

**THE MEXICAN *FRANKLINIELLA FUSCA* (HINDS),  
*F. PALLIDA* (UZEL) AND *F. SCHULTZEI* (TRYBOM)  
SPECIES ASSEMBLAGES, IN THE "INTONSA GROUP"  
(INSECTA, THYSANOPTERA: THIRIPIDAE)**

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**RESUMEN**

Se hace la revisión para México de *Frankliniella fusca* (Hinds) y se describen dos especies nuevas mexicanas, integrando un ensamble específico. Además, se hace la revisión de *F. pallida* (Uzel) de Europa y se describen tres especies nuevas mexicanas, integrando un ensamble específico. Por último se hace la revisión de *F. hemerocallis* J.C.Crawford de los Estados Unidos de América y Costa Rica; *F. schultzei* (Trybom) del Nuevo y Viejo Mundo y se describe una especie nueva mexicana, integrándose un ensamble específico. En todos los casos anteriores, se trata de especies cuyos adultos de ambos sexos carecen del peine marginal posterior en el terguito VIII o bien, lo presentan rudimentario a cada lado. Se discuten las afinidades entre estos ensambles específicos y otros ensambles del Grupo Intonsa. Se incluyen ilustraciones de cabeza, antenas, tórax y abdomen de cada especie.

**Palabras Clave:** Ensamblajes específicos *Frankliniella fusca*, *F. pallida* y *F. schultzei*, Especies nuevas, Taxonomía, Distribución, México.

**ABSTRACT**

The species *Frankliniella fusca* (Hinds) is reviewed for Mexico, together with the description of two related also Mexican new species, all integrated in a species assemblage. *Frankliniella pallida* (Uzel) from Europe, is also reviewed, together with the description of three related Mexican new species, all forming a species assemblage. *Frankliniella hemerocallis* J.C.Crawford, *Frankliniella schultzei* (Trybom) and a New Mexican species, are also considered as a species assemblage. The adults of the three specific assemblages studied herein, lack a posteromarginal comb in tergite VIII. In the case of the *F. fusca*, *F. pallida* and *F. schultzei* species assemblages, the morphologic and color characters are discussed, as well as their probable relationships with other assemblages within the "Intonsa Group". Illustrations of the head, antennae, thorax and abdomen of each species, are included.

**Key Words:** *Frankliniella fusca*, *F. pallida* and *F. schultzei* species assemblages, New species, Taxonomy, Distribution, Mexico.

**INTRODUCTION**

The *Frankliniella fusca* (Hinds), *F. pallida* (Uzel) and *F. schultzei* (Trybom) species assemblages, are very related because the adults (both sexes) of their species lack a posteromarginal comb in tergite VIII; this shared character allows the

separation of these assemblages from the rest in the Intonsa Group. Adult females of *Frankliniella hemerocallis* J.C. Crawford have a complete comb in the posterior margin of tergite VIII; furthermore, the males also lack the postocular setae i.

The present paper, is the fourth (for more details see: Johansen & Mojica, 1998; Johansen, 1998; Johansen, 2000) of a serial project of the whole review of the component specific assemblages, within the "Intonsa group" as its main purpose. The "Intonsa group" was created by Hood (1925); Moulton (1948) accepted this group, but he divided it in three serie: intonsa, insularis and tenuicornis. Sakimura (1986) accepted the "Intosa group". The original basis of this group according to Hood (Loc. cit.) is the morphology of the pedicel in the third antennal segment: cylindrical to slightly swollen. This condition also exist in the "Minuta group", which Sakimura & O'Neill (1979) considered as an artificial group. In many respects I agree with this point of view, because the "Minuta group" could be divided in "species assemblages" and included in the "Intonsa group". The main defining characters of the group are: the minute interocellar (pair III) setae, as well as the pronotal major anteroangular and anteromarginal setae. In some species they are very variable in length. The intermediate antennal segments III-VI though moniliform in many species, they are globose-elongate in many others. Retana (1998), provided a phylogenetic analysis of the "Intonsa group" (and the other groups in the genus) including eight species, he concluded that the group is not a "biological reality". Mound & Marullo (1996), reviewed the Central and South American species. They make a very critical analysis of the characters that define the groups in the sense of Hood (Loc. cit.), but they fail to recognize the validity of the groups. They provided a general key to the species, which is very large, tedious and not easy to handle.

Nakahara (1997) published a World check list of the species of *Frankliniella*. Finally, this assemblage reviews, allow the revalidation of the "Intonsa group", by finding new ways to make easier the determination, of all its component species.

The terms assemblage and group are used here as neutral terms, in the sense of Mayr and Ashlock (1991).

## **MATERIAL AND METHODS**

The adult illustrations from each of the species, were taked from Canada balsam mounted specimens. They are realistic microscopic interpretations donne using a camera-lucida equipment and two magnifications: 400 and 1000 X.

Depositories: IBUNAM. Instituto de Biología, Universidad Nacional Autónoma de México, México, D.F. USNM, United States National Museum, Washington, DC., United States of America.

#### ABBREVIATIONS

##### Head

intocc = interocellar setae (pair III)

postoc = postocular setae i-iii, IV

##### Pronotum

AA = Major anteroangular setae

AM = Major anteromarginal setae

PA = Major posteroangular setae

am = minor anteromarginal setae

pm = minor posteromarginal setae

##### Abdomen

IX i, IX ii, IX iii = Tergite IX major caudal setae; X = Tergite X major subposteromarginal setae.

#### Key to the *Frankliniella fusca* (Hinds), *F. pallida* (Uzel) and *F. schultzei* (Trybom) assemblages in the Intonsa group.

1. Metanotal scutum in the adults of both sexes with a pair of campaneiform sensilla . . . . . 2  
- Metanotal scutum in the adults of both sexes lacking a pair of campaneiform sensilla . . . . . *F. schultzei* assemblage
2. Adults of both sexes without a posteromarginal comb in tergite VIII . . . . . 3  
- Adults of both sexes with a complete posteromarginal comb in tergite VIII . . . . . most of the assemblage within the Intonsa group, some species in the Minuta group
3. Fore wings predominantly light yellow . . . . . *F. pallida* assemblage  
- Fore wings predominantly dark brown . . . . . *F. fusca* assemblage

#### The *Frankliniella fusca* (Hinds) species assemblage

**Diagnosis.** Small species (females: 1.13-1.21; males: 0.900 mm in length) in the Intonsa group. Body color predominantly chestnut brown, with abundant orange subhypodermal pigment. Antennal segments III-V bicolored yellow and brown. Fore wings completely dark brown; hind wings white to whitish-yellow. Ocellar crescents crimson red. Body setae dark brown.

**Morphology.** Head in dorsal aspect (Figs. 1, 10, 16, 21) broader than long at middle, narrower towards base; occiput sculptured with open, parallel and confluent (at middle and both sides) striae. Chaetotaxy, interocellars (pair III) commonly short; postoculars formula: i-iii, IV, v, vi (IV commonly reduced as i-iii, but also slightly developed). Compound eyes ellipsoidal slightly protruding. Antennal segments (Fig. 6), typical in the group, III with pedicel slightly fungiform. Mouth-cone sharply pointed and longer than head's dorsal length, to rounded and shorter than head's dorsal length. Pronotum (Figs. 1, 10, 16, 21), mainly smooth, or with some transverse and confluent striae in anterior and posterior

**Johansen: *Frankliniella*, species assemblages in "Intonsa group"**

margins, or completely striated. Mesonotal plate (Figs. 8, 12, 18), transverse, hexagonal to triangular, with open and parallel striae becoming confluent at center and both sides. Metanotal scutum (Figs. 7, 9, 13, 19) with polygonal reticulation at center, median setae pair in anterior margin, posterior displaced in micropterous forms (Fig. 7). Pterosternum (Figs. 2, 11, 17) typical in the group. Tergite VIII (Figs. 3, 5, 15, 20) without a posteromarginal comb. Males with one ellipsoidal to oblong transverse glandular area in each of sternites II-VIII (Figs. 4, 22).

**Specific differential characters.** Body size and proportions vary between adults of the species. Body color is variable. There are differences in the head chaetotaxy and occiput sculpture. The pronotal sculpture and chaetotaxy are variable. The meso- and metanotal sculpture also varies. The male sternal glandular areas are variable in shape.

**Comments.** The studied material is very scarce, a total of eight specimens were considered. Two species had bisexual description, and only one was described holotypically with a female.

**Relationships with other assemblages within the Intonsa group.** Three species in the *Frankliniella fusca* (Hinds) species assemblage, all have completely dark brown fore wings; in the *F. shultzei* (Trybom) species assemblage they are predominantly brown, but they have a transverse white band basally; in the *F. pallida* (Uzel) species assemblage, the adults have light yellow fore wings.

**TAXONOMIC LIST**

1. *Frankliniella fusca* (Hinds)
2. " *seneciofusca* sp. nov.
3. " *vulcanofusca* sp. nov.

**Key to the species in the *Frankliniella fusca* (Hinds) species assemblage**

1. Postocular setae i-IV almost subequal in length. Pronotum smooth at center; with a median transverse row of two setae ..... 2
- Postocular setae i-iii short and thin, IV longer and stout. Pronotum completely sculptured with faint transverse and confluent striae; median transverse setae row with four setae forming a U ..... ***F. vulcanofusca* sp. nov.**
2. Mouth-cone longer than head's dorsal length. Males with a oblong glandular area in each of sternites III-VII ..... ***F. fusca* (Hinds)**
- Mouth-cone shorter than head's dorsal length. Males with a short ellipsoidal glandular area in each of sternites III-VII ..... ***F. seneciofusca* sp. nov.**

***Frankliniella fusca* (Hinds)**

(Figs. 1-9, 66)

