

# The genus *Frankliniella* in The Netherlands, with a key to the species (Thysanoptera: Thripidae)

GIJSBERTUS VIERBERGEN

---

VIERBERGEN, G., 1995. THE GENUS *FRANKLINIELLA* IN THE NETHERLANDS, WITH A KEY TO THE SPECIES (THYSANOPTERA: THIRIPIDAE). – *ENT. BER., AMST.* 55 (12): 185-192.

**Abstract:** In The Netherlands the occurrence of species of the genus *Frankliniella* is closely linked with the intensive glasshouse cultures. Four species are indigenous (*Frankliniella intonsa*, *F. nigriventris*, *F. pallida* and *F. tenuicornis*), three synanthropic (*Frankliniella fusca*, *F. occidentalis* and *F. schultzei*) and five species are only known from interceptions during import inspection (*Frankliniella bondari*, *F. borinquen*, *F. lilivora*, *F. minuta* and *F. panamensis*). Together with the indigenous *Frankliniella intonsa*, the synanthropic species settled in heated places like glasshouses and store rooms for bulbs. An identification key to both indigenous and synanthropic species is given. *Frankliniella nigriventris* is recorded for the first time for The Netherlands.

Plant Protection Service, Entomology Section, P.O. Box 9102, 6700 HC, Wageningen, The Netherlands.

---

## Introduction

The last review of *Frankliniella* species found in The Netherlands was given by Franssen & Mantel (1962). These authors recorded only indigenous species. Additionally recorded species of the genus were all introduced in the years following this overview, but not all of them actually settled.

In this paper the species of the genus found in The Netherlands are divided into three categories: indigenous, synanthropic and intercepted species. Indigenous species are species, which are known to have occurred in a certain area from the beginning of thysanoptero-logy. Synanthropic species are species, which are introduced and have established themselves in a certain area. The category of intercepted species contains introduced (im-ported) species, which are not (yet) esta-blished.

Some closely related genera, like *Irido-thrips* and *Kakothrips*, are not included here. *Iridothrips* differs from *Frankliniella* in the sense cones on antennal segments III and IV (simple in *Iridothrips* and forked in *Frankliniella*). *Kakothrips* can be distinguished from *Frankliniella* by the presence of a small apical tooth on tarsus I together with some other characters (Mound et al., 1976).

Most *Frankliniella* species feed on pollen. This relation is reflected in the frequent occur-rence of *Frankliniella* in the international trade of flowers (Vierbergen, 1992). Intercep-ted species are listed because they may be able to settle in The Netherlands.

Identification of species of *Frankliniella* is hampered by the lack of an up to date key to the species of the world. The only available identification key to the species of the world was published by Moulton in 1948. For seven Central European species keys were published by Schliephake in 1988 and 1989. Five of these Central European species also occur in The Netherlands. Together with two addi-tional species these are included here, with a key for both males and females.

## Indigenous species

*Frankliniella intonsa* (Trybom)

Distribution: Palaearctic, but also in the Orien-tal Region (Zur Strassen, 1984).

Occurrence in The Netherlands: common in flowers of many Dicotyledones. Locally set-tled in glasshouses.

First record: Van Eecke (1922), without local-ity and date.

Note: The discovery of the reproduction of this species in greenhouses in 1987 leads to



Fig. 1. *Frankliniella nigriventris* (Uzel), brachypterous ♀ (bar 0.1 mm).



Fig. 2. *Frankliniella lilivora* Kurosawa, ♀ (bar 0.1 mm).

the assumption of an introduced form originating from Southeast Asia (Vierbergen, 1988).

*Frankliniella nigriventris* (Uzel)

Distribution: Recorded from many localities in Europe, but not south of the Pyrenees and the Alps.

Occurrence in The Netherlands: Bathmen, 1992 and Hoenderloo, 1992 (leg. G. Vierbergen). In leaf rosettes of *Hieracium pilosella* L., a perennial fairly common on the diluvium and in the dunes, causing silvery spots on the upper leaf surface as a result of sucking cell fluid. Most commonly the brachypterous form of the thrips is found.

*Frankliniella pallida* (Uzel)

Distribution: Europe.

Occurrence in The Netherlands: fairly common on *Sedum acre* L.

First record: Bennekom, 1960 (Franssen & Mantel, 1962).

