Control of *Thrips parvispinus* with different insecticides and natural enemies in Anthurium

2024

Conducted by order of

Anthura & Koppert

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SUMMARY

In 2024, VERTIFY carried out one trial by order of Anthura and Koppert to evaluate the efficacy and selectivity of different insecticides and natural enemies against *Thrips parvispinus* in anthurium.

The trial was done with anthurium plants. Anthurium plants in a tray were placed inside mesh cages. For the natural enemies treatment, two preventive introductions were performed. Two introductions of *Thrips parvispinus* were performed with all treatments.

For the insecticide treatments, 3 to 4 applications were done with an interval of five or seven days. The first application was done at 11 days after the first introduction of *Thrips parvispinus* The application volume was 1000 L/ha at all application dates. The applications were done as foliar applications with a spray lance targeted on the top and bottom of the leaves. The treatments are summarized in the table below.

Treatment		Dosage	Timing	Time of the day
1	Motto + Attracker (untreated)	0,03% + 0,1%	T1, T3, T5	-
2	NoFly + Motto + Attracker	0,25%+ 0,03% + 0,1%	T1, T2, T4, T6	End
3	Code A +Motto + Attracker	0,125%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
4	Neudosan + Motto + Attracker	2%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
5	Spruzit + Motto + Attracker	0,6l/ha+ 0,03% + 0,1%	T1, T3, T5	Morning
6	Code B+ Motto + Attracker	10L/ha + 0,03% + 0,01%	T1, T2, T4, T6	Morning
7	Velifer + Motto + Attracker	0,05%+ 0,03% + 0,1%	T1, T2, T4, T6	End
8	Botanigard (WP) + Motto + Attracker	0,0625% + 0,03% + 0,1%	T1, T2, T4, T6	End
9	Code C + Motto + Attracker	2 kg/ha + 0,03% + 0,1%	T1, T2, T4, T6	End
10	Entonem + Motto + Attracker	*500.000 / m²* + 0,03% + 0,1%	T1, T2, T4, T6	End
11	NeemAzal-T/S + Motto + Attracker	0,25% + 0,03% + 0,1%	(6 applications at Anthura) T1, T3, T5	Morning
12	Code D + Motto + Attracker (Chemical reference)	0,15% + 0,03% + 0,1%	T1, T3, T5	Morning

Treatment		Dosage
13	Rooftrips Franklinothrips	10/m2
14	Amblyseius Swirskii + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
15	Transeius montdorensis + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
16	Chrysopearla carnea (egg)	100/ m2
17	Amblydromalus limonicus + Carpoglyphus lactis/artemia	200/m2 + 2000/m2

Regular assessments were done weekly until 14 days after the last application. At each assessment date, numbers of thrips (larvae and adults separately) were counted on 12 plants. At the latest assessment moment, numbers of thrips were counted on 40 plants. Crop damage caused by thrips was scored from 1-5 (1=no infection 5=high infection). At the end of the trial, fresh weight of 15 plants were measured. At each assessment date also assessments on general crop condition, phytotoxicity and visible spray residue were done

After two introductions with *Thrips parvispinus,* good infestation was achieved. First applications with insecticides were performed on relative low numbers of *Thrips parvispinus.*

After repeated applications with insecticides, none of the treatments showed significant reduction of *Thrips parvispinus* population. With Code A, Neudosan, and Code D (chemical reference), a trend is visible in which a relatively low number of thrips were found at all assessment moment

At the end of the trial (16 days after the latest application) , significant differences were found in crop damage caused by thrips with treatments Code D, Neudosan and NeemAzal-T/S resulting in the lowest crop damage. All other treatments did not differ from untreated.

With none of the treatments any spray residue or phytotoxicity was observed.

After 2 preventative and 6 curative introductions of natural enemies, significant reduction in numbers of thrips (both Larvae, adults and total numbers of thrips) were found with all treatments compared to untreated. No significant differences were found between the treatments with natural enemies.

After 2 preventative and 2 curative introductions of natural enemies, significant reduction in crop damage was found in all treatments compared to untreated. After 7 introductions, significant differences were found with treatment Amblyseius Swirskii + Carpoglyphus lactis/artemia resulting in relative low crop damage and treatment Amblydromalus limonicus + Carpoglyphus lactis/artemia resulting in a relative high crop damage. However, after 8 introductions of natural enemies no significant differences were found between the treatments (except untreated).

1. INTRODUCTION

In 2024, VERTIFY carried out one trial by order of Anthura and Koppert to evaluate the efficacy and selectivity of different insecticides and natural enemies against *Thrips parvispinus* in anthurium. The trial was done in the greenhouse facilities of VERTIFY in Naaldwijk and identified as 240325.

2. METHOD

The trial was done with anthurium plants from variety Zizou. Anthurium plants were placed in trays with 90 plants per tray In checkerboard arrangement. Per plot, 2 trays were placed in mesh cages (60x80x100cm, mesh size 0,12x0,12mm) placed on cultivation tables in a greenhouse facility of 173 m^2. Climate settings were discussed with Anthura. The trial is performed in four replicates (4 cages per treatment).

