Sustainable Control of Thrips in Export Onions

~~Monitoring Methods for Onion Thrips~~

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~~Confidential~~ **Report to New Zealand Onion Exporters Association**

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SUSTAINABLE CONTROL OF THRIPS IN EXPORT ONIONS

Summary Report to New Zealand Onion Exporters Association - June 1999

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Introduction

There is increasing pressure from world markets to reduce pesticide use on food crops. The control of onion white rot, downy mildew and onion thrips accounts for a large proportion of pesticides applied to onion crops in New Zealand. In addition to food and grower safety aspects, the potential for target pests to develop resistance to the pesticides is of immediate concern. Resistance by onion thrips to synthetic pyrethroid insecticides is already a serious problem in the Pukekohe region. This resistance has led to the presence of unacceptably high numbers of thrips on export onion bulbs. This can lead to possible market access restrictions and thrips feeding damage can significantly reduce the quality of the bulb, resulting in the downgrading of the onion bulbs.

The control strategy being adopted for all these pests is to develop systems to allow targeted applications of the most appropriate pesticides at times which will have the maximum impact on the pest rather than relying on regular calendar based spray programmes. This report lists the objectives of the research programme and gives a brief summary of this years findings for each objective. A more comprehensive account for each research area can be found in the four reports submitted by each researcher to the Onion Exporters Association.

Objective 1. Establish an insecticide resistance management and prevention strategy which includes crop monitoring and setting thrips control action thresholds.

K.J. Froud

Two monitoring systems developed in the US (New York state system - mean number of thrips per leaf and the Illinois system - mean number of thrips per plant) were compared with the monitoring system recommended in the insecticide resistance management strategy (presence / absence system). The Illinois system gave a high level of accuracy, was moderately efficient and relatively simple to use. The New York State system was also very accurate, and moderately efficient, however calculation was more difficult and certain features were less desirable than the Illinois system. While the presence / absence system was the most efficient and simplistic method, it did not accurately describe the level of thrips populations in the crops and led to higher use of pesticides than was warranted early in the season. This method also did not give a good account of the level of control insecticide applications were having on the thrips populations. The most accurate method for monitoring onion thrips and of determining insecticide efficacy of

the three tested is the Illinois system which records the mean number of thrips present per plant.
The current recommendation of monitoring 50 plants per field was validated with no significant differences between samples of 50 and 100, or between sampling 10 groups of 5 plants and sampling 50 randomly spaced plants. There was no consistent pattern of thrips distribution other than that at the start of the season all crops displayed patchy distributions of onion thrips which became more randomly distributed over the season. Only two of the six sites showed reasonable levels of thrips control through insecticide applications.

Objective 2. To select insecticides and use clusters of sprays in accordance with the guidelines in the insecticide resistance management strategy.

A) Optimising spray efficiency against onion thrips

A.R. Tomkins, D.J. Wilson, C. Thomson

A field trial was conducted to determine the effect of using different adjuvants with diazinon to try to improve thrips control. Before and after a single spray of each treatment, the numbers of thrips infesting plants was determined.
Using adjuvants with diazinon resulted in a slight improvement in thrips control. None of the adjuvants was clearly superior. A rate effect was found.

B) Testing the efficacy of the recommended spray clusters programme

N.A. Martin

Assess the efficacy of clusters of insecticide sprays in commercial fields.
When used as a cluster of three sprays, diazinon, endosulfan and parathion reduced onion thrips populations. Four growers managed to reduce the percentage of infested plants and to keep mean number of thrips per plant low. However, two growers failed to reduce onion thrips populations with insecticides. There was no obvious cause.
Analysis of temperature records of the last ten years showed that in 1998-1999 mean temperature for each week was higher than the ten year average. From mid December onwards onion thrips were able to complete development in under four weeks. Increases of thrips populations of more than 20 times in two weeks were consistent with temperature records.

C) Persistence of chemical residues on onion leaves

N.A. Martin

To test persistence of chemical residues on onion leaves, simulated commercial spraying of four insecticides was used to control onion thrips. Onion plants in pots were sprayed with insecticide and kept exposed to weather. At intervals, onion thrips mortality was assessed after 24 h exposure to segments of sprayed leaves. Dichlorvos is the least persistent insecticide, parathion-methyl is less persistent than diazinon or endosulfan.

D) Baseline dose-mortality lines of insecticides

N.A. Martin

Objective: For five pesticides registered for onion thrips control, determine dose-mortality lines for a susceptible onion thrips and Pukekohe insecticide resistant strain using a laboratory bioassay.

This project has been delayed until this winter.

E) Immigration of onion thrips into onion crops

N.A. Martin

Yellow sticky traps in six onion crops and adjacent to the crops were changed and examined weekly for onion thrips. Very few onion thrips were caught from 17 November to mid December. After 15 December more onion thrips were caught in onion crops than adjacent areas, which suggests that most of the onion thrips flying in onion crops originated from the crop and not from outside the crop. The peak numbers of onion thrips caught on a trap in an onion crop coincided with senescence of the crop. It is concluded that high number of onion thrips in a crop originate from within the crop and not from immigration.

Objective 3. Monitor the quality of onions at harvest, and develop criterion for quality management during storage and arrival in overseas markets to ensure that onions at harvest, during storage and on arrival in overseas markets will have negligible numbers of live onion thrips present and that less than one percent has suffered thrips damage.

A.R. Tomkins, D.J. Wilson, C. Thomson

Onion plants or bulbs were assessed from the 6 monitoring fields on 2 or 3 occasions between plants maturing and the bulbs being bagged. Thrips infestation of bulbs was determined and related to thrips infestation on foliage, some crop management practices and bulb quality factors. Thrips infestation of foliage and bulbs was related in some fields. Bulb infestation was static between plant maturity and bagging. Thrips mostly got inside bulbs by walking down between leaves into the neck and most thrips infesting bulbs were in the neck. Bulbs with looser necks, exposed inner scales and shorter stems had higher levels of infestation. Clipped bulbs may have a higher level of infestation than topped bulbs.

Objective 4 Establish sustainable and environmentally safe practices to manage insecticide resistance in onion thrips.

Natural enemies of onion thrips

N.A. Martin

Crop inspections found a very few lacewings and spiders, while lacewings and ladybird were caught on sticky traps in onion crops and adjacent areas. It is unlikely that these or other natural enemies will significantly help keep thrips populations below an economic threshold.