*Frankliniella tenuicornis* (Uzel)

Distribution: Europe and North America (introduced).

Occurrence in The Netherlands: very common and reproducing on Graminae. Also collected from the inside of the pipes of leek (*Allium porrum* L.) and onion (*Allium cepa* L.), and from non-gramineous plants in glasshouses,

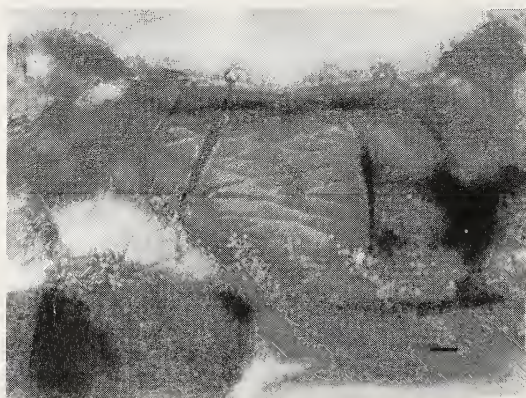


Fig. 3. *Frankliniella fusca* (Hinds), brachypterous ♀, metanotum (bar 0.01 mm).



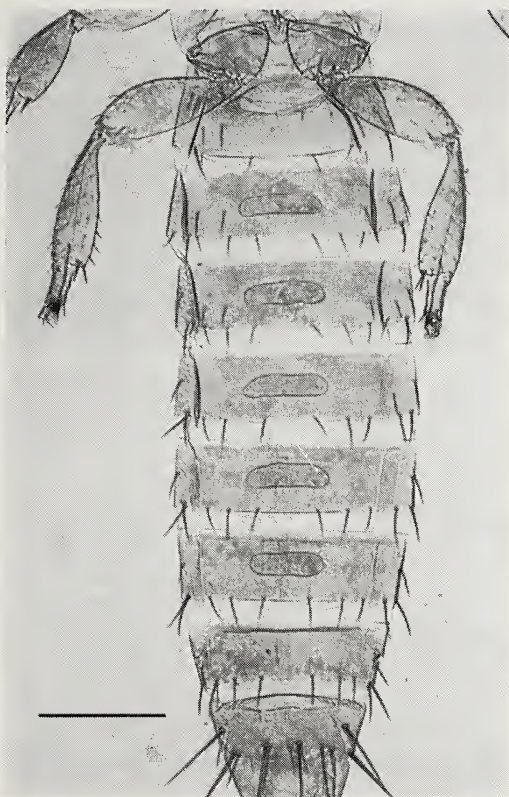


Fig. 4. *Frankliniella fusca* (Hinds), ♂, sternites I-IX (bar 0.1 mm).

but it is unknown if reproduction takes place in and on these plants.

First record: Wageningen, 1936 (Doeksen, unpublished; Franssen & Mantel, 1962).

### Synanthropic species

#### *Frankliniella fusca* (Hinds)

Distribution: North America (indigenous) and The Netherlands (introduced).

Occurrence in The Netherlands: in store rooms for bulbs of *Hippeastrum* and *Narcissus*; rare. The brachypterous form is found more commonly.

First record: Leiden, 1964 (Mantel, 1969).

#### *Frankliniella occidentalis* (Pergande)

Distribution: cosmopolitan, indigenous in Western North America.

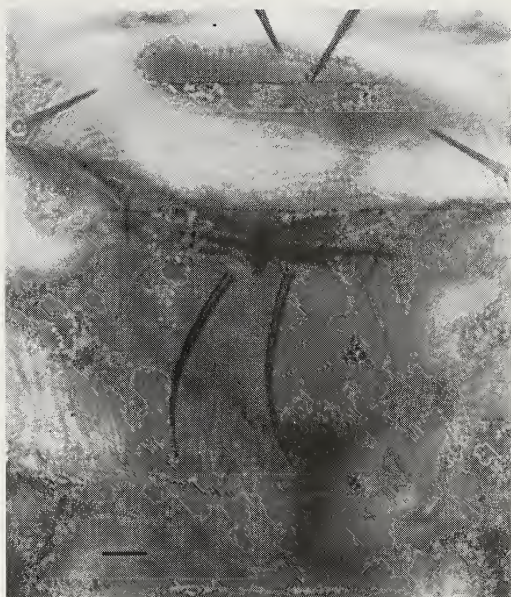


Fig. 5. *Frankliniella nigriventris* (Uzel), brachypterous ♀, metanotum (bar 0.01 mm).

