Seed or planting treatments impact on thrips – commercial-scale trials

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Key findings

- 60 thrips per plant four weeks after cotton emergence.
- Cruiser® seed treatment reduced thrips larvae numbers at one week after cotton emergence.
- Thimet® in-furrow treatment reduced thrips larvae numbers at one and three weeks after cotton emergence.
- Hand-harvest yields indicated the Thimet® treatment increased yields over no Thimet®-treated plots.
- Machine harvest yields were not significantly different between treatments.

Introduction

Thrips are common seedling pests of cotton in most growing districts. They feed on growing terminals causing leaf distortion and sometimes death of the terminals. Heavy infestation can result in yield loss and delayed maturity. Most insecticides applied in the southern cotton production region are targeted against thrips. Thiamethoxam (Cruiser®) seed treatment is aimed at controlling early season sucking pests. Phorate (Thimet®) is applied in-furrow at planting targeting wireworm, but also is likely to reduce invertebrate pest establishment.

Site details

Location	Coleambally Demonstration Farm
Cooperators	Matt Toscan and Ben Witham
Sowing date & 1st Water	8 October 2014
Variety	Sicot 74BRF
Seed treatment	Dynasty® - azoxystrobin+ metalaxyl-M+ fludioxonil
Irrigation	Furrow
Establishment	10 plants/m^2
Harvest date	14 May 2015

Treatments

T1	Cruiser + Thimet – Dynasty® and Cruiser® (thimethoxam) seed treatment + Thimet® (phorate)
T2	Thimet only – Dynasty® seed treatment + Thimet®
T3	Cruiser only – Dynasty® and Cruiser® seed treatment
T4	Untreated Control: Dynasty® fungicide seed treatment only

	Dynasty® + Cruiser® seed treatment (+C)	Dynasty® seed treatment (–C)
Thimet® in-furrow spray (+T)	T1: D2C+T	T2: D2+T
No in-furrow spray (–T)	T3: D2C	T4: D2

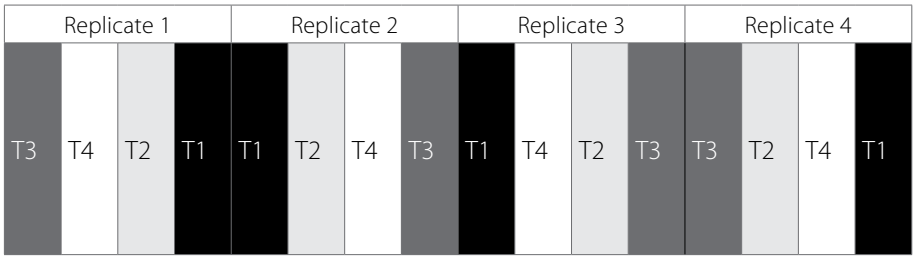

Figure 1. Coleambally Demonstration Farm trial field plan: four treatments replicated four times (plot = 6 rows × 900 m).

Experiment details

Design	Randomised block-plot
Plot size	6 rows × 0.9 m beds × 900 m = 0.486 ha
Replicates	4
Area per treatment	1.94 ha
Trial area	7.76 ha
Monitoring dates	28 October, 11 November, 17 November, 25 November and 1 December 2014
Sample unit	10 whole random plants
Monitored	Thrips adults, nymphs and species composition
Analysis	Analysis of Variance (ANOVA), significant treatment effects were detected (P <0.05), treatment means were separated by Fisher's l.s.d.

Results

Each week, 20 whole plants were sampled with both adult and larval thrips counted. Adult thrips are mobile and hence are not useful for showing treatment effects, whereas the larvae don't normally move from plant to plant so their abundance provides an excellent indicator of the treatment effects. Figure 2 shows the larval thrips numbers on each monitoring occasion. On 28 October or eight days after cotton emergence (DAE), plots treated only with fungicide seed treatment had a statistically significantly higher number of larval thrips per plant than the other plots (P <0.05). On 11 November, the two Thimet® (phorate) treatments had lower larval thrips numbers than the Cruiser® (thiomethoxam) or the fungicide only treatment. All subsequent monitoring periods showed no statistical difference of thrips numbers between treatments (P >0.05).

