THRIPS ON NECTARINES IN THE SPRING

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SUMMARY

Surveys of thrips and Eriophyid mites on nectarine flowers carried out between 1978 and 1984 established that the New Zealand flower thrips, *Thrips obscuratus* (Crawford) (NZFT), was the most common thrips present and peach silver mite, *Aculus cornutus* (Banks), was absent from many orchards. NZFT adult females were responsible for russet damage on nectarine fruits, particularly over the period from flowering to shuck fall. *Thrips tabaci* and *Frankliniella occidentalis* (collected from lupin) also showed potential for causing damage. *T. tabaci* was the second most common species found on nectarines. *F. occidentalis* was not found in the surveys although it is the major species which causes damage to nectarines in USA.

Keywords: thrips, nectarines, peach silver mite, *Thrips obscuratus*

INTRODUCTION

Kemp(1959) described symptoms of cracking and pimpling on white-fleshed nectarines and attributed the damage to peach silver mite *Aculus cornutus* (Banks). In 1978 a research programme was started with the aim of identifying the cause of the distorted shapes and irregular russet patterns on yellow-fleshed nectarine fruits. This damage caused the fruit to be downgraded from export quality.

METHODS

Surveys

Two types of survey were conducted. The first, in 1978, identified the insects and Eriophyid mites present on yellow-fleshed nectarines by sampling ten flowering twigs of nectarine cvs. 'Sunglo', 'Deltur' and 'Earliblaze' from 15 properties in the Alexandra-Clyde district (Central Otago) and examining the flowers under a binocular microscope. Levels of damage to the fruit were assessed in the same blocks at harvest time using a severity score (described below). The second survey involved the weekly collection and identification of all thrips beaten from all the branches on 10 trees from 28 blocks of cv. 'Sunglo', over the period from flowering until mid-November, for 3 consecutive years (1982-1984). Thrips were beaten onto a yellow plastic plate (250 mm diameter) and identified by A.K.Walker in 1982 and by G.F.McLaren in 1983 and 1984 (with confirmation of doubtful specimens by A.K.Walker). Voucher specimens were deposited at DSIR Plant Protection, Mt Albert Research Centre, Auckland.

Evidence for thrips damage

In the seasons between 1981 and 1985, short branches of nectarine flower buds were enclosed in cotton lawn bags (200 x 150 mm) on the tree before the flowers opened. To determine if NZFT were capable of causing damage to nectarines, several adult females were released into 12 bags on each of three cultivars 'Fairlane', 'Fantasia', and 'Sunglo' on 21 October 1981. Equivalent bags were left without thrips, as a control treatment. All bags were removed on 30 November 1981 and the enclosed fruit assessed for damage where 0= no damage, 1= minor damage (acceptable for export with scarring anticipated to be less than 1 cm long or 0.75 cm² at harvest), 2= not meeting export standards but acceptable on the local market, and 3= reject due to large blocks of russet and fruit distortion. To determine which thrips species could cause damage, five different species were released separately into the bags in 1982 and 1983. Since all except NZFT were rare on nectarines, the other species were collected from other host plants: *Thrips tabaci* from onions, *Chirothrips manicatus* and *Limothrips*

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cerealium from grasses and *Frankliniella occidentalis* from lupin. This last species was not found during the whole-tree survey but is recorded as the thrips causing most damage to nectarines in California (Bailey 1938). In 1984 and 1985, the potential for fruit damage was investigated in relation to the time of NZFT infestation by releasing adults into bags on cv. 'Fantasia' each week over a period of 11 weeks. The bags were removed at the end of November and the fruit assessed for damage.

RESULTS AND DISCUSSION

Surveys

No correlation was found between the presence of peach silver mite and russet damage in the 1978 survey. Only 6 out of the 15 nectarine blocks surveyed at flowering time had peach silver mite present but all 15 showed damage on the fruit at harvest.

Thrips collected from 28 blocks of nectarines between 1982 and 1984 showed that NZFT represented 80.3, 95.9 and 96.1% of all the thrips collected in each year respectively. The onion thrips, *T. tabaci*, was the second most common species but was found in less than half the blocks each year, generally in orchards where few insecticides were used. *T. tabaci* declined in frequency over the 3 years of the survey. The other species were relatively uncommon including the predatory species, *Haplothrips kurdjumovi* and *Apterygothrips collyerae* (Table 1). Both *F. occidentalis* and *T. tabaci* have been implicated in russetting nectarines in California (Bailey 1938, Black *et al* 1963, La Rue *et al* 1972 Yonce *et al* 1992) but *F. occidentalis* was not found in the Central Otago survey. NZFT were predominantly adult females and males did not appear until October (Table 2). Larvae were rare and found in unsprayed orchards only but adults were found in all blocks.

TABLE 1: Total thrips collected in weekly sampling of 10 trees per block from 28 blocks of nectarines cv. 'Sunglo' in Alexandra-Clyde district.