Occurrence in The Netherlands: in flowers of many plant species, but sometimes also on leaves (e.g. cucumber, *Cucumis sativus* L.) and fruits (e.g. paprika, *Capsicum annuum* L. and strawberry, *Fragaria x ananassa* Duch.). Very common in glasshouses. Only the intermediate form has settled (Bryan & Smith, 1956; Vierbergen, 1988). The species can be found in the surroundings of greenhouses from May until October (Vierbergen, in press).

First record: Wageningen, 1983 (Mantel & Van de Vrie, 1988a).

#### *Frankliniella schultzei* (Trybom)

Distribution: pantropical, indigenous in South-East Asia, Africa and South America.

Occurrence in The Netherlands: found on a number of plant species, but most commonly in flowers of Cactaceae. Restricted to glasshouses and propagation rooms.

First record: Lisse, 1965, on bulbs of *Hyacinthus* in propagation rooms (Van Rossem et al., 1968; Mantel, 1968).

Note: Only the dark form has settled (Vierbergen & Mantel, 1991).





Fig. 6. *Frankliniella occidentalis* (Pergande), ♀, head (bar 0.05 mm).

### Intercepted species

#### *Frankliniella bondari* Hood

Distribution: Mexico (indigenous), introduced in Brazil, the United States of America and probably Israel, Kenya and Cuba.

Interceptions in The Netherlands: found in flowers of *Asclepias tuberosa* L. in a glass-house at Wageningen, 1940 (origin unknown, Mantel & van de Vrie 1988b), at the flower auction of Aalsmeer on cutflowers of *Polianthes tuberosa* L. from Kenya, 1991 (Vierbergen, 1992) and at the flower auction of Honselersdijk on cutflowers of *Ornithogalum* from Israel, 1995.

Note: The species has been slept with the tubers of *Polianthes* outside its original distribution area and other recorded hosts are probably incidental (Nakahara, 1992).



Fig. 8. *Frankliniella intonsa* (Trybom), ♀, head (bar 0.05 mm).

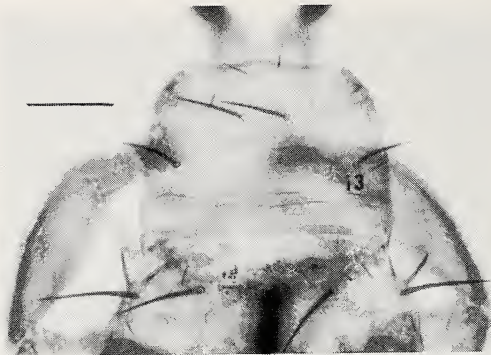


Fig. 7. *Frankliniella schultzei* (Trybom), ♀, head (bar 0.05 mm).

#### *Frankliniella borinquen* Hood

Distribution: Jamaica, Mexico, and Puerto Rico (Sakimura, 1986) and probably introduced in Kenya.

Interception in The Netherlands: at the flower auction of Aalsmeer on *Carthamus* cutflower imported from Kenya, 1995.

#### *Frankliniella lilivora* Kurosawa

Distribution: China, Korea and Japan (Kurosawa, 1937).

Interceptions in The Netherlands: on *Lilium* bulbs imported from Japan via the United States of America, 1979 (van Rossem et al., 1980).

#### *Frankliniella minuta* (Moulton)

Distribution: Central and Western United States of America, West Indies, Peru.



Fig. 9. *Frankliniella pallida* (Uzel), ♀, head (bar 0.02 mm).

