Horticulture Innovation Australia

Final Report

Thrips species in NSW Cherries and the timing of associated ring russet injury

Kevin Dodds
NSW Department of Primary Industries

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CY16000

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Level 8, 1 Chifley Square
Sydney NSW 2000
Tel: (02) 8295 2300
Fax: (02) 8295 2399

Content

Summary

Thrips activity and associated fruit damage have been a concern for some years in NSW cherry orchards. Although industry stakeholders have submitted insect samples for identification in the past, there have been no formal investigations conducted to determine the species of thrips present in NSW orchards, the timing of their attack or the nature of the damage caused.

The concept for this project resulted from findings of the HIA levy funded project CY13001 "Optimal management of pre-harvest rot in sweet cherry". This project identified a link between thrips damage to cherries and the development of pre and post-harvest rots (in particular *Alternaria* spp) in NSW Cherry orchards.

A key assumption of this study is that, if the thrips species responsible for damage to the developing fruit can be identified along with the timing of that damage, recommendations for improved control of thrips could be developed leading to a reduction in the incidence of commercial losses due to Alternaria breakdown.

A key objective of this small study was to identify thrips species and activity in NSW cherry orchards. Thrips activity was monitored on two properties in each of the key growing districts of Orange and Young using sticky traps from flowering to two weeks post-harvest. The traps were replaced on a weekly basis with the spent traps sent to the laboratory for inspection to determine thrips species and numbers throughout the season.

In addition to weekly trap deployment and collection, trap trees were tapped weekly from 100% shuck-fall to harvest and active thrips collected were sent to the laboratory for identification. Developing fruit were also inspected periodically during the growing season in an attempt to confirm the timing of russet ring damage. Unfortunately for this one year study, the 2016-17 cherry season did not favor the development of ring russet damage.

Weekly trapping, fruit inspections and canopy tapping generated a significant amount of new data relating to species and seasonal activity of thrips in NSW cherry orchards. Eleven thrips species were detected in cherry orchards, including the four common species *Thrips imaginis* (Plague), *Thrips tabaci* (Onion), *Frankliniella occidentalis* (Western Flower Thrips) and *Frankliniella schultzei* (Tomato). Populations of Plague, Onion and WFT peaked in the lead-up to or just following cherry harvest. Blue traps were more effective than yellow traps in catching the thrips. In addition, the known fruit pest Apple Dimpling Bug (*Campylomma liebknechti)* was observed in cherry tapping samples in both growing regions prompting interest in its pest/beneficial status in this crop.

Keywords

Thrips, cherries, cherry onion thrips, western flower thrips, WFT, ring russet, sticky traps, plague thrips, alternaria, apple dimpling bug

Introduction

Thrips are recognised pests of cherries here in Australia and overseas. The type of injury caused by thrips varies by pest species and crop, ranging from flower feeding and abortion to scarring and russet on developing fruit (due to direct feeding on the skin) and spotting or dimpling due to oviposition in the skin of the fruit (Childers & Achor 1995).

Thrips damage on cherry fruit in NSW Orchards was first recorded at Young in 2002 by local growers and horticulturist Peter Kennedy. The damage consisted of skin russet and circular scars on maturing fruit, becoming more noticeable as fruit colour developed late in the season. At the time, the damage was suspected to have been caused by Western Flower Thrips (*Frankliniella occidentalis*), which arrived in NSW at about the same time. Samples of thrips were sent to CSIRO and identified as Onion thrips (*Thrips tabaci*). Subsequent samples were sent for identification in 2006 and 2011 and both lots were identified as Onion thrips.

In the 2014/15 season, circular russet rings (thought to be consistent with thrips feeding damage) were found to be widespread on mature cherry fruit at Young and Orange, NSW. A commercial cherry grower at Young deployed yellow sticky traps in his orchard after harvest. Subsequent trappings were sent to the laboratory for identification. Western flower thrips were positively identified from these traps.

Also in 2014/15, a significant amount of russet ring damage was recorded on maturing fruit as part of routine damage assessments for project CY13001 "Optimal management of pre-harvest rot in sweet cherry". In the field, some of the fruit identified as having suspected thrips russet damage, also exhibited early signs of fungal breakdown which was associated with the russet rings. These fruit were sampled and sent to Dr Len Tesoriero at the NSW DPI laboratory at Ourimbah for incubation and identification of the pathogen causing the breakdown. A link between the russet ring damage and the presence of the fungal pathogen *Alternaria alternata* was established. Rotten fruit samples were collected at harvest as part of this project at Young and Orange with approximately 70% and 100% respectively of the sampled fruit testing positive for *Alternaria alternata*.

The discovery of the link between thrips damage on fruit and the incidence of pre and post-harvest breakdown due to *Alternaria* generated renewed interest in identifying the thrips species responsible for the damage and determining when in the season the damage is taking place.

The purpose of this project was to identify which thrips species are present in NSW cherry orchards and when. The project also attempted to confirm the timing of russet ring damage on fruit and the thrips species present when the damage was observed.

Field Methodology

Orchard study sites

This study was conducted on two orchards in each of the two key NSW cherry growing districts of Orange and Young. At each of the four orchards, two varieties were selected as the focus for trapping and monitoring. Details of the orchards involved in the study are provided in Table 1.

A severe hail storm on the 21st October 2016 decimated the cherry crop at the Brookelly property, Young (Figure 1). A replacement orchard (Levetts) was identified and established so that monitoring could continue on a second site at Young for the remainder of the season.

All trees selected for the trial were mature and crop bearing, similar to the tree pictured in Figure 2.

Table 1. Orchards and varieties included in the project.

