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THRIPS (THYSANOPTERA) AS A PUBLIC NUISANCE: A QUEENSLAND CASE STUDY AND OVERVIEW, WITH COMMENTS ON HOST PLANT RELATIONSHIPS

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Abstract

Pseudanaphothrips araucariae Mound & Palmer, an Australian endemic, is reported breeding in the male cones of introduced *Pinus* in such high numbers that it caused public health problems by invading a school. Information is summarised on other thrips causing a public nuisance. This problem is considered in the light of intra-generic host-shifting and behavioural opportunism amongst some thrips species.

Introduction

During the last week of July 2000, the Tropical Public Health Unit in Cairns was contacted about a plague of minute insects affecting a school near Cardwell, northern Queensland. Children were distressed because of massive numbers of tiny insects getting onto their skin and into their hair, eyes and mouth. Some children claimed to have been bitten. However, despite active surveillance by school staff and parents, few children were found to have any welts indicative of an allergic reaction. The insects also got into food, making outdoor eating impossible.

The school was forced to restrict outside activity to the period before 1130 h, when the insect numbers were tolerable. The plague became severe after that time, continuing through the afternoon. It only abated in the evening with cooler temperatures. Enormous numbers of these insects collected on walls and ledges inside classrooms, having entered readily through open doors and windows. Overhead fans in the classrooms did not prove effective in reducing the problem, although conditions were satisfactory when all doors and windows were closed and the air-conditioning turned on.

A plantation of pine trees (*Pinus caribaea*) surrounded the school. These trees were thought to be the probable source of the insects but, in the absence of more definite information, insecticide treatment was not considered appropriate. The plague had occurred in previous years, starting early in July after pollen drop in the pine trees. In 2000, the outbreak was preceded by three months of dry weather. Rainfall from May to July was 45% of normal, with only 3.2 mm of rain in July. Rains in early August (43 mm from 1-9 August), while not having an immediate effect, were considered to have contributed to the subsequent decline in numbers, such that the outbreak was over by 10 August.

The insects causing the problem at this school were identified subsequently as a species of thrips in the family Thripidae, *Pseudanaphothrips araucariae* Mound & Palmer. This is a native Australian species that was described originally as breeding in the male cones of *Araucaria bidwilli* in southern Queensland (Mound and Palmer 1990). However, in describing the thrips species, the authors also recorded it from the male cones of *Araucaria heterophylla* in the Hawaiian Islands, whence presumably it had been introduced.

More recently, this thrips was found by the Queensland Department of Primary Industries Forestry staff to be breeding in the male cones of *Pinus tecunumanii* in the seed orchard at Cardwell. It occurred in such large numbers in these cones that fears were being expressed that it might reduce the pollen yield below critical levels. DPI Forestry staff reported that the thrips swarmed all over them, but that they were not bitten. The only other available records of this thrips are also from DPI Forestry staff, who have twice found it in large numbers at Imbil, southern Queensland, on *Araucaria cookii* male cones (28.xi.1979) and on *Araucaria cunninghamii* male cones (1.ii.2001). Apart from these records nothing further is known about this insect but reports of thrips as a public nuisance when in large populations are more extensively documented.

Thrips as a public nuisance

The standard textbook on medical insects (Lane and Crosskey 1995) refers to several species of thrips being of minor medical importance, but the data in the book is derived largely from R.V. Southcott, a medical practitioner in Adelaide, South Australia. Southcott (1986) published several personal observations on thrips attacks in Adelaide, together with a summary of a number of previously published comments. One of these concerned the late C.B. Williams who, many years ago in London, recounted to one of us (LAM) an experiment carried out during his youth in Trinidad. He allowed a thrips of the family Phlaeothripidae, *Karnyothrips flavipes* (Jones), a scale insect predator, to suck blood from his wrist over a period of 30 minutes.

A rather similar thrips, *Haplothrips froggatti* Hood, the Black Plague Thrips of Australia, causes occasional annoyance in dry areas. This species breeds in grasses and in years of good grass growth the populations of thrips increase dramatically, with mass flights occurring during subsequent dry weather. Vast numbers of this thrips then disperse and enter houses as well as crops. Mass emergences of this sort were reported during the year 2000 in parts of Queensland and Northern Territory, following the dry weather that occurred that year.