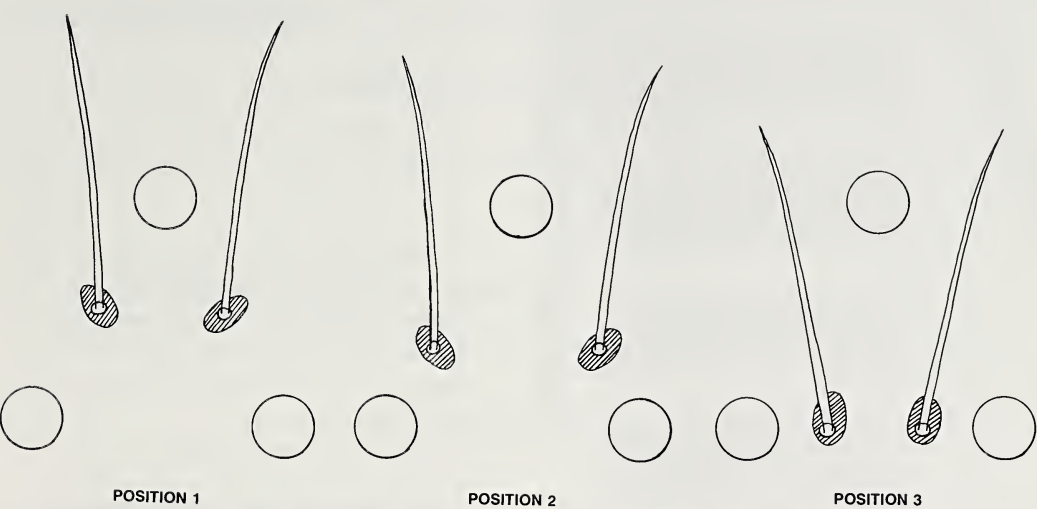


Fig. 10. Position of the interocellar setae in the imaginable triangle formed by the three ocelli.

Interceptions in The Netherlands: at the flower auction of Aalsmeer on *Chrysanthemum* cutflower imported from the United States of America (California), 1986.  
Note: this species has been frequently intercepted during import inspection in Florida (Sakimura & O'Neill, 1979).

*Frankliniella panamensis* Hood

Distribution: Panama, Colombia.

Interceptions in The Netherlands: at the flower auctions at Aalsmeer and Honselersdijk on *Dianthus* cutflowers imported from Colombia (1987, 1993 (3x), 1994 (3x), 1995). Also regularly intercepted in the United States of America on cutflowers from the same origin (S. Broda-Hydorn, United States Department of Agriculture, in litt., 1993).

Note: closely related to *F. occidentalis* and often intercepted together with this species (Vierbergen, 1994).

Identification key to indigenous and synanthropic species (males and females)

- 1. Brachypterous (fig. 1) ..... 2
- Macropterous (fig. 2) ..... 3
- 2. Ocelli vestigial or absent; metanotum with broad transverse striae (fig. 3); posterior margin of tergite VIII with a very weak

comb, developed only laterally. Female: length of marginal anteromedial metanotal setae less than 50 µm; body pale to dark coloured; intermediate forms with irregular dark patches. Wings polymorphic. Male: glandular areas on sternites III to VII fairly broad, 2/5 to 1/2 the width of the sternites (fig. 4); body normally slightly darkened. .... *Frankliniella fusca*  
– Ocelli present; metanotum mostly without broad transverse striae (fig. 5); posterior

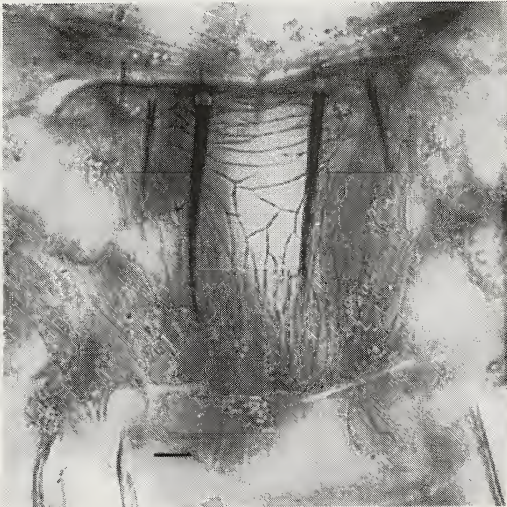


Fig. 11. *Frankliniella schultzei* (Trybom), ♀, metanotum (bar 0.01 mm).



