Grower Summary

CP 124

Managing ornamental plants sustainably (MOPS):

Efficacy of plant protection products against sucking insects – western flower thrips / protected ornamentals

Annual 2015

Disclaimer

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of this report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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Work package leader:	Jude Bennison, ADAS
Contractor:	ADAS
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GROWER SUMMARY

Headline

- Actara, three new conventional pesticides and three new biopesticides currently in development showed efficacy against WFT on verbena but none gave a quick knockdown or prevented unacceptable thrips damage.

Background and expected deliverables

Western flower thrips (WFT), *Frankliniella occidentalis* is a common pest of many ornamental crops, mainly under protection. Feeding damage by adults and larvae on leaves and petals causes white flecks or patches, which later turn brown and necrotic. Feeding in leaf and flower buds can also cause distortion and stunting. In addition to causing direct damage which can make the plants unmarketable, WFT can also transmit tospoviruses including *Tomato spotted wilt virus (*TSWV) and *Impatiens necrotic spot virus* (INSV). These viruses also have a wide ornamental plant host range and can cause severe damage and plant losses. WFT is resistant to most or all currently approved chemical pesticides on many nurseries growing protected ornamentals.

The purpose of this experiment was to test the efficacy of products against WFT on a selected susceptible protected ornamental species.

Summary of the work and main conclusions

<u>Materials and methods</u>

Seven plant protection products (Table 1) were tested against western flower thrips (WFT), *Frankliniella occidentalis* on verbena (cv. Quartz) plants grown in two glasshouse compartments between July and August 2014 at ADAS Boxworth. The glasshouse compartments were fitted with insect-proof screens to minimise the risk of plants becoming infested with other insect pests. Each experimental plot was a cage (0.5 x 0.5 x 0.5 m) covered with thrips-proof mesh to avoid WFT adults flying between plots. There were six replicate plots (cages) per treatment. Temperature was regulated in the compartments by venting at 15°C and using insect-screened fans.

Plants were obtained as plugs and potted on into 9 cm pots on 21 May. The pots were kept in thrips-proof cages in a polytunnel at ADAS Boxworth until the plants were flowering. On

18 July, plants for the experiment were selected, choosing plants uniform in size, vigour and number of flowers. Nine plants were arranged in three rows of three plants in each cage. Plants were selected so at the start of the experiment there was a mean of 20 open flowers per cage. The cages were stood on capillary matting and watered using sub-irrigation.

WFT adults were released to each cage on 18 July and 22 July. On each date, 20 adults were released (18 females and two males), equivalent to one adult per flower. WFT from a laboratory culture at ADAS Boxworth was used to infest plants. The WFT population was confirmed to be resistant to spinosad (Conserve) in a laboratory bioassay in May 2014 and is likely to be resistant to most other insecticides currently approved for use on protected ornamentals. This is typical of WFT populations on most commercial nurseries growing protected ornamentals.

Table 1. Products tested

MOPS code number	Biopesticide or conventional pesticide
Water control	-
Actara (thiamethoxam)	conventional
130	biopesticide
179	biopesticide
201	biopesticide
200	conventional
207	conventional
48	conventional

All treatments were applied to give good flower and leaf cover, just prior to run-off. Recommended application rates were used following consultation with the companies' technical experts. All treatments and the water control were applied using an Oxford Precision Sprayer fitted with an HC/1.74/3 nozzle, in 600 litres of water per hectare using 3 bar pressure. No adjuvants were used with any of the treatments. The water volume selected was consistent with the range of water volumes recommended by the suppliers and in consultation with an ADAS spray application expert. Each treatment was applied at weekly intervals for four weeks, on 29 July and 5, 12 and 19 August.

Numbers of live WFT adults and larvae per flower, top and middle leaf and percentage WFT damage to flowers and leaves were recorded one day before the first application, three and six days after the first application (days 3 and 6), six days after the second application (day 13) six days after the third application (day 20) and seven days after the fourth application (day 27). Any phytotoxicity was assessed on the same dates.

