*Acta Phytopathologica et Entomologica Hungarica 43 (2), pp. 337–343 (2008)*
DOI: 10.1556/APhyt.43.2008.2.18

# Thrips (Thysanoptera) in Flowers of Fruit Trees in Poland

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(Received: 4 March 2008; accepted: 6 June 2008)

In 2004–2006 in southern Poland an investigation of the thrips fauna in altogether 78,000 flowers recorded 19 species of Thysanoptera. In the flowers of apple *(Malus domestica),* pear *(Pyrus communis),* sweet cherry *(Prunus avium),* sour cherry *(P. collina),* plum *(P. domestica)* and black chocoberry *(Aronia melanocarpa)* a total of 3748 adults (all identified to species) and 128 larvae were found. No damage to the flowers by the thrips was observed. The level of infestation of the flowers of fruit trees and berry bush by thrips was low and the relatively low number of larvae was due to the short flowering time of fruit trees. The following thrips species were eudominant: *Taeniothrips inconsequens, Thrips fuscipennis* and *Thrips minutissimus*.

Keywords: thrips, *Thysanoptera,* flowers, fruit trees, Poland.

Some thrips (Thysanoptera) can cause serious damage to crops. However, many common species do not influence the yield. Usually these species are polyphagous, good at flying and move easily from one place to another. Such species can be found on crops, although they prefer wild plants as hosts (Zawirska, 1994). Some thrips species especially prefer flowers. In Poland, investigations of thrips in flowers have been continued for many years (Gromadska, 1957; Zawirska, 1969; Wnuk and Pobożniak, 2003).

Many authors classify thrips as pests of flowers of fruit trees and berry bushes. Thrips damage the tissue and extract the sap, which can block the development of the buds of flowers, can cause falling of flowers and distortion of fruits. A few species of thrips have been recorded as pest of orchard trees. An example is *Taeniothrips inconsequens* (Uzel), which is described as a pest of flower buds, flowers and leaves of pear trees in California (Bailey, 1944). Other thrips infesting and damaging the flowers of fruit trees in California are *Frankliniella occidentalis* (Pergande), *Frankliniella moultoni* Hood and *Frankliniella minuta* Moulton. Bournier (1975) reported that *T. inconsequens, Thrips meridionalis* (Priesner), *Thrips minutissimus* Linnaeus, *Thrips flavus* Shrank and *Frankliniella intonsa* (Trybom) cause damage to fruits in France. Tunç (1989, 1996) lists *T. meridionalis, T. inconsequens* (Uzel) and *Haplothrips reuteri* (Karny) as fruit tree pests in Turkey. In Poland, investigation of thrips species in flowers of trees and bushes was conducted by Gromad-

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ska (1957). The author found ten species, among them the most numerous were *F. intonsa, Thrips physapus* Linnaeus and *Haplothrips aculeatus* Fabricius. Gromadska (1957) did not classify the thrips as pests of flowers of orchard trees but suggested that they influence the fertilization of flowers in accordance with Fiodorow (1938).

The aim of this work was to determine the species composition of thrips and check if some of the species should be treated as pest of flowers of fruit trees and/or berry bushes.

## Materials and Methods

Thrips specimens were collected during the period 2004–2006 at the Experimental Station of the Faculty of Horticulture, Agricultural University in Cracow, located in Garlica Murowana 10 km north of Cracow. The experimental fields of the Station cover 71 ha, of which 40 ha are fruit orchards, soft fruit orchards, collections of many cultivars and mother plants. Five fruit trees were selected for the analysis: apple *(Malus domestica),* pear *(Pyrus communis),* sweet cherry *(Prunus avium),* sour cherry *(Prunus collina),* plum *(Prunus domestica)* and one berry bush: black chocoberry *(Aronia melanocarpa)*. For the analysis, nine- to twelve-year-old trees belonging to different cultivars, which have had no chemical protection, were selected *(Table 1)*.

