# Thrips from coloured water traps in Serbian wheat fields

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**Abstract**: Data is given on the thrips fauna in wheat winter crops at Srem, Serbia, using coloured water traps. A total of 2105 thrips specimens was collected, and 19 species identified. The most numerous was *Thrips physapus* followed by *Frankliniella intonsa* and *Aeolothrips intermedius*. Most specimens were caught in blue water traps, followed by yellow water traps, while white and red water traps yielded significantly smaller numbers. The largest number of specimens was collected in traps at a height of 60 cm, with half as many at 30 cm, even less at 90 cm, and the fewest in traps laid on the ground. Phytophagous species were dominant in these collections, with zoophagous and phytozoophagous species much less represented. The most numerous were polyphagous species, oligophagous were fewer, and even two monophagous species were found.

## Introduction

Wheat crops have a rich and diverse entomofauna determined, among other things, by a microclimate favourable to the survival and breeding of many insect species. The numerous insect species of different trophic groups include representatives of the Thysanoptera. The thrips fauna on wheat crops in Serbia has not been sufficiently investigated. There are still few papers offering data on the species established, the damage they can inflict, and methods of control. In research on the more harmful insect species on wheat and their control, Tanasijevic (1966) cited the following thrips as most frequent: *Haplothrips tritici* Kurdjumov, *H. aculeatus* (Fabricius), *Limothrips denticornis* (Haliday), and *Frankliniella tenuicornis* (Uzel). In addition to these four species, Ciric (1993) noted *F. intonsa* (Trybom), and *Chirothrips manicatus* (Haliday) when investigating ear pests on different varieties of wheat at several sites in Serbia. Moreover, Andjus (1996, 1998) cited 15 thrips species on wheat, of which the most numerous were *H. tritici* and *Aeolothrips intermedius* Bagnall.

In the research of thrips fauna presented in the above-mentioned papers, thrips were mainly collected by the method of catchers, or shaking plants. However, the international literature can offer numerous data on the application of other collection methods, yielding satisfactory results, the chief of which involves water traps that employ different colours to attract insects. Furthermore, the modern thripsological literature offers different papers presenting the results obtained by using coloured, water, and sticky traps (Kirk, 1984, 1985, 1987; BrØdsgaard, 1989: Gillespie & Vernon, 1990; Jenser, 1993: Kucharzyk, 1998). In Serbia, the use of coloured water traps for observing wheat pests, including thrips, were discussed in papers by Tesic (1971) and Spasic et al. (1998), who established that thrips were most attracted by traps coloured in blue, white, and yellow.

This paper aims to present the qualitative and quantitative composition of thrips fauna in wheat winter crops at Srem in the territory of Serbia, collected by the use of coloured water traps.

## Material and Methods

The thrips were collected in 1998 and 1999, from the end of April until the end of June, in the following localities in Srem (Serbia): DQ16 Ogar, DQ48 Stari Banovci, and CQ98 Veliki Radinci. The wheat investigated was the variety Europe 90, a winter variety, mid-early, with white, smooth ears, medium compact, with no awns, having 19 to 22 ear grains and the stalk height of 89 m. It was produced at the Institute of Wheat and Vegetable Farming, Novi Sad, Serbia. No insecticides were used on these wheat fields.

Plastic dishes 18 cm in diameter and 6 cm in depth were laid in the wheat field. The dishes were made of polypropylene, and coloured in blue (Kritilen $^{R}$ 40304), yellow (Kritilen $^{R}$ 10604),

white (Kritilen R 160), and red (Kritilen R 30304). The dishes were laid out at four levels, on the ground, and at 30 cm, 60 cm, and 90 cm above the ground. The dishes were first placed on the ground, and as the plants grew, metal hangers were gradually added at the heights of 30, 60, and 90 cm. The dishes were set on hangers in an alternating arrangement, so as not to over lap. They were half filled with water with a few drops of a detergent.

The collected material was treated in a laboratory where it was rinsed, filtered and preserved in 70% alcohol. Thrips were then triaged according to their taxon, following which they were treated in the usual way: permanent slide mounts were made with the use of Canada balsam, and temporary ones with glycerin.

