New chemicals for thrips control in cotton 2015–16 experiment

Sarah Beaumont, Dr Sandra McDougall, Dr Jianhua Mo, Scott Munro and Alicia Ryan (NSW DPI, Yanco)

Key findings

- Thrips density can be highly variable within a field.
- Onion thrips (*Thrips tabaci*) was the most abundant species.
- Conclusions on the efficacy of the tested insecticides could not be made from this season's data.

Introduction

Introducing transgenic varieties of cotton into Australia has led to an increase in secondary pests that were once controlled by *Helicoverpa*-targeted sprays. Thrips is a group of sucking insects that has emerged as a significant early season pest. They feed on growing terminals causing leaf distortion and terminal death if the plant is heavily infested. This can cause delayed maturation and yield loss. Currently registered insecticides for thrips control in cotton are mostly organophosphates, which are highly toxic and disruptive to beneficial insects. To find more IPM-compatible options, we evaluated for a second season under field conditions, four new-generation insecticides that are either specialised against sap-sucking insects or known to have thrips control potential. In 2015–16 we added an additional three insecticides to the experiment (Table 1).

Site details

Location	Point Farms, Darlington Point, 34°39'15.3"S 145°53'26.8"E
Experiment period	17 November–15 December 2015
Sowing date and first water	18 October 2015
Variety	Sicot 74BRF
Seed treatment	Dynasty® – azoxystrobin+ metalaxyl-M+ fludioxonil
Insecticide at planting	Lorsban® – chlorpyrifos
Irrigation	Furrow
Establishment	Nine plants/m row
Harvest date	24–25 May 2016

Experimental design

Design	Randomised block design with five replicates
Plot size	90 cm rows × 4 rows × 20 m = 0.0072 ha
Replicates	Five
Buffer	One row either side, 2 m along rows
Spray applicator	Battery powered 15 L backpack sprayer (Rapid Spray®) × 2 with a four-row hand boom
Water rate	200 L/ha
Spray dates	18 and 25 November 2015
Monitoring dates	17 and 24 November, 2 and 15 December 2015

Sample unit	10 plants (excluding roots) from centre right row
Monitored	Adult and larval thrips plus thrips species composition
Harvest assessment	2 m hand-picked open bolls from centre left row of each plot
Analysis	Data was log transformed and analysed using Analysis of Variance (ANOVA), if significant treatment effects were detected ($P<0.05$) treatment means were separated by Fisher's least significant difference (LSD).

Treatments

Table 1. Insecticides and rates tested in the experiment.

Name	Active constituent	Rate	Adjuvant	Seasons tested
Exirel®	100 g/L cyantraniliprole	600 mL/ha	500 mL/100 L Hasten™	2014/15, 2015/16
Success™ Neo	120 g/L spinetoram	400 mL/ha	60 mL/100 L Agral®	2014/15, 2015/16
Sorcerer®	18 g/L abamectin	300 mL/ha		2015/16
Mainman®	500 g/kg flonicamid	400 g/ha		2014/15, 2015/16
Canopy oil®	792 g/L paraffinic oil	2 L/ha		2015/16
Shield®	200 g/L clothianidin	250 mL/ha	200 mL/100 L Maxx™	2015/16
Transform™	240 g/L sulfoxaflor	300 mL/ha	60 mL/100 L Agral®	2014/15, 2015/16
Control	water			2014/15, 2015/16

Results

Thrips assemblages

Thrips density was 12.5 thrips/plant at the first spray date and cotton seedlings were at the 2–3 leaf stage. The thrips population consisted of 83% onion thrips, 2% tomato thrips, 2% western flower thrips (WFT), 10% plague thrips and 3% other thrips before spraying (Figure 1A). The species composition had changed very little 14 days after the second spray (14 DAS2), with a slight increase in onion and tomato thrips and a slight decrease in WFT, plague thrips, and other thrips (Figure 1B).

