A REARING METHOD FOR THE NEW ZEALAND FLOWER THRIPS

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The New Zealand flower thrips, *Thrips obscuratus*, are the most common flower inhabiting thrips in New Zealand (Walker 1985). Adults have been collected from over 30 indigenous and 60 introduced plants (Teulon unpublished). Recently, the economic importance of this insect has increased because its ubiquity has led to quarantine problems in a number of horticultural exports (Mound and Walker 1982).

Little is known of its biology, but like other thysanopterans of the family Thripidae, it lays eggs in host plant flowers. The two larval stages inhabit the flower but when mature the second instars fall to the ground where prepupae and pupae are found (Teulon unpublished). Pupation presumably occurs in the soil and leaf litter.

Many species of thrips are difficult to rear in the laboratory because they have a remarkable propensity for escaping from confining cages (Lewis 1973). Flower thrips require pollen, and pupation sites that are often different from the environment of the developing larva. Murai and Ishii (1982) have published a successful rearing method for the complete life cycle of a flower thrips, and the methods described in this note owe much to their work.

To facilitate oviposition, adult females of the New Zealand flower thrips were collected from rose and dahlia flowers in the field and two-five were placed inside each of four 'rearing cages'. A rearing cage consisted of a perspex cylinder (40 mm long x 25 mm diameter), both ends of which were enclosed by Parafilm M (American Can Company, Greenwich, CT, U.S.A.) stretched to approximately four times its original size. At one end a drop of nutrient medium was deposited, ('Fresh-Up' apple/peach juice. The N.Z. Apple and Pear Marketing Board) and covered with a further layer of stretched Parafilm. Several grains of fresh pollen essential for oviposition were placed inside the cage with the females before enclosure by Parafilm membranes. The rearing containers were placed in lidded clear plastic boxes (229 x 120 x 89 mm) on petri dishes at 20°C for 5 h. Moistened filter paper placed in the bottom of the box raised the humidity and grease-proof paper placed on the petri dishes prevented the parafilm sticking to the petri dish. Females were placed daily in new rearing cages for 6 days until sufficient eggs had been laid.

Iceland poppy (*Papaver nudicaule*) flowers were found to be useful sources of pollen as they can be grown all year round in a glasshouse with supplementary lighting. These flowers produce large amounts of pollen, and were observed in the field to be very attractive to adult female flower thrips. Eggs were laid in the nutrient solution between the double Parafilm membrane. The top level of the double Parafilm membrane was cut around its edge and then peeled back leaving the eggs exposed. Excess nutrient solution was absorbed with blotting paper. Each rearing container was then placed on moist filter paper inside a plastic pottle (65 mm high x 70 mm diameter) with a tight fitting lid, inside a controlled temperature cabinet at one of the following temperatures: 10, 15, 20 or 25°C. Eggs normally develop inside plant tissue, so a high humidity (>80% RH) was essential for hatching.

Eggs were checked daily and when larvae hatched they were placed singly in rearing cages with the aid of a fine camelhair brush. The rearing container was identical to that used for oviposition except that the nutrient solution had a mould inhibitor included (methyl para-hydroxybenzoate 15 g, sorbic acid 20 g, 95% alcohol 170 ml at a rate of 1%). Pollen was also included as it is essential for the development of larvae to adults (Teulon unpublished). Rearing cages were placed inside clear plastic boxes as described previously and replaced in the controlled temperature cabinets.

Individual thrips were observed daily for development to adult. Exoskeletons gave evidence of development to second instar, and prepupae and pupae were clearly
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distinguished using the descriptions of Mound and Walker (1982). When females matured to adults, rearing cages were supplied with fresh nutrient solution and pollen daily, until oviposition occurred. Then both males and females were supplied with fresh nutrient solution and pollen weekly (at 15, 20 and 25°C) and fortnightly (at 10°C), till death. Dead adult thrips were identified to species.

Development times for egg to adult ranged from 10 days at 25°C to 50 days at 10°C (Table 1). It has been estimated that the New Zealand flower thrips completes a generation on sour cherry (*Prunus* sp.) in October in about 25 days in Central Otago (McLaren unpublished data). Except for egg development, immature female stages generally took longer to develop than males and total development time from egg to adult was longer in females than in males at all temperatures. Female adults lived longer than males at all temperatures. Longevity at low temperatures (over 30 weeks at 10°C) suggests that when host flowers are not available thrips may overwinter as adults.

TABLE 1: Mean development time (days) and adult lifespan of female (F) and male (M) New Zealand flower thrips at constant temperatures.

		10°C		15°C		20°C		25°C	
Development Time									
		Days	n	Days	n	Days	n	Days	n
Egg to adult	F	50 (1.41)	2	21.6 (0.92)	8	14.3 (0.58)	3	12.7 (0.58)	3
	M	42 (2.32)	11	19.5 (0.71)	10	12.5 (0.98)	7	10.5 (0.90)	19
Adult to oviposition		16.5 (3.3)	4	10.4 (5.26)	8	6.3 (2.31)	3	4.7 (0.58)	3
Lifespan									
		Weeks	n	Weeks	n	Weeks	n	Weeks	n
Adult	F	34.3 (2.87)	4	17.4 (2.39)	8	7.3 (3.59)	4	3.0 (1.0)	3
	M	25.7 (14.0)	10	11.5 (4.4)	10	5.7 (4.41)	6	1.6 (1.29)	11

n = number recorded () = standard deviation

At constant temperatures greatest mortality occurred during the egg (30-80% mortality) and first instar stage (2-20%). Eggs are normally laid within plant tissue where humidity would be much higher than for the eggs exposed on Parafilm membranes so high egg mortality may be due to low humidity. Mortality at first instar was probably due to handling during the transfer of newly emerged larvae into rearing containers. Mortality of prepupal and pupal stages was low (0-2%).

Egg mortality could be reduced by leaving eggs between the double membrane until they hatch. Mortality of eggs using this technique is low (0-20%) but thrips larvae are trapped between the double membrane. This method is appropriate only if percentage hatch values, or a large supply of thrips is required. Those larvae which fail to break the surface tension of the nutrient solution and reach the airspace between membranes may drown. The larvae may be exposed by slitting the top Parafilm membrane with a sharp scalpel.

The methods described permit the laboratory rearing of the New Zealand flower thrips for further studies into pesticide controls and product disinfestation. Mass rearing has not been attempted but the methods described permit the accurate estimation of the development times for various stages of the New Zealand flower thrips for experimental purposes.

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