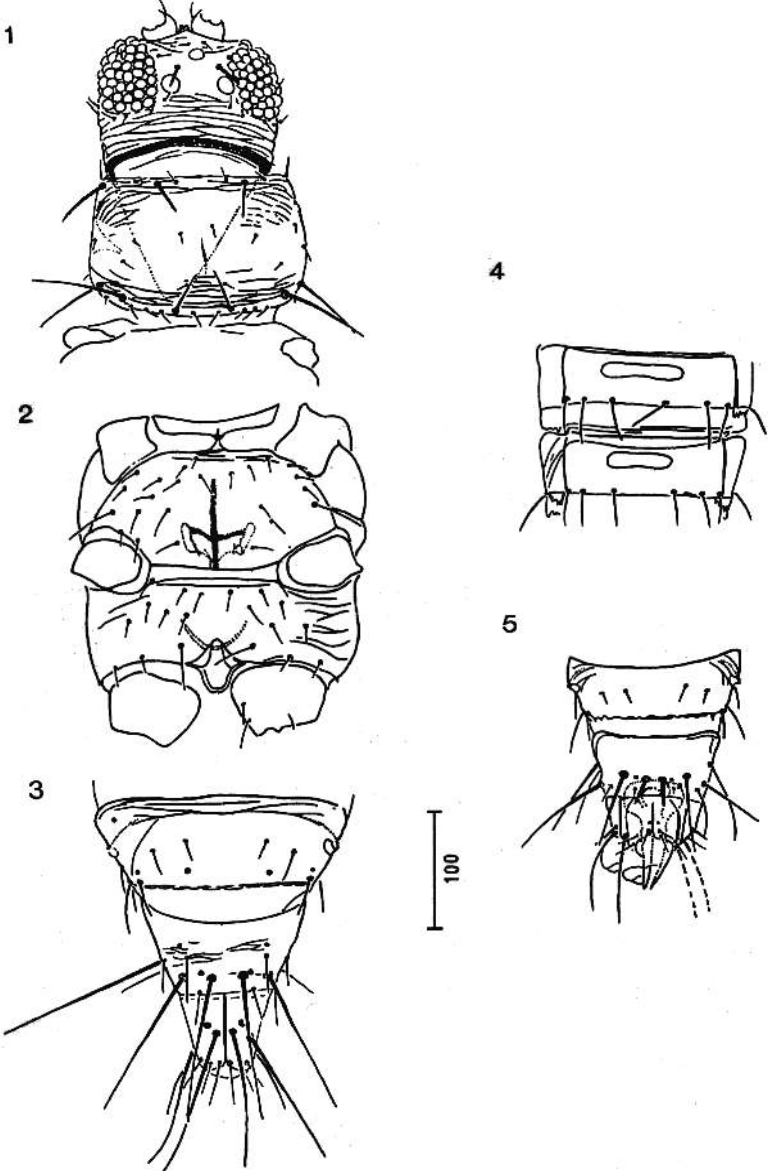
*Euthrips fuscus* Hinds, 1902: 154

*Frankliniella fusca* (Hinds); new spelling and synonymy by Karny, 1912: 335

*Frankliniella fusca* (Hinds); Moulton, 1948: 68, 97

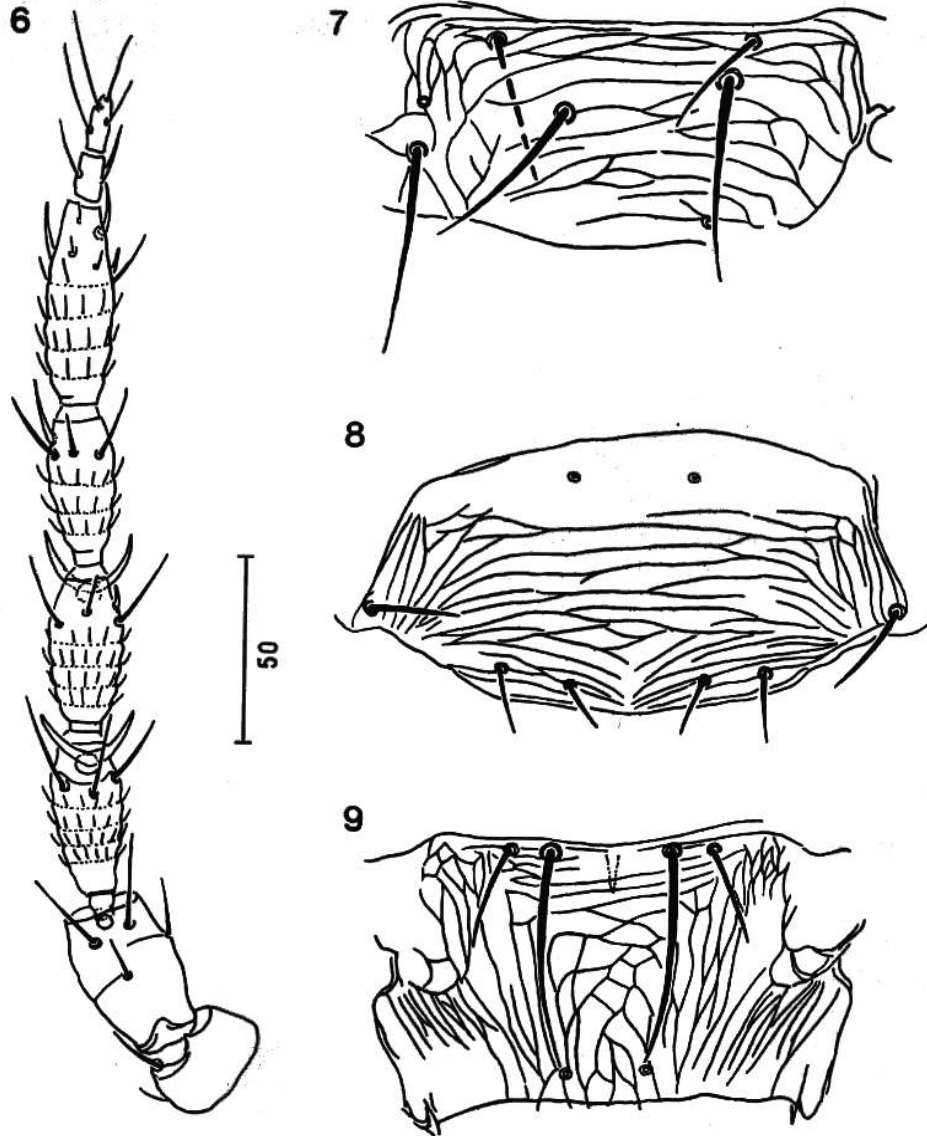
*Frankliniella fusca* (Hinds); Stannard, 1968: 311

*Frankliniella fusca* (Hinds); Jacot-Guillarmod, 1974: 777.



Figures 1-5

Views of *Frankliniella fusca* (Hinds). 1. Head and pronotum & (NaOH) in dorsal view; 2. *Idem*, pterosternum (ventral); 3. *Idem*, tergites VIII-X (dorsal). 4. Sternites VI-VII each showing the glandular area % (ventral); 5. *Idem*, tergites VIII-X. Scale in Fm, same (400 X) for all figures.



Figures 6-9

Dorsal views of *Frankliniella fusca* (Hinds) &. 5. Right antenna; 7. Metanotal scutum (micropterous); 8. Mesonotum (macropterous); 9. Metanotal scutum (macropterous). Scale in Fm, same (1000 X) for all figures.

The "Tobacco Thrips" according to Moulton (1948) and Stannard (1968), is an Eastern species in the United States of America, commonly found in agroecosystems of peanut, cotton, tobacco, clover and alfalfa, according to Newsom, Roussel and Smith (1953), as well as natural ecosystems of Eastern grasslands, according to Stannard (1968).

In Mexico, it has being recorded scarcely, both in agroecosystems (*Lactuca sativa* L.) and natural ecosystems, in flowers of *Prunella vulgaris* and *Stevia* sp.

**Material examined.** UNITED STATES OF AMERICA; SOUTH CAROLINA: Darlington Co.; VI-1985; 1 & macropterous (NaOH treated) on cotton (T. Drake), in USNM. GEORGIA: Tifton; 14-VIII-1964; 1 % (NaOH) in peanut flower (D.B. Lench), in USNM. MARYLAND: Beltsville; 16-VI-1939; 1 % in gladiolus (G.V. Johnson/det. Floyd Andre), in USNM. MEXICO (without data); 22-I-1938; 1 & brachypterous in lettuce (Haller/det. Floyd Andre), in USNM. HIDALGO: Sierra de Zacualtipán (Sierra Madre Oriental), 3 km E of Tlanchinol, 1600 m.; 19-IV-1980; 2 && in flowers of *Prunella vulgaris* (Roberto M. Johansen), in IBUNAM; *Idem*, Ixtlahuaco, 1520 m.; 25-VIII-1980; 1 % in flowers of *Stevia* sp. within Mountain Deciduous Forest (R.M. Johansen), in IBUNAM.

***Frankliniella seneciofusca* sp. nov.**

(Figs. 16-23, 66)

**Female.** Body color dark chestnut brown, with orange subhypodermal pigment, except: antennal segments, III whitish-yellow; IV dark brown, yellowish basally and light brown apically; V dark brown, lighter at base. Fore legs, femora light brown, tibiae yellow; all tarsi yellow. Fore wings dark brown; hind wings whitish. Body setae light brown. Head in dorsal aspect (Fig. 16), broader (1.73 times) than long at middle. Compound eyes not protruding; chaetotaxy as follows: antecellars (pairs I-II), postoculars i-iii shorter than one hind ocellar diameter; interocellars (pair III) and postoculars IV twice longer than i-iii. Antennal segments typical in the assemblage, III the longest. Mouth-cone shorter than head's dorsal length. Thorax; pronotum (Fig.16) almost smooth, with two minor anteroangular setae between the larger ones, median setae row with two setae, and two median subposteromarginals; mesonotum (Fig. 18) triangular; metanotal scutum (Fig. 19); pterosternum (Fig. 17) with mesosternal plate transverse-hexagonal, furca with long spinula. Abdomen; tergites VIII-X (Fig. 20).

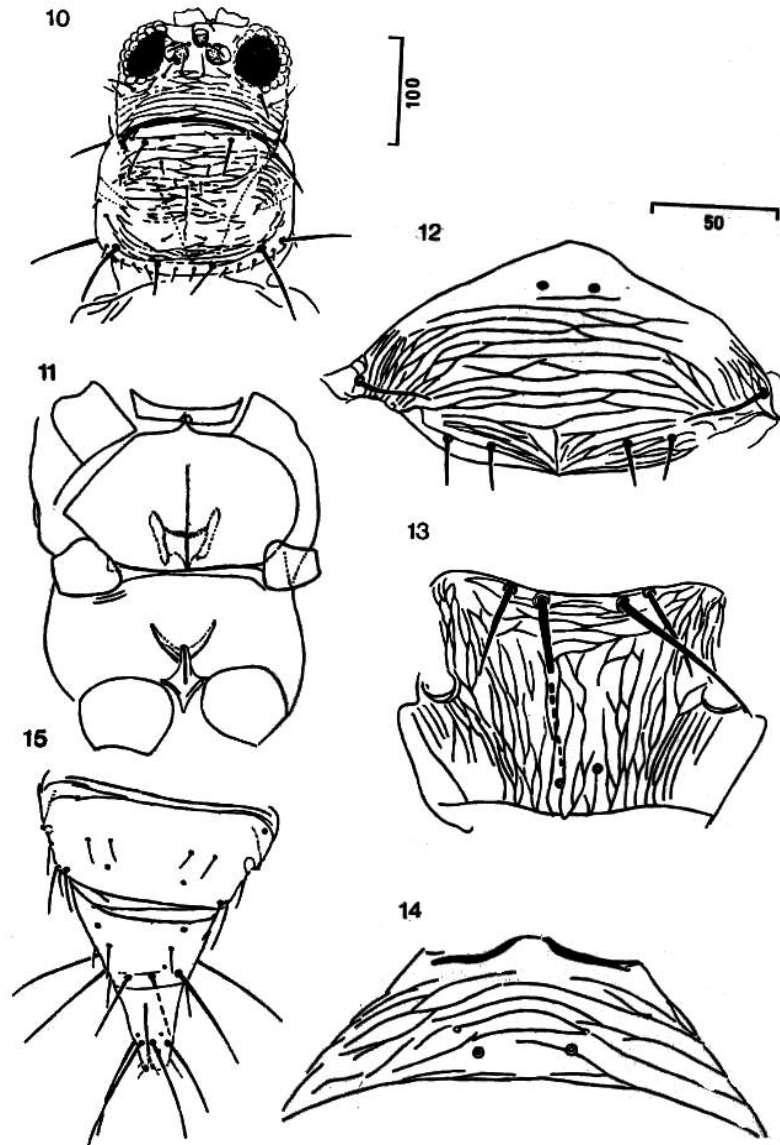
**Measurements** (Holotype & in Fm). Body length: 1.32 mm.

Head dorsal length: 82. Width at eyes: 140, behind eyes: 138, at middle: 142, at base: 132. Chaetotaxy, intocc: 32, postoc: i 10, ii 10, iii 12, IV 20. Compound eyes, length: 50, width: 42; ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 26 (24), II 32 (24), III 50 (20), IV 42 (20), V 34 (18), VI 46 (18), VII 8 (8), VIII 10 (6). Thorax; pronotum, length: 120, width at middle: 160; chaetotaxy, major setae: AA 40, AM 36; PA, outer: 56, inner: 70; minor setae: aa 18, am 10; pm i: 12, ii: 24, iii: 12. Mesothorax, width: 214; metathorax, width: 206. Fore wings width, basal: 86, middle: 56; vein chaetotaxy, fore: 22, hind: 18. Abdomen; width at segment IV: 236. Tergite IX setae, IX i 74, IX ii: 92. Tergite X setae, X i: 90.

**Male** (Figs. 21-23), virtually like adult female, but smaller, slender and with mouth-cone as long as head's dorsal length.

**Measurements** (Paratype % in Fm). Body length: 0.900 mm.

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Figures 10-15

Dorsal and ventral views of *Frankliniella vulcanofusca* sp. nov. Holotype ♂. 10. Head and pronotum; 11. Pterosternum (ventral); 12. Mesonotum; 13. Metanotal scutum; 14. Tergite I; 15. Tergites VIII-X. Scales in Fm, same (400 X) for figures 10-11, 15; same (1000 X) for figures 12-14.



Head dorsal length: 74. Width at eyes: 130, behind eyes: 126, at middle: 128, at base: 120. Chaetotaxy, intocc: 20. Compound eyes, length: 44, width: 40; ocelli, fore: 12, hind: 12. Antennal segments, length (width): I 20 (22), II 28 (20), III 40 (18), IV 36 (18), V 28 (14), VI 40 (14), VII 8 (6), VIII 10 (4). Thorax; pronotum, length: 100, width at middle: 146; chaetotaxy, major setae: AA 35, AM 30; PA, outer: 40, inner: 46; minor setae: pm i 12, ii 24, iii 12. Mesothorax, width: 188; metathorax, width: 176. Fore wings width, basal: 80, middle: 40; vein chaetotaxy, fore: 23, hind: 20. Abdomen; width at segment IV: 186. Tergite IX setae, IX i: 26. Tergite X setae, X i: 80.

**Material examined.** Holotype ♂, Paratype ♀. MEXICO; PUEBLA: Sierra Madre Oriental-Volcanic Range, 2 km E of Esperanza, near interstate border Puebla-Veracruz, 2300 m.; 26-V-1974, in flowers of *Senecio salignus* (Roberto M. Johansen), in IBUNAM.

**Comments.** *Frankliniella seneciofusca* sp. nov., is related to *F. fusca*, but they are different because of the following characters: in *F. seneciofusca*, the mouth-cone is as long as or shorter than head's dorsal length; the interocellar setae are nearly to completely between hind ocelli; males have a short ellipsoidal glandular area in each of sternites II-VII; in *F. fusca*, the mouth-cone is longer than head's dorsal length; the interocellar setae are between fore and hind ocelli; males have a long oblong glandular area in each of sternites II-VII.

**Derivatio nominis:** From Latin: *Senecio* = the host plant and *fusca* = dark; in allusion to the related species *fusca*.

