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THE PRESENT KNOWLEDGE OF THE MEXICAN THYSANOPTERA (INSECTA), INHABITING AVOCADO TREES (*PERSEA AMERICANA* MILLER)

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ABSTRACT

The taxonomic and ecologic study of 85 Mexican thysanoptera species inhabiting floral and foliar structures of avocado trees, was carryed out herein. A total of 74 species (87.05%) are phytophagous (on flowers and leaves), ten (11.76%) are natural predators of thrips and acari, whereas one (1.17%) is mycophagous in litter. Of the phytophagous species, 71 belong into the Suborder Terebrantia, Thripidae, in 12 genera as follows: *Arorathrips* (1 sp.), *Aurantothrips* (1 sp.), *Calliothrips* (3 spp.), *Exophthalmothrips* (1 sp.), *Frankliniella* (30 spp.), *Heliothrips* (1 sp.), *Heterothrips* (2 spp.), *Leucothrips* (2 spp.), *Microcephalothrips* (1 sp.), *Neohydatothrips* (6 spp.), *Scirtothrips* (22 spp.) and *Thrips* (1 sp.).

In contrast, only three species belong into Suborder Tubulifera, Phlaeothripidae: *Haplothrips* (1 sp.), *Karnyothrips* (1 sp.) and *Pseudophilothrips* (1 sp.). From the predatory species, seven belong into Suborder Terebrantia, Aeolothripidae*: Aeolothrips* (2 spp.) *Franklinothrips* (3 spp.); Thripidae*: Scolothrips* (2 spp.), whereas three belong into Suborder Tubulifera, Phlaeothripidae: *Leptothrips* (1 sp.), *Trybomia* (2 spp.). From the phytosanitary point of view, only four genera are very important: *Frankliniella* (9 spp.), *Neohydatothrips* (2 spp.), *Scirtothrips* (14 spp.) and *Pseudophilothrips* (1 sp.).

The rest of the genera and their species (specially *Frankliniella, Neohydatothrips* and *Scirtothrips*), can be considered as incidental visitors. *Heliothrips haemorrhoidalis* apparently was eradicated from avocado trees in Coatepec Harinas, Mexico. *Franklinothrips orizabensis* Johansen up to the present time become the most important predative species on *Scirtothrips perseae* in California, U.S.A., because its life cycle was finally studied and this allowed the rearing of the species under laboratory conditions; finally it has being successfully liberated within avocado orchards in California, U.S.A.

In the near future, the species number recorded herein, will be increased when several *Frankliniella* and *Scirtothrips* species in process of taxonomic study, will be finally described.

Key Words: Insecta, Thysanoptera, Pests, Predators, Avocado thrips, Mexico.

INTRODUCTION

This study is the result of field and laboratory work during the last 29 years, but specially during the last four years (1999-2003). This last period is significant because the number of species increased from 41 according to Johansen, Mojica and Ascención-Betanzos (1999), to 85 in this paper, this means an increase of 51.7 % (44 additional species). The achieved information, allows better taxonomic studies, as well as ecologic, phytosanitary and agronomic solutions.

METHODS AND MATERIALS

The majority of the examined thrips specimens (inmmature and adults), were sampled in the field: most of them in avocado orchards, some others in natural ecosystems. The samplings were taked monthly, or every two weeks during a year. The sampled thrips were preserved in a 70 percent etanol solution. All mountings were done using the Canada balsam technique. A few specimens were provided from institutional collections.

RESULTS AND DISCUSSION

A) Taxonomy

The detailed taxonomic aspects can be found in Jacot-Guillarmod (1971, 1974); Johansen, Mojica and Ascensión (1999).

Family Aeolothripidae Uzel, 1895; Genus *Aeolothrips* Haliday, 1836: **1. *A. major* Bailey, 1951, **2. *A. mexicanus* Priesner, 1924; Genus *Franklinothrips* Back, 1912: 3. *F. linneatus* Hood, 1949, **4. *F. orizabensis* Johansen, 1974, **5. *F. vespiformis* (D.L. Crawford, 1909). Family Heterothripidae Bagnall, 1912; Genus *Heterothrips* Hood, 1908: 6. *H. decacornis* D.L. Crawford, 1909, 7. *H. mexicanus* Watson, 1924; Family Thripidae (Stephens) Uzel, 1895; Subfamily Thripinae (Stephen) Karny, 1921; Tribe Thripini (Stephen) Priesner, 1907; Genus *Aurantothrips* Bhatti, 1978: 8. *A. orchidaceus* (Bagnall, 1909); Genus *Exophthalmothrips* Moulton,1933: 9. *E. chiapensis* Johansen, 1981; Genus *Frankliniella* Karny, 1910: 10. *F. albacuriosa* Johansen, 1998, 11. *F. aurea* Moulton, 1948, 12. *F. bagnalliana* Hood, 1925, *13. *F. borinquen* Hood, 1942, *14. *F. bruneri* Watson, 1925, 15. *F. brunnescens* Priesner, 1932, 16. *F. cephalica* (D.L. Crawford, 1910), *17. *F. chamulae* Johansen, 1981, *18. *F. cubensis* Hood, 1925, 19. *F. curiosa* Priesner, 1932, *20. *F. difficilis* Hood, 1925, 21. *F. dubia* Priesner, 1932, *22. *F. fallaciosa* Priesner, 1933, *F. fallaciosa* f.

