Chemical defence in thrips

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The production of volatile substances by a single species of Thysanoptera was noticed long ago by HODSON (1935) as "a pungent and distinctive but not unpleasant odour". During the last three decades there have been more than 30 papers dealing with secretions by thrips. It was noticed that several thrips species raise and lower their abdomen with a drop of certain kind of fluid on the abdominal tip when they are attacked by an enemy (LEWIS 1973). The secretion reservoir seems to be the hindgut (HOWARD et al. 1983). Some of the complete secretions, as well as single components, eg. lactones like mellein, were found to be ant repellents (BLUM 1991, BLUM et al. 1992, HOWARD et al. 1983). Further they may function as contact irritants, alarm pheromones, or in some cases, fumigants. Thrips produce a great variety of substances including alkanes, alkenes, alkanoic and alkenoic acids, aliphatic and cyclic esters, monoterpenes and aromatic compounds (reviews in BLUM 1991, TERRY 1997). Some authors investigated only whole thrips, but not the single allomone droplets.

The presented paper deals with defensive secretion used by *Suocerathrips linguis* MOUND & MARULLO 1994. The droplets of *S. linguis* secretion were collected with a fine capillary tube, dissolved, treated with derivatives if necessary, and analysed by gas chromatography coupled with mass spectrometry. They contain esters of acetic acid and long chained saturated and unsaturated alcohols (C16 .. C20) as main components (Fig. 1, peaks from17.11 to 19.82). The components have a very high boiling point. One of the saturated esters is solid at room temperature. There are no differences in the mixture between male and females, and the secretion does not contain any compound from the fungi on which the thrips feed or from the host plant (*Sansevieria*). Sex specific concentrations of monoterpenes (fig. 2, peak at

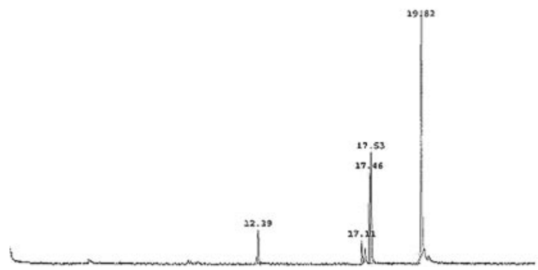

Fig 1 Total ion gas chromatogram of droplets (the numbers are retention times in minutes)

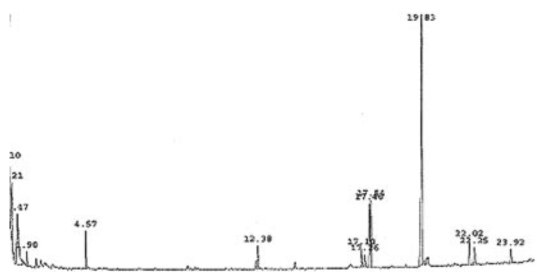

Fig 2 Gas chromatogram of substances from whole thrips

4.57 min) and a lot of other substances (fig. 2, peaks before 4.57 and behind of 19.82 min) were found only if the whole thrips was put into a solvent. So the thrips must have additional secretory glands to produce volatile semiochemicals.

The ester cocktail of *S. linguis* defensive secretion is probably optimized to jamb chemosensory receptors of predators (e.g. ants and mites). Substances mentioned above have not previously been found in Thysanoptera. The longest chained ester known previously was hexadecyl acetate, from two species of *Gynaikothrips* (HOWARD et al. 1987). Acetates with 20 C-atoms and more occur as sex pheromones in Lepidoptera. With defensive function they can be found in secretions of larvae from some species of saw flies (Tenthredinidae, Hymenoptera, JONSSON et al. 1988) and leaf beetles (Chrysomelidae, Coleoptera, SUGAWARA et al. 1978, 1979). For some ant species the long chained ester cocktails are repellents, and in a primitive Australian ant of the genus *Myrmecia* it serves as an alarm pheromone produced by their Dufour gland (JACKSON et al. 1989).

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