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SPOTTING BUG MANAGEMENT IN AVOCADOS – A REVIEW

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SUMMARY

This paper summarises the data collected through a postal survey of Australian avocado growers on their experiences and practices for controlling spotting bugs. It highlights opportunities for improved control through grower education on pest identification, monitoring and pesticide dose management.

Key words:
Amblypelta, Australia avocado management, pesticide, dose, spraying

INTRODUCTION

The coreid spotting bugs, *Amblypelta nitida* and *A. lutescens*, are recognised as serious pests of avocados, other fruits and macadamias in many parts of Queensland (QLD) and New South Wales (NSW). An extensive review of the ecology and behaviour of spotting bugs in several crops carried out by Waite *et al*. (2000) investigated the importance of orchard types, hot spots and habitat and also trialed several alternative chemicals. It showed the importance of variety and location in the levels of pest damage. However a comprehensive industry-wide review of actual grower chemical and non-chemical control practices in avocados had never been carried out.

As a result Avocados Australia Ltd (AAL) and Horticulture Australia Ltd (HAL) funded a review under HAL Project No. AVO4013. The project aimed to redress the lack of information and identify current opportunities for improved management. Various surveys were carried out in the main avocado growing regions affected by spotting bugs, including the Atherton Tablelands, Bundaberg, Sunshine Coast, Blackbutt, Mt Tamborine, Northern NSW and NSW Mid North Coast, to quantify the impact of the pest across the industry and the effectiveness of current control strategies.

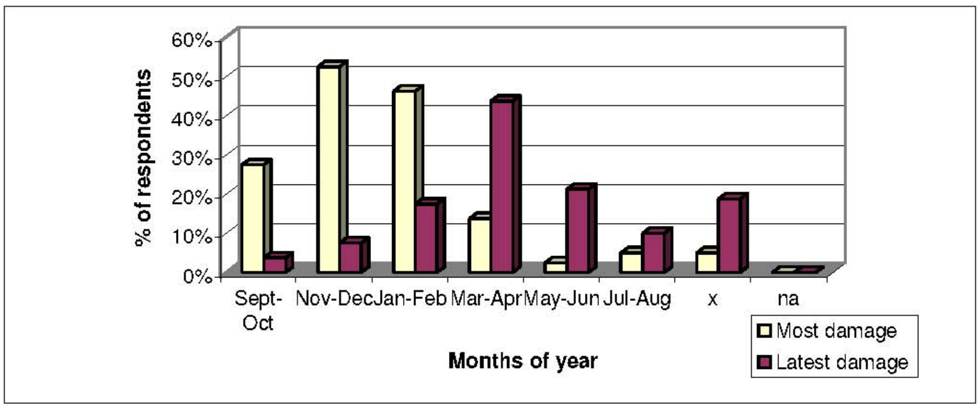
METHODS

The methodology was designed to identify concerned growers and tap into their knowledge and experience of controlling spotting bugs. It was particularly focused on growers' experiences with spraying and on the issues arising out of the use of insecticides. The first stage involved a straightforward postal survey distributed through the AAL newsletter "Talking Avocados" to 600 avocado growers in Eastern states. These were followed up by a telephone survey of 50 growers who had particularly innovative methods or experience of controlling FSB, and on-farm visits and discussions with 20 growers to fully assess the farm situation and spray equipment. The on-farm visits included an indepth study of an unusual avocado property at Duranbah (NSW) by a team from NSW DPI led by Dr Ruth Huwer. This paper summarises the postal survey data gathered. Response to the postal survey was low (14% of surveys despatched) but interesting conclusions were still possible. 94% of respondents grew Hass, 41% Sharwill, 33% Fuerte, 25% Wurtz, 18% Pinkerton and 16% Shepard. Hass was the main variety for 86% of respondents. 43% of respondents produced less than 5000 trays per year while 26% produced more than 10,000 trays, thus reflecting a good mix of small and large growers. Total production of the respondents was 1.15 million trays of avocados, with 56% growing only avocados.

RESULTS

A majority of growers felt that most spotting bug damage was occurring between November and February as shown in FIGURE 1. Most growers felt that the latest damage occurred in March – April, but a few in most areas believed that damage could occur all year.