	1982	1983	1984
<i>Thrips obscuratus</i>	1349	1535	5486
<i>Thrips tabaci</i>	184	30	204
<i>Ceratothrips frici</i>	13	8	0
<i>Chirothrips manicatus</i>	41	7	10
<i>Limothrips cerealium</i>	17	15	0
<i>Anaphothrips obscurus</i>	2	0	2
<i>Haplothrips kurdjumovi</i>	18	4	8
<i>Haplothrips niger</i>	4	0	0
<i>Aeolothrips fasciatus</i>	2	1	0
<i>Apterothrips septicornis</i>	1	0	0
<i>Apterygothrips collyerae</i>	0	0	1
Total	1680	1600	5711

Evidence for damage by NZFT

Damage scores of the fruit inside the release bags on the three cultivars in 1981 suggested that NZFT could cause significant damage to commercial nectarine cultivars (Table 3). *T. tabaci* and *F. occidentalis* also appeared to be capable of causing similar damage to NZFT. However, on the basis of thrips numbers on nectarine trees, only NZFT and *T. tabaci* could be regarded as a threat (Table 4). Interpretation of bagging and release experiments was complicated by the similarity between scarring caused by the wind rubbing the bag and damage due to thrips, an effect which was less pronounced in 1983. However, the ability of NZFT to cause damage to 'Fantasia' nectarines was confirmed in 1984 and 1985 when releases during flowering caused significantly more damage than releases after 'petal fall' ($P < 0.05$, Figure 1). The ability of NZFT to cause damage ceased immediately after emergence of the fruit from the calyx in early November ('shuck fall'). Levels of NZFT were, however, relatively low during flowering and increased after 'petal fall', particularly in 1984 (Figure 2).

TABLE 2: Total NZFT females and males sampled weekly from 10 trees of 28 blocks of nectarines cv. Sunglo.

Sampling date		1982		1983		1984	
		Females/Males		Females/ Males		Females/Males	
Sept	15-23	65	0			227	0
	24-30	42	0	215	0	117	0
Oct	1 - 7	38	0	184	1	67	2
	8 -14	84	3	117	0	482	17
	15-21	79	5	114	0	855	25
	22-28	155	21	331	7	426	38
Nov	29-04	450	25	156	12	727	70
	5-11	221	30	355	43	993	247
	12-18	104	27			474	396
	19-25	42	7			137	42

A significant ($P < 0.01$) negative correlation was found between total thrips sampled from 10 trees per block over the period from flowering to 'shuck fall' and the level of export grade fruit at harvest in 28 blocks of cv. 'Sunglo' over 3 years ($r = -0.491$, -0.759 and -0.756 for 1982, 1983 and 1984).

TABLE 3: Mean damage score for three nectarine cultivars (with standard error) after NZFT females were released onto bagged branches on 21 October 1981 and compared to bagged branches with no released thrips. Damage assessed 30 November 1981. Damage score 0 = no damage, 3 = severe; n = number of fruit.

	With NZFT			Without NZFT		
	Damage score	n	% undamaged	Damage score	n	% undamaged
Fairlane	1.65 (0.11)	20	0	0.08 (0.06)	13	100
Fantasia	1.58 (0.14)	26	3.8	0.83 (0.34)	6	16.7
Sunglo	2.15 (0.09)	18	5.6	0.43 (0.16)	7	57.0

TABLE 4: Mean damage score per fruit (and standard errors) after several adults of different thrips species were released into bags 1 - 2 weeks after petal fall and assessed in November. Damage score 0 = no damage, 3 severe damage; n = number of fruits.

	1982			1983		
	Damage score	n	% un-damaged	Damage score	n	% un-damaged
<i>T. obscuratus</i>	1.71 (0.14)	17	6	1.64 (0.15)	11	0
<i>T. tabaci</i>	1.60 (0.21)	10	10	1.25 (0.42)	4	25
<i>F. occidentalis</i>	1.33 (0.18)	18	17	1.25 (0.22)	4	0
<i>C. manicatus</i>	1.25 (0.42)	4	25	-		
<i>L. cerealium</i>	0.42 (0.22)	12	75	-		
Control (no thrips in bag)	1.082 (0.122)	49	31	0.500 (0.196)	14	64

Fig. 1: Mean damage score per fruit (with standard error) of nectarine cv. 'Fantasisa' following release of NZFT from flowering to mid November in 1984 and 1985.

Fig. 2: Mean NZFT per tree sampled from 10 trees in 28 blocks of nectarine cv. 'Sunglo' over 4 years.

CONCLUSION

While peach silver mite may have been a problem in nectarines in the 1950's, it is a minor pest in present day orchards. NZFT is the most common thrips found on nectarines in spring in Central Otago and it was associated with damage in bagging and release experiments. The damage was caused by adult females, rather than the larvae as in the case of *F. occidentalis* in California (Bailey 1938). The potential for damage by NZFT was greater if infestation took place at flowering time, or soon after. However, numbers of NZFT tended to be low over flowering and increased after 'petal fall'. Consequently, it is during the 4 to 5 weeks from 'petal fall' to 'shuck fall' that the risk of damage is greatest and this is the period when control measures would be of most benefit. Research on this aspect will be reported elsewhere.

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