***Frankliniella vulcanofusca* sp. nov.**

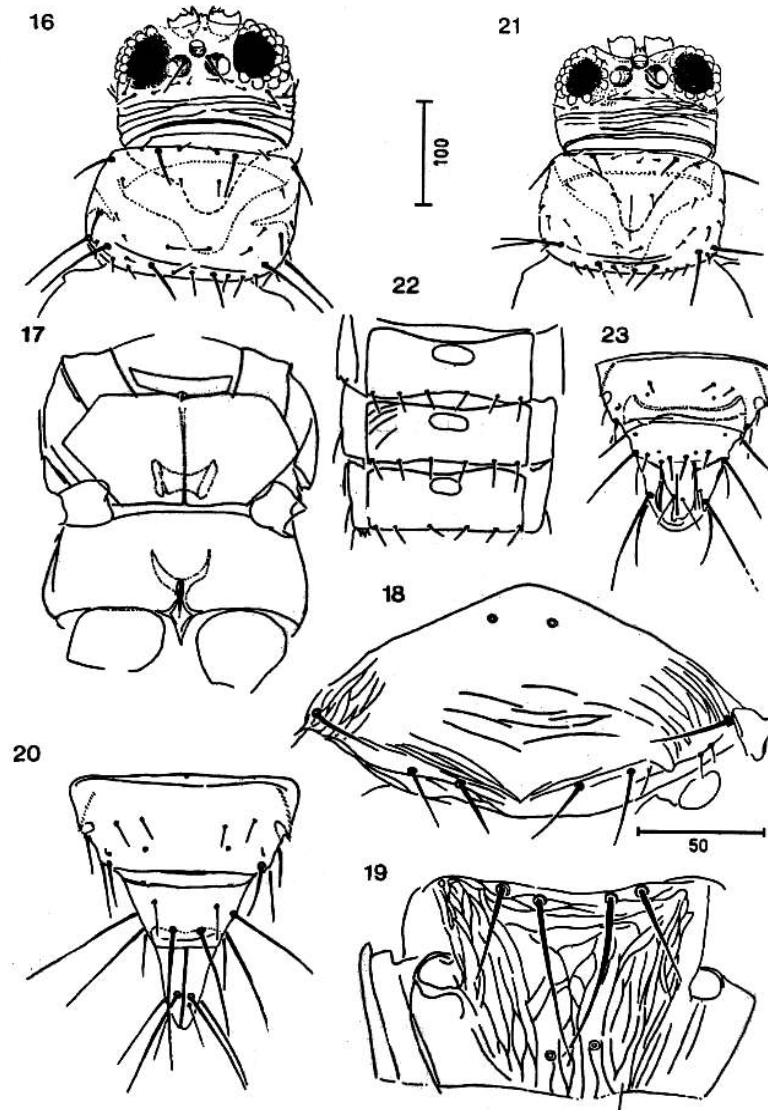
(Figs. 10-15, 66)

**Female.** Body color dark chestnut, with orange subhypodermal pigment, except: antennal segments, III yellowish-brown; V dark brown, with a yellowish sub-basal ring. Fore legs, tibiae yellow; all tarsi yellow. Fore wings brown with darker veins; hind wings whitish-yellow. Body setae dark brown. Head in dorsal aspect (Fig. 10), broader (1.67 times) than long at eyes and middle, cheeks sinuose. Compound eyes slightly protruding; chaetotaxy as follows: antecellars (pairs I-II), postoculars i-iii shorter than one ocellar diameter; interocellars (pair III) and postoculars IV slightly longer than one ocellar diameter. Antennal segments typical in the assemblage, III the longest. Mouth-cone longer than head's dorsal length. Thorax; pronotum (Fig. 10) sculptured with fine transverse and confluent striae; chaetotaxy as follows: two minor anteromarginals very apart, between the major ones; median row with four setae forming a U; four subposteromarginals, the median pair advanced; mesonotum (Fig. 12) almost triangular; metanotal scutum (Fig. 13); pterosternum (Fig. 2). Abdomen; tergite I (Fig. 11); tergites VIII-X (Fig. 15).

**Measurements** (Holotype ♂ in Fm). Body length: 1.21 mm.

Head dorsal length: 80. Width at eyes: 134, behind eyes: 130, at middle: 134, at base: 124. Chaetotaxy, intocc: 24, postoc: i-iii 12, IV 18. Compound eyes, length: 58, width: 40; ocelli, fore: 14, hind: 14. Antennal segments, length (width): I 22 (24), II 34 (24), III 44 (20), IV 36 (18), V 34 (16), VI 42 (18), VII 8 (8), VIII 10 (6). Thorax; pronotum, length: 120, width at middle: 158; chaetotaxy, major setae: AA 40, AM 34; PA, outer: 58, inner: 54; minor setae: aa 18, am 10; pm i: 12, ii: 28, iii: 12. Mesothorax, width: 214; metathorax, width: 206. Fore wings width, basal: 100, middle: 50; vein chaetotaxy, fore: 21, hind: 18. Abdomen; width at segment IV: 270. Tergite IX setae, IX i: 60, IX ii: 100. Tergite X setae X i: 108.

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Figures 16-23

Dorsal and ventral views of *Frankliniella seneciofusca* sp. nov. 16. Holotype & head and pronotum (corrected); 17. *Idem*, pterosternum (ventral); 18. *Idem*, mesonotum; 19. *Idem*, metanotal scutum; 20. *Idem*, tergites VIII-X. 21. Paratype %head and pronotum (corrected); 22. *Idem*, sternites V-VII (ventral); 23. *Idem*, tergites VIII-X. Scales in Fm, same (400 X) for figures 16-17, 20-23; same (1000 X) for figures 18-19.

**Material examined.** Holotype &. MEXICO; PUEBLA-VERACRUZ interstate border line (Sierra Madre Oriental-Volcanic Range), 12 km E of Esperanza, Pue., 2265 m.; 4-XI-1975; in flowers of *Bidens* sp. within *Pinus-Quercus* Forest (Roberto M. Johansen), in IBUNAM.

**Comments.** *Frankliniella vulcanofusca* sp. nov., is different from *F. fusca* and *F. seneciofusca* in the following characters: the pronotum is completely sculptured with transverse and confluent striae and the chaetotaxy is as follows: two minor anteromarginals very apart from each other, the median transverse row has four setae forming a U, and there are four subposteromarginals, the median pair advanced; in *F. fusca* and *F. seneciofusca* the pronotal surface is almost glabrous, and the chaetotaxy is as follows: two minor anteromarginals close together, the median transverse row with only two setae, and there is only one pair of subposteromarginals.

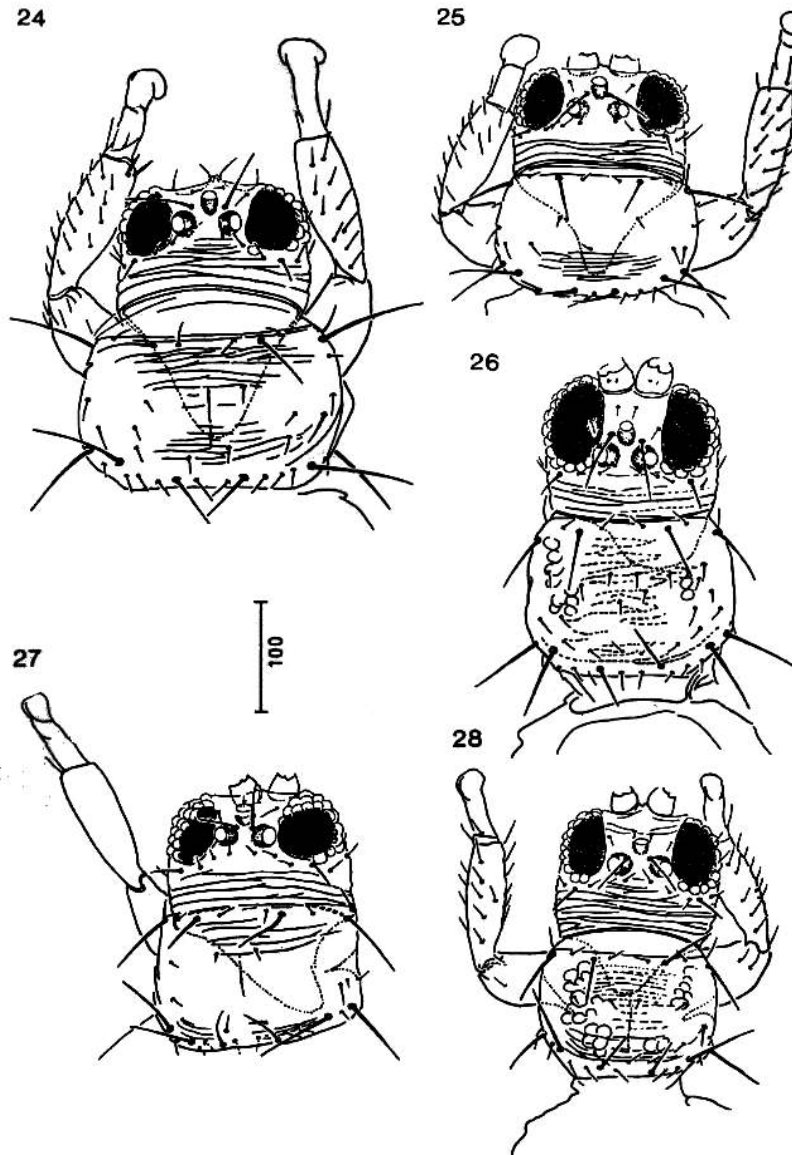
**Derivatio nominis:** From Latin, vulcano, *fusca* = dark in allusion to the volcanic habitat and the related species.

#### The *Frankliniella pallida* (Uzel) species assemblage.

**Diagnosis.** Small species (females: 1.17-1.50; males: 1.03 mm in length), in the Intonsa group. Body color predominantly yellow or bicolored yellow and brown, with abundant orange subhypodermal pigment. Antennal segments III-V whitish-yellow or bicolored yellow and brown. Fore wings clear yellow; hind wings whitish. Ocellar crescents orange to crimson red. Body setae dark brown.

**Morphology.** Head in dorsal aspect (Figs. 24-28), broader than long at middle; occiput sculptured with open, parallel and confluent (at middle and sides) striae. Chaetotaxy as follows: intercellars (pair III) well developed; postocular setae formula: i-iii, IV, v, vi. Compound eyes ellipsoidal, slightly protruding. Antennal segments typical in the group (Figs. 29-32), III with a slightly fungiform pedicel, IV-VI globose-elongate. Mouth-cone rounded and short, to pointed and longer than head's dorsal length. Pronotum (Figs. 24-28), with the surface almost smooth, and with some faint transverse striae either in anterior or posterior margin, or completely sculptured with faint transverse and confluent striae. Mesonotal plate (Figs. 33, 35, 37-38), transverse-hexagonal and with open transverse striae. Metanotal scutum (Figs. 34, 36, 38) with transverse elongate polygonal reticulation posteriorly; two sub-basal campaniform sensilla; median pair of setae in anterior margin. Pterosternum (Figs. 39, 41, 43) typical in the group. Abdomen; tergite I (Figs. 39, 41, 43), tergites VIII-X (Figs. 40, 42, 44, 47, 50), VIII without a posteromarginal comb. Males, sternites II-VII each with an ellipsoidal glandular area (Figs. 46, 49).

**Specific differential characters.** Body size and proportions are variable. Body color is also variable. There are also differences in the head's dorsal shape; the length and shape of mouth-cone is also variable. The New World species are represented by few adult specimens: the Holotype females and one Holotype male. In the *Frankliniella pallida* (Uzel) species assemblage, the adults have fore wings clear yellow and the intercellular setae (pair III) well developed, whereas in the *F. fusca* (Hinds) species assemblage, the fore wings are dark brown and the intercellular setae (pair III) are reduced.



Figures 24-28

Dorsal views of *Frankliniella* spp. 24. *pallida* (Uzel) & from Germany; 25. *Idem et Ibidem*, %. 26. *pallidatagetes* sp. nov. Holotype &. 27. *bicoloripallida* sp. nov. Holotype &. 28. *seneciopallida* sp. nov. Holotype %. Scale in Fm, same (400 X) for all figures.

### TAXONOMIC LIST

1. *Frankliniella bicoloripallida* sp. nov.
2. *Frankliniella pallida* (Uzel)
3. " *seneciopallida* sp. nov.
4. " *pallidatagetes* sp. nov.

#### Key to the species in the *Frankliniella pallida* (Uzel) species assemblage

1. Pronotum with a median transverse row of only two setae ..... 2
  - Pronotum with a median transverse row of about six setae forming an ellipsoid. Mouth-cone broadly rounded and very short ..... ***F. pallidatagetes*** sp. nov.
2. Mouth-cone longer than head's dorsal length; pronotum with a pair of subposteromarginal setae. Body clear yellow or bicolored ..... 3
  - Mouth-cone very much shorter than head's dorsal length; pronotum lacking subposteromarginal setae. Body color yellow ..... ***F. seneciopallida*** sp. nov.
3. Body completely clear yellow. Pronotum with a transverse setae row at center, but with the setae very apart between them. From Europe ..... ***F. pallida*** (Uzel)
  - Body bicolored: dark chestnut brown in head and thorax, clear yellow in abdomen. Pronotum smooth at center and with some striae in both anterior and posterior margins; median transverse row with close together setae ..... ***F. bicoloripallida*** sp. nov.