Onion thrips (*Thrips tabaci*) was the dominant thrips species observed at Coleambally Demonstration Farm (Figure 3) and at the other project monitoring sites in Whitton and Darlington Point. Such dominance is consistent with what was found in other cotton production areas (Lewis Wilson *pers. com*). Tomato thrips (*Frankliniella schultzei*) was the next most dominant thrips species. Its proportions were even higher among larval thrips, suggesting it was more residential than onion thrips in cotton. The insecticide-resistant Western flower thrips (WFT) (*Frankliniella occidentalis*), plague thrips (*Thrips imaginis*) and a number of predatory thrips species, were observed in very small numbers during cotton establishment.

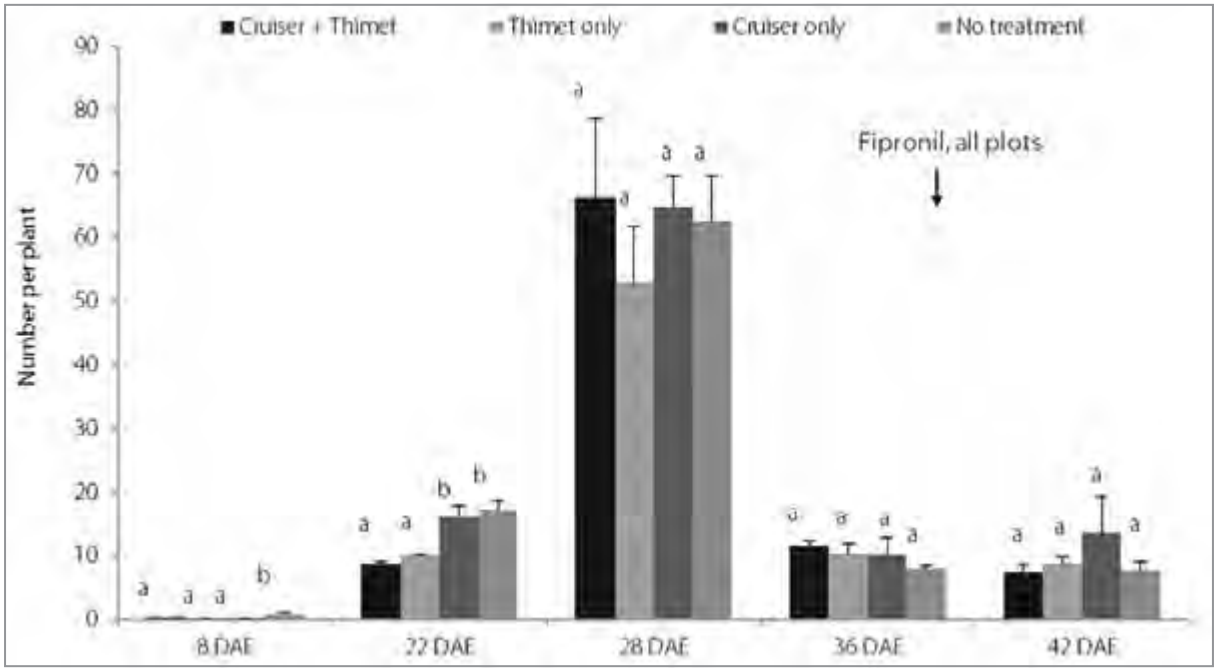

Figure 2. Larval thrips per plant during early establishment from 8–42 days after emergence (DAE). At 8 DAE the cotton was at the cotyledon stage, at 22 DAE it was at 1.5–2-leaf stage, at 28 DAE was 5-leaf stage, at 36 DAE 6–8-leaf stage and at 42 DAE was at 14-leaf stage. Error bars show the standard errors. At eight DAE, the three treatments with Thimet® and Cruiser® reduced thrips larval numbers compared with the untreated control. At 22 DAE, only the two Thimet treatments had significantly reduced numbers of thrips larvae. From 28 DAE on, the differences between treatments were no longer significantly at P = 0.05. A foliar application of the insecticide fipronil was applied across all plots after the 36 DAE assessment.

