Thrips threshold validation – commercial-scale experiments 2015–16

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Key findings

- Thrips pressure was lower in the earlier planted Whitton site.
- Thrips pressure reached the industry control threshold of 10 thrips/plant on 3 November while plants were still at the cotyledon to 1-leaf stage at the Darlington Point site, and only in some plots at Whitton on 9 November and most plots on 23 November when plants were at the 6–8 leaf stage.
- Onion thrips were the dominant thrips species observed during monitoring.
- Western flower thrips constituted less than 5% of thrips monitored.
- There was no yield difference between sprayed and unsprayed plots.

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. The cotton industry thrips spray threshold of 10 thrips per plant and >80% leaf area loss from seedling to 6-leaf stage was developed and validated in many research experiments in the northern production areas. The southern production areas have a shorter season; early crop establishment has been strongly linked to high yields in the south.

In the 2015–16 thrips threshold experiments, rain and spray rig breakdown prevented correct timing of insecticide applications at thresholds. Hence the two commercial-scale experiments became a comparison of three different insecticides applied at one or two applications during crop establishment versus an unsprayed control. The experiments are part of a project to validate whether the Australian Cotton Industry thrips threshold applies in southern NSW cotton production areas.

Site details

Location	Stotts Whitton block 15 near Irrigation Research and Extension Committee (IREC) demonstration site, Whitton Point Farms (PF), Darlington Point
Cooperators	Matt Stott (Owner PF and current leasee of IREC demonstration site); James Hill (agronomist for Matt) and farm operations staff
Sowing date	9 October 2015 (IREC); 16 October 2015 (PF)
First water	10 October 2015 (IREC); 18 October 2015 (PF)
Variety	Sicot 74BRF
Seed treatment	Dynasty® – azoxystrobin + metalaxyl-M + fludioxonil
Insecticide at planting	Lorsban® – chlorpyrifos
Irrigation	Furrow

Experiment design

Design	Randomised block-plot; four replicates
Plot size	IREC: 12 beds (two rows to a bed) × 1.8 m beds × 770 m = 1.66 ha PF: 12 beds (two rows to a bed) × 1.8 m beds × 600 m = 1.3 ha

Monitoring dates	IREC: 28 October, 9, 18, 23 November, and 2 December PF: 3, 11, 18, 23 November, 2 and 10 December
Sample unit	20 whole random plants
Spray dates	IREC: 16 November PF: 16 November and 4 December
Monitored	Thrips adults, nymphs and species composition
Hand harvest	IREC: 11 April PF: 24–25 May
Machine harvest	IREC: 15 and 18 April PF: 2 June
Analysis	Analysis of Variance (ANOVA), significant treatment effects were detected ($P<0.05$), treatment means were separated by Fisher's least significant difference (LSD).

Treatments

Whitton

T1: D2 Dynasty® fungicide seed treatment only
T2: D2C + R Dynasty and Cruiser® seed treatment + Regent®
T3: D2 + R Dynasty + Regent®
T4: D2 + E Dynasty + Exirel®
T5: D2 + C Dynasty + Canopy oil®

Point Farms

T1: D2 + 2 × R Dynasty® fungicide seed treatment + 2 × Regent®
T2: D2C Dynasty and Cruiser® seed treatment
T3: D2 + 1 × R Dynasty + 1 × Regent®
T4: D2 + 2 × E Dynasty + 2 × Exirel®
T5: D2 + 2 × C Dynasty + 2 × Canopy oil®

Regent® fipronil 200 g/L SC Group 2B; rate: 125 mL/ha
Exirel® cyantraniliprole 100 g/L Group 28: rate: 600 mL/ha + Hasten™
Canopy oil® paraffinic oil C27, 792 g/L 2%v/v

Results

IREC site

Rain on 21 October, 1–7, 12 and 13 November and spray rig breakdown on 11 November delayed any sprays applied by ground rig to 16 November when plants were at 6-leaf stage. Figure 1 shows the number of thrips nymphs per plant for three monitoring periods. On 28 October 2015 when plants were at 1–2 leaf stage (15 days after emergence – DAE) there were significantly lower numbers of nymphs in the plots with Cruiser® seed treatment. By 9 November with rain preventing earlier access, the crop was at 3–4 leaf stage, cupping was evident on most plants and the Cruiser® effect was no longer evident. The crop was sprayed on 16 November when the plants were at 6–7 leaf stage. Thrips numbers had increased and were highly variable, hence no treatment effects were evident in thrips counts on 23 November, a week after the spray application.