District	Property Name	Variety	First Trap Deployed	Last Trap Collected	Comment
Orange	Eastwood	Lapin	22.09.16	4.01.17	
Orange	Eastwood	Sweetheart	22.09.16	11.01.17	
Orange	Ag Institute	Lapin	22.09.16	4.01.17	
Orange	Ag Institute	Sweetheart	22.09.16	11.01.17	
Young	Eastlake	Lapin	12.09.16	9.01.17	
Young	Eastlake	Rons seedling	12.09.16	27.12.16	
Young	Brooke-Kelly	Lapin	12.09.16	31.10.16	Hail effected 21.10.16
Young	Brooke-Kelly	Rons seedling	12.09.16	31.10.16	Hail effected 21.10.16
Young	Levett	Rons seedling	31.10.16	5.12.16	Replacement for Brookelly
Young	Levett	Supreme	31.10.16	20.12.16	Replacement for Brookelly

Figure 1. A severe hail storm on the 21st of October wiped out the study blocks at Brookelly's and replacement blocks had to be identified on another nearby orchard (Levett's).

Trapping

Yellow sticky traps were deployed from mid to late budswell and replaced weekly until two weeks post-harvest, giving a good coverage of the entire growing season. In addition, blue coloured traps of the same design were deployed in one variety block at each property alongside the yellow traps every third week in order to provide a comparison of the relative trapping efficiency of the two colours.

All traps were placed at around chest height, attached to a horizontal limb one on the outside edge of the tree canopy.

For the main trapping study, five yellow traps were deployed in each variety block with a distance of at least 20 metres between traps. Traps were labelled with deployment and collection dates, plus a four character code to identify district, property, variety and tree.

On any given week, a grand total of 40 yellow traps were collected, sealed using plastic food wrap and posted to the entomology laboratory at the Yanco Agricultural Institute for processing. On every third week, a grand total of 20 blue traps were also collected and sent to the laboratory.

By the completion of the study, a total of 614 yellow traps and 100 blue traps had been deployed, collected and inspected in the laboratory.

Figure 2. A representative orchard tree selected for trapping and monitoring, showing typical placement of yellow and blue traps.

There were some initial problems with the method of attaching the sticky traps to the monitor trees. In wet and windy weather, the factory supplied twist tie hangers were prone to failure. An alternative and more robust method was developed using poster hangers or document clips (Figure 3).

Figure 3. Factory supplied trap hangers (left) were found to be inadequate in wet windy weather. A more robust trap hanger had to be devised (right).

Flower and Fruit Tapping

Collections of active thrips commenced at all locations in the period from full bloom to petal-fall and continued weekly until the completion of harvest. During the weekly block visit, each trap tree was tapped to collect active thrips in the foliage and fruit clusters. Tapping involved beating (by hand) approximately 5 branches or laterals on a random sample around each trap tree over a white surface (beating tray). Immediately after each branch was tapped, the beating tray was inspected for active thrips. All active thrips were collected using a fine tip paint brush dipped in ethyl-alcohol. The thrips were placed in vials filled with alcohol, labelled with the trap tree ID, dated and sent with the sticky traps to the laboratory for species and life stage identification.

During the weekly tappings, other insects of interest were dislodged and observed on the beating tray. The presence of these insects was noted as a comment on the field record sheet.

Fruit Inspections

Commencing from 100 percent shuck-fall, 50 randomly selected fruit per trap tree were inspected closely for ring russet (in-situ) and the result recorded on the field data sheet.

Laboratory Methodology

Sticky Trap inspections

On arrival at the laboratory, all sticky traps were inspected using a dissecting microscope (Figure 4)Figure 4. (right) NSW DPI (Yanco Ag Institute) Technical Assistant , Scott Munro inspecting one of the blue sticky traps for thrips using a dissecting microscope.. Thrips species were identified and recorded to give a species total and overall thrips count for each trap and collection date. When thrips numbers on the traps were low-moderate (ie, ≤50), all thrips on the traps were individually identified and recorded. When total thrips exceeded this level (Figure 5), species identification was carried out on a sub sample of 50 individual thrips on each trap. In this case, total thrips numbers were then estimated by counting a single row of nine grid cells on each side of the trap and multiplying the resulting count for each side by the total number of rows (6). This technique is detailed in Figure 6. By the completion of the study, a total of 614 yellow and 100 blue sticky traps had been deployed in the orchards, collected and inspected.

Some *Thrips australis* specimens looked similar to plague thrips on sticky traps except they were slightly smaller and darker. These thrips were initially identified as plague thrips. Data for the affected thrips (traps collected from Orange during 19/09/16 to 21/11/16 and from Young traps on 28/11/16) were later put in a separate column labelled 'Plague or Australis'. Later identifications separated *T. australis* from plague thrips. .

Figure 4. (right) NSW DPI (Yanco Ag Institute) Technical Assistant , Scott Munro inspecting one of the blue sticky traps for thrips using a dissecting microscope.

