

## **ABOUT SOME THRIPS SPECIES ASSEMBLAGES FOUND IN AVOCADO TREES (*Persea americana* Mill) IN MEXICO**

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Contrary to what is found in countries like the United States of America (California), Israel and South Africa, where only one or two thrips species have an economic impact on avocado trees, Mexico has 33 species of phytosanitary concern, 10 predators and 42 visitors.

What is very remarkable in avocado damaging species, is that many of them can be assembled in the same tree, which means one pest species is rarely acting isolated, like *Frankliniella brunneri* Watson (at Uruapan, Michoacán). Assemblages found in several localities of the Volcanic Range of Mexico, in the states of Mexico and Michoacán were considered in this study, as follows: I) Huerta El Durazno, Nuevo San Juan Parangaricutiro, Michoacán: *Frankliniella* 7 spp., *Neohydatothrips* 2 spp. and *Scirtothrips* 5 spp. II) La Loma, Municipio de Uruapan, Michoacán: *Frankliniella* 19 spp., *Neohydatothrips* 2 spp., *Scirtothrips* 8 spp. III) El Mesón, Municipio de Ziracuaretiro, Michoacán: *Frankliniella* 19 spp., *Neohydatothrips* 2 spp. *Scirtothrips* 9 spp. IV) Centro Experimental La Cruz, Coatepec Harinas, Estado de México; in this location the thrips species were shared in four cultivars: Hass, Fuerte, Sánchez Colín and Creole. The most important genera are: *Frankliniella* 5 spp., *Neohydatothrips* 1 sp., *Scirtothrips* 7 spp.

Key words: Thysanoptera, Ecology, Damage, Taxonomy, Mexico

## **ACERCA DE ALGUNOS ENSAMBLES DE ESPECIES DE TRIPS, EN ÁRBOLES DE AGUACATE (*Persea americana* Mill), EN MÉXICO.**

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En países tales como Estados Unidos de América (California), Israel y Sudáfrica, en los cuales sólo hay una o dos especies de trips de interés fitosanitario en los árboles de aguacate, en México existen actualmente, 33 especies de interés fitosanitario, 10 son depredadoras y 42 son visitadoras. Lo notable de las especies que causan daño, es que pueden estar ensambladas en un mismo árbol, participando más de una especie en el daño; por otro lado, es raro encontrar una sola especie dañina, como es el caso de *Frankliniella brunneri* Watson (un caso conocido en Uruapan, Michoacán). En este estudio incluimos algunos ensambles de especies de interés fitosanitario (destacándose los géneros *Frankliniella*, *Neohydatothrips* y *Scirtothrips*), estudiados en varias localidades del Eje Volcánico Transversal de México, en el Estado de México y

Michoacán como sigue: I) Huerta “El Durazno”, Nuevo San Juan Parangaricutiro, Michoacán: *Frankliniella* 7 spp., *Neohydatothrips* 2 spp. y *Scirtothrips* 5 spp. II) La Loma, Municipio de Uruapan, Michoacán: *Frankliniella* 19 spp., *Neohydatothrips* 2 spp. y *Scirtothrips* 8 spp. III) El Mesón Municipio de Ziracuaretiro, Michoacán: *Frankliniella* 19 spp., *Neohydatothrips* 2 spp., *Scirtothrips* 9 spp. IV) Centro Experimental La Cruz, Coatepec Harinas, Estado de México; en esta localidad las especies de trips están compartidas en cuatro cultivares: Hass, Fuerte, Sánchez Colín y Criollo. Los géneros más importantes son como sigue: *Frankliniella* 5 spp., *Neohydatothrips* 1 sp., *Scirtothrips* 7 spp.

Palabras clave: Thysanoptera, Ecología, Daño, Taxonomía, México

## 2 MATERIALS AND METHODS

The Thysanoptera insects being of microscopic size, were sampled in avocado orchards according phonological appearance, of both the vegetative (foliage buds), and the reproductive (inflorescences), by two methods: a) By beating and shaking of the foliage and flowers on a flat plastic dish or white cotton blanket, then taking each insect with a wet (alcohol) brush to vials of 70% ethylic alcohol; b) By spraying on floral and foliage structures with a solution of one part of Suavitel<sup>®</sup> with nine parts of pure fresh water; this solution will knock down the thrips on a plastic dish, were the thrips will float, from here the specimens are taked with a wet brush and they are passed to vials with 70% ethylic alcohol. All the field sampling data are to be writed in the field book and small paper labels introduced in each vial. Later at the laboratory, each thrips sample is treated with a successive dehydration process, of ethylic alcohol, 80%, 95% and absolute with xilene clearing, and finally Canada Balsam mounting of each specimen.