In 2015, similar to the 2014 season, onion thrips, *Thrips tabaci*, were the dominant thrips species. Western flower thrips, *Frankliniella occidentalis*, were more numerous, and tomato thrips *Frankliniella schultzei*, less numerous than in 2014 (Figure 2).

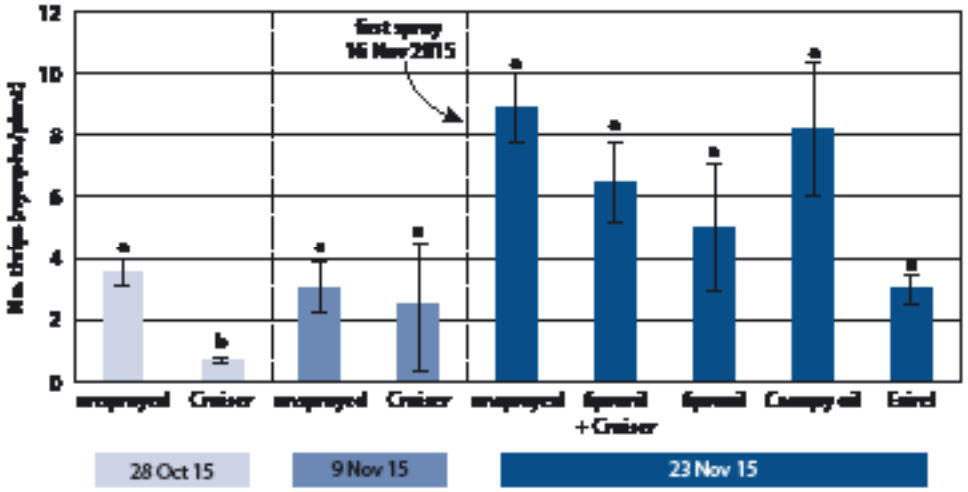

Figure 1. Number of thrips nymphs per cotton plant at three monitoring dates in October/November 2015 during crop establishment at the IREC site, Whitton NSW.

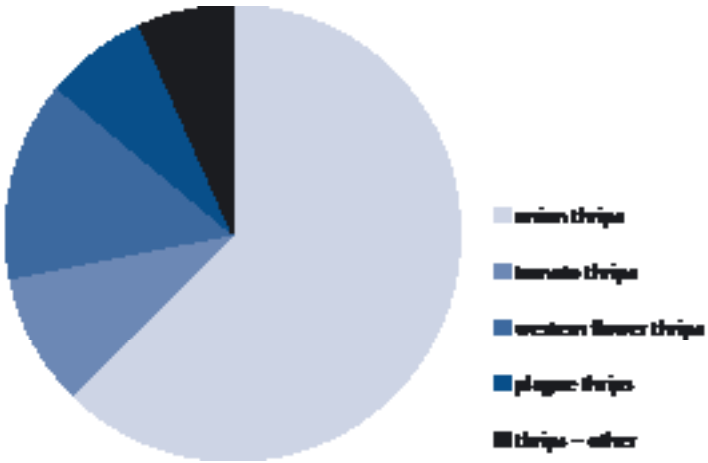

Figure 2. Adult thrips species observed in seedling cotton in November 2015 at the IREC site, Whitton NSW.

Harvest

In 2015, similar to the 2014 season, there was no significant yield difference between thrips control treatments (Figure 3).

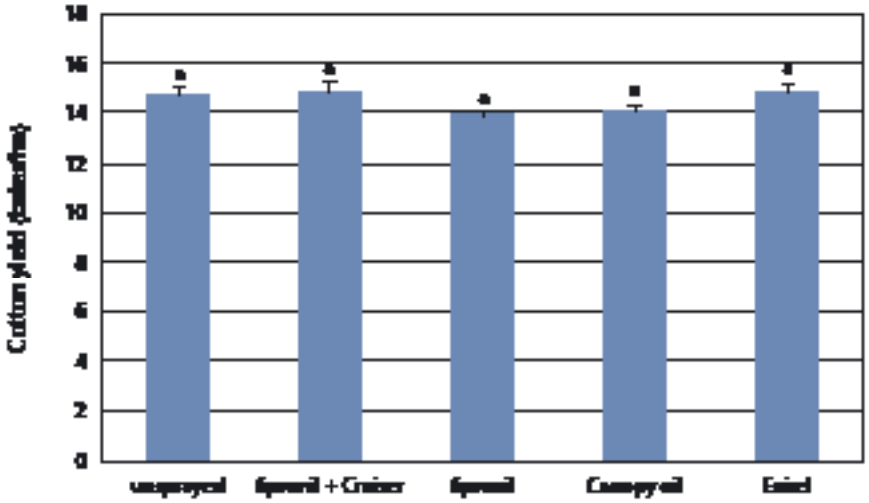

Figure 3. Machine harvest cotton yields by thrips treatment at Whitton site.