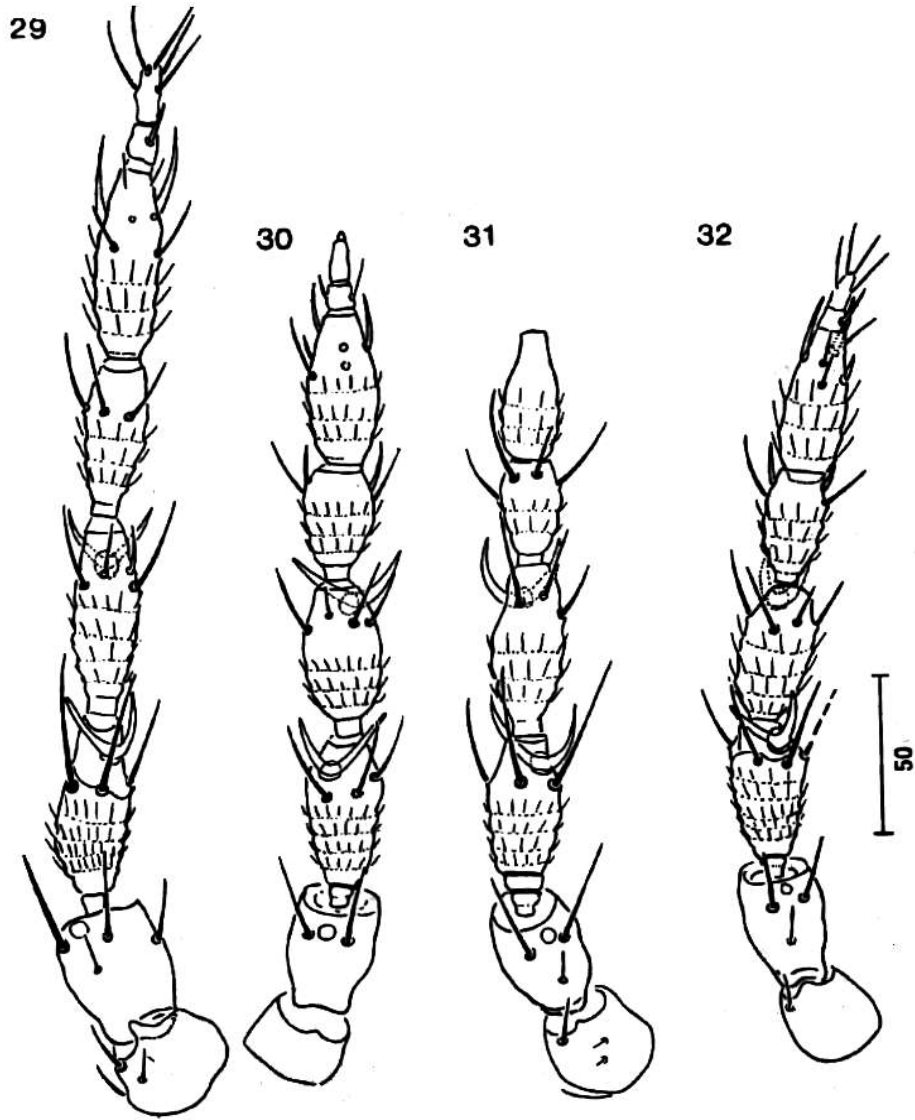
#### ***Frankliniella bicoloripallida* sp. nov.**

(Figs. 27, 30, 38, 44, 66)

**Female.** Body color bicolored: light brown in head and thorax; clear yellow in abdomen. Antennal segments: I light yellowish-brown; II light yellowish-brown, yellow at apex; III whitish-yellow; IV yellowish-brown in basal one half, the rest light brown; VII-VIII light brown. All femora, tibiae and tarsi yellow. Fore wings yellow; hind wings whitish-yellow. Ocellar crescents crimson red. Body setae yellow. Head in dorsal aspect (Fig. 27), broader (1.55 times) than long at middle, with same width at eyes and these slightly protruding; chaetotaxy as follows: antecellars (pair I) and postoculars i-iii shorter than one ocellar diameter; antecellars (pair II) longer; interocellars (pair III) 2.5 times longer than one ocellar diameter. Antennal segments (Fig. 30) typical in the group, III the longest. Mouth-cone pointed and longer than head's dorsal length. Thorax; pronotum (Fig. 27) almost smooth, with some transverse striae in anterior and posterior margins; with two minor anteromarginal setae two in the transverse row and another subposteromarginal pair; metanotal scutum (Fig. 38). Abdomen; tergites VIII-X (Fig. 44).

**Measurements** (Holotype & in Fm). Body length: 1.17 mm.

Head dorsal length: 90. Width at eyes: 132, behind eyes: 130, middle: 140, basal: 132. Chaetotaxy, intocc: 30, postoc: IV 20. Compound eyes, length: 54, width: 40; ocelli, fore: 12, hind: 12. Antennal segments length (width): I 26, II 32 (24), III 46 (20), IV 40 (20), V 32, VI 40, VII 8, VIII 10. Thorax; pronotum, length: 108, width at middle: 150; chaetotaxy, major setae: AA 50, AM 30; PA, outer: 54, inner: 60. Mesothorax, width: 230; metathorax,



Figures 29-32

Dorsal views of the antennae from *Frankliniella* spp. 29. *pallida* (Uzel) & (right) from Germany. 30. *bicoloripallida* sp. nov. Holotype & (left). 31. *pallidatagetes* sp. nov. Holotype & (right). 32. *seneciopallida* sp. nov. Holotype % (right). Scale in Fm, same (1000 X) for all figures.

width: 200. Fore wings width, basal: 60; vein chaetotaxy, fore: 23, hind: 18. Abdomen; width at segment IV: 244. Tergite IX setae; IX i: 64, IX ii: 90. Tergite X setae, X i: 106.

**Material examined.** Holotype &. MEXICO; PUEBLA: Sierra Madre Oriental-Volcanic Range, 2 km E of Esperanza, Pue. near interstate border line Puebla-Veracruz, 2300 m.; 26-V-1974; in flowers of *Senecio salignus* (Roberto M. Johansen), in IBUNAM.

**Comments.** The adult female of *Frankliniella bicoloripallida* sp. nov., is close to those of *F. pallida* (Uzel) from Europe. However, they are different from *F. seneciopallida*, because both share the following characters: the mouth-cone is longer than head's dorsal length and the pronotum bears a median pair of subposteromarginal setae; in *F. seneciopallida* the mouth-cone is very much shorter than head's dorsal length and the pronotum lacks the median pair of subposteromarginal setae. Furthermore, *F. pallida* is completely light yellow, whereas *F. bicoloripallida* is bicolored: dark brown in head and thorax, clear yellow in all legs and abdomen.

**Derivatio nominis:** from Latin, bicolor = of two colors, pallida = pale, in allusion to the related species *pallida*.

***Frankliniella pallida* (Uzel)**

(Figs. 24-25, 29, 33-34, 39-40, 45-47, 66)

**Material examined.** GERMANIA, Nieder Sachsea Perestorf krs. Dannenberg; 11-VI-1966; 1 ♂, 1 ♀ in flowers of *Sedum acre* L. (E. Titschack), in IBUNAM.

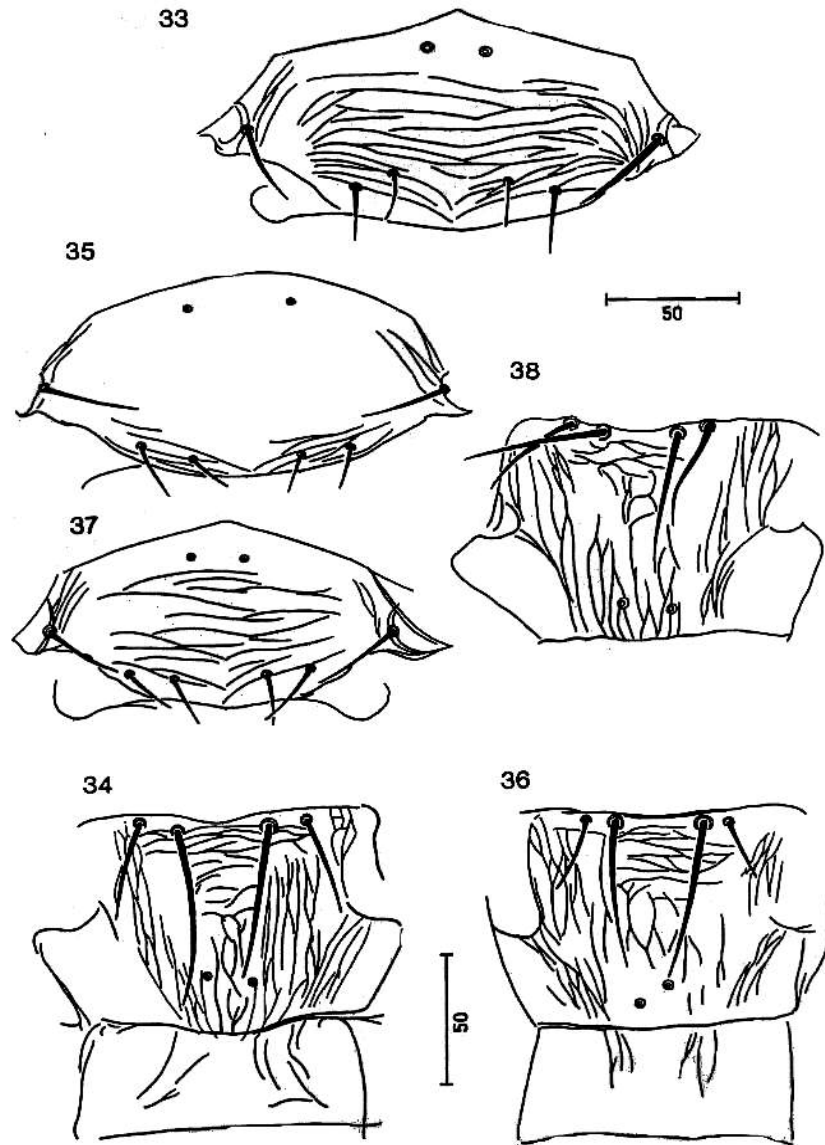
***Frankliniella seneciopallida* sp. nov.**

(Figs. 28, 32, 37, 43, 49-50, 66)

**Male.** Body color clear yellow, with yellow-orange subhypodermal pigment, except: antennal segments, I whitish-yellow; II-III yellow; IV-V yellow basally in one half and two thirds respectively, the rest dark brown, VI yellow in basal one half, the rest dark brown, VII-VIII dark brown. Fore and hind wings with typical coloration in the assemblage. Ocellar crescents orange. Body setae yellowish-brown. Head in dorsal aspect (Fig. 28), broader at eyes and 1.3 times broader than long at middle, narrower at base. Compound eyes slightly protruding; chaetotaxy as follows: antecellars (pairs I-II) shorter than one hind ocellar diameter, interocellars (pair III) between fore and hind ocelli, 3.0 times longer than one ocellar diameter; postocular i and iii longer than ii. Antennal segments typical (Fig. 32), III and VI subequal in length. Mouth-cone very much shorter than head's dorsal length. Thorax; pronotum (Fig. 28) sculptured with fine and faint transverse striae; chaetotaxy as follows: two minor anteromarginals, and two setae in the median transverse row, without any subposteromarginal setae. Mesonotum (Fig. 37), pterosternum (Fig. 43). Abdomen; tergites VIII-X (Fig. 50); sternites II-VII each with an ellipsoid transverse glandular area (Fig. 49).

**Measurements.** (Holotype ♀ in Fm). Body length: 1.035 mm.

Head dorsal length: 94, width at eyes: 124, behind eyes: 122, at middle: 122, at base: 114. Chaetotaxy, intocc: 30, postoc: i-iii 10, IV 12. Compound eyes, length: 54, width: 36; ocelli, fore: 8, hind: 10. Antennal segments, length (width): I 22 (20), II 30 (20), III 40 (18),



Figures 33-38

Dorsal views of pteronota from *Frankliniella* spp. adults. 33. *pallida* (Uzel) & from Germany, mesonotum; 34. *Idem et Ibidem*, metanotal scutum and scutellum. 35. *pallidatagetes* sp. nov. Holotype & mesonotum; 36. *Idem*. metanotal scutum and scutellum. 37. *seneciopallida* sp. nov. Holotype % mesonotum. 38. *bicoloripallida* sp. nov. Holotype & metanotal scutum. Scales in Fm, same (1000 X) for all figures.