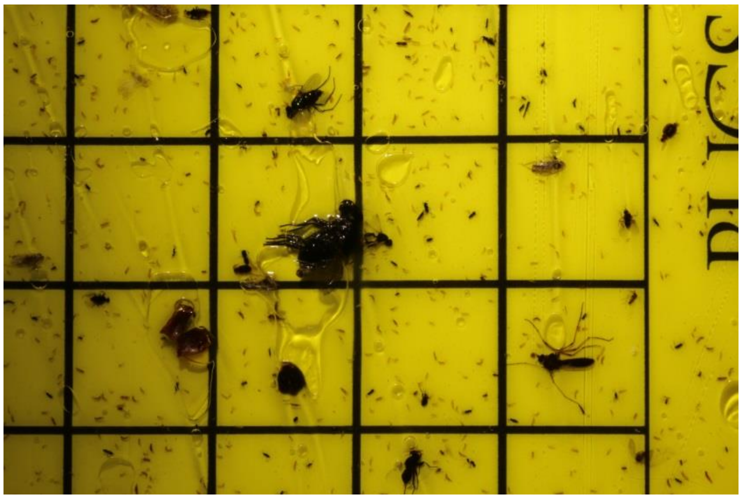
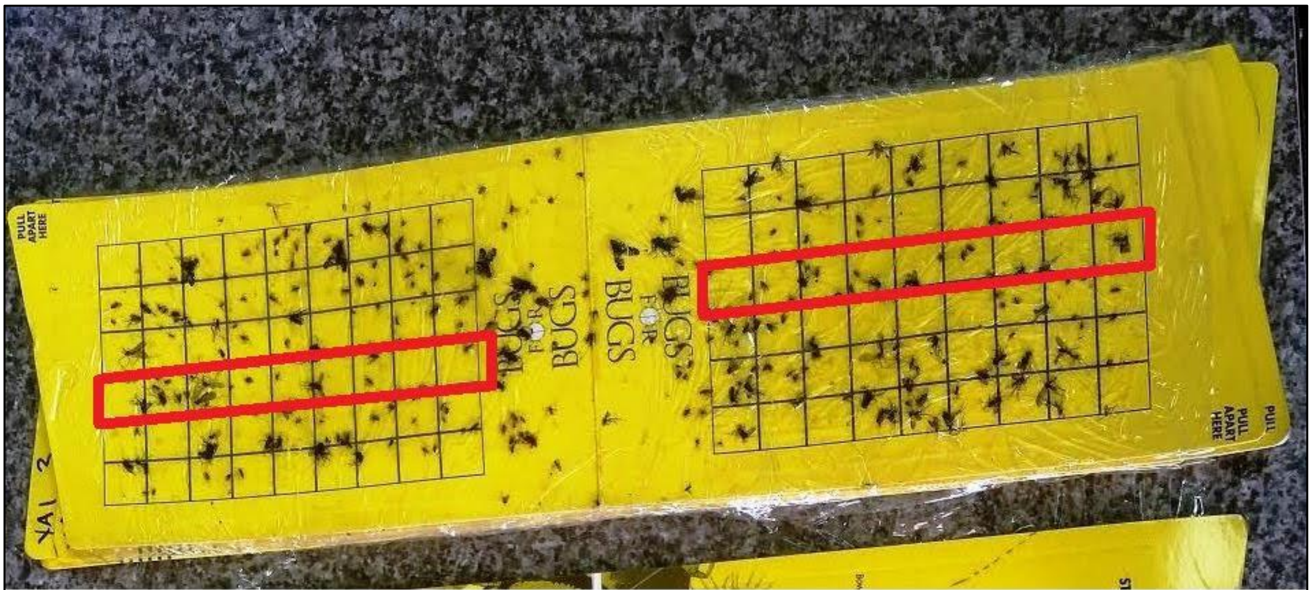


Figure 5. A trap from the Levett property (Young) showing very high adult thrips numbers in the first week of December.



When high numbers of thrips are present on a trap they are generally evenly spread out across the trap.

1. Select a row that contains the number of thrips that is representative of that half of the trap.
2. Count all thrips present in that row.
3. Multiply that total by 6 to get a total thrips number for that half of the trap.
4. Repeat above steps for the other side of the trap.
5. Add the 2 totals together to get the trap total.

Figure 6. Laboratory method for estimating total thrips numbers on sticky traps when the weekly catch exceeds fifty.

Active thrips sample inspections

The active thrips samples collected during flower and fruit tapping were inspected in the laboratory to determine approximate life stage (adult or juvenile), species and number present. For adult thrips, this was done using a dissecting microscope, whilst juvenile thrips were slide mounted using the technique described Mound and Gillespie (1997) and species identification made using a compound microscope and larval identification keys (Kirk 1987, Milne, Milne and Walter 1997).

Outputs

Outputs completed as at 30th May 2017

Milestone Report MS102

A milestone report was completed 31st January 2017, documenting the completion of all fieldwork associated with the project. The report was approved by HIA.

Final Report

This Final report is one of the main outputs of the project and is due to be submitted to HIA by 30th May 2017 along with a financial reconciliation.

Outputs pending completion by 31st August 2017

Fact Sheet

A preliminary factsheet outlining some of the key findings from the 2016-17 study will be developed. The factsheet will form the basis for a second edition pending the results of further study in 2017-18 season. This potential for and scope of any further study in this area is yet to be explored by NSW DPI, HIA and the Cherry Industry SIAP.

Grower Meetings

Grower meetings will be held in Winter 2017. Suitable dates for both Young and Orange are currently being investigated and dates will be advised once they have been confirmed.

Article in NSW DPI orchard plant protection guide

A brief article will be written outlining the key findings of this one season study and will be included in the 2017-18 edition of the NSW Orchard Plant Protection guide for Deciduous Fruits in NSW. Due for publication September 2017.

Outcomes

No Ring Russet at Young or Orange in 2016-17….but we found some at Batlow

Weekly fruit inspections throughout the growing season on each of the trap trees at Young and Orange found no signs of ring russet. This was unfortunate, as the lack of visible damage in season 2016-17 meant that it has not been possible to demonstrate a link between a particular thrips species and the occurrence of ring russet.

As an add-on to this study, project leader Kevin Dodds visited cherry orchards at Batlow in early December and did observe ring russet on cherry fruit in several varieties on two neighboring properties. Figure 7 shows the circular ring russet between two recently separated cherries of the Lapin variety.

