LEEKS AND SALAD ONIONS

EXAMINATION OF THRIPS CONTROL

USING FOLIAR SPRAYS OF EXP 60720A

Report of a Trial Done by Saynor Consultancy Services Jointly for

Rhone-Poulenc Agriculture Ltd and

The Horticultural Development Council

December 1997

Final Report To :	**HORTICULTURAL DEVELOPMENT COUNCIL** **AND** **RHONE-POULENC AGRICULTURE LTD**
Project title :	Leeks and salad onions: Examination of thrips control using foliar sprays of EXP 60720A
Project number :	FV 185a
Project leader :	Michael Saynor
Key workers and their roles :	Michael Saynor - Project leader; involved with all aspects of the project Charles Swift - Assistance with spraying Valerie Pock - Assistance with collecting samples and counting thrips
Location of project :	On land belonging to W.C.Emmett and Son. Land at Severalls Farm, Wallingford, Oxon. O.S. Ref. : SU 609902
Project Co-ordinator :	Peter Emmett
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Objectives and Background

In recent years onion thrips has become a major pest of leeks and salad onions in the UK. The main damage is a silvering caused by the insects when they graze on the surface of the leaves. This spoils the appearance and reduces the shelf life of the crops and it can lead to their downgrading or rejection.

Control of onion thrips with the insecticides currently approved for use on leeks and salad onions has become progressively more difficult, even when they are applied frequently. In 1995 the HDC therefore commissioned trials on the control of thrips on leeks project number FV 185. In one trial 15 'approved' or experimental insecticides were compared, and in a second trial 10 different types of spray adjuvants were evaluated to see if they improved the effectiveness of Dursban 4, currently the most effective insecticide for the control of thrips on Alliums. Disappointingly none of the insecticides was significantly better than Dursban 4, nor did the addition of adjuvants improve the control from Dursban 4.

Two further trials were done in 1997 on crops of leeks and salad onions, to assess the effectiveness of another new insecticide, EXP 60720A. Because the results from both of the trials done in 1995 were so disappointing, this product was only tested in unreplicated plots, but further trials would be done if the results warranted it. One, two or four sprays of EXP 60720A were compared with four sprays of either chlorpyrifos (Dursban 4), or deltamethrin (Decis).

Summary of Results

On leeks all the EXP 60720A-treated plots had appreciably fewer thrips on them than either the untreated plot (water only), or the one sprayed four times with Decis (Table 1). Of the EXP 60720A-sprayed plots, the one sprayed four times had the lowest numbers of thrips and both plots sprayed twice had fewer thrips on them than either of the plots sprayed once, although the differences were small. Comparable numbers of thrips were present on the plots sprayed four times with either Dursban 4 or EXP 60720A.

The two plots with the largest numbers of thrips on them showed the most damage and the two plots with the fewest thrips the least damage.

On salad onions untreated plants and those sprayed four times with Decis also had more thrips on them than any of the EXP 60720A-sprayed plants, but the differences were smaller than they were on leeks. There were appreciably more thrips on the plants sprayed four times with Dursban 4 than there were on the plants sprayed four times with EXP 60720A. Indeed the control from both two-spray programmes of EXP 60720A was comparable with that from four sprays of Dursban 4.

The amount of damage on salad onions did not correlate well with the numbers of thrips present, although the most damage was present on the unsprayed plot.

Action Points for Growers

Because EXP 60720A is an experimental insecticide that is not yet approved in the UK, growers cannot use the product at present.

The control of onion thrips with EXP 60720A was encouraging enough in these unreplicated trials to warrant further evaluation. The optimum rate and frequency of use of EXP 60720A against onion thrips needs to be established.

A programme of control measures in which a soil-acting insecticide such as imidacloprid, applied early, as either a seed treatment or as a drench at planting, is then followed by sprays of EXP 60720A also warrants investigation.

Practical and Financial Benefits from the Study

EXP 60720A is the first insecticide (of 16) screened in recent HDC-funded trials (FV 185) that appears to control thrips on leeks and salad onions. If EXP 60720A is as effective when it is used on a field scale (and before that, in replicated trials) as it was in these unreplicated trials, the insecticide would be of very considerable value against a pest which has become more serious throughout the UK, and in some areas has made it almost uneconomic to grow leeks or salad onions.

