A. orana.* It began at the turn of July and August and lasted for about 3 weeks. On the other hand, the flight of *P. heparana* and *P. cerasana* moths was observed at the end of the first or the beginning of the second 10 days' period of August and it lasted only about one week (Fig. 3). Such a short period of flight probably resulted from the small number of the summer generation of the enumerated species.

DISCUSSION

Three-year studies conducted in apple orchards in the vicinity of Lublin found out the presence of 13 species of leaf tortricids. Płuciennik and Olszak (1997) state that about 17–18 species can appear in orchards; however, observations in different objects find from 3 to 6 species of leaf tortricids. This results from the fact that the species composition is affected by natural conditions and the environment of an orchard.

The presence of the first caterpillars of *S. ocellana*, *H. nubiferana* and *A. orana* was observed at the end of April. The last ones were picked at the end of May. On the other hand, Łabanowski (1979) and Płuciennik and Olszak (2005) state that the larvae of *S. ocellana* and *H. nubiferana* feed till the second half of June. The appearance of the other species of leaf tortricids caterpillars found in the examined orchards was most frequently observed in the first half of May. However, Płuciennik and Olszak (2005) point that they usually appear in apple orchards in the end of April.

The first scarce pupae of the first generation of *A. orana* were observed at the end of April, while at the beginning of May *S. ocellana*, *H. nubiferana* and *P. cerasana* were found. According to Riedl (1968), the pupation of *H. nubiferana* caterpillars takes place in the first half of May, which corresponds to the author's own observations. On the other hand, Riedl (1968) finds out that *S. ocellana* caterpillars undergo the process of pupation much later than the present author's own studies showed, namely in the first half of June.

The moths' flights began at the beginning of May, and *H. nubiferana* adults and the first generation of *A. orana* were observed as the first. The date of adult forms' flights was earlier than that given by other authors. For example, Krakowiak (1974) states that the flight of *H. nubiferana* and *A. orana* moths in apple

orchards in the area of Poznań took place in the first half of June, while Burdajewicz and Kokot (1978), who observed leaf tortricids on roses, found out that the flight of *A. orana* moths takes place in June and July.

In the author's own studies the flight of the first moths of the other species of leaf tortricids was noted at the turn of May and June. This corresponds to the datas presented by Koślińska (1982).

SUMMARY AND CONCLUSIONS

1. The studies conducted in three apple orchards in the vicinity of Lublin found out the appearance of 13 species of leaf tortricids.

2. The presence of the first caterpillars of tortricids was observed at the end of April and those were the larvae of *Spilonota ocellana* (Den. et Schiff.), *Hedya nubiferana* (Haw.) and the caterpillars of *Adoxophyes orana* (Fisch. v. Rösl.) first generation.

3. The caterpillars of *Archips crataegana* (Hbn.) and *Archips podana* (Scop.) were observed the latest, namely at the end of May.

4. The shortest flight of moths was observed in the case of *Pandemis cerasana* (Hbn.) and it lasted about 4 weeks, while the longest was found for *Acleris holmiana* (L.) – 7 weeks.

5. The occurrence of the second generation was observed for *Pandemis heparana* (Den. et Schiff.), *Pandemis cerasana* (Hbn.) and *Adoxophyes orana* (Fisch. v. Rösl.).

6. The caterpillars of the second generation were observed between the third decade of July and the first of August.

7. The flight of the second generation moths lasted from one to three weeks, depending on the species. The short time of the flight was probably affected by the small number of the summer generation.

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STRESZCZENIE

Badania prowadzono w latach 1999–2001 w trzech sadach jabłoniowych w okolicach Lublina. Ich celem było ustalenie składu gatunkowego oraz terminów występowania poszczególnych stadiów rozwojowych niektórych zwójkówek liściowych zasiedlających sady jabłoniowe. W wyniku przeprowadzonych badań stwierdzono występowanie 13 gatunków zwójkówek liściowych. Obecność pierwszych gąsienic notowano pod koniec kwietnia i były to larwy *Spilonota ocellana* (Den. et Schiff.), *Hedya nubiferana* (Haw.) oraz gąsienice pierwszego pokolenia *Adoxophyes orana* (Fisch. v. Rösl.). Najkrótszy wylot motyli odnotowano w przypadku *Pandemis cerasana* (Hbn.) i trwał on około 4 tygodni, natomiast najdłużej trwał wylot *Acleris holmiana* (L.) – 7 tygodni. Występowanie drugiego pokolenia stwierdzono u *Pandemis heparana* (Den. et Schiff.), *Pandemis cerasana* (Hbn.) oraz *Adoxophyes orana* (Fisch. v. Rösl.). Gąsienice drugiego pokolenia obserwowano od III dekady lipca do I dekady sierpnia. Wylot motyli drugiego pokolenia trwał od jednego do trzech tygodni w zależności od gatunku.