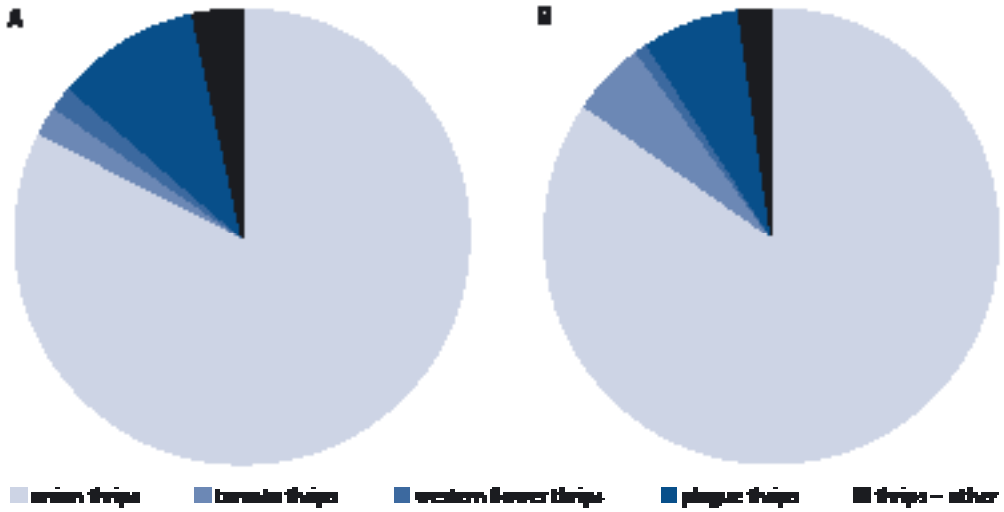

Figure 1. Thrips species composition observed on seedling cotton on 17 November 2015 (A) before starting spray treatments and (B) on 15 December 2015 after receiving two spray treatments on 18 and 25 November.

Efficacy for thrips control

The first spray had no effect on adult thrips density seven days after spraying (7 DAS1) (Figure 2). Seven days after the second spray (7 DAS2), adult density was reduced by some insecticide treatments more than others, however no insecticides were significantly more or less effective than the control. The lack of significant difference between treatments and the control remained at 14 days and 21 days after the first spray (7 days and 14 days after the second spray), except for more adult thrips in clothianidin-treated plots at 7DAS2.

