Thrips responses to plant odours

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Abstract: Thrips responses to plant odour compounds were assessed using a Y-tube olfactometer. Several compounds were attractive to adult *Frankliniella occidentalis* females, since the majority walked towards the odour source. Some odours that were attractive for western flower thrips appeared to be non-attractive for *Thrips tabaci* and visa versa. Chrysanthemum buds or flowers that were used as an odour source in the olfactometer elicited no positive response from western flower thrips. In wind tunnel experiments, where thrips could use both olfaction and vision, thrips preferred to settle on open chrysanthemum flowers when buds were the alternative. When flowers and buds were covered with a perforated hood, preventing visual orientation, there was no difference in numbers of thrips settling on buds and open flowers. This indicates that colour is a dominant factor for thrips orientation towards flowers.

Introduction

Many thrips species can be found in flowers, feeding and even breeding, but the precise methods that thrips use to find such flowers are not clear. The objective of this work was to elucidate some of the mechanisms by which thrips adults orientate towards flowers.

Materials & Methods

Western flower thrips were reared on potted flowering chrysanthemum plants, *Dendranthema grandiflora* cv 'Sunny Cassa' in a greenhouse at 25° C, 70 % RH and a photoperiod of L16: D8. A field collected strain of *Thrips tabaci* was reared on leek using the bean-pod method, modified from Loomans and Murai (1997), at 25 ± 1°C and 65 ± 5% RH with a photoperiod of L16:D8 in a climate chamber. Adult females were collected from the rearing with an aspirator and starved overnight, only provided with water (Koschier et al., 2000) before they were used in experiments in an olfactometer or windtunnel.

The Y-tube olfactometer is described in detail by Koschier et al (2000). The windtunnel set-up is described by Smits et al. (2000).

Results & Discussion

Responses to individual odour compounds
The olfactometer experiments showed that several plant odour compounds were attractive for adult female western flower thrips. These compounds included benzenoids (benzaldehyde, p- and o- anisaldehyde), monoterpenes (geraniol, nerol, linalool, (+)-citronellol), sesquiterpenes and some other compounds (Koschier et al., 2000). Salicylaldehyde elicited negative responses and appeared to be repellent for western flower thrips at certain concentrations.

Responses of *Thrips tabaci* to some of the odours tested appeared to be quite different. Anisaldehyde which is attractive for western flower thrips, was not attractive for *T. tabaci*. Salicyladehyde at a concentration that was repellent to western flower thrips appeared to be attractive for *T. tabaci* (Figure 1). This shows that different thrips species respond differently to odours.

Responses to flower oils and whole flowers
The flower-oils, Geranium oil and Rose oil, elicited no positive response from western flower thrips when used as an odour source

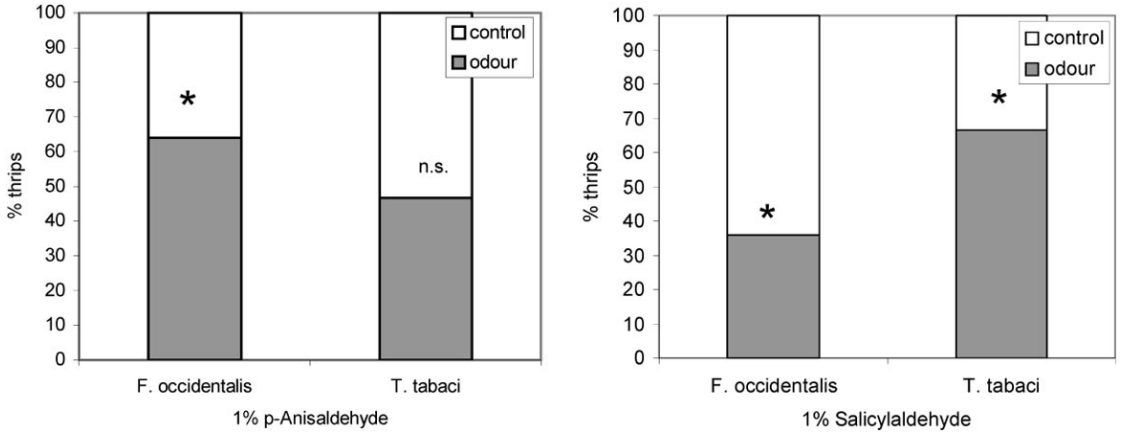

Figure 1. Response of *Frankliniella occidentalis* and *Thrips tabaci* to p-anisaldehyde and salicylaldehyde in a Y-tube olfactometer; n.s. not significant, * $p<0.05$, two-sided binominal test.

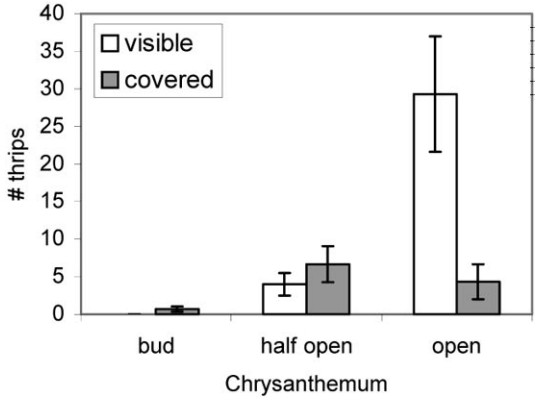

Figure 2. Percentage of thrips (*Frankliniella occidentalis*) that settled on different stages of chrysanthemum flowers (bud, half-open, open flower) in a windtunnel experiment. Open bars represent visible flowers, grey bars represent flowers covered with a perforated paper hood (i.e. flowers not visible).

in the olfactometer (Koschier et al., 2000). A single chrysanthemum flower (fully opened, half-opened or closed bud) used as an odour source in the olfactometer did not elicit positive responses from this thrips either. Interestingly, Gaum et al. (1994) found that the odour of several rose cultivars was either neutral or repellent to western flower thrips in olfactometer experiments. Apparently, the "complete odour" of the flowers of these thrips host plants was not attractive in the olfactometer set-up.

When western flower thrips females were offered a choice in the wind tunnel set-up between fully opened yellow chrysanthemum flowers, half open flowers or closed buds the majority preferred to settle on the fully opened flowers. When the flowers were covered with a perforated paper hood that allowed air to pass through but blocked sight, there was no preference for fully opened flowers (Smits et al., 2000; figure 2). This suggests that colour and not odour is the dominant factor determining thrips orientation towards flowers

References

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