IV 36 (18), V 30 (16), VI 40 (16), VII 6 (6), VIII 10 (4). Thorax; pronotum, length: 102, width at middle: 134; chaetotaxy, major setae: AA 42, AM 34; PA, outer: 46, inner: 50; minor setae: aa 12, am 10; pm i: 14, ii 30, iii 12. Mesothorax, width: 192; metathorax, width: 162. Fore wings width, middle: 50; vein chaetotaxy, fore: 22, hind: 15. Abdomen; width at segment IV: 144. Tergite IX setae, IX i: 28.

**Material examined.** Holotype ♀, paratypes: 2 ♀♀. MEXICO; MICHOACAN: Sierra de Mil Cumbres (Volcanic Range), km 188 on road Méx-15, 2800 m.; 23-IV-1977 (Holotype ♀), in flowers of *Senecio tolucanus* within *Abies-Pinus* Forest (Roberto M. Johansen), in IBUNAM; *Idem*, Sierra Madre del Sur, Municipio de Gabriel Zamora, El Guaco (near Apatzingán), 500 m.; 21-V-1997 (paratypes: 2 ♀♀, in flowers of *Mangifera indica* L. (J. Gabriel Gutierrez), IBUNAM.

**Comments.** See *Frankliniella bicoloripallida*.

**Derivatio nominis:** from Latin, *senecio* = old, *pallida* = clear; in allusion to the host plant and a related species.

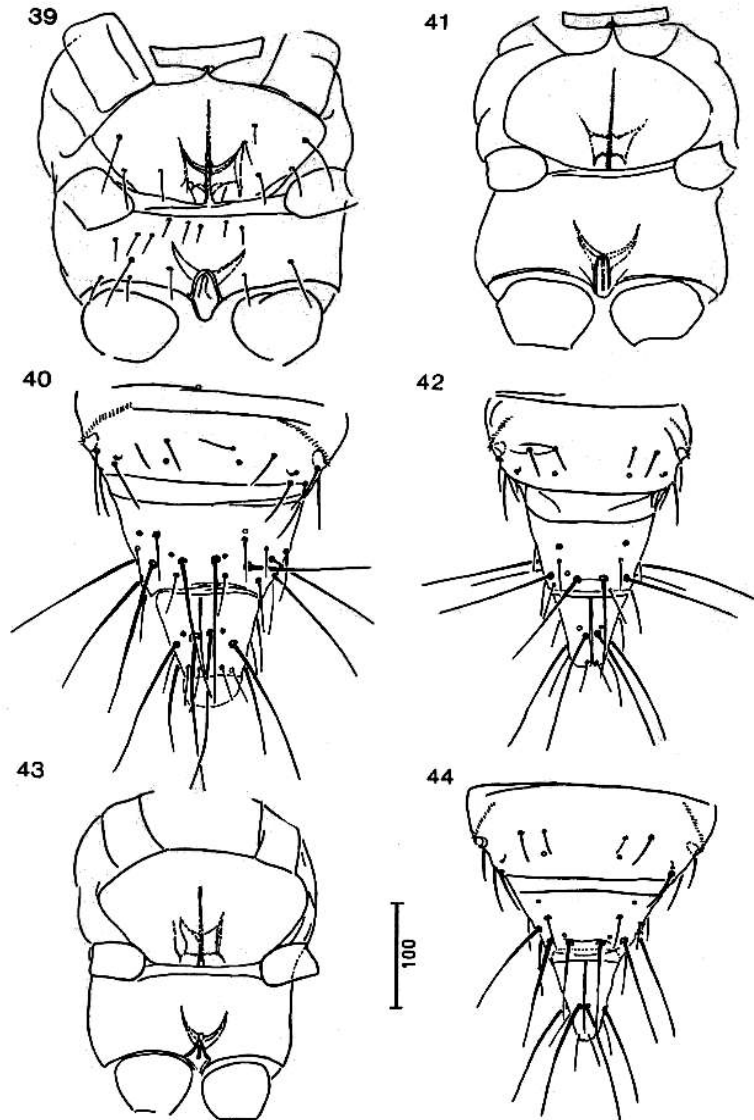
***Frankliniella pallidatagetes* sp. nov.**

(Figs. 26, 31, 35-36, 41-42, 48, 66)

**Female.** Body bicolored: yellow in head and thorax (pronotum lighter), with yellow subhypodermal pigment; abdomen light yellowish-brown in segments I-V, becoming darker in segments VI-X. Antennal segments, I-II whitish-yellow, III whitish-yellow, light brown in apical one fifth, IV whitish-yellow, dark brown in apical two thirds, V whitish-yellow, dark brown in apical one half, VI whitish-yellow, dark brown in apical four fifths, VII-VIII dark brown. Fore legs, femora dark brown, yellow in apical one half, tibiae and tarsi yellow; middle and hind legs, femora dark brown, yellow in both ends; tibiae yellow, dark brown at middle; tarsi yellow. Fore wings yellowish-white, hind wings white. Ocellar crescents orange. Body setae dark brown. Head in dorsal aspect (Fig. 26) broader at eyes, narrowed behind eyes and 1.1 times broader than long at middle; compound eyes slightly protruding; chaetotaxy as follows: antecellars (pairs I-II) longer than one ocellar diameter and postoculars i-iii; interocellars (pair III) 3.28 times longer than one ocellar diameter, between fore and hind ocelli. Antennal segments (Fig. 31) typical in the group, III the longest. Mouth-cone very much shorter than head's dorsal length. Thorax; pronotum (Fig. 26) faintly sculptured with transverse striae; chaetotaxy as follows: two minor anteromarginals; median row with six setae, two posterior advanced; four subposteromarginals; posteromarginals ii slightly shorter than interocellars. Mesonotum (Fig. 35), with the anterior campaniform sensilla very apart; metanotal scutum (Fig. 36); pterosternum (Fig. 41). Abdomen; tergites VIII-IX (Fig. 42).

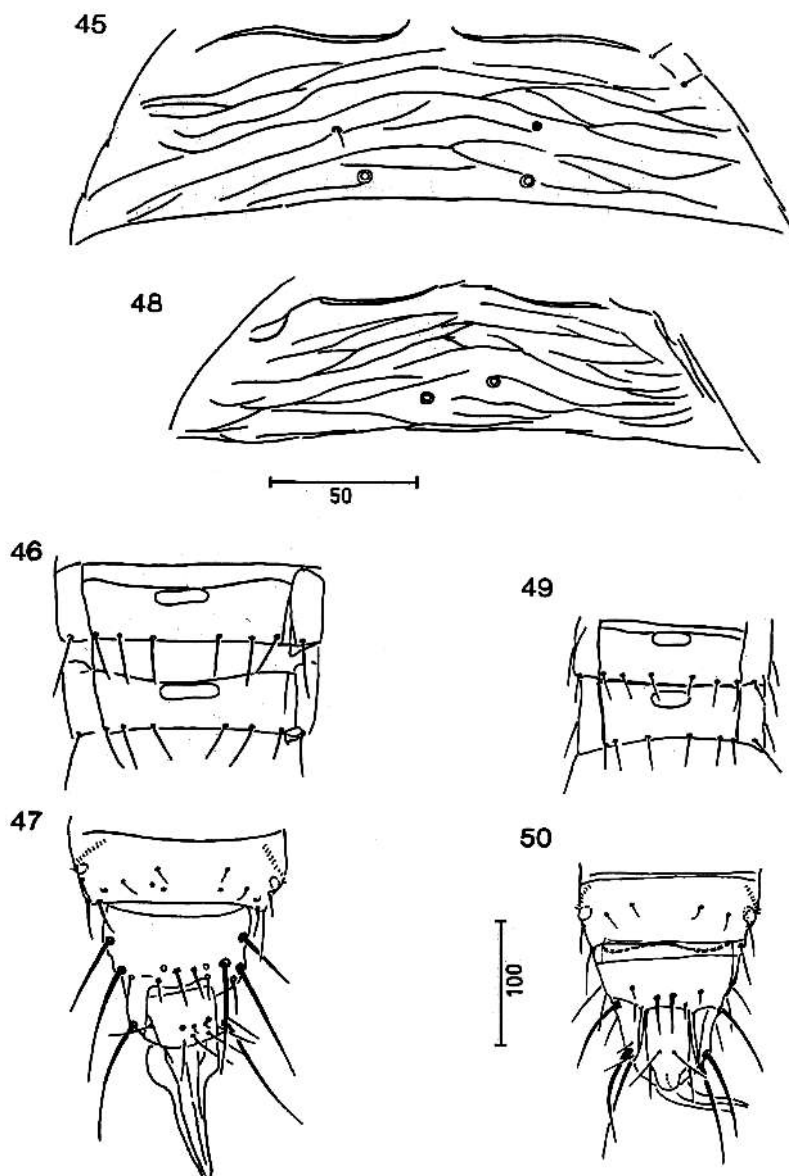
**Measurements.** (Holotype & in Fm). Body length: 1.52 mm.

Head dorsal length: 120. Width at eyes: 140, behind eyes: 130, at middle: 132. Chaetotaxy, intocc: 46, postoc: i-iii 12, IV 24. Compound eyes, length: 80, width: 50; ocelli, fore: 14, hind: 14. Antennal segments, length (width): I 22 (28), II 26 (22), III 50 (20), IV 42 (18), V 30 (16), VI 34 (16), VII 6 (6), VIII 12 (4). Thorax; pronotum, chaetotaxy, major setae: AA 50, AM 50; PA, outer: 60, inner: 60; minor setae: aa 16, am 16; pm i: 16, ii: 40, iii: 16. Mesothorax, width: 190; metathorax, width: 225. Fore wings width, basal: 70,



Figures 39-44

Figs. 39, 41 and 43 Ventral views of pterosterna and figs. 40, 42, 44 Dorsal views of tergites VIII-X from *Frankliniella* spp. adults. 39. 40 *pallida* (Uzel) & from Germany. 41-42 *pallidatagetes* sp. nov. Holotype &. 43. *seneciopallida* sp. nov. Holotype ♀. 44. *bicoloripallida* sp. nov. Holotype &. Scale in Fm same (400 X) for all figures.



Figures 45-50

Dorsal and ventral views of *Frankliniella* spp. adults. 45. *pallida* (Uzel) from Germany, & Tergite I; 46. *Idem et Ibidem*, % sternites VI-VII; 47. *Idem*, % tergites VIII-X. 48. *pallidatagetes* sp. nov. Holotype & tergite I. 49. *seneciopallida* sp. nov. Holotype % sternites VI-VII; 50. *Idem*, tergites VIII-X. Scales in Fm same (400 X) for figures 46-47, 49-50; same (1000 X) for figures 45, 48.

**Johansen: *Frankliniella*, species assemblages in "Intonsa group"**

middle: 50; vein chaetotaxy, fore: 19, hind: 18. Abdomen; width at segment IV: 270. Tergite IX setae, IX i: 80, IX ii: 100. Tergite X setae, X i: 100.

**Material examined.** Holotype &. MEXICO; MORELOS: Sierra de Tepoztlán (Volcanic Range), 10 km E of Tepoztlán, 1400 m.; 17-XI-1973; in flowers of *Tagetes birradiata* (Roberto M. Johansen), in IBUNAM.

**Comments.** The adult female of *Frankliniella pallidatagetes* sp. nov., is different from those in the other three species in the assemblage, because the pronotal chaetotaxy has the median transverse row with six setae, the median pair posterior displaced.

**Derivatio nominis:** from Latin, *Tagetes* an Asteraceae genus, *pallida* = clear; in allusion to the host plant and related species.