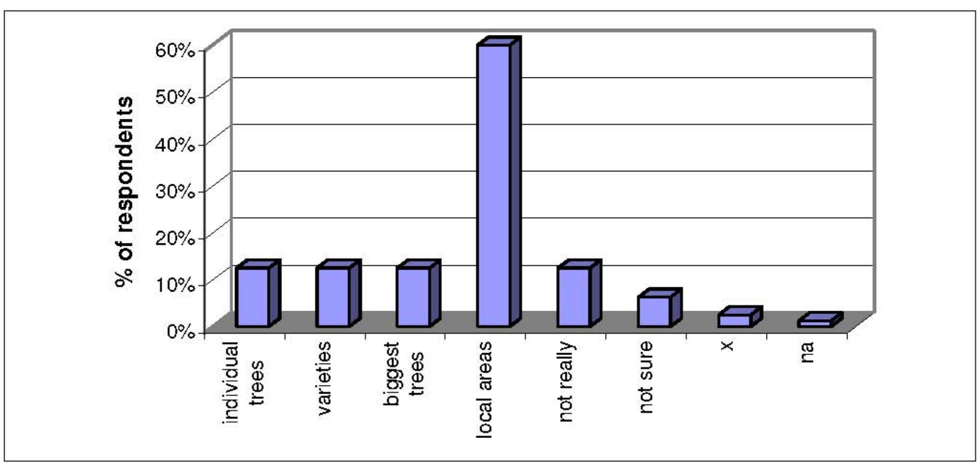
FIGURE 1. Seasonal effects on perceived incidence of spotting bugs.



In all FIGURES x = no response, na = not applicable

The most consistent factor relating to damage was the location of the tree as shown in FIGURE 2. Other important factors were the variety and tree size. Fuerte and Pinkerton were considered the most susceptible varieties.

FIGURE 2. Key factors contributing to hotspots.

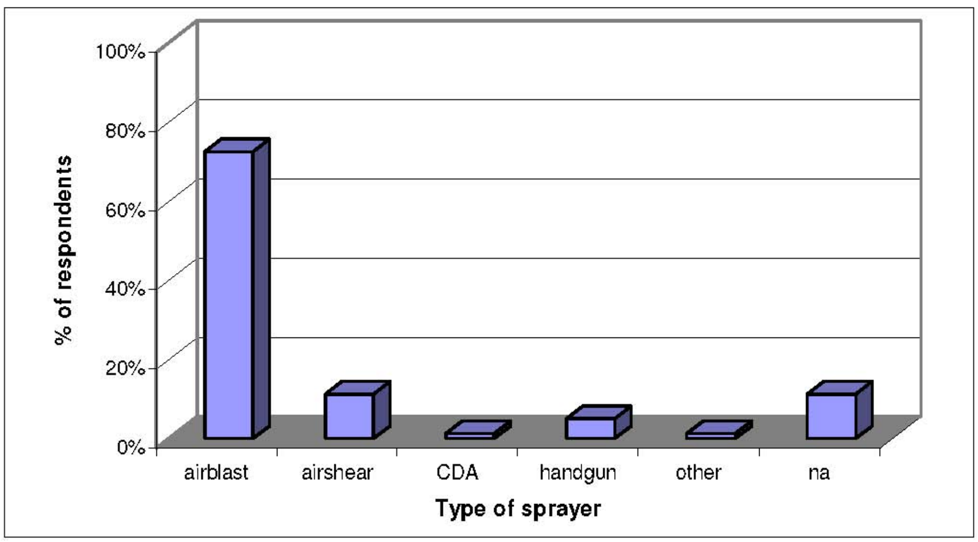


Only 40% and 65% of respondents had ever seen a spotting bug nymph or adult, respectively, in their orchard. None had seen an egg. Only 33% of respondents reported seeing spotting bug in their orchard at least once a year with 14% seeing them every month. 3% saw them every week. Given the cryptic nature and elusive habits of spotting bug weekly or monthly detection would suggest very high levels of infestation. There was, however, considerable confusion over the similarities between spotting bug and assassin bug, a common orchard predator. Only 34% of respondents could tell the difference between the nymphs and 59% between the adults. This may explain the relatively high frequency of detections of spotting bugs.

The relationship between fruit fly damage and spotting bug damage has always been confusing. This is because both Queensland fruit fly and Island fruit fly will lay eggs into surface damage, including spotting bug stings. In general spotting bug stings are deeper and larger than fruit fly stings. However 65% of respondents were confident of the difference, which was a surprisingly high figure from an expert point of view!

Three quarters of respondents had trees more than 6m high, and average canopy volume was 188 m^3/tree, ie. some very challenging trees to spray. 80% of respondents sprayed for both insects and diseases, 4% for diseases only and 5% for insects only with 11% following “no insecticide spray” organic programmes. The dominant brand of sprayer was Silvan, used by 56% of respondents. 73% of respondents used airblast sprayers, see FIGURE 3.