For each species of fruit, four rows of trees were randomly selected and successively ten trees from each row. From each tree, 50 flowers were collected in plastic bags. Because

**Table 1**

Fruit tree orchard size, sampling period and number of samples (1 sample = 2000 flowers)

| Fruit species | Orchard size (ha) | Period | No. of samples |
|---|---|---|---|
| Apple *(Malus domestica)* | 1.0 | 03 – 09 May 2004 | 2 |
| | | 13 – 15 May 2005 | 3 |
| | | 10 – 15 May 2006 | 3 |
| Pear *(Pyrus communis)* | 0.6 | 29 April – 03 May 2004 | 2 |
| | | 07 – 09 May 2005 | 2 |
| | | 05 – 08 May 2006 | 2 |
| Sweet cherry *(Prunus avium)* | 0.1 | 03 – 06 May 2004 | 2 |
| | | 06 – 08 May 2005 | 2 |
| | | 03 – 06 May 2006 | 2 |
| Sour cherry *(Prunus collina)* | 0.1 | 29 April – 06 May 2004 | 4 |
| | | 06 – 15 May 2005 | 4 |
| | | 02 – 10 May 2006 | 3 |
| Plum *(Prunus domestica)* | 0.5 | 26 – 29 April 2004 | 2 |
| | | 04 – 07 May 2005 | 2 |
| | | 30 April – 02 May 2006 | 2 |
| Black chocoberry *(Aronia melanocarpa)* | 0.1 | 15 – 21 May 2004 | 4 |
| | | 20 – 27 May 2005 | 4 |
| | | 18 – 25 May 2006 | 4 |

of the different lengths of the flowering periods of each fruit species the number of samples and the number of collected flowers differed *(Table 1)*. At the laboratory, adult thrips specimens and their larvae were extracted and placed in a conservation fluid. Microscopic slides were prepared using methods proposed by Zawirska (1994). The specimens were identified to species level according to Mound et al. (1976) and Zawirska (1994). The larvae were not identified to species, because their determination was not possible. The species of Thysanoptera found were related to particular ecological and chorological elements.

The damage caused by thrips was determined by investigation of 200 flowers (5 flowers randomly selected from each sample consisting of 50 flowers).

A faunistic analysis, including the dominance class, was conducted. The dominance gives the quantitative participation of a given species in the examined ecosystem. It was calculated using the formula developed by Szujecki (1980):

$$D_i = \frac{n_i}{N} 100\%$$

where:
$D_i$ – dominance of particular species,
$n_i$ – numerousness of particular species,
N – the total number of all species.

# Results

Three years of collecting in fruit trees showed that the largest number of adult thrips was in flowers of apple, followed by the flowers of sweet cherry, sour cherry and pear *(Tables 1, 2)*. A significantly lower number was collected from flowers of plum and black chokeberry. The average number of thrips collected from 50 flowers was a little different for the particular species of analysed plants. This was caused mainly by the differences in the length of the flowering period. Over three years of observations, 19 species of thrips were found *(Tables 3, 4)*. As many as 3735 adults belonging to 18 species of the suborder Terebrantia and 13 adults of the suborder Tubulifera were identified.

# Discussion

The average number of thrips per single sample of 50 flowers was very low *(Table 2)*. Also the number of larvae in the analysed material was very low. Gromadska (1957) did not find any larvae in the flowers of the analysed plants. Based on the received results and the findings of Gromadska (1957) it can be deduced that the fruit trees are not host plants or are poor host plants for thrips or their presence is accidental. The additional reason for the low number of larvae in the analysed plant samples is probably the short flowering period of fruit trees, which does not allow the larvae to develop into (pre)pupae in the same place. The greater number of larvae in the flowers of black chokeberry can be explained by

**Table 2**

Numbers of larval and imago thrips in flowers of fruit trees at Garlica Murowana in three successive years