With only a couple of weeks remaining before harvest at Batlow, some sticky traps were deployed, tapping's were carried out and several direct collection of thrips from damaged clusters were made. Direct collections consisted of separating cherry clusters and looking for thrips movement. Any active thrips observed, were collected using a fine tip brush and ethyl-alcohol. Figure shows an active thrips on a Lapin cherry at Batlow.

Similar to the study districts of Young and Orange, plague and onion thrips were the two main species present in these Batlow traps and samples. The results of these additional investigations were inconclusive in regard to identifying the species responsible for the ring russet. As the damage was already present when Mr Dodds first visited these blocks, we were unable to confidently identify the causal species.

Tappings and direct thrips collections from fruit at Batlow yielded only Plague and Onion thrips adults and juveniles, (no WFT).

Figure 7. Adjacent Lapin cherries separated to show corresponding ring russet (Batlow 19.12.2016). Note the undamaged tissue in the centre of the ring where insects cannot gain access to cause damage.

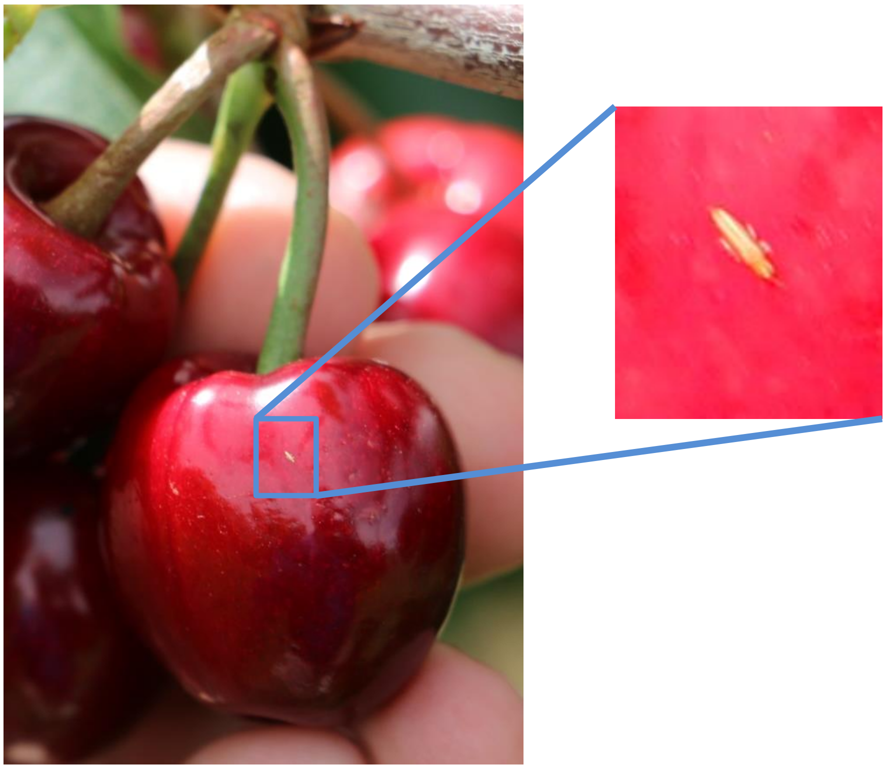


Figure 9. An active thrips seen here on the Lapin variety at Batlow during fruit inspection (19.12.2016)

Eleven thrips species identified in cherry orchards

The 2016-17 season was not conducive to ring russet damage and this has limited the conclusions that can be drawn from this study. However some useful observations relating to species and general thrips activity can be made from the significant amount of trap catch and species identification data that was collected for Young and Orange. These observations may help to inform future investigations into thrips in cherry orchards.

Table 2 lists four pest thrips species and seven native thrips species that were found in traps and/or tapping's during the study. This is thought to be the first intensive survey of this kind focused on thrips in NSW Cherry orchards.

Table 2. Thrips species trapped and/or collected in cherry orchards at Young and Orange NSW in season 2016-17.

Pest species
Thrips imaginis (Plague)
Thrips tabaci (Onion)
Frankliniella occidentalis (Western Flower Thrips)
Frankliniella schultzei (Tomato)
Haplothrips spp
Thrips australis
Chirothrips spp
Tenothrips frici

Andrewarthaia kellyana
Australothrips bicolor
Desmothrips spp

Plague thrips the dominant species

Of the four pest species observed in the study, plague thrips (*Thrips imaginis*) was consistently the most prevalent, accounting for 92% of all the pest thrips identified on yellow sticky traps and 94% on blue traps. The second most commonly trapped thrips was onion thrips (*Thrips tabaci*) accounting for a much lower proportion of 2.16% of all thrips identified. Western Flower Thrips (*Frankliniella occidentalis*) ranked 5th overall at a very low 0.25% of thrips identified on yellow traps. Table 3 shows the total thrips identified by species for yellow and blue traps with species ranked from highest to lowest based on yellow trap catch.

Table 3. Total thrips numbers identified, percentage of total identified and species rank for Yellow and Blue traps at Young and Orange combined.