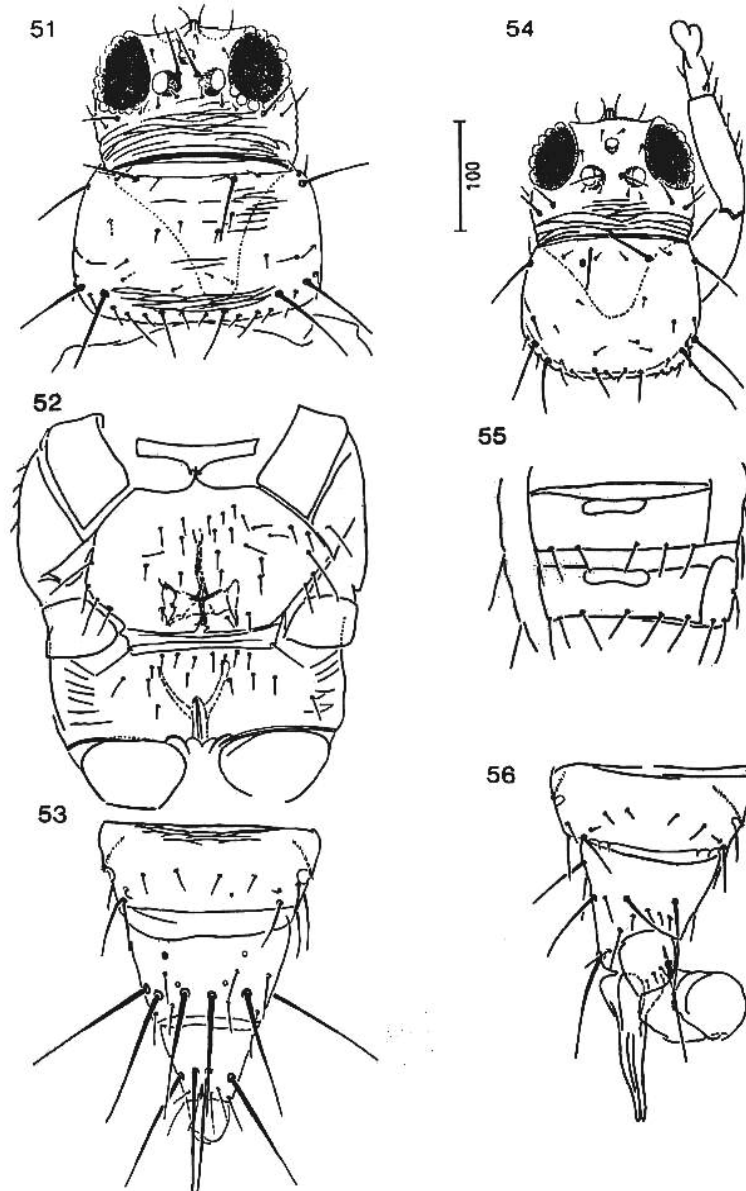
#### **The *Frankliniella schultzei* (Trybom) species assemblage.**

**Diagnosis.** Small species (females: 1.2-1.5; males: 1.0-1.06 mm. in length) in the Intonsa group. Body color predominantly dark chestnut to blackish-brown, or bicolored (head yellowish, pronotum yellow to light brown; pterothorax brownish-yellow; abdomen dark chestnut brown); males dark chestnut-brown like the females, or lighter in thorax and antennae. Subhypodermal pigment orange. Fore wings dark brown to yellowish-brown, with a white basal and transverse band, lighter in the males; hind wings clear yellow. Ocellar crescents orange. Body setae brown.

**Morphology.** Head in dorsal aspect (Figs. 51, 54, 61), broader than long at middle; cheeks somewhat convex; occiput sculptured with parallel and confluent (at center and both sides) striae; chaetotaxy as follows: interocellars (pair III) between hind ocelli or between fore and hind ocelli; postocular setae formula, females: i-iii, IV; males: ii-iii, IV. Compound eyes ellipsoidal, slightly or not protruding. Antennal segments (Fig. 57) typical in the group, III with slightly fungiform pedicel. Mouth-cone pointed, longer to shorter than head's dorsal length. Pronotum (Figs. 51, 54, 61) almost smooth to faintly sculptured with transverse striae, stronger in posterior margin; chaetotaxy as follows: median transverse row with 2-4 setae; 2-3 subposteromarginal setae. Mesonotal plate (Figs. 58, 63); metanotal scutum (Fig. 59, 64), without a pair of campaniform sensilla; pterosternum (Figs. 52, 62). Abdomen; tergite I (Fig. 60); tergites VIII-X (Figs. 53, 56, 65). Females with a complete or without a posteromarginal comb in tergite VIII. Males, sternites II-VII each with a oblong transverse glandular area (Fig. 55), always without in tergite VIII.

**Specific differential characters.** Body size and proportions vary between adults of the species. Body color is also variable. There are some differences in the interocellar setae length. The pronotal sculpture and chaetotaxy are variable. The meso- and metanotal sculpture also varies.

**Comments.** The *Frankliniella schultzei* (Trybom) species assemblage, is different because of the following characters: body color and the fore wings color; the metanotal scutum without campaniform sensilla (a shared characters in some species in the "Minuta group"); females and males without a comb in tergite VIII (only present by 1-2 very short microtrichia, in both sides) or only present in females. The lack of the campaniform sensilla in the metanotal scutum is a distinctive character of this assemblage and some species in the "Minuta group" and it is considered an apotypic character in the sense of Retana (1998).



Figures 51-56

Dorsal and ventral views of *Frankliniella schultzei* (Trybom) adults. 51. Head and pronotum of ♂; 52. *Idem*, pterosternum (ventral); 53. *Idem*, tergites VIII-X. 54. Head, pronotum and right fore leg of ♀; 55. *Idem*, sternites VI-VII (ventral); 56. *Idem*, tergites VIII-X. Scale in Fm, same (400 X) for all figures.

TAXONOMIC LIST

1. *Frankliniella hemerocallis* J.C. Crawford
2. *Frankliniella schultzei* (Trybom)
3. *Frankliniella zapotecofusca* sp. nov.

Key to the species in the *Frankliniella schultzei* (Trybom) species assemblage

1. Tergite VIII with the two pairs of median setae broadly apart. . . . . 2  
- Tergite VIII with the two pairs of median setae regularly spaced. From South America, South Africa, Australia, Tonga Islands (Polynesia) . . . . . ***F. schultzei*** (Trybom)
2. Interocellar setae (pair III) long (3.0 times longer than one hind ocellar diameter) and between fore and hind ocelli. Adult female with a complete posteromarginal comb in tergite VIII (absent in the males). From Bermuda, Costa Rica, United States of America (Continental), Hawaii and Japan . . . . . ***F. hemerocallis*** J.C. Crawford  
- Interocellar setae (part III) short (2.0 times longer than one hind ocellar diameter) and between hind ocelli. Adult female without a posterior comb in tergite VIII. From Mexico . . . . . ***F. zapotecofusca*** sp. nov.

***Frankliniella hemerocallis* J.C. Crawford**  
(Figs. 66-75)

*Frankliniella hemerocallis* J.C. Crawford, 1948: 83  
*Frankliniella hemerocallis* J.C. Crawford; Jacot-Guillarmod, 1974: 782  
*Frankliniella hemerocallis* J.C. Crawford; Mound & Marullo, 1996: 141  
*Frankliniella hemerocallis* J. C. Crawford; Nakahara, 1997: 365.  
**Derivatio nominis:** from Greek, hemera= day; kallos= beauty, the flowers last for only one day.  
**Material examined.** Paratypes: 1 ♂ (58495), 1 ♀ (58495). UNITED STATES OF AMERICA; Wisconsin: Lake Geneva; 7-VII-1944; on *Hemerocallis* (E.J. Krauss), in USNM.

***Frankliniella schultzei* (Trybom)**  
(Figs. 51-56)

*Physopus schultzei* Trybom, 1910: 151  
*Frankliniella schultzei* (Trybom); Karny, 1912: 334  
*Frankliniella schultzei* (Trybom); Moulton, 1948: 100  
*Frankliniella schultzei* var. *nigra* Moulton, 1948: 100  
*Frankliniella schultzei* (Trybom); Nakahara, 1997: 373

The adults of *Frankliniella schultzei* show contrasting color forms, like those of *F. occidentalis* (Pergande); in this way, *F. schultzei* can also be considered as a "species complex" in the sense of Bryan and Smith (1956).

In this study, specimens from Tonga, South Africa and Australia were examined. The females from Tonga are bicolored, whereas the males are yellow. The South African specimens are dark chestnut-brown in the females, but bicolored in the males (the

abdomen is yellow, tergites I-VII each with a dark brown median spot). The Australian specimens are blackish chestnut brown. The various synonyms (see Nakahara, 1996), are an evidence of this variable species. The adults of both sexes, lack the posteromarginal comb or this is present in a very rudimentary condition (Fig. 56). according to Monteiro, Mound & Zucchi (2001).

*Frankliniella ipomoeae* Moulton (1948) is not a synonym of *F. schultzei* as Mound and Marullo (1996) stated, because of the following characters: in *F. ipomoeae*, 1. The smaller body size; 2. Body color clear yellow, with orange subhypodermal pigment; 3. Fore wings are clear yellow; 4. Pronotum lacks setae at center; 5. Metanotal scutum bears a pair of campaniform sensilla; 6. Both female and male adults have a complete posteromarginal comb in tergite VIII. Alternatively, in *F. schultzei*, 1. The body size is larger; 2. Body color is dark blackish brown to bicolored (head yellowish, pronotum brown to yellow, pterothorax yellowish-brown, abdomen dark brown); 3. Fore wings are predominantly brown, with a white basal transverse band; 4. The pronotum has a median transverse row of 2-4 setae; 5. Metanotal scutum lacks a pair of campaniform sensilla; 6. Adult females completely lack a posteromarginal comb in tergite VIII, whereas in the males it is only present in both sides, by two very short microtrichia.

The above disagreement, is based in the examination of the types of *Frankliniella ipomoeae* Moulton, deposited in the California Academy of Sciences.

The additional problem with this erroneous synonymy, is that it was followed by other colleagues, as happened with Nakahara (1997).

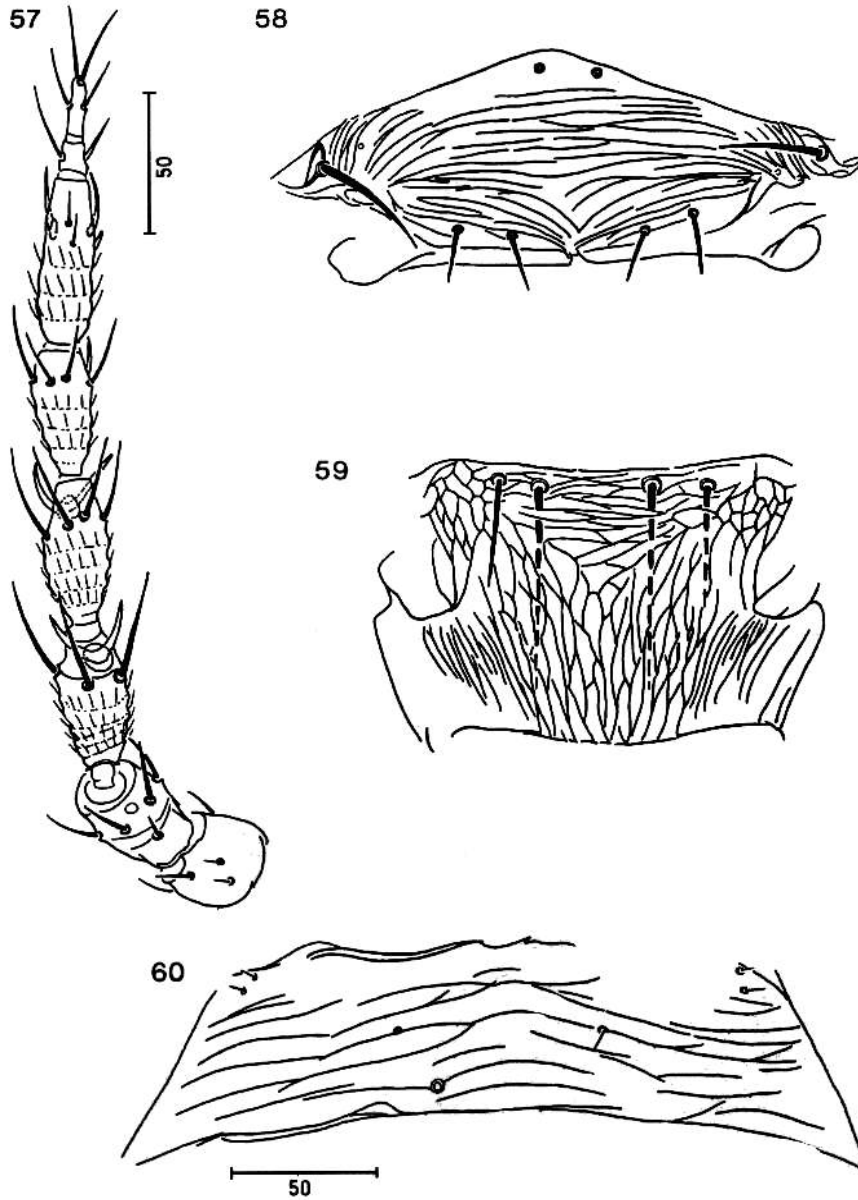
**Material examined.** Syntypes: 9 ♂♂, 1 ♀ (CAS Type No. 10764) of *Frankliniella schultzei* var. *nigra* Moulton. AUSTRALIA: Guild-Ford; 23-IV-1932 (Bennet/No. 5098), in CAS. TONGA ARCHIPIEL (MELANESIEN): Ins. Vavau Neiapu; 24-I-1980; 1 ♂, 1 ♀ (N.L.H. Kraus), in IBUNAM. SOUTH AFRICA: ORANGE FREISTAAT, Bloemfontein; VIII-1980; 1 ♂, 1 ♀ in *Triticum aestivum* L. (D.H. Hewill), in IBUNAM.