Results and Conclusions

- None of the treatments gave control of WFT adults in flowers or on leaves compared with water-treated controls. Where a significant reduction of thrips numbers was given compared with the water controls, only numbers of larvae were reduced. However, on the final assessment date Actara (positive control), biopesticide treatment 130 and conventional treatments 200 and 48 reduced numbers of WFT adults per top leaf compared with biopesticide treatment 179. On the same assessment date, all treatments except for biopesticide 179 reduced numbers of adults per middle leaf compared with biopesticide treatment 201. These results indicated that biopesticide treatments 179 and 201 may be less effective against WFT adults than the other treatments tested.
- None of the treatments gave a quick knock-down of WFT three days after the first treatment. Only one treatment (conventional treatment 48) reduced numbers of larvae per top leaf compared with water controls six days after the first treatment (Table 2, Figure 1).
- On the last three assessment dates (days 13, 20 and 27), numbers of available flowers per cage were too variable to draw any meaningful results from the data, with some cages having no live flowers due to senescence caused by WFT damage. Therefore only the efficacy data from top and middle leaves can be used on these assessment dates.
- Actara reduced numbers of WFT larvae on leaves compared with water-treated controls on the last three assessment dates (days 13, 20 and 27). Numbers of larvae were reduced on top leaves six days after the second treatment (day 13), on both top and middle leaves six days after the third treatment (day 20) and on middle leaves seven days after the fourth treatment (day 27), Table 2, Figures 1 and 2.
- The three conventional treatments (200, 207 and 48) were equally effective as Actara in reducing numbers of WFT larvae compared with water-treated controls on either top or middle leaves on the last three assessment dates (Table 2, Figures 1 and 2).

- The three biopesticide treatments (130, 179 and 201) reduced numbers of WFT larvae compared with water-treated controls on the last two assessment dates. Six days after the third treatment (day 20), all three biopesticides were as effective as Actara and the other three conventional treatments on both top and middle leaves. Seven days after the fourth treatment (day 27), biopesticides 130 and 179 were as effective as Actara and the other three conventional treatments on middle leaves but biopesticide 201 was ineffective.
- Where numbers of WFT larvae were reduced on top leaves on the last three assessment dates, there was a corresponding reduction in thrips leaf damage except for with conventional treatment 207 on day 13 and with biopesticide treatment 201 on day 20. Where numbers of WFT larvae were reduced on middle leaves on the last two assessment dates, there was only a corresponding reduction in thrips leaf damage on day 27.
- Although significant reductions in WFT numbers were given in this experiment, WFT damage to flowers and leaves would have made the plants unmarketable in all treatments. Therefore the treatments have most potential for contributing to WFT control as part of an IPM programme, together with the use of biological control agents such as the predatory mite *Neoseiulus cucumeris*. Safety to biological control agents would need to be confirmed.
- Biopesticide 179 caused white spotting to petals on a small number of flowers three and six days after the first treatment and white spotting to leaves on one plant only, six days after the first treatment. It is possible that if used at a lower concentration or as a finer spray, this damage may not occur.

