EFFECT OF SOME FLORAL SCENTS ON HOST FINDING BY THRIPS (INSECTA: THYSANOPTERA)

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Abstract—The role of floral scents in host location by flower-dwelling thrips is investigated by experiment in the field. The scent of anisaldehyde significantly increased the catches of seven species of flower-dwelling thripid, but had no significant effect on three species of cereal thripid and one species of flower-dwelling aeolothripid. The catches of white (without UV) traps were increased by a factor of 3.3 to 8.3 in the presence of the scent.

Key Words—Thysanoptera, thrips, attractant, scent traps, color traps, flowers, cereals, anisaldehyde, myrcene, eugenol, geraniol.

INTRODUCTION

There is evidence that the primitive angiosperms were not exclusively beetle pollinated and that some were closely associated with, and probably pollinated by, Thysanoptera (Gottsberger, 1974, 1977; Thien, 1980). Odor is probably an old "secondary attractant" (Faegri and van der Pijl, 1979), so that thrips may have been associated with scented flowers throughout the evolution of the angiosperms.

It is likely that flower-dwelling thrips are aided in finding flowers while in flight by the scent cues that have evolved in response to legitimate insect pollinators. Annand (1926) and Appanah and Chan (1981) observed that plants with perfume seem to have more thrips on them than those without, which appears to support this hypothesis. In this paper, the effect of flower scents on host location by thrips is investigated and discussed.

I have tested four scents in association with white (without UV) water traps. This color has already been shown to catch more flower thrips than several other colors (Walker, 1974; Kirk, 1984a,b), so the combined influe-
ence of color and scent can be assessed. One of the compounds (anisaldehyde) was tested further.

The four scents represent chemical groups commonly found in floral fragrances: open-chain monoterpenes (geraniol, myrcene) and simple aromatics (eugenol, anisaldehyde) (Williams, 1983), and have all been identified in essential oils of many flowers (Gildemeister and Hoffmann, 1928; de Naves and Mazuyer, 1947; Attaway et al., 1966; Loper, 1972). Anisaldehyde is not only present in flower scents (de Naves and Mazuyer, 1947; Wakayama et al., 1971; Nilsson, 1979; Lindeman et al., 1982), but is a metabolic product of some wood-rotting fungi and can be the chief contributor to the characteristic odor (Birkinshaw et al., 1952).

The influence of scent on flying thrips has been demonstrated in the field several times. In India, Howlett (1914) caught many thrips in water traps scented with benzaldehyde, anisaldehyde (4-methoxybenzaldehyde), salicaldehyde (2-hydroxybenzaldehyde), or cinnamaldehyde (3-phenyl-2-propenal). Morgan and Crumb (1928) in the United States list several chemicals that caught more thrips than unscented controls. All of the above aromatic aldehydes appear at or near the top of their list. Uchida (1973) patented the use of anisaldehyde and (or) cinnamaldehyde in traps for thrips, after using such traps successfully. In New Zealand, Penman et al. (1982) found that sticky traps scented with ethyl nicotinate caught many more *Thrips obscuratus* (Crawford) than the controls. Evans (1932), however, obtained no positive results for *Thrips imaginis* Bagnall caught in traps scented with three of the above aldehydes, citral, or geraniol.

Some experiments with olfactometers have demonstrated an influence of scent on walking thrips (Holtmann, 1963; Syed, 1978), but these results cannot necessarily be extrapolated to flying insects in the field (Snapp and Swingle, 1929).

**METHODS AND MATERIALS**

Water traps (painted plastic dishes of diameter 165 mm and depth 60 mm) were filled with tap water to 20 mm below the rim, and 0.3 ml of Teepol detergent was added to each. They were placed on level grassy surfaces, so that the tops were about 90 mm above ground level. All the traps were matt black on the outside and were painted white without UV (titanium dioxide pigment) inside. The diffuse reflectance spectrum of the white paint is shown in Figure 1A of Kirk (1984a). All the experiments were run during periods of relatively low wind speeds.

Scent was released from glass specimen tubes (length 50 mm, diameter 10 mm) with a dental roll wick, cut to a length of 20 mm, projecting 10 mm above the top. A strip of filter paper ran the length of the tube and acted as a