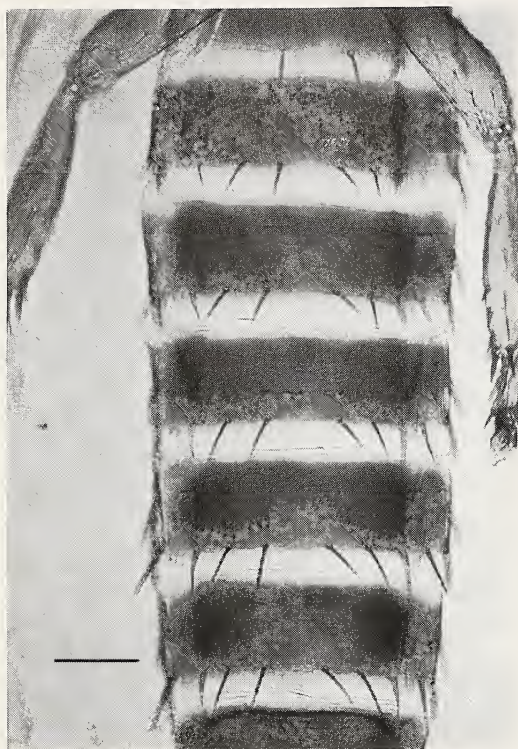


Fig. 12. *Frankliniella schultzei* (Trybom), ♂, sternites III-VII (bar 0.05 mm).

margin of tergite VIII with well developed comb. Female: length of marginal antero-medial metanotal setae more than 50  $\mu$ m; body dark. Male: glandular areas on sternites III to VII about 1/3 the width of the sternite..... *F. nigriventris*

3. Length of the postocular setae i3 more than three times the length of the other postocular setae (figs 6-7); interocellar setae in position 2 or 3 (fig. 10) ..... 4
- Length of the postocular setae i3 less than three times the length of the other postocular setae (figs 8-9); interocellar setae in position 1 or 2 (fig. 10) ..... 5
4. Interocellar setae in position 2 (fig. 6); metanotal pores present or (rarely) absent; posterior margin of tergite VIII with a well developed comb. Female: metanotal pores rarely absent; body colour variable, usually darkened only partially with saucer shaped dark area on abdominal tergites II-VII (intermediate colour form). Male:

glandular areas on sternites III-VII small, oval, about a quarter of the width of the sternite; metanotal pores present or absent; body pale. .... *F. occidentalis*

- Interocellar setae in position 3 (fig. 7); metanotal pores absent (fig. 11); posterior margin of tergite VIII with a very weak comb, developed only laterally. Female: metanotal pores absent; body colour pale to dark; pale form with dark band on posterior part of abdominal tergites II to VII. Male: glandular areas on sternites III-VII broad, more than half the width of the sternite (fig. 12); body pale, but often largely darkened. .... *F. schultzei*
- 5. Length of the anteromarginal pronotal setae about 3/4 the length of the anteroangular pronotal setae (fig. 13); interocellar setae in position 2; margin of tergite VIII with a well developed comb; female dark coloured..... 6
- Length of the anteromarginal pronotal setae about 1/2 the length of the anteroangular pronotal setae; interocellar setae in position 1 or 2; posterior margin of tergite VIII with a well or partly developed comb; female light or dark coloured..... 7
- 6. Metanotal pores absent. Female: posterior

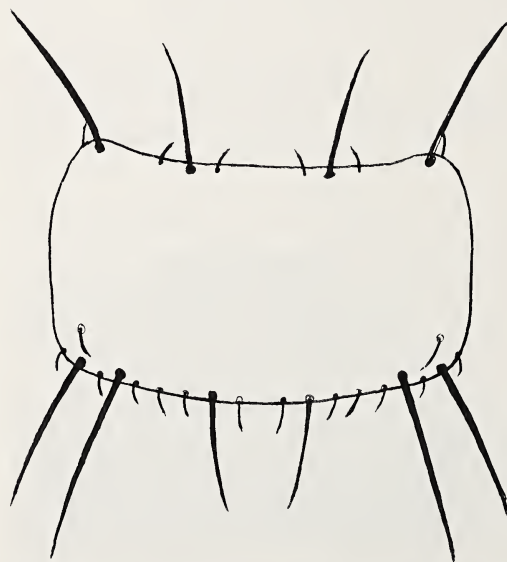


Fig. 13. *Frankliniella occidentalis* (Pergande), pronotum, marginal setae.



Fig. 14. *Frankliniella tenuicornis* (Uzel), ♀, head (bar 0.02 mm).