SCIENCE SECTION

Introduction

In recent years onion thrips has become a major pest of leeks and salad onions in the UK. The main damage is a silvering caused by the insects when they graze on the surface of the leaves. This spoils the appearance and reduces the shelf life of the crops and it can lead to their downgrading or rejection.

Control of onion thrips with the insecticides currently approved for use on leeks and salad onions has become progressively more difficult, even when they are applied frequently. In 1995 the HDC therefore commissioned trials on the control of thrips on leeks (FV 185). In one trial 15 'approved' or experimental insecticides were compared, and in a second trial 10 different types of spray adjuvants were evaluated to see if they improved the effectiveness of Dursban 4, currently the most effective insecticide for the control of thrips on Alliums. Disappointingly none of the insecticides were better than Dursban 4, nor did the addition of adjuvants improve the control from Dursban 4.

In 1995 the HDC sponsored two other trials on thrips on leeks as well as the two on chemical control. These were done by ADAS and were designed to try to establish spray thresholds for thrips and how best to monitor the numbers present on leeks. Even if EXP 60720A proves to be appreciably more effective that the insecticides currently available for the control of thrips, it will still be important to know whether and when to spray. Such information is necessary for economic and environmental reasons and to minimise the risk of resistant strains developing.

Materials and Methods

a) Site Details and Trial Diary

These are shown in Table 1.

b) Treatments

Details of the treatments used and when each was applied are given in Table 2. The same sprayer (and nozzles) was used to spray the trials as was used to spray the trials done in 1995.

The sprays were all applied at 2 bar pressure at 1000 litres per hectare with a CO_2-powered Oxford Precision Sprayer. This was fitted with a 4-nozzle boom with Lurmark "Swirl Tip" Disc and Core Hollow Cone Spray Tips (DC-06 (yellow) discs and CR-45 (Green) cores). The four nozzles were adjusted so they lined-up centrally between the five rows of leeks in the beds. The boom was held so that it just brushed the tops of the leaves, about 450 mm above the ground.

After field testing other options, this combination of nozzle and boom height was selected because it appeared to direct the maximum amount of spray into the necks of the plants, where most of the thrips larvae congregated and the damage was done. The sprays were applied in 1000 litres of water per hectare, because this was considered to be about the maximum amount of water that most growers would accept when spraying outdoor vegetable crops.

The nozzle spacing was not adjusted when the smaller, salad onions were sprayed, but the boom was lowered (to 375 - 400 mm approx.), so the bed was sprayed evenly.

Table 1. Site Details

	Leek Trial	**Salad Onion Trial**
Location of Trial :	Messrs W.C.Emmett and Sons, Severalls Farm, Wallingford, Oxon. O.S. Ref. : SU 609902	
Sprayer	Oxford Precision Sprayer, powered by compressed CO_2 at 2 bar pressure, at 1000 litres water per ha. 4 Nozzles boom fitted with Lurmark "Swirl Tip" Disc and Core Hollow Cone Spray Tips fitted with :- DC-06 (Yellow) discs and CR-45 (Green) cores.	
Cultivar and date planted/sown:	Jolant 13 May	Winter White Bunching 12 May
Plot Size :	12 x 1.9 m (i.e. 1 Bed of 5 rows)	12 x 1.9 m (i.e. 1 Bed of 7 rows)
Trial Design :	Single plots of each treatment	Single plots of each treatment
Crop Planted :	2 May	
Sprays applied :	24 June 1 July 8 July 15 July	24 June 1 July 8 July 15 July
Plant Samples taken for Thrips Assessments :	8 July 21 July	8 July 21 July
Crop Damage Assessed :- In the field On plants being assessed for thrips :-	 10 July 21 July 8 July 21 July	 10 July 21 July 8 July (One assessment only)

Table 2. Treatments and Timing of sprays

Treatments	Dates Sprays Applied			
	24 June	**1 July**	**8 July**	**15 July**
1. Untreated Control - Sprayed with water only				
2. EXP 60720A 80% WG. @ 62.5g product / ha	Sprayed	Sprayed	Sprayed	Sprayed
3. EXP 60720A 80% WG. @ 62.5g product / ha	Sprayed			
4. EXP 60720A 80% WG. @ 62.5g product / ha		Sprayed		
5. EXP 60720A 80% WG. @ 62.5g product / ha	Sprayed		Sprayed	
6. EXP 60720A 80% WG. @ 62.5g product / ha		Sprayed		Sprayed
7 Decis at 300 ml product / ha	Sprayed	Sprayed	Sprayed	Sprayed
8. Dursban at 2.0 litres product / ha	Sprayed	Sprayed	Sprayed	Sprayed

c) Assessments

i) Numbers of Thrips on Plants

Samples of 20 plants per plot, selected at random, were taken twice from the trial on leeks 14 and 28 days after the first sprays were applied. The plants were examined under a microscope and the numbers of adult and larval thrips on the youngest four, fully developed leaves were recorded.