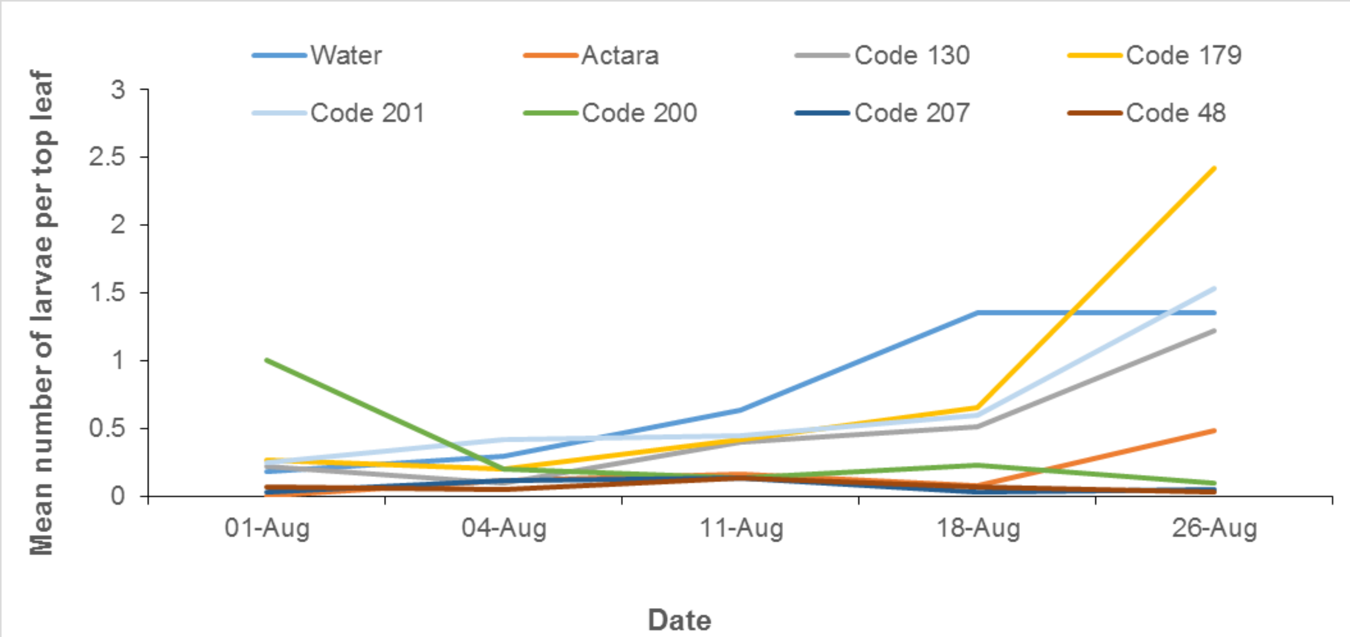

Figure 1 Mean numbers of WFT larvae per top leaf on each assessment date

Table 2. Mean numbers of WFT larvae per top (T) and middle (M) leaf 3, 6, 13, 20 and 27 days after the first treatment. *** significantly fewer than in water controls (P<0.05).** Where more than one treatment was effective on any one date, they were equally effective. LSD is least significant difference. NS is no significant reductions in numbers of larvae compared with water controls on that date.

Product name or MOPS code	Day 3		Day 6		Day 13		Day 20		Day 27	
	T	M	T	M	T	M	T	M	T	M
1. Water control	0.18	0.27	0.30	0.17	0.63	0.15	1.35	0.50	1.35	0.73
2. Actara	0	0.02	0.12	0.02	**0.17***	0.03	**0.08***	**0***	0.08	**0.08***
3. 130	0.22	0.08	0.10	0.15	0.40	0.27	**0.52***	**0.12***	0.52	**0.20***
4. 179	0.27	0.15	0.20	0.08	0.42	0.33	**0.65***	**0.13***	0.65	**0.32***
5. 201	0.25	0.13	0.42	0.27	0.45	0.20	**0.60***	**0.03***	0.60	**0.80***
6. 200	0.1	0.05	0.20	0.02	**0.13***	0.07	**0.23***	**0.03***	0.23	**0.02***
7. 207	0.03	0.08	0.12	0.02	**0.13***	0.03	**0.03***	**0***	0.03	**0***
8. 48	0.07	0.12	**0.05***	0.15	**0.13***	0.05	**0.07***	**0.02***	0.07	**0.02***
LSD	0.210 NS	0.220 NS	0.208	0.287 NS	0.328	0.09 NS	0.580	0.208	0.580 NS	0.394