Species	Total number identified on Yellow traps	Percentage of total identified on Yellow traps (%)	Species Rank for Yellow traps	Total number identified on Blue traps	Percentage of total identified on Blue traps (%)	Species Rank for Blue traps
***Thrips imagines* (Plague)**	17140	92.11	1	3680	94.5	1
***Thrips tabaci* (Onion)**	402	2.16	2	55	1.41	2
***Tenothrips frici* (Dandelion)**	278	1.49	3	5	0.13	8
***Haplothrips* spp**	62	0.33	4	16	0.41	4
***Frankliniella occidentalis* (Western Flower)**	47	0.25	5	12	0.31	5
Thrips australis	46	0.25	6	-	-	-
Desmothrips spp	20	0.11	7	26	0.67	3
***Frankliniella schultzei* (Tomato)**	15	0.08	8	11	0.28	6
Chirothrips spp	15	0.08	9	8	0.21	7
Andrewarthaia kellyana	3	0.02	10	-	-	-
Australothrips bicolor	3	0.02	11	-	-	-
Plague or Australis[1]	578	3.11	-	81	2.08	-

Thrips were active throughout the growing season

Thrips activity was surprisingly synchronized by calendar date for the Young and Orange districts (Figure 10). The first sustained thrips catch occurred in the first week of October which was early bud break stage at Orange and full bloom to early petal-fall at Young depending on variety. Thrips steadily increased to a peak of activity in the first week of December for both districts which was

[1] Plague or Australia has been excluded from ranking. All traps with collection date from 19/09/16 to 21/11/16 (plus Young traps collected on 28/11/16) had 2 similar looking thrips species grouped in the column labelled 'Plague or Australis'. Closer identification was then carried out for all future thrips of this type and specimens identified as either Plague Thrips or Thrips Australis.

straw colour to first red stage at Orange and mid red stage to full mature at Young depending on variety.

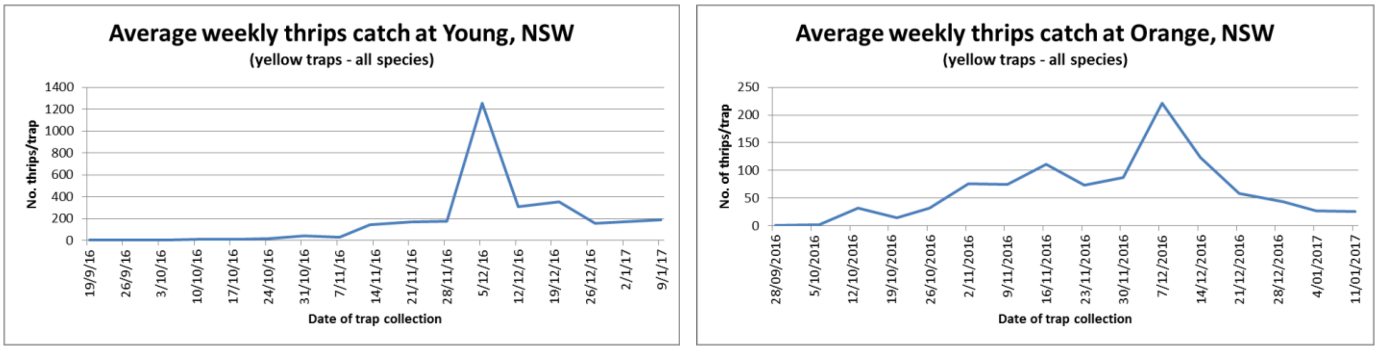


Figure 8. Average weekly thrips catch for all species combined was surprisingly synchronized across districts by calendar date.

Late season peaks observed for Plague, Onion and Western Flower Thrips

Because plague thrips represented such a high proportion of the total species catch (92%), the charts provided in

Figure 8 for all species are also representative of the trend and general population level for plague thrips. Seasonal abundance of two other pest species WFT and Onion thrips also increased towards the latter part of the season. Both species in both districts reached their highest levels in sticky traps after the completion of cherry harvest.

WFT first appeared in the traps in late spring to early summer in both districts and was recorded at very low levels. Their numbers did appear to increase slightly towards the end of the season with the highest numbers reached in the week or two after harvest.

Onion thrips first appeared on sticky traps earlier than WFT, with low levels recorded at Young as early as the 4th week of September during flowering (Figure 11). The first Onion thrips at Orange were not detected on sticky traps until mid-November (Figure 12).

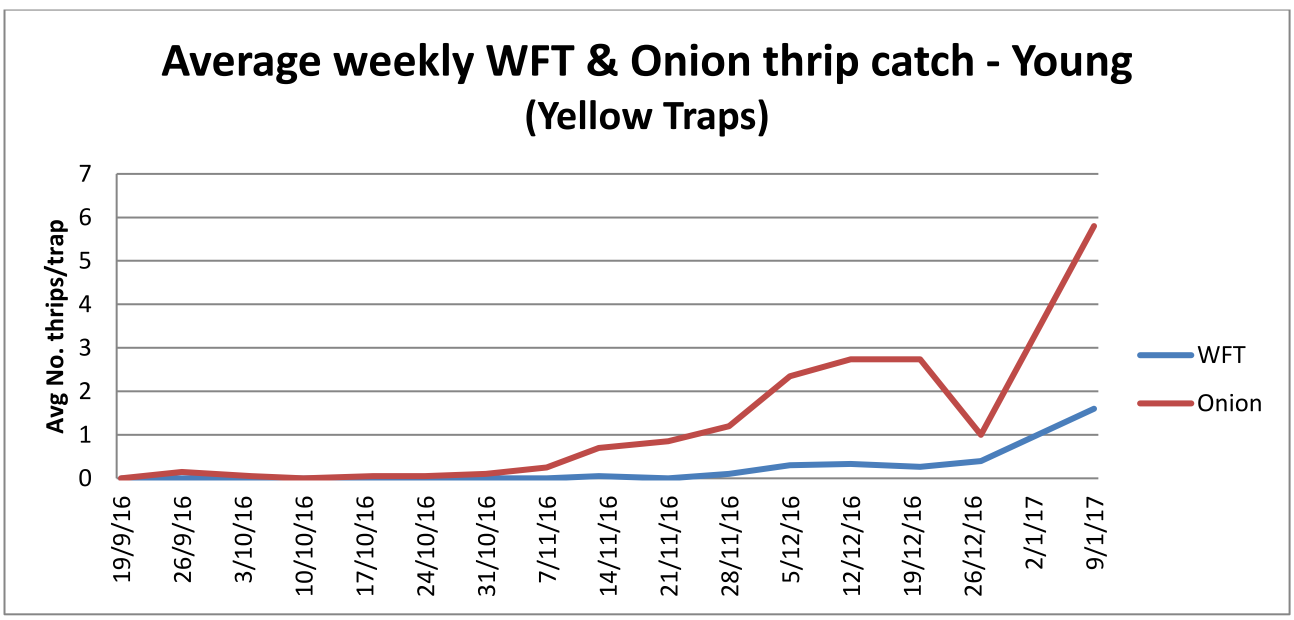


Figure 9. Average weekly trap catch for Western Flower Thrips and Onion Thrips at Young, NSW.