parvifossis Priesner, 1933, 23. *F. gossypiana* Hood, 1936, 24. *F. insularis* (Franklin, 1908), 25. *F. inutilis* Priesner, 1932, *26. *F. invasor* Sakimura, 1972, 27. *F. kelliae* Sakimura, 1981, *28. *F. minor* Moulton, 1948, 29. *F. minuta* (Moulton, 1907), *30. *F. occidentalis* (Pergande, 1895), 31. *F. panamensis* Hood, 1925, 32. *F. pestinae* Sakimura & O'Neill, 1979, 33. *F. rostrata* Priesner, 1932, 34. *F. salviae* Moulton, 1948, 35. *F. seneciopallida* Johansen, 2002, 36. *F. simplex* Priesner, 1924, *F. simplex* f. celata Priesner, 1932, 37. *F. spinosa* Moulton, 1936, 38. *F. syringae* Moulton, 1948, 39. *F. zucchini* Nakahara & Monteiro, 1999; Genus *Microcephalothrips* Bagnall, 1926: 40. *M. abdominalis* (D.L. Crawford, 1910); Genus *Thrips* Linnaeus, 1758: 41. *T. tabaci* Lindeman, 1889; Genus *Scolothrips* Hinds, 1902: **42. *S. pallidus* (Beach, 1895), **43. *S. sexmaculatus* (Pergande, 1892); Tribe Chirothripini (Karny) Priesner, 1957; Genus *Arorathrips* Bhatti, 1990: 44. *A. mexicanus* (D.L. Crawford, 1909); Tribe Dendrothripini Priesner, 1926; Genus *Leucothrips* Reuter, 1904: 45. *L. furcatus* Hood, 1931, 46. *L. piercei* (Morgan, 1913); Tribe Sericothripini Priesner, 1921; Genus *Neohydatothrips* John, 1925 sensu Bhatti, 1973: 47. *N. annulipes* (Hood, 1935), *48. *N. burungae* (Hood, 1935), 49. *N. inversus* (Hood, 1928), *50. *N. signifer* (Priesner, 1932), 51. *N. tibialis* (Priesner, 1924), 52. *N. variabilis* (Beach, 1896); Genus *Scirtothrips* Schull, 1909: *53. *S. aceri* Moulton, 1926, 54. *S. albosilvicola* Johansen & Mojica, 1999, *55. *S. aztecus* Johansen & Mojica, 1999, *56. *S. citri* (Moulton, 1909), 57. *S. cognatoalbus* Johansen & Mojica, 1999, *58. *S. danieltelizi* Johansen & Mojica, 1999, *59. *S. detereomangus* Johansen & Mojica, 1999, *60. *S. hectorgonzalezi* Johansen & Mojica, 1999, *61. *S. kupandae* Johansen & Mojica, 1999, 62. *S. longipennis* (Bagnall, 1909), *63. *S. mangiferaffinis* Johansen & Mojica, 1999, *64. *S. mangoaffinis* Johansen & Mojica, 1999, *65. *S. manihotifloris* Johansen & Mojica, 1999, *66. *S. martingonzalezi* Johansen & Mojica, 1999, *67. *S. perseae* Nakahara, 1997, *S. perseae* f. aguacatae Johansen & Mojica, 1999, 68. *S. silvicola* Johansen & Mojica, 1999, 69. *S. silvatropicalis* Johansen & Mojica, 1999, *70. *S. tacambarensis* Johansen & Mojica, 1999, 71. *S. totonacus* Johansen & Mojica, 1999, *72. *S. uruapaniensis* Johansen & Mojica, 1999, 73. *S. willihennigi* Johansen & Mojica, 1999, 74. *S. zacualtipanensis* Johansen & Mojica, 1999; Subfamily Panchaetothripinae Bagnall, 1912; Genus *Heliothrips* Haliday, 1831: 75. *H. haemorrhoidalis* (Bouché, 1853); Genus *Caliothrips* Daniel, 1904: 76. *C. phaseoli* (Hood, 1912), 77. *C. punctipennis* (Hood, 1912), 78. *C. fasciatus* (Pergande, 1895); Family Phlaeothripidae Uzel, 1875; Genus *Haplothrips* Amyot & Serville, 1843: 79. *H. gowdeyi* (Franklin, 1908); Genus *Karnyothrips* Watson, 1924, 80: *K. flavipes* (Jones, 1912); Genus *Leptothrips* Hood, 1909: **81. *L. mcconnelli* (D.L. Crawford, 1918); Genus *Stephanothrips* Trybom, 1912: 81. *S. occidentalis* Hood & Williams, 1925; Genus *Pseudophilothrips* Johansen, 1979, 83. *P. perseae* (Watson, 1923); Genus *Trybomia* Karny, 1911: **84. *T. brevitubus* (Moulton, 1929), **85. *T. intermedia* (Bagnall, 1910).