| Fruit species | 2004 | | | | 2005 | | | | 2006 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | I | % | T/F | L | I | % | T/F | L | I | % | T/F |
| Apple *(Malus domestica)* | 5 | 379 | 1.3 | 4.8 | 1 | 244 | 0.4 | 2.0 | 3 | 311 | 0.9 | 2.6 |
| Pear *(Pyrus communis)* | 8 | 251 | 3.1 | 2.0 | 10 | 207 | 4.6 | 2.7 | 0 | 141 | 0 | 1.7 |
| Sweet cherry *(Prunus avium)* | 3 | 298 | 3.1 | 3.2 | 0 | 243 | 0 | 3.0 | 1 | 189 | 0.5 | 2.4 |
| Sour cherry *(Prunus collina)* | 3 | 287 | 1.0 | 1.8 | 0 | 214 | 0 | 1.4 | 1 | 161 | 0.6 | 1.3 |
| Plum *(Prunus domestica)* | 0 | 163 | 0 | 2.0 | 0 | 116 | 0 | 1.4 | 0 | 123 | 0 | 1.5 |
| Black chocoberry *(Aronia melanocarpa)* | 38 | 169 | 22.5 | 1.3 | 36 | 134 | 21.2 | 1.1 | 19 | 118 | 13.4 | 0.8 |
| Total | 57 | 1547 | 3.7 | | 47 | 1158 | 4.1 | | 24 | 1043 | 2.3 | |

L = number of larvae, I = number of imagos, % = number of larvae/number of imagos × 100%,
T/F = number of imagos and larvae per 50 flowers

the longer flowering period and its later start in comparison with the flowering of fruit trees *(Table 1)*. No damage which could be attributed to these insects was found. Also Gromadska (1957) did not observe damage caused by feeding thrips. It can be assumed that the thrips found in the flowers of fruit trees are not pests.

In the analysed material 19 thrips species were found, from which only eight were present in the flowers of all sampled plants. *Thrips fuscipennis* Haliday and *T. minutissimus* were found to be the most numerous in the flowers of all analysed plants, while the third species, *T. inconsequens* was found in the flowers of all analysed plants except the black chokeberry. The numerous occurrence of *T. inconsequens* in the flowers of sweet cherry, sour cherry and plum is in line with the findings of Fiodorow (1938) and Gromadska (1957). According to these authors, *T. inconsequens* obviously prefers the flowers of stone fruit tree, in which it appears more frequently, than the flowers of other fruit trees. Also, its infestation and damage to fruits in Europe was noticed by zur Strassen (1985). *T. inconsequens* is present in Poland and near Cracow it was found in Jaworzno (Sierka and Sierka, 2004). *T. fuscipennis* and *T. minutissimus* were most frequent in the flowers of pome fruit, i.e. apple and pear. *T. fuscipennis* is one of the most common thrips on various plants. This species can be found in the whole of Poland (Zawirska, 1988). It prefers plants belonging to *Rosaceae* (Zawirska, 1994).

The species composition was similar to the species composition on flowers of fruit trees and bushes noticed by Gromadska (1957), although the quantity and dominance differed significantly between the species encountered. In the research conducted by Gromadska (1957), the most frequent were: *F. intonsa, T. physapus* and *H. aculeatus*. Among these species, according to my results only *F. intonsa* was numerous in the flowers of all analysed fruit trees, especially in the flowers of sour cherry, where it was classified as eudominant. The numbers of other species were low, and these species were classified as subrecendent *(Table 3)*. To the subrecedents belong also the zoophagous *Aeolothrips intermedius* Bagnall

and *Aeolothrips melaleucus* Bagnall. *A. intermedius* is predacious but its larvae can also puncture leaves and suck sap especially from petals of flowers (Zawirska, 1969).

*T. fuscipennis* was noticed by Brożbar et al. (1995) as a serious pest in a plum tree nursery. The females of this species lay eggs on the youngest leaves, usually on the underside. Both larvae and adults puncture the leaves and suck the sap, feeding also on the

**Table 3**

Percentage (%) and dominance of the thysanopterous species collected from flowers of fruit trees at Garlica Murowana