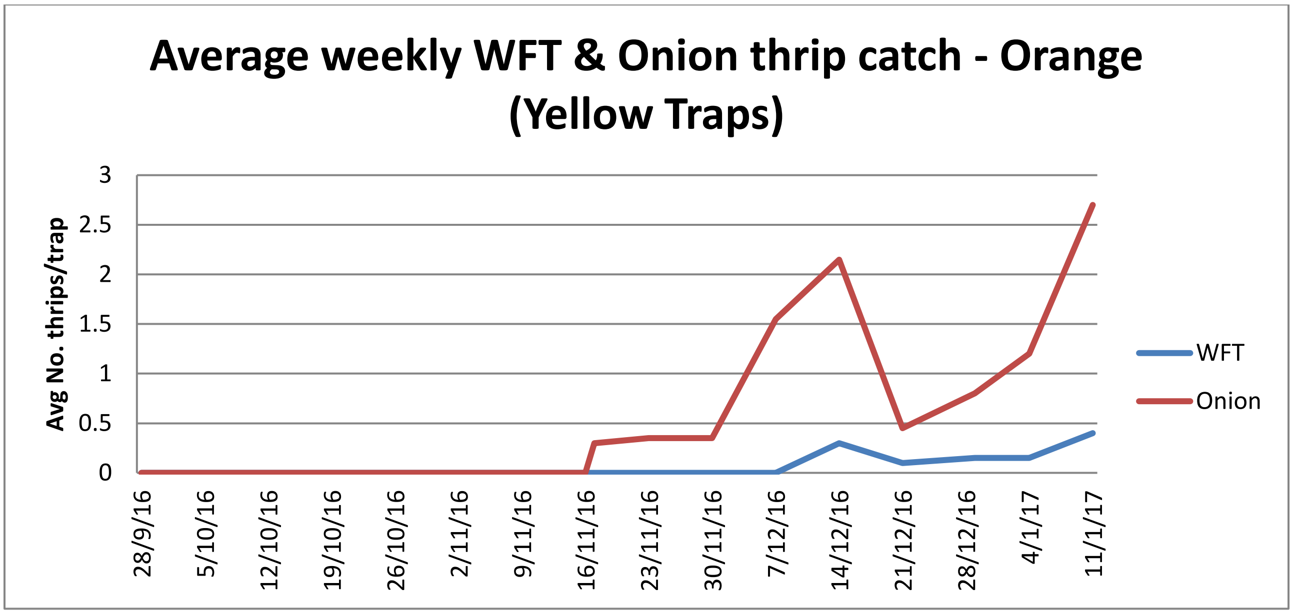


Figure 10. Average weekly trap catch for Western Flower Thrips and Onion Thrips at Orange, NSW.

Blue traps consistently caught more thrips that yellow traps

Every third week throughout the season, blue traps were deployed along-side yellow traps in order to collect some data on the relative thrips trapping efficiency of the two colours. Although not always statistically significant, raw data blue traps did consistently catch more thrips than yellow traps (Figures 13 and 14). This is consistent with findings published for vegetable and field crops in other countries (Natwick et al, 2007., Ranamukhaarachichi and Wickramarachichi, 2007)