The numbers of thrips on samples of 20 salad onion plants per plot was assessed in a similar way 14 days after the first sprays were applied, but a different method was used on the second occasion. Unlike leeks, where most thrips are found at the junction of the leaf and the stem, where they are not easily dislodged, thrips are found all over on salad onion plants and even when present at the base of leaves, are easily dislodged.

Samples of 20 plants per plot were collected in the same way, but instead of putting the plants into bags, the plants were submerged one at a time in 30 per cent alcohol in a shallow tray. Any thrips were removed by brushing the plants carefully with a small (15mm) paint brush, after which the alcohol was strained through a fine sieve (300 mesh). The thrips caught on the sieve were washed into small tubes and counted later under a microscope.

ii) Leaf Damage

The damage caused by thrips was recorded in two ways. The damage present on each plant of the 20-plant sample per plot examined for thrips was recorded on both occasions in the leek trial and on the first samples taken from the salad onion trial. In all cases damage was recorded on a 1 - 5 scale where :

1 = Least damage - None or traces only of damage present
5 = Most damage - Damage severe; plants (virtually) unmarketable.

The amount of damage present in the plots as a whole was also scored twice, using a similar 1 - 5 scale. The assessments were made 16 and 28 days after the first sprays were applied.

Results

Although the numbers of thrips on plants and the amount of damage present was assessed twice, only half the treatments had been applied when the first assessments were done. The results of both assessments are shown for the record (Tables 3 & 4), but the comments relate only to the results from the second, more pertinent assessments (Table 4).

a) Trial on Leeks

On leeks all the EXP 60720A-treated plots had appreciably fewer thrips on them than either the untreated plot (water only), or the one sprayed four times with Decis (Table 4). Of the EXP 60720A-sprayed plots, the one sprayed four times had the lowest numbers of thrips and both plots sprayed twice had fewer thrips on them than either of the plots sprayed once, although the differences were small. Similar numbers of thrips were present on the plots sprayed four times with either Dursban 4 or EXP 60720A.

The plant samples from the two plots with the largest numbers of thrips on them showed the most damage and the two from the plots with the fewest thrips the least damage (Table 4). The assessments of damage made in the field correlated less well with the numbers of thrips, although the unsprayed plot had the most damage and the most thrips and the plots sprayed four times with Dursban 4 or EXP 60720A had the least damage and the fewest thrips.

b) Trial on Salad Onions

On salad onions untreated plants and those sprayed four times with Decis also had more thrips on them than any of the EXP 60720A-sprayed plants, but the differences were smaller than they were on leeks (Table 4). There were appreciably more thrips on the plants sprayed four times with Dursban 4 than there were on the plants sprayed four times with EXP 60720A. Indeed the control from both two spray programmes of EXP 60720A was comparable with that from four sprays of Dursban 4.

The amount of damage assessed in the field four weeks after the first sprays were applied (Damage was not assessed on the plants on which counts of thrips were made on the second occasion.) on salad onions did not correlate well with the numbers of thrips present, although the most damage was present on the unsprayed plot.

Discussion and Conclusions

Although the trials were unreplicated so the results need to be treated with caution, there were never-the-less strong indicators that EXP 60720A has potential for the control of onion thrips.

The results from both trials were broadly similar, which although not the same as replication, increases confidence in the data.

The results were what might have been expected if EXP 60720A was active against thrips. The largest numbers of insects were present on the control plots (and those sprayed four times with Decis, which is largely ineffective when it is used commercially on the farm where the trials were done). Also the more often the plots were sprayed with EXP 60720A the better the control.

EXP 60720A appeared to be as or more effective than Dursban 4, currently the most effective insecticide approved for use on onions and leeks. On leeks four sprays of either product gave comparable control and on salad onions two sprays of EXP 60720A were as good as or better than four sprays of Dursban 4.