- margin of tergite VIII with a well developed comb; hind vein of fore wing with more than 13 setae; body dark. Male: glandular areas on sternites III-VII broad, about one third the width of the sternites; body pale or completely dark (= forma *maritima* Priesner, occurring only in coastal areas) ..... *F. intonsa*
- Metanotal pores present .... *F. nigriventris*
  - 7. Interocellar setae in position 2 (fig. 6). Female: body almost completely pale and length of antennal segment III 50 µm or less; posterior margin of tergite VIII with a well developed comb; metanotal pores present; hind vein of fore wing with 13 or less setae. Male: glandular areas on sternites III-VII about one third the width of the sternites; metanotal pores present or absent; body pale..... *F. pallida*
  - Interocellar setae in position 1 (fig. 6, 14). Female: body completely dark and length of antennal segment III 53 µm or more . 8
  - 8. Females ..... 9
  - Males..... 10
  - 9. Metanotal pores absent; posterior margin of tergite VIII with a well developed comb; hind vein of fore wing with 13-18 setae. .... *F. tenuicornis*
  - Metanotal pores present; posterior margin of tergite VIII with a very weak comb, developed only laterally; hind vein of fore wing with 12-14 setae ..... *F. fusca*
  - 10. Glandular areas on sternites III-VII small,

- about one third the width of the sternites; body pale ..... *F. tenuicornis*
- Glandular areas on sternites III to VII fairly broad, about half the width of the sternites (fig. 4); body normally slightly darkened ..... *F. fusca*

Remarks on distribution and occurrence

In comparison with the known number of about 150 *Frankliniella* species, the number of species indigenous and synanthropic in The Netherlands is rather low. Most *Frankliniella* species are recorded from the tropical parts of the Caribbean and Central American region (Sakimura, 1986). In the temperate parts of the Old and New World, however, the number of indigenous species is relatively small (8 species: Jacot-Guillarmod, 1974). It is remarkable, however, that half of these species are well known and widely distributed: *F. achaeata* Hood - Nearctic, from Colorado to Saskatchewan (Sakimura & O'Neill, 1979), *F. intonsa* - Palearctic and in the Oriental Region, *F. pallida* - Eurosiberian, and *F. tenuicornis* - Palearctic.

In The Netherlands synanthropic species only occur in heated places. Apparently our climate is not suitable for these species to survive the winter period, most likely due to the lack of diapause. *Frankliniella occidentalis*, for instance, reproduces on a low level in the winter period, but it does not enter diapause. *Frankliniella schultzei* originates from areas with a warmer climate than *F. fusca* and *F. occidentalis*, the other synanthropic species. This results in a preference of *F. schultzei* for settlement in warmer places, like greenhouses for cultivation of Cactaceae and propagation rooms for bulbs (Vierbergen & Mantel, 1991).

Heated places like greenhouses and store rooms for plant products are well represented in The Netherlands, offering suitable sites for settlement of the intercepted species *Frankliniella bondari*, *F. borinquen*, *F. lilivora*, *F. minuta* and *F. panamensis*. However, these species have been found only a few times during import inspection of plant material. The synanthropic species *F. occidentalis* and *F.*



*schultzei* on the other hand were found regularly during these inspections (Vierbergen, 1992). These data suggest that for *Frankliniella* there is a positive relation between "introduction pressure" and the chance of successful establishment.