Point Farms site

Rain on 21 October, 1–7, 12 and 13 November, and spray rig breakdown on 11 November delayed any sprays applied by ground rig up to 16 November. This crop, sown a week later than the IREC cotton, was more patchy and slower to establish.

The Cruiser® seed treatment appeared to have no effect on numbers of nymphs per plant, approximately 10 DAE (Figure 4) and about 50% of plants were showing leaf cupping. Thrips numbers increased before the 16 November spray; most leaves at 4–5 node were cupped at spraying. Thrips numbers in the unsprayed plots on 16 November before spraying had already dropped off to 2.7 nymphs per plant. Note that the Cruiser®-treated plot did not receive a foliar spray, but the unsprayed plots did hence after 4 December there were no unsprayed treatments at Point Farms.

In both the Canopy oil® and Exirel® plots, replicate three had seven times more thrips than the other replicates, hence the very large error bar. If those replicates were removed, then the thrips numbers were similar to the unsprayed and Cruiser® treatments. The fipronil treatment was significantly more effective than the other treatments.

Over the next 9 days, the thrips numbers again were above 10 thrips per plant and, although the plants were at the 6–8 leaf stage, a second spray was applied to the Exirel®, Canopy oil® and one of the fipronil treatments. Both fipronil treatments (including the one not sprayed) and the Exirel® treatment had lower thrips numbers relative to the Canopy oil® or Cruiser®-only treatment.

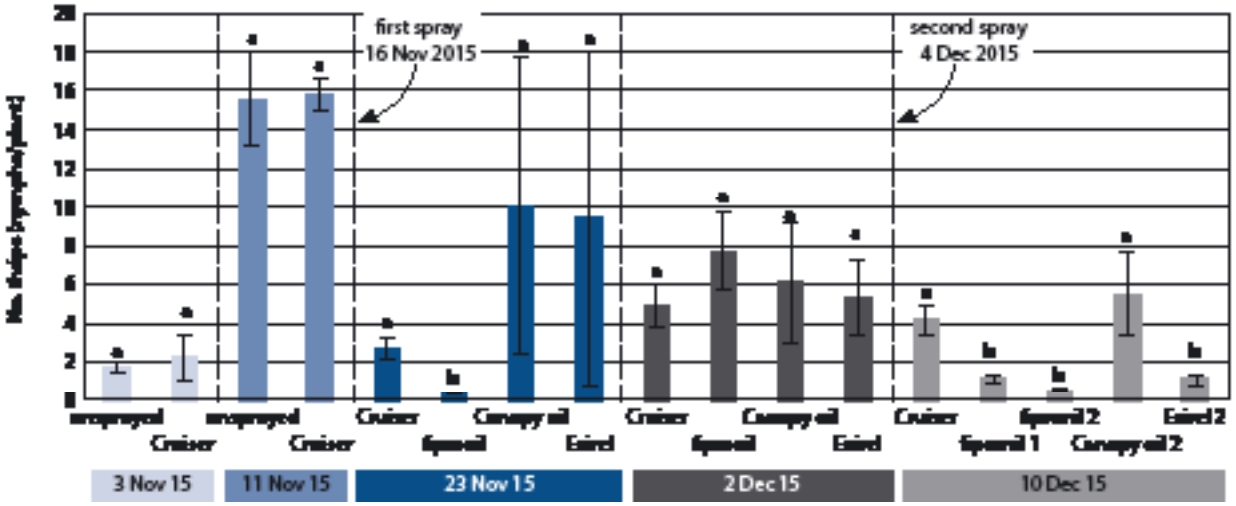

Figure 4. Number of thrips nymphs per cotton plant at five monitoring dates in November and December 2015 during crop establishment at Point Farms, Darlington Point NSW.

In 2015, similar to the 2014 season, onion thrips, *Thrips tabaci*, were the dominant thrips species. Plague thrips, *Thrips imaginis*, was more numerous in 2015 than 2014 and tomato thrips *Frankliniella schultzei* less numerous than in 2014 (Figure 5). There were fewer western flower thrips at the Point Farms site in both years than at the Whitton site.