Simple trials like these were done with EXP 60720A in the first instance, in case it was no more effective than the majority of products tested in fully replicated trials in 1995. The results suggest that further evaluation is justified. Guidance from and discussions with both the manufacturer and HDC is necessary before proceeding, but possible aspects to investigate include :-

i) The rate(s) of use of EXP 60720A.
This might possibly differ on the two crops or change, particularly on leeks, as crops grow.

ii) The frequency of use and when to apply EXP 60720A.
This should perhaps be co-ordinated with further research along the lines begun by ADAS in 1995, to establish spray thresholds for onion thrips. Spray thresholds and the frequency with which sprays should be applied could vary on the two crops.

iii) Consider/compare programmes of insecticide treatments against onion thrips.
In particular programmes in which a soil-acting insecticide such as imidacloprid, applied early as either a seed treatment or as a drench at planting, is followed by sprays of EXP 60720A, should be considered.

iv) Include the best experimental treatment from the trial done in 1995 (Cyanamid's AC 303630), in future screening trials.
Four sprays of this product gave comparable control to that from four sprays of Dursban 4. Four sprays of either product are unlikely to be approved, but two sprays of each might be.

Table 3. **1st Assessment - Numbers of Thrips and Damage on Leeks and Salad Onions Two Weeks after the First Sprays Were Applied**

Treatment	Leeks					Salad Onions				
Date Sampled : 10 July	Damage Score 1= Least 5 = Most		Thrips per Plant *			Damage Score 1 = Least 5 = Most		Thrips per Plant *		
	Plots	Plants	Adults #	Larvae	Total	Plots	Plants	Adults #	Larvae	Total
1. Control - Water only	5	3.7		24.4	24.4	4	3.3		4.2	4.2
2. EXP 60720A - 4 sprays	2	1.7		3.5	3.5	2	2.0		3.3	3.3
3. EXP 60720A - 1 Spray (1st occasion)	3	2.0		5.9	5.9	2	2.5		3.4	3.4
4. EXP 60720A - 1 Spray (2nd occasion)	2	2.1		5.1	5.1	2	2.3		3.9	3.9
5. EXP 60720A - 2 sprays (1st & 3rd occasions)	2	1.8		6.0	6.0	3	2.5		4.5	4.5
6. EXP 60720A 2 sprays (2nd & 4th occasions)	3	2.5		6.8	6.8	2	2.3		2.9	2.9
7. Decis- 4 Sprays	2	2.5		7.2	7.2	4	1.8		2.2	2.2
8. Dursban - 4 Sprays	2	1.7		7.0	7.0	2	1.7		1.5	1.5
Field sample	3	2.0		2.2	2.2	3	2.1		1.5	1.5

* Counts made on 20 plants per plot collected in the field and examined later under a microscope.

\# Virtually no adult thrips

Table 4. **2nd. Assessment - Numbers of Thrips and Damage on Leeks and Salad Onions Four Weeks after the First Sprays Were Applied**

Treatment	Leeks					Salad Onions				
Date Sampled : 21 July	Damage Score 1= Least 5 = Most		Thrips per Plant *			Damage Score 1 = Least 5 = Most		Thrips per 20 Plants #		
	Plots	Plants	Adults	Larvae	Total	Plots	Plants	Adults	Larvae	Total
1. Control - Water only	5	4.4	2.5	15.2	17.7	5	-	42	56	98
2. EXP 60720A - 4 sprays	1	1.5	0.3	0.2	0.5	2	-	19	6	25
3. EXP 60720A - 1 Spray (1st occasion)	4	2.7	1.7	3.3	5.0	4	-	48	22	70
4. EXP 60720A - 1 Spray (2nd occasion)	4	3.5	0.7	1.5	2.2	3	-	51	31	82
5. EXP 60720A - 2 sprays (1st & 3rd occasions)	2	2.1	0.6	1.2	1.8	2	-	24	10	34
6. EXP 60720A 2 sprays (2nd & 4th occasions)	3	3.5	0.8	0.7	1.5	2	-	47	16	63
7. Decis- 4 Sprays	2	3.6	2.8	12.0	14.8	3	-	65	53	118
8. Dursban - 4 Sprays	1	1.5	0.5	0.0	0.5	1	-	49	12	61
Field sample	2	1.6	0.5	0.5	1.0	-	-	35	39	74

* Counts made on 20 plants per plot collected in the field and examined later under a microscope - as in the 1st assessment.

\# Thrips washed off 20 plants with alcohol in the field, collected in bottles and examined later under a microscope. (Method changed because thrips easily dislodged from salad onions when the 1st assessment was made.)