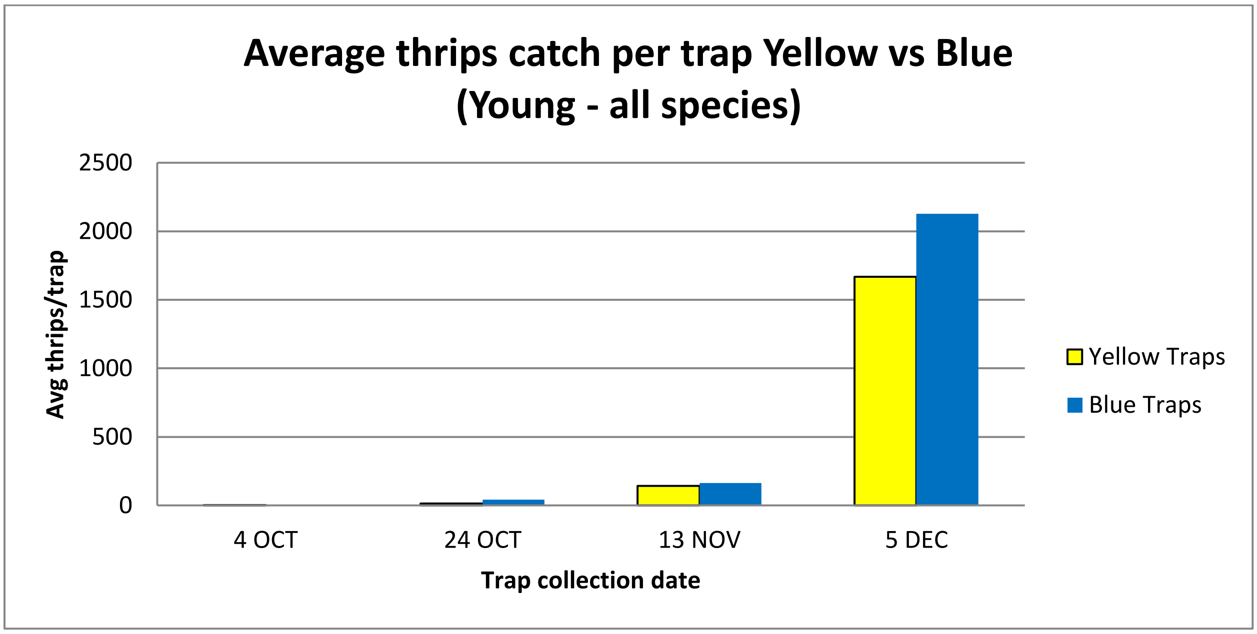


Figure 13. Comparison of the average thrips catch for Yellow traps versus Blue traps for all species combined at Young, NSW.

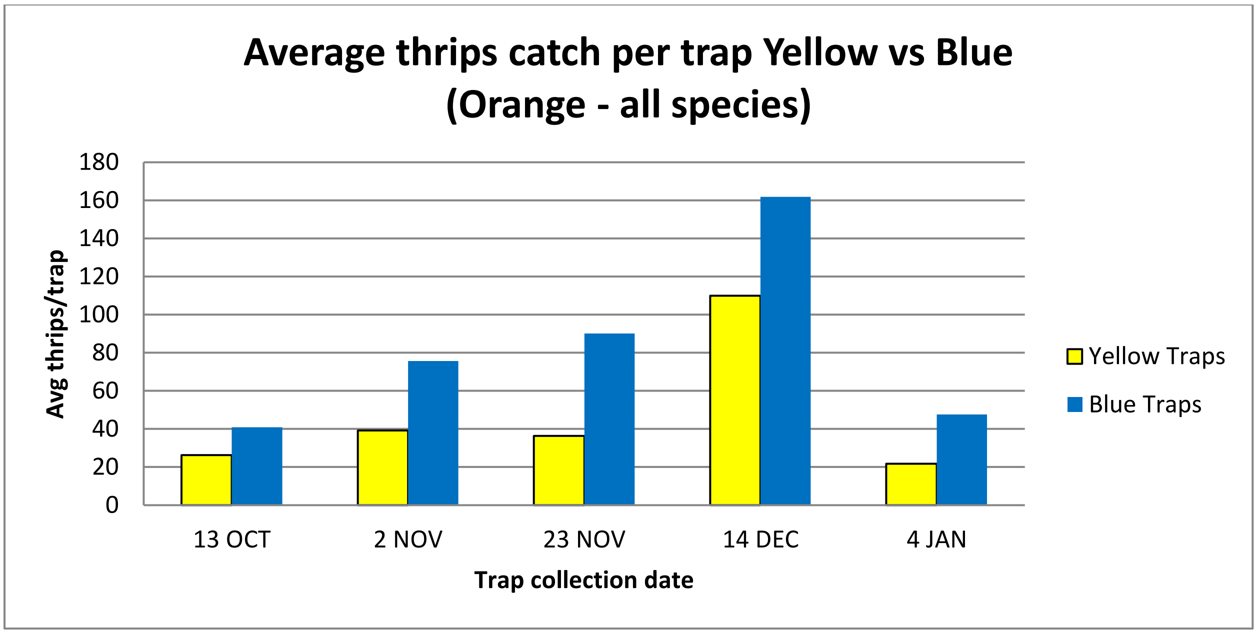


Figure 14. Comparison of the average thrips catch for Yellow traps versus Blue traps for all species combined at Orange, NSW.

Tapping collections comparative to sticky trap populations

Weekly tappings of flowers at bloom and fruit plus foliage throughout the growing season at Young and Orange yielded a total of 275 vial samples of active thrips that were sent to the laboratory for species identification and life stage classification (eg Adult or Juvenile). Table 4 details the lab results for the vial samples.

Table 4. Adult and juvenile thrips identified from 275 tapping collections at Young and Orange combined.

Species	Number of adults identified	Number of juveniles identified	Species total as percentage of total actives collected (%)
Thrips imagines (Plague)	1454	74	80.68
Thrips tabaci (Onion)	343	1	18.16
Frankliniella occidentalis (Western Flower)	2	1	0.16
Frankliniella schultzei (Tomato)	2	-	0.11
Haplothrips spp	6	-	0.32
Thrips australis	7	-	0.37
Andrewarthaia kellyana	2		0.11
Other/Unknown	-	2	0.11
Total Collected	**1816**	**78**	-

Interestingly, juvenile thrips accounted for only 4.3% of all active thrips collected as a result of tappings. Once again, plague thrips dominated the numbers representing 80.68% of all thrips collected. Of interest was the relatively low incidence of juvenile Onion thrips and WFT, with only one individual for each of these species and life stage recovered from tapping samples. WFT also had relatively low adult numbers at just 2 individuals compared with 343 for Onion thrips.

Fruit Symptoms

Symptoms consistent with earwig feeding on stems and fruit were the most commonly observed during weekly fruit inspections. As fruit clusters began to close and fruit started touching, inspections were concentrated on clusters, so that any damage occurring between touching fruit could be detected if present. Weekly fruit inspections resulted in zero detections of ring russet.

In the early stages of cluster closure, some brown spotting was observed between touching fruit, but this was a rare finding (Figure 15).

Figure 15. Brown dots or scarring between touching fruit on one orchard at Young (Var. Rons Seedling).