## 3 RESULTS AND DISCUSSION

### Background

The species that we have being knowing as integrant of “specific assemblages” in avocado trees, which are the principal objective of this work, have as first condition to be assembled, to be sympatric (living in the same place), but also to be synchronic (at the same time): these two ecologic facts together with the Mexican avocado thrips megadiversity –there are known 85 species according to Johansen et. al. (2005) and Johansen et. al. (2007) is what allows the species assemblage.

### Taxonomic list of all the thrips which form assemblages

Genus *Frankliniella* Karny  
 1. *F. albacuriosa* Johansen  
 2. *F. borinquen* Hood  
 3. *F. bruneri* Watson  
 4. *F. brunnescens* Priesner

5. *F. chamulae* Johansen  
 6. *F. celata* Priesner  
 7. *F. cephalica* (D. L. Crawford)  
 8. *F. cubensis* Hood  
 9. *F. curiosa* Priesner  
 10. *F. difficilis* Hood

- |  |   |
|--|---|
| 11. <i>F. dubia</i> Priesner                           | Genus <i>Leucothrips</i> Reuter                 |
| 12. <i>F. fallaciosa</i> Priesner                      | 31. <i>L. piercei</i> Morgan                    |
| 13. <i>F. fallaciosa</i> f. <i>parvifosis</i> Priesner |   |
| 14. <i>F. insularis</i> (Franklin)                     | Genus <i>Scirtothrips</i> Shull                 |
| 15. <i>F. invasor</i> Sakimura                         | 32. <i>S. albosilvicola</i> Johansen & Mojica   |
| 16. <i>F. minor</i> Moulton                            | 33. <i>S. danieli</i> Johansen & Mojica         |
| 17. <i>F. minuta</i> (Moulton)                         | 34. <i>S. detereomangus</i> Johansen & Mojica   |
| 18. <i>F. mixtecacuriosa</i> Johansen                  | 35. <i>S. hectorgonzalezi</i> Johansen & Mojica |
| 19. <i>F. occidentalis</i> (Pergande)                  | 36. <i>S. kupandae</i> Johansen & Mojica        |
| 20. <i>F. panamensis</i> Hood                          | 37. <i>S. mangorum</i> Johansen & Mojica        |
| 21. <i>F. pestinae</i> Sakimura y O'Neill              | 38. <i>S. mangofrequentis</i> Johansen & Mojica |
| 22. <i>F. rostrata</i> Priesner                        | 39. <i>S. manihotifloris</i> Johansen & Mojica  |
| 23. <i>F. seneciopallida</i> Johansen                  | 40. <i>S. perseae</i> Nakahara                  |
| 24. <i>F. simplex</i> Priesner                         | 41. <i>S. tacambarensis</i> Johansen & Mojica   |
| 25. <i>F. spinosa</i> Moulton                          | 42. <i>S. totonacus</i> Johansen & Mojica       |
|  |   |
| Genus <i>Neohydatothrips</i> John                      | Genus <i>Caliothrips</i> Daniel                 |
| 26. <i>N. annulipes</i> (Hood)                         | 43. <i>C. punctipennis</i> (Hood)               |
|  |   |
| 27. <i>N. burungae</i> (Hood)                          |   |
| 28. <i>N. signifer</i> (Priesner)                      |   |
| 29. <i>N. tibialis</i> (Priesner)                      |   |
| 30. <i>N. variabilis</i> (Beach)                       |   |

The field and laboratory research and their results

I State of Michoacan

Background

The Michoacan Regions where the fields studies were carried out, can be considered of great historic volcanic activity, not only in the Volcanic Range, but in all the Mexican Country. To say an example, in the Uruapan-Tancitaro Region, there are about 250 volcanos, starting with the Pico Tancitaro (the highest mountain in Michoacan) probably the most ancient, which was extinguished the prehistoric times, as well as the more recent one: the Paricutín, which was born in 1943 and was extinguished in 1951.

A)The first sampling

They had a pioneer character, because it was known which Thysanopteren species pf phytosanitary interest the damage in tender foliage and fruits, according with Bayer (1984).

The considered material was provided by fragmentary (incomplete year) field work samplings done by the colleagues Rubén Quiróz Alemán from Tacambaro, as well as Víctor Manuel Coria Ávalos and Agustín Audiffred Ayala, from Uruapan, Michoacan, according with Johansen, Mojica and Ascensión (1995). They are divided in two regions:

a) The Tacambaro Region, 1800 m. snm. The sampling from avocado trees were taken from the Mexican Race called "criollos" and in other plants within or

surrounding the orchard. The thrips assemblages are as follows: 1. 7-May- 1991: *Scirtothrips kupandae* and *S. tacambarensis* in avocado tender leaves; 2. 16-May-1991: *Scirtothrips mangofrequentis* and *S. perseae* in flowers of avocado; 3. 7-May-1991: *Scirtothrips manihotifloris* and *S. tacambarensis* in *Manihot aesculifolia*; 4. 14-May-1998: *Frankliniella cephalica*, *F. difficilis*, *F. invasor* and *F. minor* in *Rosa centifolia* flowers.