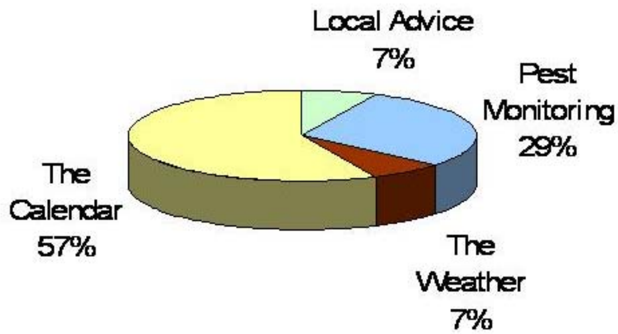
FIGURE 3. Types of sprayer used



58% of respondents were spraying at between 2 and 4 kph and only 5% sprayed at a slower speed. In large canopies spraying at over 4 kph would be unlikely to result in canopy air displacement, a key factor in most air-assisted spraying using hollow cone nozzles (Drew, 2004). Of respondents who were applying sprays for spotting bug more than half were calendar spraying while 29% were basing their timing of sprays on their own monitoring – a surprisingly high, but positive, figure.

Many growers suggested that hot humid weather favoured spotting bug and timed sprays accordingly, see FIGURE 4. Of respondents who sprayed for spotting bug 52% applied 6-10 sprays per season and 10% more than 10 sprays. The maximum number of reported sprays was 15.

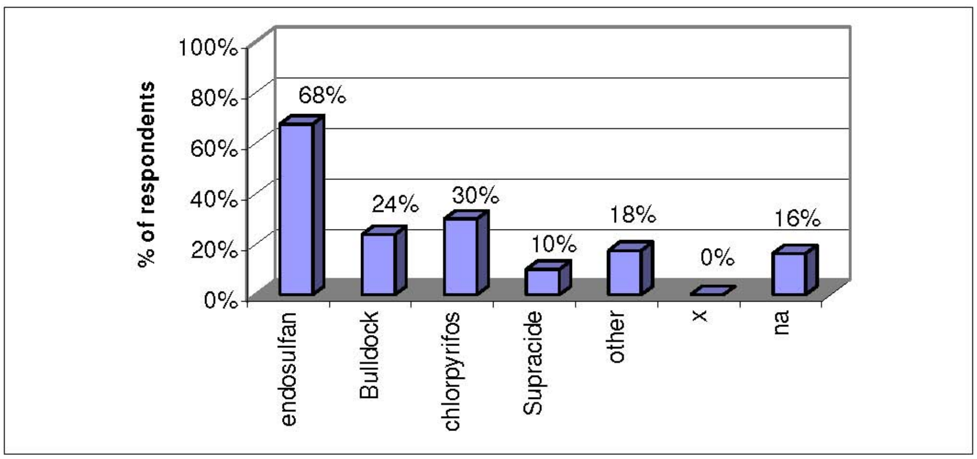
FIGURE 4. Basis on which respondents timed their spotting bug sprays



31% of respondents were applying less than 4 L spray/tree, with 41% applying 4-8 L/tree. When the reported volumes applied per tree were converted to the more meaningful concept of volumes/100m^3 canopy, based on a conservative estimate of point-of-runoff of 6.0 L/100m^3 canopy (Drew, Betts & Geitz, 2002), only 4% of respondents were actually using "Dilute" spraying volumes. Average spray volume was 2.6 L/100m^3 canopy, well below runoff. This equated to 788 L/hectare, although in such a varied crop the hectare rate has little relevance.

68% of respondents were still using Endosulfan 350EC despite increased restrictions on its use in recent years. Several alternatives, which do not necessarily require grower accreditation, were also being used as indicated in FIGURE 5.

FIGURE 5. Usage of registered insecticides for spotting bug control



While 4% were using "Dilute" spraying volumes only 19% (compared with an expected 96%) reported using "Concentrate" mixing rates. This differed from the survey carried out by Drew (2000) of both avocado AND macadamia growers which showed a higher proportion of growers using "Concentrate" rates. Reported rates and volumes were converted to calculated Endosulfan rates/100m^3 canopy as shown in FIGURE 6.