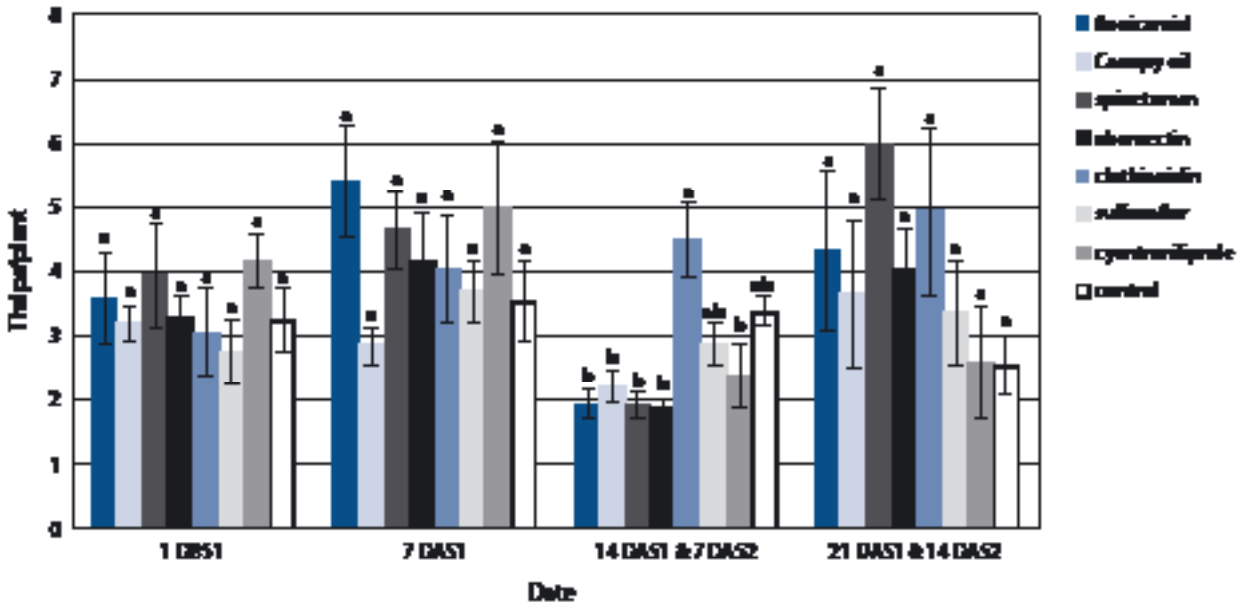

Figure 2. Mean adult thrips densities before and after sprays. Bars in the same group labelled with different letters are significantly different based on log transformed data at $P<0.05$ by Fisher's LSD following the detection of significant overall treatment effects using ANOVA. Data presented in graph is untransformed data and error bars indicate standard error. DBS: days before spray, DAS1 and DAS2: days after first and second spray.

All insecticide treatments and the water-sprayed control reduced larval thrips density from 7–14 thrips/plant to less than 2.5 thrips/plant at 7 DAS1 (Figure 3). As no insecticide was significantly more effective than the control, this reduction in larval thrips cannot be attributed to chemical action. Larval thrips density was not further reduced by any insecticide treatments at 7 DAS2; however, larval thrips populations increased with Canopy oil®, clothianidin and sulfloxaflor at 7 DAS2. Spinetoram suppressed larval thrips more effectively than Canopy oil® or sulfloxaflor following the second spray, however, these were not significantly more effective than the control. As with the adults, there were no significant effects on larval thrips at 14 DAS2.

In comparison with the 2014–15 experiment where thrips pressure was as high as 70 thrips per plant, this season's experiment did not identify any clear efficacy in the tested insecticides for thrips control. In 2014–15, all four tested insecticides reduced larval thrips by at least 50% 7 DAS1 and by as much as 77% following two spray treatments.

Harvest assessment

No significant differences were found in the seed cotton yield despite some treatments having a lower thrips density (Figure 4).

Summary

Onion thrips remained the most prevalent species throughout the experiment and there was little change in thrips species composition following the sprays. Due to the low thrips pressure and the highly variable nature of thrips densities within the experiment area it is not possible to make conclusions about the efficacy of the tested insecticides at controlling thrips in cotton based on the 2015–16 season data. Another season with greater thrips density would be required to make recommendations on the efficacy of these insecticides on thrips control in cotton.