As mentioned previously, damage was observed on several varieties at Batlow, NSW during an initial visit to the cherry orchards in this district in early December 2016. Ring russet was observed on all the varieties visited at Batlow, those being Santina, Lapin, Kordia and Sweet Georgia. As the damage was already present when the orchards were first visited, there could be no certainty regarding when the damage first appeared. Figure 16 shows typical ring russet on a cherry of the Santina variety which is representative of the damage observed generally at Batlow this past season.

Figure 16. Batlow district "Santina" variety showing tell-tale ring russet where this fruit touched another (Date observed : 6th December 2016)

Other observations

Apple Dimpling Bug in Cherries

The presence of another known fruit pest not previously associated with cherries was noted during weekly fruit inspections at both Young and Orange. Apple dimpling bug (*Campylomma liebknechti*) was observed during flower and fruit tappings throughout the season from October to December at Young and around cherry flowering time (October) at Orange. Insect samples were sent to the laboratory for formal identification and confirmed our suspicions. Apple Dimpling Bug (ADB) is considered a pest during flowering in Apple orchards as it feeds on the ovary of flowers causing a tell-tale dimpling as the fruit grows. Later in the apple season (after complete petal-fall), ADB is considered a potentially beneficial insect as it will predate on other insects in the tree canopy.

The presence of ADB (discovered during this thrips study), raises the question of the pest/beneficial status of the insect in cherry orchards. This question could be worthy of further investigation.

Evaluation and discussion

Our study in 2016-17 yielded some useful new information relating to thrips species in NSW cherries and the occurrence of certain pest species at Young, Orange (and Batlow as a project add-on). Key observations included;

- the detection of eleven different species of thrips in cherry orchards,
- thrips were found to be active throughout the growing season from bud burst to post harvest,
- plague thrips were the dominant species across all three districts,
- populations of the three key pest species Plague, Onion and WFT peaked in the lead-up to or following harvest
- Blue traps appeared to be more efficient at trapping thrips than yellow
- Tapping flowers, foliage and fruit, yielded similar species and population trends to those recorded from sticky traps
- Apple Dimpling Bug was observed in flower and fruit tappings over multiple weeks in both Young and Orange

A key objective of this study was to monitor for ring russet throughout the growing season and identify thrips species present prior to, during and following the appearance of the damage. As reported (unfortunately for the project), it was a season on zero ring russet at both of the primary study districts of Young and Orange. The lack of ring russet has made it impossible to draw any conclusions in regard to which thrips species causes the damage.

In the USA, extension articles identify ring russet as the damage caused by Western Flower Thrips late in the cherry season (Riedl, Year Unknown and Grant et al 2009). Although present on traps and in tappings at Young and Orange during this study, WFT numbers were the lowest recorded for any of the pest species identified. Because this is the first time such an intensive study of thrips activity has been conducted in cherries in NSW, we have no baseline data to determine whether the pest thrips species numbers were high, moderate or low relative to other seasons. For this reason we are unable to relate pest population status to the lack of damage.

In the case of Batlow, ring russet damage was detected close to harvest on a number of varieties. Traps, tappings and direct collection of active thrips from cherries yielded just one adult WFT on one trap over a two week period of monitoring. Direct collections of active thrips on damaged fruit at Batlow yielded adults and juveniles of Plague and Onion thrips only (no WFT).

When ring russet was observed at Young in 2006 and 2011, thrips present at the time were identified as Onion thrips. If Onion thrips are capable of causing ring russet like that described for WFT in the USA, then our results in 2016-17 raise the obvious questions; Why did we see damage at Batlow but not in Young and Orange when Onion thrips were present in all three districts at the perceived critical time leading up to cherry harvest? Is there a micro-climatic trigger which occurred at Batlow but not the other districts in 2016-17? This would need further investigation to determine.

Spring 2016, over much of South Eastern Australia, was characterised by cold and very wet weather. Conditions for flowering and pollination particularly at Young and to a lesser extent Orange were very poor. This certainly had an impact on fruit set in both districts, resulting in a lighter than normal crop with more single cherries and much less clustering than normal (particularly on varieties like Lapin). Cherries at Batlow flowered later than both Young and Orange and at a time when weather conditions had improved dramatically. Batlow cherries matured 2-3 weeks later than Orange and 3-4 weeks later that Young. This later maturity might have been a factor involved in the appearance of ring russet damage at Batlow only.

Anecdotally, cherry growers and other crop protection stakeholders say that a wet season will mean lower risk of thrips damage and conversely, a dry Spring will mean a greater risk. This observation would seem to support the lack of damage to fruit in the 2016-17 season at Young and Orange.

The seasonal nature of thrips populations and the sporadic occurrence of damage in cherries was identified as a risk factor for this single season study at the commencement. Weather conditions in Spring 2016 may have played a part in reducing the potential for thrips population build-up and subsequent damage. The occurrence of ring russet damage at Batlow this season in the presence of similar pest species to the undamaged districts is not explained and will require further investigation if the causal species and/or environmental triggers are to be identified.

The presence of Apple Dimpling Bug in cherry orchards may also warrant further investigation, to determine its status as a crop pest, beneficial or both.

Recommendations

1. Cherry industry SIAP consider extending this preliminary study for a second season, focusing on;
    a. targeted thrips collections via an ethanol dipping study in season 2017-18,
    b. field exclusion experiments (where thrips are excluded from fruit clusters), and
    c. field thrips introduction experiments where target thrips species are artificially introduced into a field enclosure around a fruit cluster

    Costs would be kept to a minimum by sampling only at the point in time when ring russet damage is observed. The aim would be to correlate damage with species present in the clusters at the time the damage occurs.

2. Cherry industry SIAP give consideration to further investigation of the pest/beneficial status of Apple Dimpling Bug in cherry orchards.

Scientific refereed publications

Nil to report

Intellectual property/commercialisation

No commercial IP generated

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Appendices

Nil