**Results and Discussion**

A total of 2105 thrips specimens was collected during these investigations; 1503 specimens in 36 in 1998, and 602 specimens in 48 samplings in 1999 (Table 1). Samplings varied considerably in the number of specimens. Most yielded 20 or fewer specimens, but the most abundant one supplied 549 specimens, while the next most bountiful samplings provided 108 and 92 respectively.

A total of 19 thrips species were identified, 18 in 1999 compared to 15 in 1998. *Aeolothrips fasciatus* Bagnall, *Kakothrips robustus* Uzel, *Stenothrips graminum* Uzel, and *Haplothrips reuteri* Karny appeared as new species in 1999. There were no records of the species *Chirothrips manicatus* Haliday, which was extremely scarce even in 1998 when only two specimens were found.

| **Species** | **1998** | **1999** | **Total** |
|---|---|---|---|
| *Aeolothrips fasciatus* Bagnall | | 8 | 8 |
| *Aeolothrips intermedius* Bagnall | 25 | 198 | 223 |
| *Melanthrips fuscus* (Sulzer) | 19 | 5 | 24 |
| *Chirothrips manicatus* Haliday | 2 | | 2 |
| *Frankliniella intonsa* (Trybom) | 325 | 64 | 389 |
| *Frankliniella pallida* (Uzel) | 117 | 9 | 126 |
| *Frankliniella tenuicornis* Uzel | 3 | 10 | 13 |
| *Kakothrips robustus* Uzel | | 11 | 11 |
| *Limothrips denticornis* (Haliday) | 1 | 2 | 3 |
| *Stenothrips graminum* Uzel | | 3 | 3 |
| *Taeniothrips atratus* (Haliday) | 53 | 27 | 80 |
| *Thrips physapus* L. | 848 | 69 | 917 |
| *Thrips tabac* Lindeman | 14 | 55 | 69 |
| *Thrips validus* Uzel | 28 | 11 | 39 |
| *Haplothrips aculeatus* (Habricius) | 9 | 2 | 11 |
| *Haplothrips niger* (Osborn) | 1 | 1 | 2 |
| *Haplothrips reuteri* Karny | | 1 | 1 |
| *Haplothrips setiger* Priesner | 4 | 13 | 17 |
| *Haplothrips tritici* Kurdjumov | 54 | 113 | 167 |
| **TOTALS** | **1503** | **602** | **2105** |

Table 1. Thrips species collected during 1998 and 1999.

The most numerous species, with 917 collected specimens, was the polyphagous and floricolous *Thrips physapus*. It was followed by the biologically similar *Frankliniella intonsa* with 389 specimens, and the polyphagous and zoophagous *Ae. intermedius* with 223 specimens. The monophagous and graminicolous *H. tritici* was represented by 167 specimens, and the polyphagous and floricolous *Frankliniella pallida* (Uzel) by 126. The remaining species numbered less than 100 specimens, and five of them less than five specimens.

The number and occurrence of species differed between the two years. The two most numerous species in 1998 – *T. physapus* and *F. intonsa* were considerably reduced in numbers in 1999, the first from 56,43% to 11,46%, the other from 21,62% to 10,63%. At the same time, three species of interest for these investigations became significantly more numerous in 1999. The zoophagous *Ae. intermedius* rose from 1,66% to 32,89%, *H. tritici* from 3,58% to 18,77% and *Thrips tabaci* Lindeman from 0,93% to 9,13%. The three foregoing species occurred in unusually small numbers in 1998. Presumably there was not enough prey to attract the zoophagous and polyphagous *Ae. intermedius*. However, the monophagous, wheat-related *H. tritici* used to be dominant on this crop in almost all previous investigations, so that its percentage for 1998 can be seen as conspicuously low. The extremely polyphagous *T. tabaci* was unusually scarce in 1998, with the percentage below 1%.