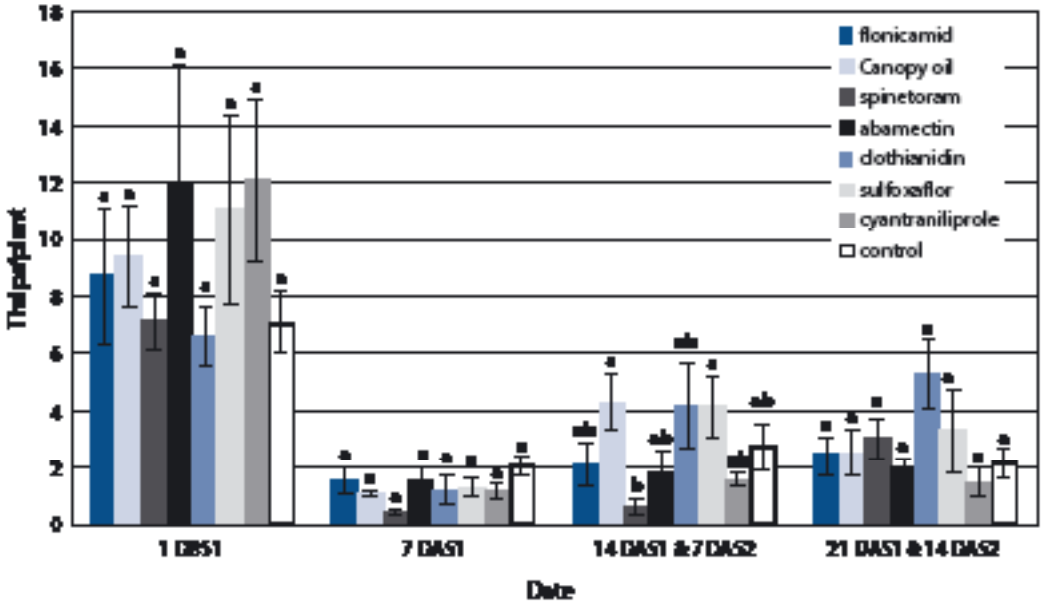

Figure 3. Mean larval thrips densities before and after sprays. Bars in the same group labelled with different letters are significantly different based on log transformed data at $P<0.05$ by Fisher's LSD following detecting significant overall treatment effects using ANOVA. Data presented in graph is untransformed data and error bars indicate standard error. DBS: days before spray, DAS1 & DAS2: days after first and second spray.

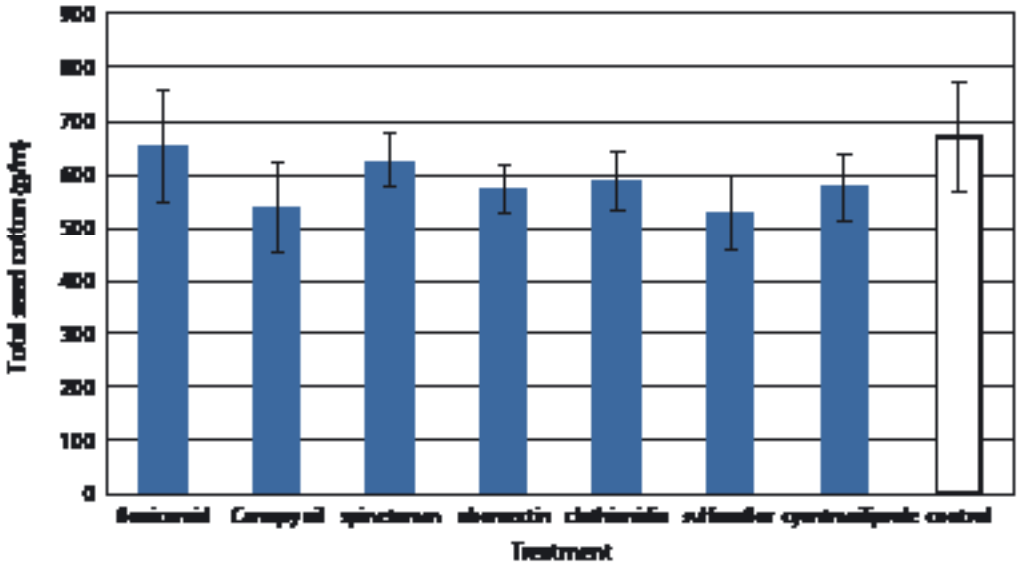

Figure 4. Mean seed cotton weight calculated from hand-harvested sub samples. Error bars indicate standard error. The differences are not significant; effects using ANOVA at a significance level of 0.05.

Acknowledgements

'Establishing Southern Cotton – IPM', DAN1501, 2014–17, is a project with joint investment by NSW DPI and CRDC.

We greatly appreciate the cooperation of Matt Stott and agronomists James Hill and Matt Watson on this project. We also appreciate the support from casual staff Emma O'Connell, Hannah Draper and Jack Dunne.