A third member of the family Phlaeothripidae that causes recurrent problems is *Gynaikothrips ficorum* (Marchal). This thrips induces leaf-roll galls on *Ficus microcarpa*, a tree that is widely planted throughout tropical and

subtropical countries. In Latin America, where these trees are common in town and village squares, local residents relaxing in their shade can be plagued by this thrips getting into their eyes and glasses of beer. The tree is widely planted in gardens around Australia, the thrips being reported occasionally as a local irritant in parts of New South Wales (Peter Gillespie, pers. comm.).

Amongst the members of the Thripidae, the other large family of Thysanoptera, *Limothrips cerealium* (Haliday) is the most frequently recorded species causing irritation. In Western Europe, this species frequently probes sweaty skin on stormy summer days, when the adults emerge from their cereal hosts in mass flights. This habit has earned the species the common name 'Thunder Fly'. Other species of Thripidae that occur in large numbers and have been noted to cause problems of skin irritation through the probing of adults, are *Frankliniella bispinosa* (Morgan) in Florida, *Thrips tabaci* Lindeman in California, *Thrips major* Uzel in Germany and *Thrips imaginis* Bagnall in South Australia. According to Southcott (1986), the earliest published record of thrips causing irritation was from Paris in 1902, the species involved being *Melanthrips fuscus* (Sulzer), a common member of the Melanthripidae.

Mass flights of thrips also give rise to complaints, in various countries, of freshly laundered clothes being soiled whilst drying. This is a common problem in southern Australia with the Plague Thrips, *Thrips imaginis*. A more serious effect of these mass flights is the nuisance caused by large numbers of adults triggering smoke-detector fire alarms (Lewis 1997), thus causing considerable distress in hospitals and old peoples' homes. This is particularly important with *Limothrips cerealium* in Western Europe, a species notorious for its thigmotactic behaviour. Each summer adults crawl into minute spaces to over-winter. They can then be found in many unlikely situations, the following being some of the places noted during routine identifications over many years: under glass of framed pictures, in backs of brooches in museums, inside stored polystyrene blocks intended for building insulation, within factory sealed hypodermic syringes and tampons, and on tissue cultures in sterile laboratories with a double-scrubbed air supply.

Intra-generic host-plant diversity

This record of a *Pseudanaphothrips* species becoming a public nuisance draws attention to the interesting biological phenomenon of host-shifting. Biologists commonly expect that species within a single genus will exhibit similar biological characteristics, such that congeneric species are commonly predicted to breed on host plants that are related to each other. There are several examples of such host-relationships amongst Australian Thysanoptera, including *Dichromothrips* species in the flowers of orchids, *Odontothripiella* species in pea flowers and several genera of Phlaeothripidae on *Acacia*

phyllodes. In contrast, host-exploitation in some genera such as *Pseudanaphothrips* is more opportunistic and unpredictable.

Pseudanaphothrips achaetus (Bagnall) is a widespread flower-thrips in Australia, apparently breeding in a very wide range of flowers. In contrast, recent field-work has established that five of the 14 named species in the genus (Mound 1996) are specific to remarkably different plants: *P. araucariae* in male cones of Pinopsida; *P. casuarinae* Mound & Palmer in male cones of various Casuarinaceae; *P. frankstoni* (Steele) on fertile fronds of *Dicksonia antarctica* (Filicopsida); *P. melanurus* (Steele) in flowers of *Cassinia* (Asteraceae); *P. annettae* Mound & Palmer on leaves of several small *Leucopogon* species (Epacridaceae).

Irregular and opportunistic patterns of host exploitation are rarely studied. They are less susceptible to investigation than patterns that exhibit regularity. But the evolution of several species of pest thrips derives from their opportunistic behaviour (Mound and Teulon 1995), with radical changes in host-plant associations as well as changes from phytophagy to predation. *P. araucariae* is an endemic Australian thrips, yet it now breeds in large numbers on one or more exotic *Pinus* species. Given the flexibility in behaviour that must underlie such opportunism, perhaps it should not come as a surprise that such a species indulges occasionally in thalophagy. However, any thrips species that occurs in very large numbers seems likely to have the potential to cause irritation to humans.

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