THRIPS AS POTENTIAL VECTORS OF BROWN ROT OF STONEFRUIT IN NEW ZEALAND

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The potential of thrips (Thysanoptera:Terebrantia) to be vectors of plant pathogens has been described by Bailey (1935), Sakimura (1947), Ananthakrishnan (1980) and Ananthakrishnan and Suresh (1984). Most reports are based on observational records of transmission, but thrips-borne fungal pathogens have been demonstrated experimentally. Ondrej (1973) gave evidence of *Thrips* spp. as mechanical vectors of *Botrytis fabae*, a pathogen of beans (*Vicia faba*). Spore loads on the insects were not reported and there were no laboratory assessments or quantification of the pathogen transfer process.

Thrips, principally *Thrips obscuratus* the New Zealand Flower Thrips (NZFT), have been recorded in New Zealand both in stonefruit flowers (McLaren 1986) and on fruit (Spiller 1951; Teulon and Penman 1988). We observed NZFT on brown rot lesions on fruit in orchards which had not been sprayed for thrips control in 1987. This report describes initial investigations of this association and reviews methods used for studying transmission of the brown rot pathogen, *Monilinia fructicola*.

The ability of NZFT to carry *M. fructicola* spores was assessed by direct examination of thrips after they had walked over flowers and fruit infected with sporulating *M. fructicola*. Twenty adult female thrips were collected from gorse (*Ulex europaeus*) flowers in the field with a sterile aspirator. The thrips were placed at 2.5 °C for 1 hour to reduce movement and facilitate handling. After chilling, the thrips were placed singly, using a clean sterile fine camelhair brush, onto the stem of a peach shoot. Each shoot had flowers which had been inoculated with a spore suspension (1×10^4 spores/ml) of *M. fructicola*. The thrips usually moved directly to a flower after release. When thrips left a flower they were removed with a brush and placed singly in a clean sterile vial. The thrips were placed at -20 °C for 24 h to kill them. Individual thrips were mounted ventral or dorsal side up on scanning electron microscope (SEM) tabs with double sided adhesive tape and viewed with the SEM at magnifications of 60 x to 4000 x. Drying of the thrips was not found to be necessary.

M. fructicola spores were identified by their size and shape. Spores were seen on most ventral body surfaces, including antennae, head, thorax, abdomen and legs (Plate 1), and dorsal surfaces including the wings. Spores were found in comparable numbers on both dorsal and ventral surfaces. Groups of spores were noted as well as individual spores under body hairs. A sub-sample of ten control thrips collected from gorse flowers were also examined and were not infested with *M. fructicola* spores.

The relevance of the above to field conditions was determined by sampling natural populations of thrips from brown rot infected peach fruits (cv. Redhaven). Some thrips were observed to walk over and rest on brown rot lesions. Fifty thrips were removed after leaving a sporulating lesion and placed in a clean vial. They were killed and prepared for SEM examination as before. Thrips removed from sporulating lesions were infested with *M. fructicola* spores, with average loads of 170 spores/thrips (range 1 to 300). Spores were found predominantly on ventral surfaces. Ten thrips removed from uninfected peach fruits were not infested with *M. fructicola* spores.

These observations indicate that NZFT is a mechanical carrier of *M. fructicola* spores under laboratory and field conditions. The SEM method provided information on the location of spores on the thrips body and a permanent photographic record of each specimen.

The method, however, has limitations for studying the dynamics of spread of the pathogen. It is time consuming, only one surface of the thrips is examined on each

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specimen and there is no indication of spore viability. Currently we are developing methods to quantify spore loads on thrips and measure spore viability. Efforts are also being made to apply specific spore loadings onto thrips for experimental purposes. Tagging and tracking systems are being developed and evaluated to monitor thrips movement in orchards, and thereby to assess the efficiency and range of spore dispersal by thrips. Laboratory studies will further analyse the pathogen transfer process and orchard studies will determine the importance of thrips-mediated spore dissemination relative to other dispersal systems (e.g., wind and water splash).

Plate 1: Scanning electron micrograph of a New Zealand Flower Thrips showing *Monilinia fructicola* spores on its body. Mag. 170 x.

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