Harvest

In 2015, similar to the 2014 season, there was no significant yield difference between thrips control treatments (Figure 6).

Summary

The cotton seedlings with Cruiser® seed treatment had fewer thrips than the untreated seed at the 1–2 leaf stage, but not at the 3–4 leaf stage at Whitton, and had no effect at Point Farms.

Thrips numbers were higher at Point Farms with around 16 thrips nymphs per plant on 11 November, which resulted in significant leaf cupping, whereas at Whitton there were between 2–3 thrips nymphs per plant on 9 November.

Wet conditions and a breakdown in the spray rig prevented any spray application until 16 November when the plants were at the 4–5 leaf stage (Point Farms) and 6–7 leaf stage (Whitton). Thrips numbers post-spray were highly variable across both experiment sites.

At Point Farms, the fipronil treatment delivered statistically fewer thrips nymphs seven days post spray compared with the other treatments, but not at 16 days post spray. There was no statistical difference in spray treatments at Whitton seven days post spray, although Exirel® and fipronil tended to lower thrips nymph numbers. A second spray at Point Farms on 4 December also resulted in fipronil and Exirel® significantly reducing thrips nymph numbers more than either Canopy oil® or Cruiser®-treated seed, but otherwise unsprayed, plants.

In 2015, similar to the 2014 season, onion thrips, *Thrips tabaci*, were the dominant thrips species. Western flower thrips, *Frankliniella occidentalis*, and plague thrips, *Thrips imaginis* were more numerous, and tomato thrips *Frankliniella schultzei*, less numerous than in 2014.

There were no significant differences in yields across treatments at either site. Yields at Whitton were around 14 bales per hectare and at Point Farms between 10–11 bales per hectare.

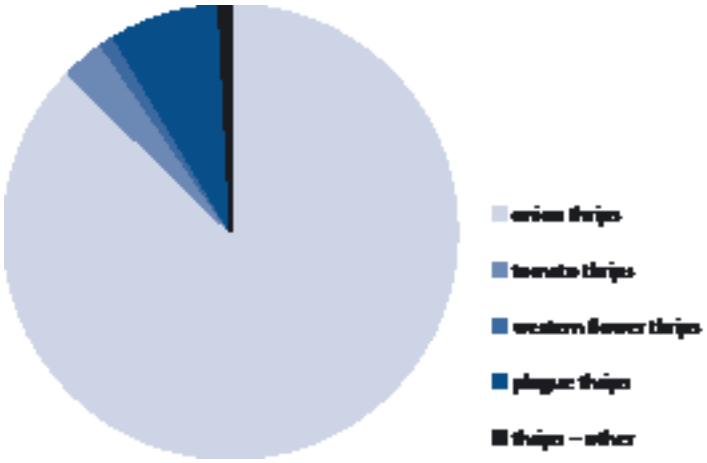

Figure 5. Adult thrips species observed in seedling cotton in November 2015 at Point Farms, Darlington Point NSW.

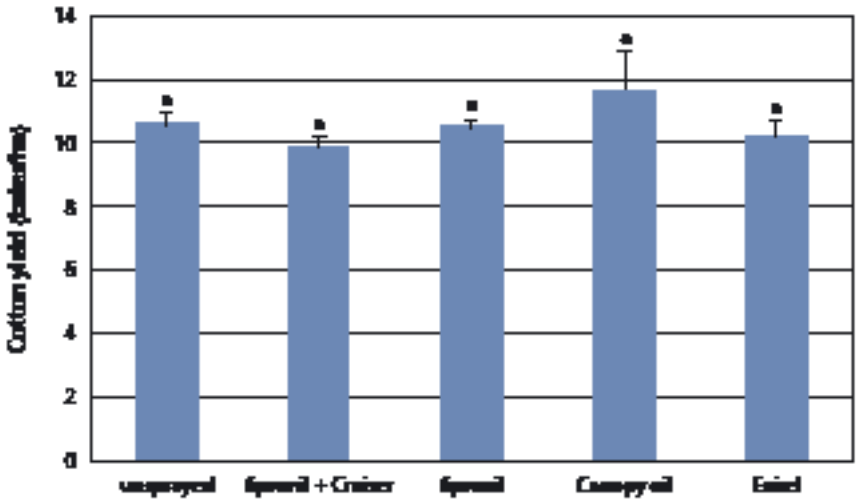

Figure 6. Machine harvest cotton yields by thrips treatment at Point Farms, Darlington Point NSW.

Acknowledgements

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