b) The Uruapan Region. The sampling in avocado were taken from cv. Hass races. The assemblages are as follows: 1. Jucutacato, 1500 m.snm, 1-4-September-1992: *Scirtothrips kupandae*, *S. perseae* and *S. tacambarensis* in foliage buds; Toreo El Alto, on road Uruapan-Patzcuaro, 1760 m.snm, 20-September-1992: *Scirtothrips kupandae*, *S. mangorum* and *S. perseae* in foliage buds; *Frankliniella cubensis*, *F. difficilis* and *F. minor* in flowers; 3. 2 km of Toreo El Alto, Huerta Bautista, desviación from road Méx.14 Uruapan-Patzcuaro, 20-September-1992: *Scirtothrips perseae*; *Frankliniella cubensis*, *F. difficilis* and *F. minor* in flowers; 4. Las Pajas, Municipio de Tiamba, carretera Uruapan-Paracho, 1980 m.snm, 20-September-1991: *Scirtothrips kupandae*, *S. perseae* y *Frankliniella difficilis*; 5. Km 7 on road Uruapan-Nuevo San Juan Parangaricutiro, 1800 m.snm, 1-4 September-1992: *Scirtothrips kupandae* and *S. perseae* in leaves buds; *Frankliniella difficilis* in flowers; 6. El Durazno, Municipio de Nuevo San Juan Parangaricutiro, 2300 m.snm, 1-4-September-1992: *Scirtothrips kupandae* and *S. perseae* in leaves buds; 7. Uruapan, 1700 m.snm, 1-4-September-1991: *Scirtothrips kupandae*, *S. perseae* and *S. tacambarensis* in leaves buds; 8. Sumpinito, on road 37 Uruapan-Gutiérrez-Zamora, 1500 m.snm, 24-October-1992: *Frankliniella cubensis*, *F. difficilis* and *F. minor* in flowers.

B) The study at the El Durazno, orchard Municipio de Nuevo San Juan Parangaricutiro, 2300 m.snm. The sampling were done in cv. Hass, trees during the period from September 1998 to May 1999. Ther information about this study, appeared in: Johansen *et al* (1999), Ascensión-Betanzos *et al* (1999), as well as Ascensión-Betanzos (2000). The assemblages (of economic importance) are as follows: 1. November 1998: *Frankliniella chamulae*\*, *F. dubia*, *F. fallaciosa*\*, *F. minor*, *F. occidentalis*\*, *F. panamensis* and *F. simplex* in flowers; *Neohydatothrips annulipes* and *N. signifer*\* in foliage; *Scirtothrips danieltelizi*\* and *S. detereomangus*\*, in foliage. 2. December 1998: *Frankliniella borinquen*\*, *F. chamulae*\*, *F. curiosa*\*, *F. occidentalis*\* and *F. panamensis*. *Neohydatothrips annulipes* and *N. signifer* ; *Scirtothrips kupandae*, all in flowers. 3. January 1999: *Frankliniella borinquen*\*, *F. brunnescens*\*, *F. chamulae*\*, *F. fallaciosa*\*, *F. minuta*, *F. occidentalis*\*, *F. panamensis* and *F. pestinae*; *Neohydatothrips signifer*\*, all in flowers. 4. February 1999: *Frankliniella chamulae*\*, *F. dubia*\* and *F. fallaciosa*\*. 5. March 1999: *Frankliniella borinquen*\*, *F. brunnescens*\*, *F. chamulae*\*, *F. dubia*, *F. fallaciosa*\*, *F. invasor*\*, *F. minuta*, *F. panamensis*, *F. simplex* and *F. spinosa*; *Neohydatothrips signifer*\* and *N. tibialis*; *Scirtothrips kupandae*\*, all in flowers.

C) The studies carried out at the El Durazno, Nuevo San Juan Parangaricutiro, La Loma, Uruapan orchards and El Mesón Ziracuaretiro were done from June 1997 to September 1999 by Johansen-Naime *et al* (2003), as well as Valle-De la Paz (2003). The assemblages are as follows:

a) El Durazno; 1) 20-November-1997: *F. chamulae*, *F. rostrata*; *Leucothrips piercei*; 2) 28-November-1997: *Frankliniella curiosa*, *F. celata*, *F. fallaciosa*, *F. occidentalis* and *F. borinquen*, all in flowers; 3) 17-December-1997: *F. curiosa*, *F. chamulae*, *F. dubia*, *F. occidentalis*, *F. seneciopallida* and *F. invasor*, *Neohydatothrips burungae* and *N. signifer*; *Scirtothrips perseae*; 4) 30-January-1998: *F. mixtecacuriosa*, *F. minor*; *Neohydatothrips burungae*, *N. signifer* and *N. variabilis*; *Scirtothrips perseae*; 5) 10-February-1998: *Frankliniella albacuriosa*, *F. fallaciosa*, *F. invasor* and *F. occidentalis*; 6) 23-March-1998: *Frankliniella borinquen*, *F. cubensis*, *F. curiosa*, *F. fallaciosa*, *F. minor* and *F. occidentalis*; 7) 31-March-1998: *F. brunnescens*, *F. fallaciosa*, *F. minor*, *F. occidentalis*; *Caliothrips punctipennis*; *Neohydatothrips burungae* and *N. signifer*. The *Frankliniella* species inhabit flower structures, whereas those of *Scirtothrips*, *Neohydatothrips* and *Leucothrips* are phytophagous on leaves and flowers.

b) La Loma; 1) 10-December-1997: *Frankliniella curiosa*, *F. invasor* and *F. rostrata*; *Neohydatothrips burungae* and *N. signifer*; *Scirtothrips albosilvicola*; 2) 23-March-1998: *Frankliniella dubia*, *F. occidentalis*, *F. invasor*; *Neohydatothrips signifer*; *Scirtothrips kupandae*, *S. perseae*, *S. tacambarensis*, *S. hecorgonzalezi* and *S. totonacus*; 3) 1-April-1998: *F. fallaciosa*, *F. occidentalis*, *F. panamensis*, *F. fallaciosa f. parvifosis*; 4) 21-April-1998: *Frankliniella bruneri*, *F. brunnescens* and *F. chamulae*. The *Frankliniella* species inhabit flowers, whereas the *Scirtothrips* and *Neohydatothrips* are phytophagous on leaves and flowers.

c) El Mesón; 1) 21-January-1998: *Frankliniella curiosa*; *Neohydatothrips burungae* and *Neohydatothrips signifer*, 2) 29-January-1998: *Frankliniella curiosa*, *F. minor*; *Neohydatothrips burungae* and *N. signifer*, 3) 2-April-1998: 4) 18-December-1998: *Frankliniella celata* and *F. chamulae*; 4) 29-January-1999: *Frankliniella curiosa*, *F. brunnescens*, *F. cephalica* and *F. invasor*; *Neohydatothrips signifer*. 5) 30-April-1999: *Frankliniella curiosa* and *F. occidentalis*; 6) 24-September-1999: *Frankliniella brunnescens*, *F. difficilis*, *F. insularis*, *F. invasor* and *F. minor*; *Neohydatothrips burungae*; *Scirtothrips perseae* and *S. longipennis*. The *Frankliniella* species are phytophagous on flowers, whereas those of *Neohydatothrips* and *Scirtothrips* are phytophagous on leaves and flowers

## II Estado de Mexico

The studies in the Estado de Mexico, were carried out in the orchard of the Centro Experimental La Cruz, from the Fundación Salvador Sánchez Colín, in Coatepec Harinas, 2000 m. snm.

a) Pioneer Phase. The information is provided by the samplings that the colleague Martha Salgado Siclain did and were published by Johansen & Mojica (1999). The only recorded assemblage is as follows: October-1993: *Scirtothrips kupandae* and *S. perseae* on avocado cv. Hass.

b) Recent studies. The works of Castañeda-González (2001) and Castañeda-González et al (2003), provided for the first time, valuable information about the

thrips megadiversity found in the orchards of the cultivars: Criollo, Fuerte, Colín V. 333 and Hass. According to Castañeda-González et al (Loc. Cit), the seven shared thrips species within the four cultivars are as follows: *Frankliniella bruneri*, *F. difficilis*, *F. minor*, *F. occidentalis*, *Scirtothrips kupandae*, *S. perseae* and *Neohydatothrips signifer*; only were found in foliage, flowers and young fruit of cv. Hass, as well as in flowers of weeds associated with the crop, on the other side *Neohydatothrips signifer* was the second more frequent species in cv. Hass. In the coming future we will have to re-examine the samples material in order to find more assemblages.

#### 4 CONCLUSIONS

1. The principal cause of the thrips assembling on the tender foliage and avocado flowers in Mexico, is the specific megadiversity demonstrated by 85 Mexican species in avocado trees.
2. To allow an assemblage, the participant species have to be sympatric and synchronic in the same tree, in the foliage as well as in flowers.
3. It is now Known, that the assemblages occur at random even within species of the same genus and they will only be integrated if the phenologic events of foliation and flowering are given
4. The integrating thrips species in an assemblage can vary through time.
5. Many thrips species are to be found in other plants present between the avocado trees or surrounding an orchard. The presence of almost all the thrips species, in the avocado trees, it is originated in other native plants before the establishment of the avocado orchards.
6. It is necessary to study in which way the chemical and biological control, affects the thrips assemblages.

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