| Species | Chotological elements | Feeding area | Feeding preferences | Ecological elements | Apple-tree (*Malus domestica*) | Pear-tree (*Pyrus communis*) | Sweet cherry-tree (*Prunus avium*) | Sour cherry-tree (*Prunus collina*) | Plum-tree (*Prunus domestica*) | Black chocoberry (*Aronia melanocarpa*) | All fruit flowers | Dominance group | Dominance group total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Thrips fuscipennis* | Hol | Fl, H | Pol | Ub | 31.6 | 37.8 | 18.8 | 20.5 | 24.5 | 42.6 | 29.3 | ED | 76.3 |
| *Thrips minutissimus* | Eur | F | Pol | For | 32.3 | 28.1 | 17.5 | 20.6 | 26.4 | 32.2 | 26.2 | | |
| *Taeniothrips inconsequens* | WP | Fl, F | Pol | For | 15.0 | 9.7 | 42.6 | 24.8 | 29.6 | 3.2 | 20.8 | | |
| *Frankliniella intonsa* | ES | Fl | Pol | Ub | 6.1 | 6.2 | 7.7 | 20.8 | 7.1 | 1.7 | 8.4 | D | 14.3 |
| *Thrips flavus* | Pal | Fl | Pol | Ub | 6.0 | 8.0 | 5.7 | 3.0 | 3.0 | 10.0 | 5.9 | | |
| *Thrips trehernei* | Eur | Fl | Olig | Fless | 1.8 | 4.4 | 2.3 | 3.1 | 3.5 | 2.7 | 3.0 | SD | 5.4 |
| *Thrips major* | Hol | Fl, H | Pol | Ub | 1.6 | 1.7 | 1.0 | 1.3 | 1.9 | 7.0 | 2.4 | | |
| *Thrips tabaci* | Cos | Fl, H | Pol | Ub | 1.7 | 2.1 | 2.1 | 3.1 | 2.1 | – | 1.9 | R | 1.9 |
| *Thrips physapus* | ES | Fl | Pol | Fless | 0.9 | 0.3 | 0.9 | 0.5 | 0.3 | 0.3 | 0.5 | SR | 2.1 |
| *Haplothrips aculeatus* | Pal | Gr | Pol | Ub | 0.8 | 0.2 | – | 0.6 | 0.5 | – | 0.3 | | |
| *Limothrips denticornis* | Hol | Gr | Pol | Ub | – | 0.5 | 0.7 | 0.3 | – | – | 0.3 | | |
| *Aeolothrips melaleucus* | Hol | F, Z | Pol | For | 0.5 | 0.5 | 0.1 | 0.3 | – | – | 0.2 | | |
| *Thrips vulgatissimus* | Hol | Fl | Pol | Fless | 0.4 | 0.2 | – | 0.1 | 0.3 | 0.3 | 0.2 | | |
| *Aeolothrips intermedius* | Pal | F, Z | Pol | Ub | 0.3 | – | 0.4 | 0.3 | – | – | 0.2 | | |
| *Dendrothrips degeeri* | Eur | F | Olig | For | 0.4 | 0.3 | – | 0.1 | – | – | 0.1 | | |
| *Chirothrips manicatus* | Hol | Gr | Pol | Ub | – | – | 0.2 | 0.6 | – | – | 0.1 | | |
| *Oxythrips ajugae* | WP | F | Olig | For | 0.5 | – | – | – | – | – | 0.1 | | |
| *Thrips pillichi* | Eur | Fl | Olig | Fless | – | – | – | – | 0.5 | – | 0.1 | | |
| *Taeniothrips picipes* | Pal | Fl, F | Pol | Ub | 0.1 | – | – | – | 0.3 | – | 0.1 | | |

ED eudominants- > 10.00%; D dominants- 5.1–10.00%; SD subdominants-2.1–5.0%; R recedents 1.01–2.00%; SR subrecedents < 1.00%

Cos = Cosmopolitic, Eur = European, ES = Eurosiberian, Hol = Holarctic, Pal = Palearctic, WP = West-palearctic, Fl = Floricolous, F = Folicolous, Gr = Graminicolous, H = Herbicolous, Z = Zoophagous, Olig = Oligophagous, Pol = Polyphagous, Fless = Forestless areas, For = Forest Areas, Ub = Ubiquitous

youngest parts of plants and flowers. The other numerous species *T. minutissimus* is common in dense stand areas and feeds mainly in buds of flowers and on young leaves of trees, usually in early spring. It was found in Skrzeszowice, close to Cracow (Zawirska, 1988).