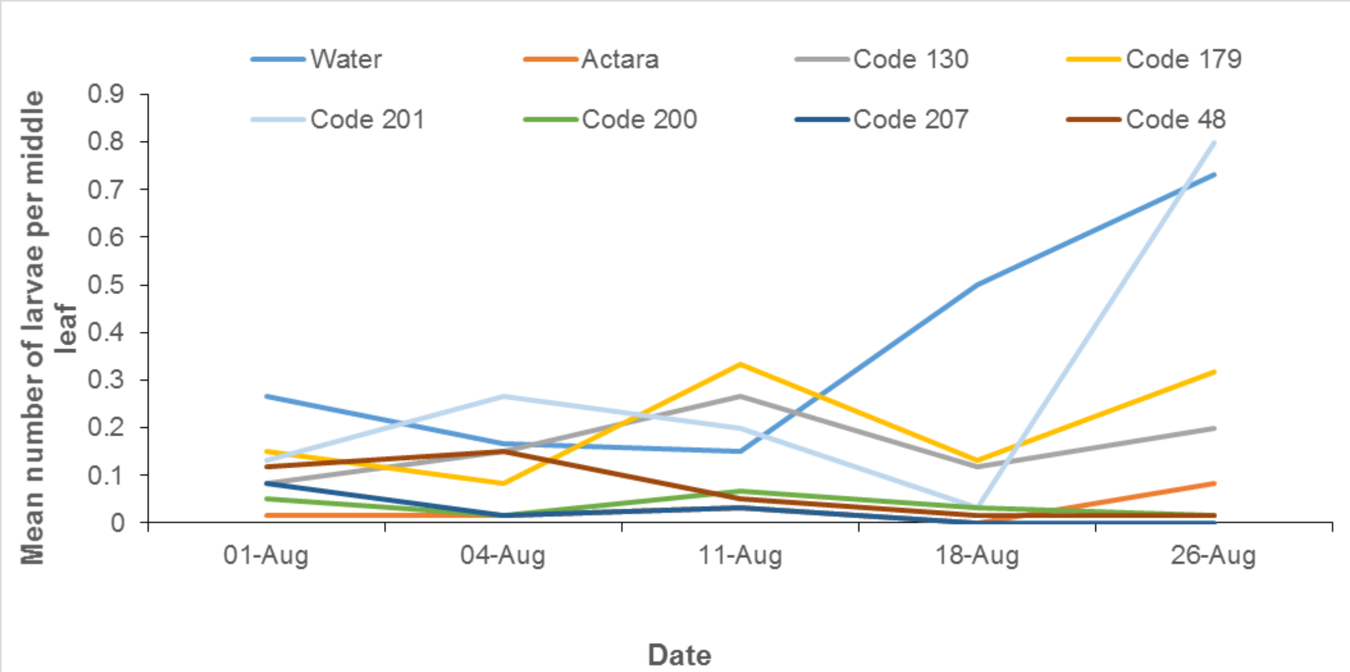

Figure 2 Mean numbers of WFT larvae per middle leaf on each assessment date

Action points

- Although Actara showed efficacy against WFT in this experiment, only use this product on ornamental plants in a glasshouse on plants that will not be sold or moved outside until after flowering. Actara has an EAMU for use on protected ornamentals but is subject to the current EU restrictions on the use of certain neonicotinoids (including thiamethoxam) on plants considered attractive to bees.
- If the three conventional pesticides (200, 207 and 48) gain approval in the future, consider their use against WFT as all were as effective at reducing numbers of WFT as Actara. Like Actara, treatment 207 is systemic and treatments 200 and 48 have translaminar action which helps to target the pest.
- If the three biopesticides (130, 179 and 201) gain approval in the future, consider their use against WFT as all were as effective as Actara and the other conventional pesticides against WFT larvae on two of the assessment dates except for 201 which was as effective on only one date. None of these biopesticides have systemic or translaminar action so require good spray coverage to reach the target. All have contact action but treatment 130 also has an antifeedant effect from the spray residue on plant surfaces and ingestion will interrupt larval moulting and adult reproduction. Target pests will also be affected by some secondary pick-up from spray residues with treatment 201.

- Do not rely on any of the treatments tested in this experiment for control of WFT. They would need to be used as part of an IPM programme and safety to biological control agents would need to be confirmed.