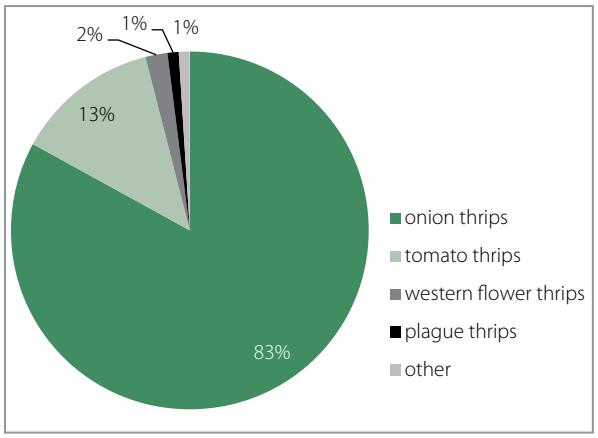

Figure 3. Adult thrips species found at Coleambally Demonstration Farm during cotton establishment (8–42 days after emergence).

Cotton yields were assessed by a 2 × 1 m hand harvest and with a commercial cotton machine harvester. Hand harvest data was converted to bales per hectare based on plot areas and areas needed to generate a single module/round from the machine harvest. Each machine harvested module/round was weighed on Cotton Seed Distributors' (CSD) trailer scales and the turnout was calculated from the hand-ginned results (CSIRO Narrabri) from the hand-harvested samples. Statistical analysis showed a lower yield in the non-Thimet® treatments (Figure 4), however, no such difference was detected by machine harvest (Figure 5).

Summary

A commercial scale cotton trial was conducted at the Coleambally Demonstration Farm in the 2014–15 season comparing Cruiser® (thiamethoxam) seed treatment with and without in-furrow Thimet® (phorate) treatment. Cruiser® with and without Thimet®, and Thimet®-only treatments reduced thrips larvae numbers a week after cotton emergence when compared with un-treated plots. However, only the Thimet® treatments reduced thrips larvae numbers at three weeks after emergence. There were no significant treatment differences on subsequent monitoring occasions. Larval thrips numbers peaked at approximately 60 per plant, or about four weeks after cotton emergence, before declining. Yields calculated from hand harvest samples indicated the Thimet®-treated plots had higher yields, but yields calculated from the machine harvest data were not significantly different.

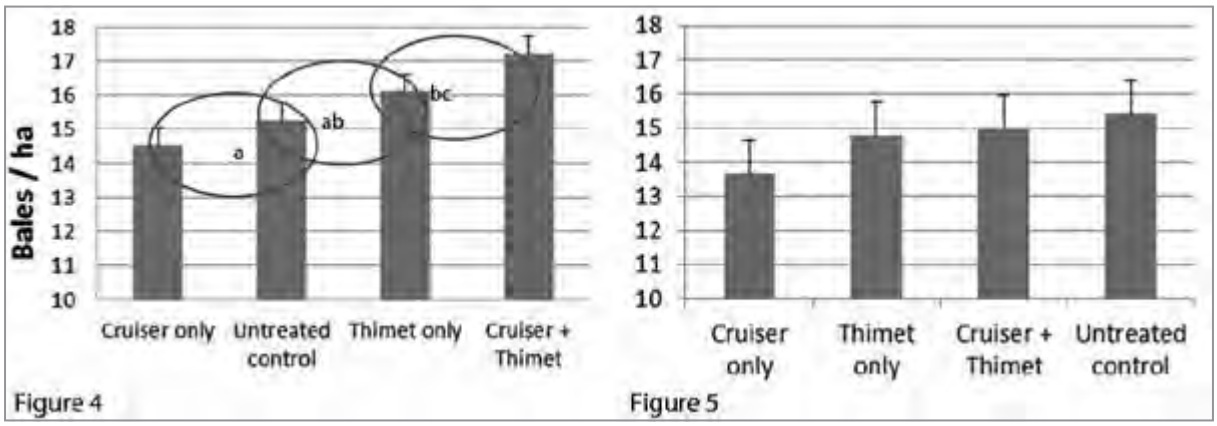

Figure 4. Hand harvest treatment yields were calculated from 2 × 1 m hand harvests and hand-gin turnout figures. Bars in the same group labelled with different letters are significantly different at P = 0.05 by Fisher's l.s.d. following the detection of a significant overall treatment effect.

Figure 5. Machine harvest treatment yields were calculated on the area it took to harvest a single round per plot, the round's weight and hand-gin turnout figures from the plot hand harvest samples. The treatment differences are not significantly different.

Acknowledgements

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