The straight line represents the 64% of respondents using the registered "Dilute" Endosulfan 350EC mixing rate of 150 ml/100L irrespective of spray volume. As shown, very few respondents were applying the equivalent of a "Dilute" spray at "Dilute" rates, ie. close to 9.0 ml Endosulfan/100m^3 canopy. In fact 40% of respondents were using less than

50% of the registered "Dilute" dose. Only 12% of respondents reported varying mixing rates in response to changes in weather or pest pressure. Overall rates of Endosulfan per hectare varied widely due to differences in spray volume, rate and frequency. The highest calculated application was 54L Endosulfan/hectare/season, but only 9% of those spraying applied more than 20L, while 50% applied less than 10L.

FIGURE 6. Relationship between spray volume and Endosulfan dose.

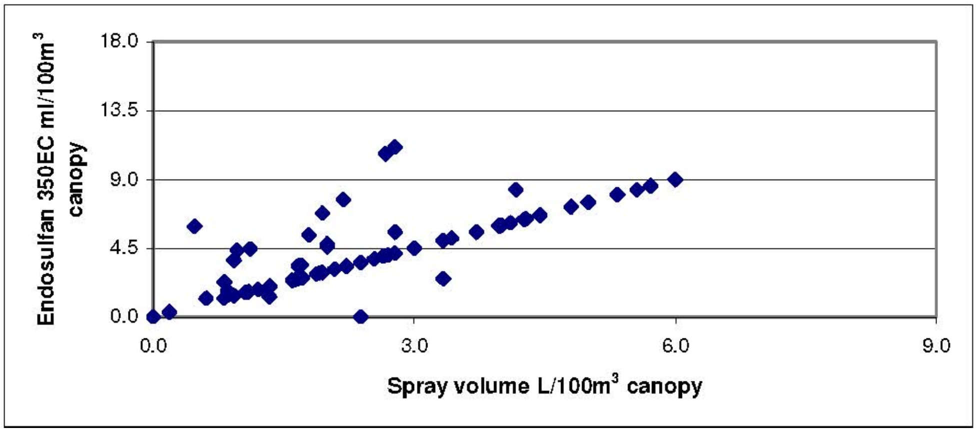
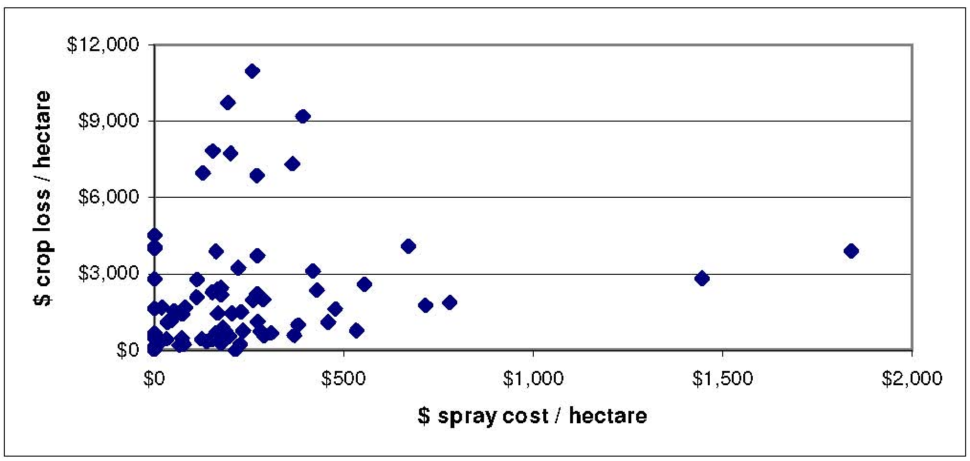


FIGURE 7. Estimated $ crop loss compared with cost of control.



DISCUSSION

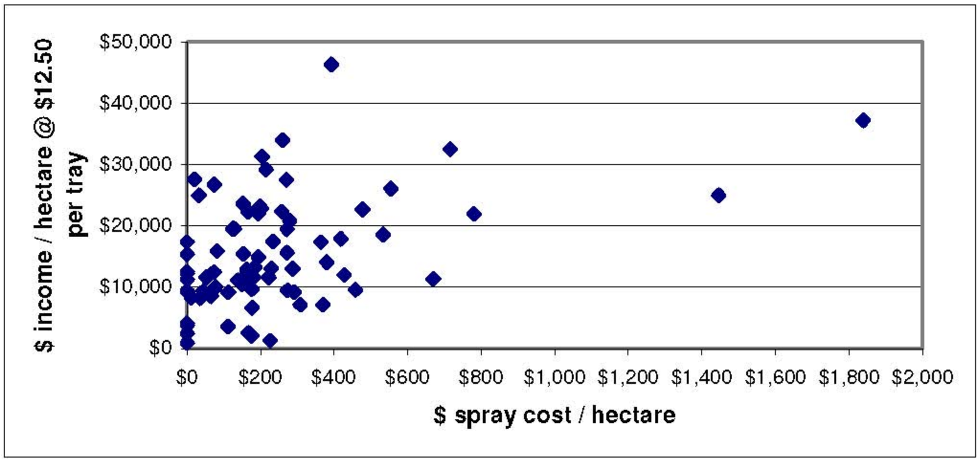
There are obviously large differences in spotting bug risk between orchards. This makes comparisons between management practices difficult but not impossible. Ineffective control measures are obviously not going to be cost-effective. Thus the reported justification for several respondents giving up spraying was that it was a waste of time. Similarly unnecessary spraying is not going to be cost effective.