**Table 4**

Imago thrips numbers (Thysanoptera) in flowers of fruit trees at Garlica Murowana

| Species | *Aeolothrips intermedius* | *Aeolothrips melaleucus* | *Chirothrips manicatus* | *Dendrothrips degeeri* | *Frankliniella intonsa* | *Haplothrips aculeatus* | *Limothrips denticornis* | *Oxythrips ajugae* | *Taeniothrips inconsequens* | *Taeniothrips picipes* | *Thrips flavus* | *Thrips fuscipennis* | *Thrips major* | *Thrips minutissimus* | *Thrips physapus* | *Thrips pillichi* | *Thrips tabaci* | *Thrips trehernei* | *Thrips vulgatissimus* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apple *(Malus domestica)* | | | | | | | | | | | | | | | | | | | |
| 2004 | 2 | 2 | – | 2 | 18 | 2 | – | 2 | 40 | 1 | 23 | 81 | 8 | 166 | 4 | – | 8 | 10 | 4 |
| 2005 | – | 1 | – | – | 19 | 3 | – | 1 | 51 | – | 15 | 109 | 3 | 36 | – | – | – | 4 | – |
| 2006 | 1 | 2 | – | 2 | 19 | 2 | – | 2 | 47 | – | 17 | 100 | 4 | 95 | 3 | – | 7 | 3 | – |
| Pear *(Pyrus communis)* | | | | | | | | | | | | | | | | | | | |
| 2004 | – | 3 | – | 2 | 11 | – | 1 | – | 24 | – | 19 | 71 | – | 89 | 2 | – | 9 | 11 | 1 |
| 2005 | – | – | – | – | 14 | 1 | 1 | – | 13 | – | 20 | 93 | 4 | 43 | – | – | 1 | 12 | – |
| 2006 | – | – | – | – | 11 | – | 1 | – | 19 | – | 7 | 54 | 6 | 30 | – | – | 2 | 2 | – |
| Sweet cherry *(Prunus avium)* | | | | | | | | | | | | | | | | | | | |
| 2004 | 2 | 1 | 2 | – | 28 | – | 2 | – | 99 | – | 8 | 56 | 2 | 58 | 3 | – | 9 | 5 | – |
| 2005 | – | – | – | – | 13 | – | 2 | – | 125 | – | 21 | 41 | 2 | 31 | 2 | – | 1 | 3 | – |
| 2006 | 1 | 2 | – | – | 13 | – | 1 | – | 73 | – | 11 | 34 | 3 | 33 | 1 | – | 5 | 8 | – |
| Sour cherry *(Prunus collina)* | | | | | | | | | | | | | | | | | | | |
| 2004 | – | 1 | 1 | – | 45 | – | 1 | – | 70 | – | 4 | 61 | 3 | 73 | 1 | – | 14 | 7 | – |
| 2005 | – | 1 | 1 | – | 62 | 4 | 1 | – | 54 | – | 6 | 38 | 1 | 32 | 2 | – | 1 | 8 | – |
| 2006 | 2 | – | 2 | 1 | 27 | – | – | – | 37 | – | 10 | 27 | 5 | 29 | – | – | 5 | 5 | 1 |
| Plum *(Prunus domestica)* | | | | | | | | | | | | | | | | | | | |
| 2004 | – | – | – | – | 7 | 1 | – | – | 51 | 1 | – | 30 | – | 46 | 1 | 2 | 3 | 10 | 1 |
| 2005 | – | – | – | – | 9 | – | – | – | 28 | – | 4 | 32 | 4 | 26 | – | – | 2 | 2 | – |
| 2006 | – | – | – | – | 10 | 1 | – | – | 30 | – | 7 | 28 | 3 | 25 | – | – | 3 | 3 | – |
| Black chocoberry *(Aronia melanocarpa)* | | | | | | | | | | | | | | | | | | | |
| 2004 | – | – | – | – | 5 | – | – | – | 8 | – | 6 | 71 | 9 | 51 | 1 | – | – | – | 1 |
| 2005 | – | – | – | – | 2 | – | – | – | 2 | – | 20 | 48 | 12 | 42 | – | – | – | 8 | – |
| 2006 | – | – | – | – | – | – | – | – | 3 | – | 14 | 52 | 7 | 36 | – | – | – | 3 | – |

# Acknowledgement

I would like to thank Dr Wojciech Sierka from the Department of Zoology, Faculty of Biology and Environmental Protection, University of Silesia in Katowice, Poland for the help in identification of thrips.


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