B) Important phytosanitary species

All these species are found in natural ecosystems as well as in agroecosystems of avocado orchards. Genus *Frankliniella* with nine species (*).*Frankliniella chamulae* is a pest of several coniferae: *Pinus* spp. and *Pseudotsuga* sp.; whereas *F. fallaciosa* is a Mexican High Mountain inhabitant, according to Johansen, Mojica and Ascensión (1999). Genus *Neohydatothrips* with two species (*): *N. burungae* and *N. signifer* are two very related species. *N. burungae* is a more Neotropical species, sometimes with orange veins in fore wings. *N. signifer* is a Neovolcanic species. Genus *Scirtothrips* with 14 spp.(*). The other eight species in this genus while less frequent. They also coexist in the specific assemblages of this genus, according to Johansen & Mojica (1999), Johansen, Mojica & Ascensión-Betanzos (1999), Castañeda-González et al. (2002a, 2002b). Genus *Pseudophilothrips* with one sp. (*): *P. perseae*, this species was described from specimens sampled in Honduras. It is frequent as a pest in the leaves of "criollo" avocado trees in the Golf of Mexico Coastal Plain as well as the Sierra Madre Oriental.

C) Important predator species

Genus *Aeolothrips* with two species (**): *A. major* and *A. mexicanus*. Genus *Franklinothrips* with two species(**)

D) Ecologic data

Phytophagous species assemblages

These are integrated in the avocado orchards agroecosystems. The primary source of these assemblages are the species within the genera *Frankliniella* (39 spp.), *Neohydatothrips* (6 spp.) and *Scirtothrips* (22 spp.). Furthermore, additional species belong to the genera *Heterothrips* (2 spp.), *Aurantothrips* (1 sp.), *Exophthalmothrips* (1 sp.), *Macrocephalothrips* (1 sp.), *Thrips* (1 sp.), *Arorathrips* (1 sp.), *Leucothrips* (2 spp.), *Heliothrips* (1 sp.), *Caliothrips* (3 spp.), *Haplothrips* (1 sp.) and *Karnyothrips* (1 sp.). The specific composition of each assemblage is variable in time and place, according to Johansen & Mojica (1999), Ascensión et al (1999), Castañeda-González et al (2002a), Ávila-Quezada et al (2002) and Hoodle, Nakahara & Phillips (2002). This means that the assemblage composition is highly variable. Off course there are several important species in the genera *Frankliniella*, *Neohydatothrips* and *Scirtothrips*, which are responsable of most of the foliar and fruit damage.

Population studies and life cycles

Most of the thrips population studies on avocado trees, had being based on damage qualification and quantification. The main population studies are those of Ascensión et al (1999), González-Hernández et al (1999), Castañeda-González et al (2002a) and Ávila-Quezada (2002). Recently Hoddle et al (2000, 2001a, 2001b) provided very good studies on the development and reproduction, as well as pupation biology of the Mexican species *Franklinothrips orizabensis* Johansen, in California, U.S.A. Furthermore Hoddle (2002), studied the development and reproduction biology of *Scirtothrips perseae* Nakahara in California, U.S.A.

CONCLUSIONS

1. There is an outstanding increase in the knowledge of Mexican avocado Thysanoptera: 41 spp. in 1999 versus 85 spp. (44 spp. more) up to the present time.

2. The Mexican thrips species of phytosanitary interest do not exist as isolate individuals in the avocado crop agroecosystems, they coexist in several specific and generic assemblages not constant in place and time, in their species components.

3. Population studies had increased, this allowed to find in which period of the avocado tree cycle, the thrips damage (foliar and young fruit) appears.

4. The life cycles studies of *Scirtothrips perseae* Nakahara (a phytophagous species) and *Franklinothrips orizabensis* Johansen (a predator) in California, U.S.A. were provided by Hoddle (2002) and Hoddle et al (2000, 2001a, 2001b).

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