## References

- BRYAN, D.E. & R.F. SMITH, 1956. The *Frankliniella occidentalis* (Pergande) complex in California (Thysanoptera: Thripidae). – *Univ. Calif. Publ. Ent.* 10: 359-410.
- EECKE, R. VAN, 1922. Eerste bijdrage tot de kennis der Nederlandsche Thysanoptera. – *Natuurk. Verh. holland. Maatsch. Wet. Haarlem* 3 (9): i-viii, 1-142.
- FRANSSSEN, C.J.H. & W.P. MANTEL, 1962. Lijst van in Nederland aangetroffen Thysanoptera met beknopte aantekeningen over hun levenswijze en hun betekenis voor onze cultuurgewassen. – *Tijdschr. Ent.* 105: 97-133.
- JACOT-GUILLARMOD, C.F., 1974. Thysanoptera Catalogue. Part 3. – *Ann. Cape Prov. Mus. (nat. Hist.)* 7: 517-976.
- KUROSAWA, M., 1937. Descriptions of four new thrips in Japan. – *Kontyû* 11: 266-275.
- MANTEL, W.P., 1968. Een aantasting van hyacinthebollen in de holkamer door *Frankliniella schultzei* Trybom. – *Ent. Ber., Amst.* 28: 106-108.
- MANTEL, W.P., 1969. Onderzoek inzake de systematiek en morfologie der in Nederland bij land- en tuinbouwgewassen schadelijk optredende tripsen. – *Jaarversl. Inst. plantenz. Onderz.* 1969: 83-85.
- MANTEL, W.P. & M. VAN DE VRIE, 1988a. De Californische trips, *Frankliniella occidentalis*, een nieuwe schadelijke tripssoort in de tuinbouw onder glas in Nederland. – *Ent. Ber., Amst.* 48: 140-144.
- MANTEL, W.P. & M. VAN DE VRIE, 1988b. A contribution to the knowledge of Thysanoptera in ornamental and bulbous crops in the Netherlands. – *Acta phytopath. entomol. hung.* 23: 301-311.
- MOULTON, D., 1948. The genus *Frankliniella* Karny with keys for the determination of species (Thysanoptera). – *Revta Ent., Rio de J.* 19: 55-114.
- MOUND, L.A., G.D. MORISON, B.R. PITKIN & J.M. PALMER, 1976. Thysanoptera. – *Handbk Ident. Br. Insects* 1 (11): 1-79.
- NAKAHARA, S., 1992. New synonyms of *Frankliniella bondari* and a review of the synonyms of *F. cephalica* (Thysanoptera: Thripidae). – *Jl N.Y. ent. Soc.* 100: 415-417.
- ROSSEM, G. VAN, H.C. BURGER & C.F. VAN DE BUND, 1968. C. Entomologisch onderzoek. Schadelijke insekten in 1966. Thysanoptera. – *Versl. Meded. Plantenz.kund. Dienst* 143: 69.
- ROSSEM, G. VAN, C.F. VAN DE BUND, H.C. BURGER & L.J.W. DE GOFFAU, 1980. Bijzondere aantastingen door insekten in 1979. – *Ent. Ber., Amst.* 40: 60-62.
- SAKIMURA, K., 1986. Thrips in and around the coconut plantations in Jamaica, with a few taxonomical notes (Thysanoptera). – *Fla Ent.* 69: 348-363.
- SAKIMURA, K. & K. O'NEILL, 1979. *Frankliniella*, redefinition of genus and revision of *minuta* group species (Thysanoptera: Thripidae). – *Techn. Bull. U.S. Dep. Agric.* 1572: 1-49.
- SCHLIEPHAKE, G., 1988. Beitrag zur Unterscheidung mitteleuropäischer Arten der Gattung *Frankliniella* Karny, 1910 (Thysanoptera, Thripidae). – *Dt. ent. Z.* 35: 257-263.
- SCHLIEPHAKE, G., 1989. Beitrag zur Unterscheidung mitteleuropäischer Arten der Gattung *Frankliniella* Karny, 1910: die Männchen (Thysanoptera, Thripidae) (2. Beitrag). – *Hercynia* 26: 417-423.
- STRASSEN, R. zur. Gelbschalenfänge von Fransenflüglern aus Kartoffelkulturen in Bangladesh (Insecta: Thysanoptera). – *Senckenbergiana biologica* 65: 75-95.
- VIERBERGEN, G., 1988. *Frankliniella intonsa* Trybom in de Nederlandse kassen. – *Versl. Meded. Plantenz.kund. Dienst* 166: 82.
- VIERBERGEN, G., 1992. Interceptions of species of the genus *Frankliniella* in the Netherlands. – *Proc. exp. appl. Ent., N.E.V. Amsterdam* 3: 175-180.
- VIERBERGEN, G., 1994. *Frankliniella panamensis*: a new threat to Dutch greenhouse growers? – *Versl. Meded. Plantenz.kund. Dienst* 173 (Annual Report Diagnostic Center 1993): 38-40.
- VIERBERGEN, G., in press. Which thrips species can we find close to greenhouses? – *Versl. Meded. Plantenz.kund. Dienst* 174 (Annual Report Diagnostic Center 1994).
- VIERBERGEN, G. & W.P. MANTEL, 1991. Contribution to the knowledge of *Frankliniella schultzei* (Thysanoptera: Thripidae). – *Ent. Ber., Amst.* 51: 7-12.

Accepted 24.v.1995.