The different coloured water traps were not equally attractive to thrips. Most specimens were caught in blue water traps, as many as 1055 thrips, followed by yellow water traps yielding 636 specimens, and considerably fewer in white (293) and red traps (121 specimens) (Table 2). Similar results were obtained by Tesic (1971) in research

| **Species** | **blue** | **yellow** | **white** | **red** | **Total** |
|---|---|---|---|---|---|
| *Aeolothrips fasciatus* Bagnall | 2 | 3 | 3 | | 8 |
| *Aeolothrips intermedius* Bagnall | 91 | 79 | 53 | | 223 |
| *Melanthrips fuscus* (Sulzer) | 20 | 2 | 2 | | 24 |
| *Chirothrips manicatus* Haliday | | 2 | | | 2 |
| *Frankliniella intonsa* (Trybom) | 67 | 241 | 68 | 13 | 389 |
| *Frankliniella pallida* (Uzel) | 46 | 25 | 54 | 1 | 126 |
| *Frankliniella tenuicornis* Uzel | 7 | 2 | | 4 | 13 |
| *Kakothrips robustus* Uzel | 9 | | 2 | | 11 |
| *Limothrips denticornis* (Haliday) | | 3 | | | 3 |
| *Stenothrips graminum* Uzel | 2 | | 1 | | 3 |
| *Taeniothrips atratus* (Haliday) | 45 | | 31 | 4 | 80 |
| *Thrips physapus* L. | 728 | 143 | 44 | 2 | 917 |
| *Thrips tabac* Lindeman | 3 | 58 | 8 | | 69 |
| *Thrips validus* Uzel | 21 | 14 | 3 | 1 | 39 |
| *Haplothrips aculeatus* (Habricius) | 3 | | 6 | 2 | 11 |
| *Haplothrips niger* (Osborn) | | | 2 | | 2 |
| *Haplothrips reuteri* Karny | | | 1 | | 1 |
| *Haplothrips setiger* Priesner | | 2 | 2 | 13 | 17 |
| *Haplothrips tritici* Kurdjumov | 11 | 62 | 13 | 81 | 167 |
| **TOTALS** | **1055** | **636** | **293** | **121** | **2105** |

Table 2. Thrips species collected in different water coloured traps

on cereals when most thrips were collected by white, blue, and yellow traps. In his investigations by means of ecologically selective coloured traps in England Kirk (1984) gathered most thrips by white traps followed by blue and yellow. In her investigations of thrips and other insects in bog habitats in Poland, Kucharczyk (1998) found most specimens by white and yellow coloured traps. She probably did not use blue traps.

Considering the occurrence of certain species in blue traps, *T. physapus* dominated (728 specimens), although even when this sampling is not taken into account, the species is still the most numerous in these traps. All other species were represented by fewer than 100 specimens, the only numerous species being *Ae. intermedius* (91), *F. intonsa*(67), *F. pallida* (46), and *Taeniothrips atratus* (Haliday)(45), while the others were fewer than 20. The great number of the two floricolous species of the genus *Frankliniella* is in accordance with BrØdsgaard (1989) who published that another floricolous species of the genus *Frankliniella*, namely *F. occidentalis* (Pergande) likewise preferred blue sticky traps.

Dominating the yellow traps was *F. intonsa* with 241 specimens, followed by *T. physapus* (143 specimens). *F. intonsa* with 68 specimens was likewise the most numerous in the white traps, followed by *F. pallida* (Uzel) (54 specimens) and *Ae. intermedius* (53 specimens). With regard to the species composition, the findings of Jenser (1993) concerning thrips collected by white coloured traps in oak forest and in ruderal area in Hungary differ from ours, which is only to be expected, considering the habitat where the insects were collected. On that occasion, the most dominant species caught in white traps was *T. tabaci*.

Red traps yielded the fewest specimens, but contained the greatest number of *H. tritici* (81), while *F. intonsa* and *Haplothrips setiger* Priesner were each represented by 13 specimens. Tesic (1971) also cited that in his research in wheat fields, a very small number of insects, including thrips was caught in the red, black, and green traps. *H. tritici*, important for wheat crops, occurred in the greatest numbers in the red traps (81), followed by yellow (62), and to a much lesser degree in white (13) and blue traps (11). The second most numerous species in our research, *F. intonsa*, was most abundant in yellow traps (241) almost equally represented in white and blue traps (68 and 69), and most scarce in red traps (13 specimens). The polyphagous *T. tabaci* was likewise most numerous in yellow traps (58), significantly fewer in white (8) and blue traps (3), and was not taken in red traps.