Estimates of the value of losses and the costs of control were based on the following cost values: Endosulfan $14.00/L, Water $ nil, Tractor & driver $35.00/hr, Filling $10.00/hr and Fruit $12.50/tray. FIGURE 7 shows the relationship between the value of crop lost and cost of spraying. While the higher crop losses were occurring when spraying cost (a combination of volume, dose and frequency) was below $500/hectare many growers suffered insignificant losses with minimal spraying. However for those respondents with the highest losses above $6000/hectare increasing the frequency or dose of sprays may still make economic sense.

In fact 31% of respondents had combined losses and control costs of below $1000/hectare, while 38% had $1000-4000, and only 11% had over $4000. This latter group represent two scenarios, low spray users with high losses and high spray users with low losses. Unfortunately the figures could not be calculated for 20% of respondents due to incomplete data.

Given that the economic cost of control measures for spotting bug using Endosulfan based on 200 trees/hectare, 10 trays/tree and 6 full Dilute sprays per hectare would be approximately $555/hectare, sprays can be justified if unsprayed losses of more than 37 trays/hectare, or 0.2 of a tray/tree can be eliminated. This equates to only 3-4 fruit per tree. As can be seen in FIGURE 8 most respondents have the potential gross income of $10,000-30,000 per hectare per year with a spotting bug spray cost of below $500 per hectare, ie only 1.7-5.0% of gross earnings. Even for the two highest spray cost respondents spraying represented less than 2% of gross income.

FIGURE 8. Estimated $ income compared with cost of control.



An analysis of the worst case scenario losses shown in FIGURE 9 suggests that about 35% of respondents (in **Bold**) suffered high losses (above 10%) despite relatively high spraying costs (more than $100/hectare). Analysis of these growers showed that the great majority were in the Alstonville (NSW) or Palmwoods-Woombye (QLD) areas, two anecdotal hotspots.

FIGURE 9. Worst case scenarios.

Percentage of respondents	Losses to SB LOW Less than 10%	Losses to SB MEDIUM 10-20%	Losses to SB HIGH More than 20%
Spray cost NIL $0/ha	9.0	2.6	6.4
Spray cost LOW Less than $100/ha	7.7	5.1	2.6
Spray cost MEDIUM $100-300/ha	20.5	**10.2**	**15.4**
Spray cost HIGH More than $300/ha	11.5	**5.1**	**3.9**
TOTAL	48.7%	23.0%	28.3%

CONCLUSION

The survey has identified several factors determining the importance of spotting bugs in avocados. The first is strong regional differences. Overlying this are strong local hotspot differences. These local hotspot differences, the subject of work by Waite (2004), offer significant opportunities for targeted sprays IF the linkage between insecticide and fungicide spraying can be broken AND a more effective monitoring system developed. A further key piece of research is to find out how many applications of protectant fungicides, such as copper compounds, are actually required for effective anthracnose control in each variety. Currently most growers add insecticide to frequent fungicide sprays to reduce sprayer usage.

The presence of hotspots can best be exploited in association with monitoring. Currently the monitoring system relies on detection of fresh damage and live insects, and very few pest scouts are offering this option. That 29% of respondents said that they relied on monitoring is encouraging. An effective pheromone or host volatile bait trap could greatly simplify and reduce costs of monitoring. Currently Improved adoption of monitoring would require an increased awareness of the differences between spotting and assassin bugs and between spotting bug and fruit fly damage.

There appears to be a poor understanding of the new concepts of “Dilute” and “Concentrate” spraying now found on product labels. The likely result is under-dosing leading to incomplete control and an increased frequency of sprays. In addition to training to improve coverage growers must more fully understand the concept of application dose for low volume sprays (below point-of-runoff).

Acknowledgements

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