***Frankliniella zapotecafusca* sp. nov.**

(Figs. 61-66)

**Female.** Body dark chestnut brown, with abundant orange subhypodermal pigment, except: antennal segments, III-V whitish-yellow; VI whitish-yellow in basal one half, the rest dark brown; VII-VIII yellowish-brown. Fore legs, femora dark brown, whitish-yellow in inner margin; tibiae whitish-yellow; median and hind legs: femora dark brown; tibiae dark brown at middle, whitish-yellow in both ends; all tarsi whitish-yellow. Fore wings dark brown, with a white transverse band in basal fourth; hind wings whitish-yellow. Ocellar crescents orange. Body setae dark brown. Head in dorsal aspect (Fig. 61) broader (1.38 times) at middle, narrower at eyes; compound eyes not protruding; chaetotaxy as follows: antecellars (pairs I-II) and postoculars i-iii shorter than one hind ocellar diameter; interocellars (pair III) 2.0 times longer than one hind ocellar diameter, between hind ocelli. Antennal segments typical in the group IV and VI the longest. Mouth-cone much shorter than head's dorsal length. Thorax; pronotum (Fig. 61) almost smooth, but with some faint transverse striae at middle forming a triangle with forwards base; chaetotaxy as follows: two minor anteromarginals; median row with two setae: two subposteromarginals. Mesonotum (Fig. 63); metanotal scutum (Fig. 64), pterosternum (Fig. 62). Abdomen, tergites VIII-X (Fig. 65).

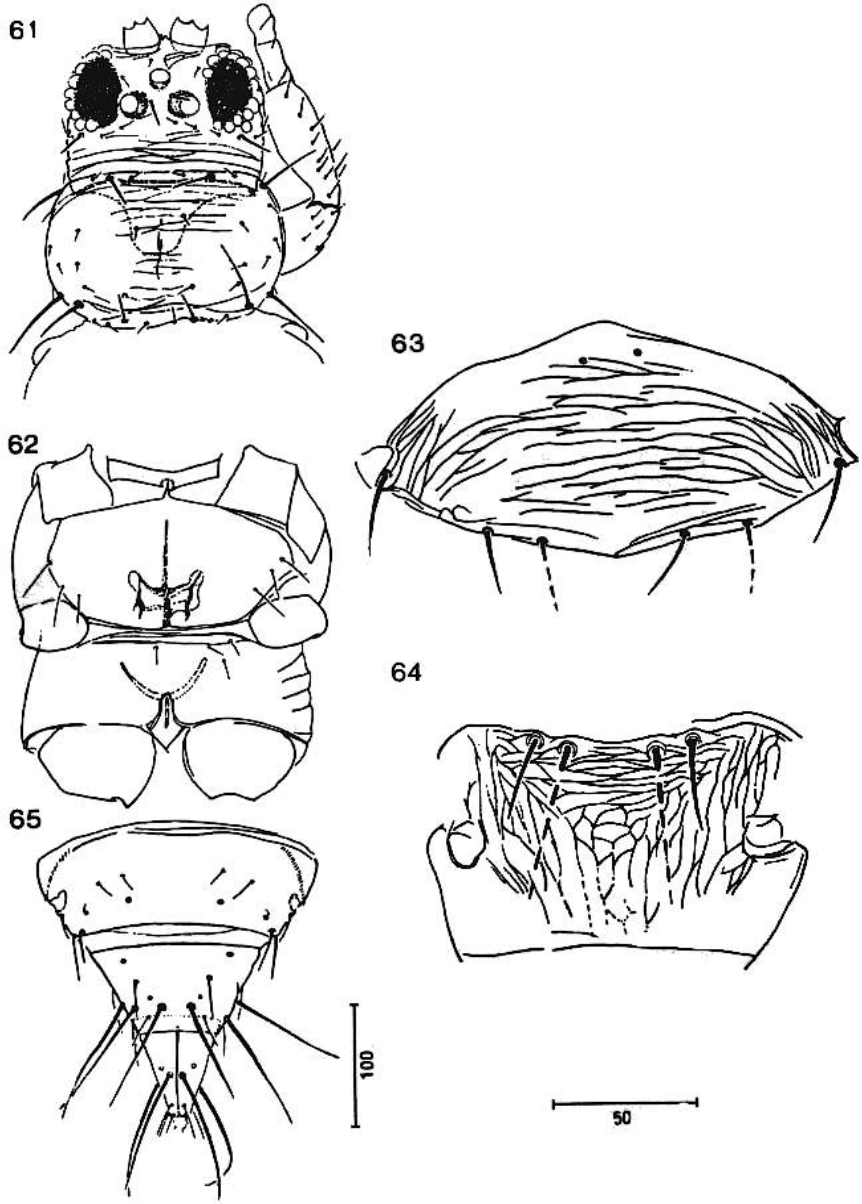
Johansen: *Frankliniella*, species assemblages in "Intonsa group"



Figures 57-60

Dorsal aspects of *Frankliniella schultzei* (Trybom) adult &. 57. Right antenna; 58. *Idem*, mesonotum; 59. *Idem*, metanotal scutum; 60. *Idem*, tergite I. Scale in Fm, same (1000 X) for all figures.





Figures 61-65

Dorsal and ventral views of *Frankliniella zapotecafusca* sp. nov. Holotype ♂. 61. Head, pronotum and right fore leg; 62. Pterosternum; 63. Mesonotum; 64. Metanotal scutum; 65. Tergites VIII-X. Scales in Fm, same (400 X) for figures 61-62, 65; same (1000 X) for figures 63-64.

**Johansen: *Frankliniella*, species assemblages in "Intonsa group"**

**Measurements.** (Holotype & in Fm). Body length: 1.21 mm.

Head dorsal length: 98. Width at eyes: 132, behind eyes: 134, at middle: 136, at base: 134. Chaetotaxy, intocc: 24, postoc: i 10, ii 10, iii 10. Compound eyes, length: 64, width: 44; ocelli, fore: 12, hind: 12. Antennal segments, length (width): I 20 (24), II 30 (22), III 36 (20), IV 38 (16), V 26 (12), VI 38 (12), VII 8 (6), VIII 10 (4). Thorax; pronotum, length: 118, width at middle: 166; chaetotaxy, major setae: AA 42, AM 26; PA, outer: 50, inner: 36; minor setae: aa 10, am 10; pm i: 10, ii: 20, iii: 10. Mesothorax, width: 206; metathorax, width: 200. Fore wings width, basal: 94, middle: 50; vein chaetotaxy, fore: 21, hind 15. Abdomen; width at segment IV: 220. Tergite IX setae, IX i: 72, IX ii: 88. Tergite X setae, X i: 94.

**Material examined.** Holotype &. MEXICO; OAXACA: Sierra de Juárez (Sierra Madre Oriental), km 157 on road Méx-175 Oaxaca-Tuxtepec, 710 m.; 10-III-1978; in flowers of an Asteraceae (*Bidens* sp. ?), in IBUNAM.

**Comments.** Adults of *Frankliniella zapotecafusca* sp. nov. are very related to those of *F. schultzei* (Trybom). However in *F. zapotecafusca* the interocellar setae are much shorter. *Derivatio nominis*: zapoteca = an ancient people, language, and culture from Oaxaca, Mexico; from Latin, *fusca* = in allusion to a related species.

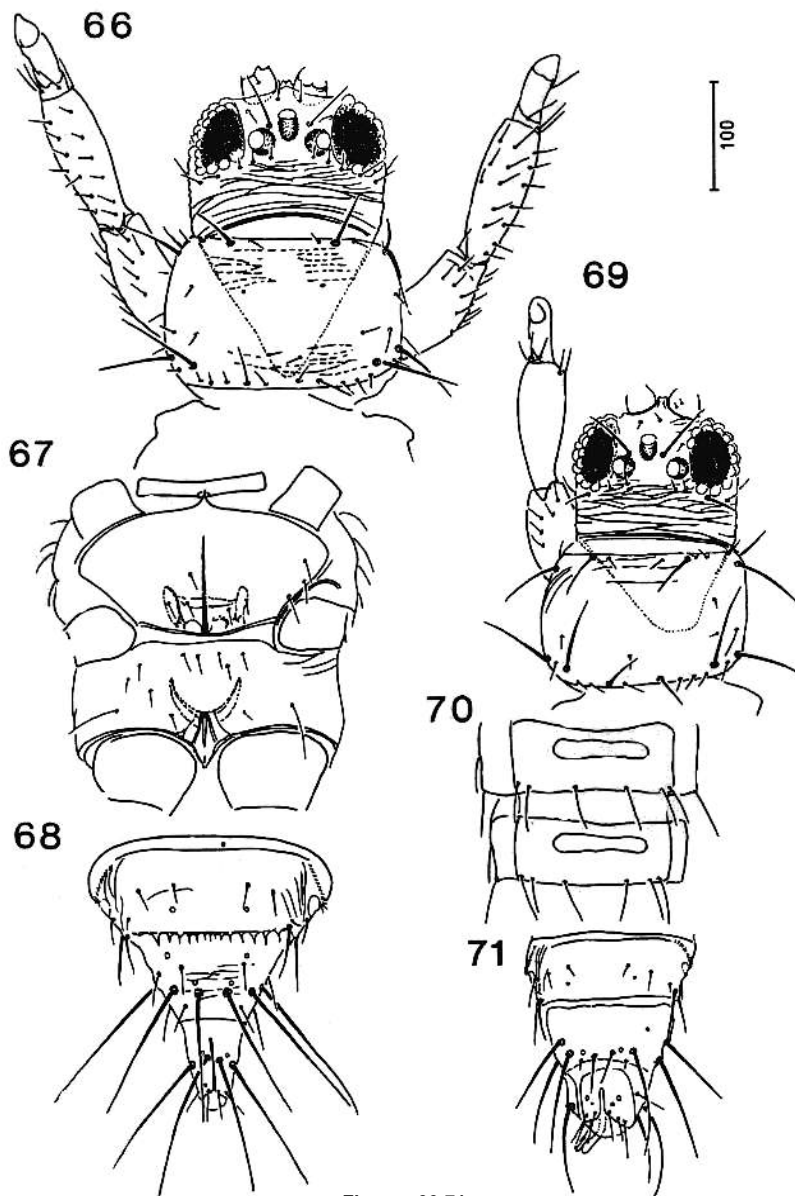
**Geographic distribution.**

The *Frankliniella fusca* (Hinds) species assemblage, has a recent distribution in Mexico mainly in the Sierra Madre Oriental (710-166 m.), and the intersection of the Volcanic Range and the Sierra Madre Oriental (2265-2300 m.) in the central part of the State of Veracruz and its border line with the state of Puebla. There also some undetermined Mexican places as a result of some interceptions by U.S.D.A inspector, in the Mexico-United States border (see examined material in *F. fusca*). The *Frankliniella pallida* (Uzel) species assemblage has a recent distribution in Mexico, in the Sierra Madre Oriental (2300 m.) and the Volcanic Range (1400-2800 m.). The highest recorded altitude (2800 m.) at Mil Cumbres, Michoacán is for the species *F. seneciopallida*.

The *Frankliniella schultzei* (Trybom) species assemblage is only represented in Mexico, by the species *F. zapotecafusca* from the Sierra Madre Oriental (710 m.), in Oaxaca.

*Frankliniella hemerocallis*, has a recent geographic distribution in the United States of America: Florida, Maryland, New York, Wisconsin and Hawaii; Bermuda; Costa Rica; Japan, in *Hemerocallis* sp. plants.