With regard to the effects of height at which the water traps were placed, the greatest number of specimens was collected at 60 cm – 1086 specimens (Table 3). This was only natural, considering that it was the height of the plant in the period of intensive growth before earing. Half as many specimens were found at 30 cm (545). 339 specimens at 90 cm, and only 135 specimens in the traps on the ground – (Table 3). Tesic (1971) cited that in his investigations of cereals, the traps laid on the ground, regardless of colour, yielded a very small number of insects, so he excluded those results from the analysis.

Generally speaking, the greatest number of specimens collected during these investigations were phytophagous (15 species – 1839 specimens), while the zoophagous species (3 species – 255 specimens) and phytozoophagous (1 species – 11 specimens) were much fewer. The most numerous were the floricolous species, of which 1759 specimens were collected comprising 12 species, while 6 species were found to be graminicolous (277 specimens), and 1 species floricolous and folicolous with 69 specimens. The polyphagous species dominated with 10 species and 1888 specimens, followed by 7 oligophagous species with 47 specimens, and 2 monophagous species with 170 specimens. Of those, 3 oligophagous species were related to grass (fam. *Poacea*), 2 species to fam. *Leguminosae* and 2 species to *Compositae*. As could be expected, one of the monophagous species was wheat-related *H. tritici*, while the other was oat-related *S. graminum*.

It can be observed that the floricolous thrips dominated largely over the graminicolous in blue, red, and white traps. Only in red traps were the graminicolous thrips more numerous.

| Species | ground | 30 cm | 60 cm | 90 cm | Total |
|---|---|---|---|---|---|
| *Aeolothrips fasciatus* Bagnall | 2 | 3 | 1 | 2 | 8 |
| *Aeolothrips intermedius* Bagnall | 16 | 95 | 89 | 23 | 223 |
| *Melanthrips fuscus* (Sulzer) | | 3 | 21 | | 24 |
| *Chirothrips manicatus* Haliday | | | 1 | 1 | 2 |
| *Frankliniella intonsa* (Trybom) | 49 | 152 | 119 | 69 | 389 |
| *Frankliniella pallida* (Uzel) | 3 | 6 | 112 | 5 | 126 |
| *Frankliniella tenuicornis* Uzel | | 8 | 3 | 2 | 13 |
| *Kakothrips robustus* Uzel | | | 11 | | 11 |
| *Limothrips denticornis* (Haliday) | | | 2 | 1 | 3 |
| *Stenothrips graminum* Uzel | | | | 3 | 3 |
| *Taeniothrips atratus* (Haliday) | 26 | 7 | 27 | 20 | 80 |
| *Thrips physapus* L. | 11 | 148 | 635 | 123 | 917 |
| *Thrips tabac* Lindeman | | 49 | 17 | 3 | 69 |
| *Thrips validus* Uzel | 1 | 8 | 25 | 5 | 39 |
| *Haplothrips aculeatus* (Habricius) | 1 | 6 | 1 | 3 | 11 |
| *Haplothrips niger* (Osborn) | | | 2 | | 2 |
| *Haplothrips reuteri* Karny | 1 | | | | 1 |
| *Haplothrips setiger* Priesner | 2 | | 4 | 11 | 17 |
| *Haplothrips tritici* Kurdjumov | 23 | 60 | 16 | 68 | 167 |
| **TOTALS** | **135** | **545** | **1086** | **339** | **2105** |

Table 3. Thrips species collected in water coloured traps situated at different heights

Certain differences can be established by comparing the species composition and the number of specimens collected on wheat by this and other methods. Our earlier investigations in wheat by the classic method of shaking plants yielded a much smaller number of specimens. There were also fewer species. A total of 15 species was collected in earlier investigations, while these investigations, as previously stated, supplied 19 species. The method of coloured traps obviously yields better results. A similar conclusion was reached by Kucharczyk (1998) who found in her investigations of thrips and other insects in bog habitats of Poland that the method of coloured traps was more successful than the method of collecting thrips by using sweeping net.

Our present knowledge and the results obtained during these investigations suggest that the method of coloured water traps can help to establish not only the entomofauna composition, but the beginning and the duration of activity of certain species, as well as their numbers.

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