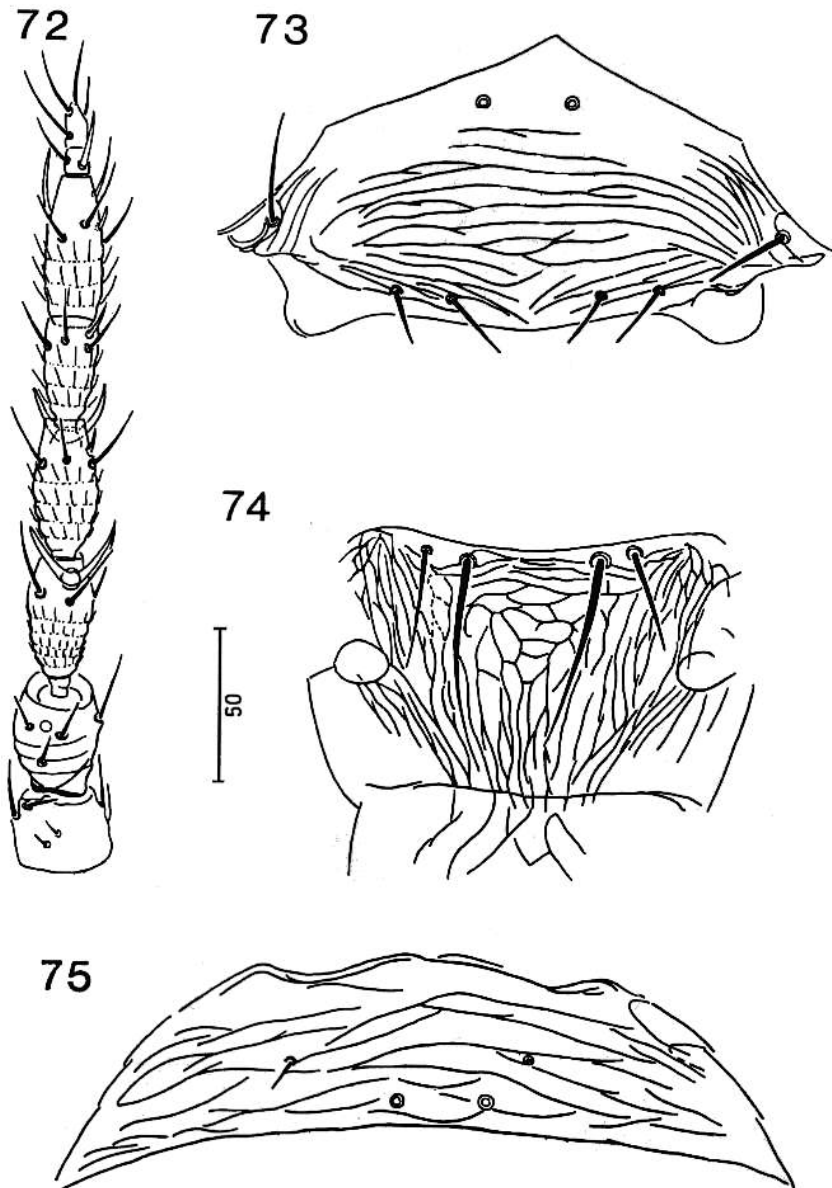
*Frankliniella schultzei* has a very broad distribution: Africa, South America, Australia and New Guinea, according to Moulton (1948). AFRICA: Camerron, Chad, Egypt, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Mauritius, Morocco, Namibia, Nigeria, Senegal, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zaire, Zimbabwe. ATLANTIC: Canary Islands, Cape Verde Islands. EUROPE: Italy, The Netherlands. ASIA: Bangladesh, India, Indonesia, Israel, Iran, Iraq, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Yemen. AUSTRALIA. PACIFIC ARCHIPIELAGOS: Johnston Island, Kiribati, Mariana Islands, Papua, New Guinea, Thaiti. NEW WORLD: Caribbean Islands: Dominican Republic, Haiti, Jamaica, Puerto Rico, St. Thome, Tortola; North America: United Staes of America, Florida; South America: Argentina, Brazil, Colombia, Guyana, Paraguay, Surinam, Uruguay, Venezuela, according to Jacot-Guillarmod (1974) and Nakahara (1977).



Figures 66-71

Dorsal and ventral views of *Frankliniella hemerocallis* J.C. Crawford adults. 66. Paratype & head, pronotum and fore legs; 67. *Idem*, pterosternum (ventral); 68. *Idem*, tergites VIII-X. 69. Paratype % head, pronotum and left fore leg; 70. *Idem*, sternites VI-VII (ventral); 71. *Idem*, tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.

Johansen: *Frankliniella*, species assemblages in "Intonsa group"



Figures 72-75

Dorsal views of *Frankliniella hemerocallis* J.C. Crawford. Paratype &. 72. Right antenna; 73. Mesonotum; 74. Metanotal scutum; 75. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

### Some ecologic data.

#### A) Natural ecosystems

The *Frankliniella fusca* (Hinds) and *F. pallida* (Uzel) species assemblages, are both inhabitants of some native vegetation types.

##### 1) *F. fusca* (Hinds) assemblage

- *F. fusca* (Hinds) was recorded in *Prunella vulgaris* (Labiatae) within Mountain Deciduous Forest (Sierra Madre Oriental).
- *F. seneciofusca* was recorded from *Senecio salignus* (Asteraceae) within *Pinus-Quercus* Forest (Sierra Madre Oriental-Volcanic Range).
- *F. vulcanofusca* was recorded from *Bidens* sp. within *Pinus* Forest (Sierra Madre Oriental-Volcanic Range)

##### 2. *F. pallida* (Uzel) assemblage

- *F. bicoloripallida* was recorded from *Senecio salignus* within *Pinus-Quercus* Forest (Sierra Madre Oriental-Volcanic Range).
- *F. seneciopallida* was recorded from *Senecio tolucanus* within *Abies-Pinus* Forest (Volcanic Range).
- *F. pallidatagetes* was recorded from *Tagetes birradiata* within Tropical Deciduous Forest (Volcanic Range).

##### 3. *F. schultzei* (Trybom) assemblage

- *F. hemerocallis* has being recorded in wild *Hemerocallis* sp. (Liliaceae) plants.
- *F. zapotecafusca* was recorded from an Asteraceae within Mountain Deciduous Forest (Sierra Madre Oriental).

#### B) Agroecosystems

*Frankliniella fusca* (Hinds) "The Tobacco Thrips", damages tobacco and peanuts, according to Stannard (1968), but it also is a cotton, clovers and alfalfa pest, according to Newson, Roussel & Smith (1953). Lewis (1973) provided the information about the complete life cycle, at fluctuating temperatures in South Carolina, U.S.A. The only record from Mexico, was taken from lettuce (*Lactuca* sp.). According to Nakahara (1997), *Frankliniella fusca* is the vector of the Tomato Spotted Wilt Virus (TSWV) in Southern Unites States of America.

*Frankliniella hemerocallis* J.C. Crawford has been recorded in cultivated *Hemerocallis* sp. plants (Costa Rica)

*Frankliniella schultzei* (Trybom) has been recorded as a vector of Spotted Wilt Disease of Tomato (TSWV), according to Moulton (1948); Monteiro, Mound, Zucchi (2001) in Brazil. In South Africa it is a vector of the Groundnut Ringspot Virus and Tomato Disease Spot Virus, according to Nakahara (1997). It has being recorded from *Triticum aestivum* L. in South Africa. Ananthakrishnan (1984) provided all the information about the complete life cycle.

Recently, Monteiro, Mound & Zucchi (2001), recorded the species in Brazil as a crop pest in: cotton (*Gossypium*), tobacco (*Nicotiana*), tomato (*Lycopersicum*). letucce (*Lactuca*), watermelon (*Citrulus*), pepper (*Capsicum*). They also recorded it as a tospovirus vector in tomato plants.

Johansen: *Frankliniella*, species assemblages in "Intonsa group"

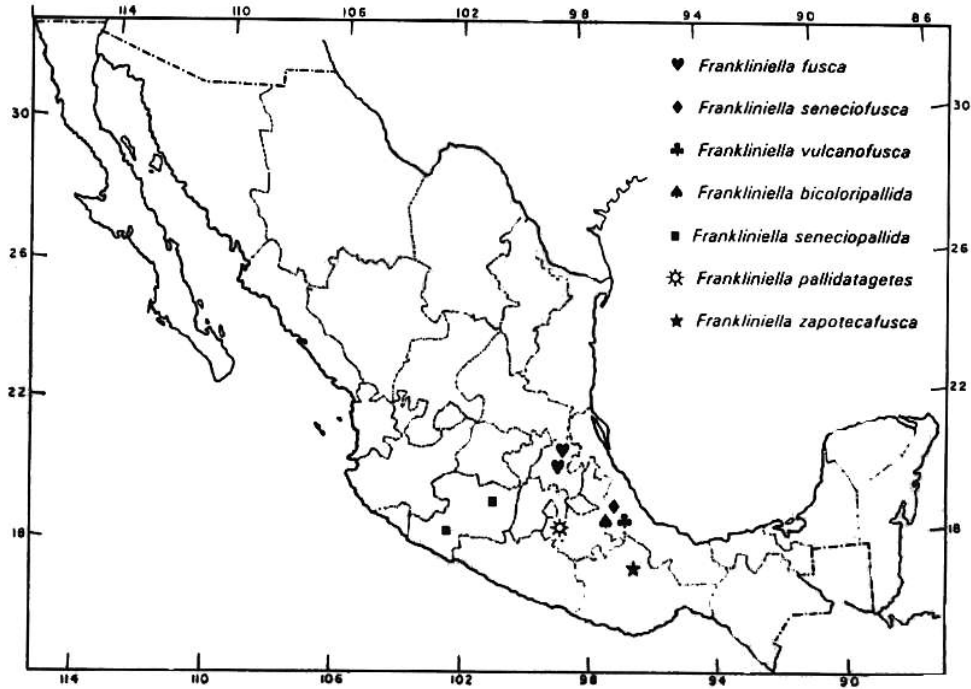


Figure 76

Distribution of *Frankliniella* spp: | - *Frankliniella fusca*. È - *Frankliniella seneciofusca*. È - *Frankliniella vulcanofusca*. | - *Frankliniella bicoloripallida*. ■ - *Frankliniella seneciopallida*. ' - *Frankliniella pallidatages*. U - *Frankliniella zapotecafusca*.

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LITERATURE CITED

- Ananthkrishnan, T.N.**, 1984. *Bioecology of Thrips*. Indira Publishing House, Michigan, U.S.A, 233 pp.
- Bryan, D.E. & R.F. Smith**, 1956. The *Frankliniella occidentalis* (Pergande) Complex in California (Thysanoptera: Thripidae). *Univ. Calif. Pub. Entomol.* 10: 359-410.
- Crawford, J.C.**, 1948. A new species of *Frankliniella* on *Hemerocallis* (Thysanoptera, Thripidae). *Proc. Ent. Soc. Wash.*, 50 (4): 83-84.
- Hinds, W.E.**, 1902. Contributions to a Monography of the Insects Thysanoptera Inhabiting North America. *Proc. U.S. Nat. Mus.* 26(1310): 79-242 + 11 pls.
- Hood, J.D.**, 1925. New species of *Frankliniella* (Thysanoptera) *Bull. Brooklyn Ent. Soc.* 20 (2): 71-82.
- Jacot-Guillarmod, C.F.**, 1974. Catalogue of the Thysanoptera of the World, Part 3. *Annals Cape Prov. Mus. (nat. Hist.)*, 7 (3): 517-976.
- Johansen, R.M.**, 1998. The Mexican *Frankliniella desertileonidum* Watson species assemblage, in the "Intonsa group" (Insecta, Thysanoptera: Thripidae) *Acta Zool. Mex. (n.s.)* 75: 143-161.
- \_\_\_\_\_. 2000. The Mexican *Frankliniella paricutinensis* sp. nov. species assemblage, in the "Intonsa group" (Insecta, Thysanoptera: Thripidae). *Acta Zool. Mex. (n.s.)* 80: 1-49.
- Johansen, R.M. & A. Mojica-Guzmán**, 1998. The Mexican *Frankliniella anitahoffmannae* sp. nov. species assemblage, in the "Intonsa group" (Insecta, Thysanoptera: Thripidae). *Acta Zool. Mex. (n.s.)* 75: 1-16.
- Lewis, T.**, 1973. *Thrips, their Biology, Ecology and Economic Importance*. Academic Press, London, 349 pp.
- Mayr, E. & P.D. Ashlock**, 1991. *Principles of Systematic Zoology, 2 Ed.* Mc Graw Hill Inc., New York, 475 pp.
- Monteiro, R.C., L.A. Mound & R.A. Zucchi**, 2001. Sistemática, Morfologia e Fisiologia Espécies de *Frankliniella* (Thysanoptera: Thripidae) de Importância Agrícola no Brasil. *Neotrop. Entomol.* 30 (1): 65-72.
- Moulton, D.**, 1948. The genus *Frankliniella* Karny, with keys for the determination of species (Thysanoptera). *Rev. Entomol. (Rio de Janeiro)*, 19 (1-2): 55-114.
- Mound, L.A & R. Marullo**, 1996. *The thrips of Central and South America: An Introduction (Insecta: Thysanoptera)*. *Mem. Entomol. Inter.* Vol. 6: 1-487.
- Nakahara, S.**, 1997. Annotated list of the *Frankliniella* species of the World (Thysanoptera: Thripidae). *Contrib. Entomol. Inter.* 2 (4): 355-389.
- Newson, L.D., J.S. Roussel & C.E. Smith**, 1953. The Tobacco Thrips. Its Seasonal History and status as a cotton Pest. *Louis. Tech. Bull.* 474: 1-36.
- Retana-Salazar, A.P.**, 1998. Una visión filogenética de *Frankliniella* (Thysanoptera: Thripidae). *Rev. Biol. Trop.* 46 (2): 397-406.
- Sakimura, K.**, 1986. Thrips in and around the coconut plantation in Jamaica, with few taxonomical notes (Thysanoptera). *Fla. Entomol.* 69: 348-363
- Sakimura, K. & K. O'Neill**, 1979. *Frankliniella* redefinition of genus and revision of Minuta group species (Thysanoptera: Thripidae). *U. S. Dept. Agr. Tech. Bull.* No: 1572: 1-49.

**Johansen:** *Frankliniella*, species assemblages in "Intonsa group"

**Stannard, L.J.**, 1968. The Thrips, or Thysanoptera, of Illinois. *Illinois. Nat. Hist. Survey Bull.* 29 (4): 215-552.

**Trybom, F.**, 1910. Physopoda. In Schultze Zoologische und Anthropologische und zentralen Südafrika, (1903-1905). *Denkschriften der Medizinisch- naturwissenschaftlichen Gessellschaft zu Jena*, 16: 147-174.

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