Figure 1. Plot lay out.

The plants were artificially infected by introducing 17 and 11 female *Thrips parvispinus* adults with an weekly interval in each cage. These thrips batches came from Vertify and were cultured on pepper plants. These cultures have been tested several times by Anthura using DNA analysis and no other thrips species have been detected.

For the insecticides treatments, 3 to 4 applications were done with an interval of 5 or 7 days. The first application was done at four days after the latest introduction of thrips. The application volume was 1000 L/ha at all application dates. The applications were done as foliar applications with a spray lance targeted on the top and bottom of the leaves. The treatments are summarized in table 1.

Table 1. Treatments insecticides

Treatment		Dosage	Timing	Time of the day
1	Motto + Attracker (untreated)	0,03% + 0,1%	T1, T3, T5	-
2	NoFly + Motto + Attracker	0,25%+ 0,03% + 0,1%	T1, T2, T4, T6	End
3	Code A +Motto + Attracker	0,125%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
4	Neudosan + Motto + Attracker	2%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
5	Spruzit + Motto + Attracker	0,6l/ha+ 0,03% + 0,1%	T1, T3, T5	Morning
6	Code B + Motto + Attracker	10L/ha + 0,03% + 0,01%	T1, T2, T4, T6	Morning
7	Velifer + Motto + Attracker	0,05%+ 0,03% + 0,1%	T1, T2, T4, T6	End
8	Botanigard (WP) + Motto + Attracker	0,0625% + 0,03% + 0,1%	T1, T2, T4, T6	End
9	Code C + Motto + Attracker	2 kg/ha + 0,03% + 0,1%	T1, T2, T4, T6	End
10	Entonem + Motto + Attracker	*500.000 / m^2* + 0,03% + 0,1%	T1, T2, T4, T6	End
11	NeemAzal-T/S + Motto + Attracker	0,25% + 0,03% + 0,1%	(6 applications at Anthura) T1, T3, T5	Morning
12	Code D + Motto + Attracker (Chemical reference)	0,15% + 0,03% + 0,1%	T1, T3, T5	Morning

At preparing of the spraying solutions, the solubility of the products was good. No irregularities were noticed.

For the natural enemies treatments, two preventative introductions were performed at 8 and 2 days before the first introduction of *Thrips parvispinus* and was repeated weekly to a total of 8 introductions. The treatments are summarized in table 2.

Table 2. Treatments natural enemies

Treatment		Dosage
1	Untreated	-
13	Predatorythrips Franklinothrips	10/m2
14	Amblyseius Swirskii + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
15	Transeius montdorensis + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
16	Chrysopearla carnea (egg)	100/ m2
17	Amblydromalus limonicus + Carpoglyphus lactis/artemia	200/m2 + 2000/m2

Regular assessments were done weekly until 14 days after the last application. At each assessment date, numbers of thrips (larvae and adults separately) were counted on 12 plants. These plants were cut from the plug and placed in a pot with 80% ethanol. This ethanol was later rinsed over a sieve, after which the numbers of larvae and adults on the sieve were counted. At the latest assessment moment, numbers of thrips were counted on 40 plants. Crop damage caused by thrips was scored from 1-5 (1=no infection 5=high infection).

At the end of the trial, fresh weight of 15 plants were measured

At each assessment date also assessments on general crop condition, phytotoxicity and visible spray residue were done. Trial details are shown in table 3

Table 3: Trial details.

Location:	Europa 1 2672 ZX Naaldwijk
Crop:	Anthurium (Zizou)
Date of planting:	04-04-2024
Introduction *Thrips parvispinus*	12-04-2024 (17 female adults) 19-04-2024 (11 female adults)
Application dates insecticides:	T1 23-4-2024 T2 29-4-2024 T3 1-5-2024 T4 3-5-2024 T5 8-5-2024 T6 15-5-2024
Introduction dates natural enemies	I1 4-4-2024 I2 10-4-2024 I3 17-4-2024 I4 25-4-2024 I5 2-5-2024 I6 8-5-2024 I7 14-5-2024 I8 20-5-2024
Assessment moments	23-04-2024 30-04-2024 07-05-2024 (only insecticides) 16-05-2024 22-05-2024 31-05-2024 (fresh weight)

3. RESULTS

Statistical analysis was done with Genstat (LSD test at 95%). In the table fprob means probability. When fprob has a value of 0,05 or less, the difference between two treatments is statistically significant. The least significant difference (lsd) is the smallest difference between significant different treatments at 95% (fprob = 0,05). Figures with the same letter do not significantly

3.1 Population development in untreated

At each assessment date, numbers of thrips (larvae and adults separately) were counted on 12 plants (last assessment date on 40 plants). Crop damage caused by thrips was scored from 1-5 (1=no infection 5=high infection). Results of untreated is shown in figure 2.

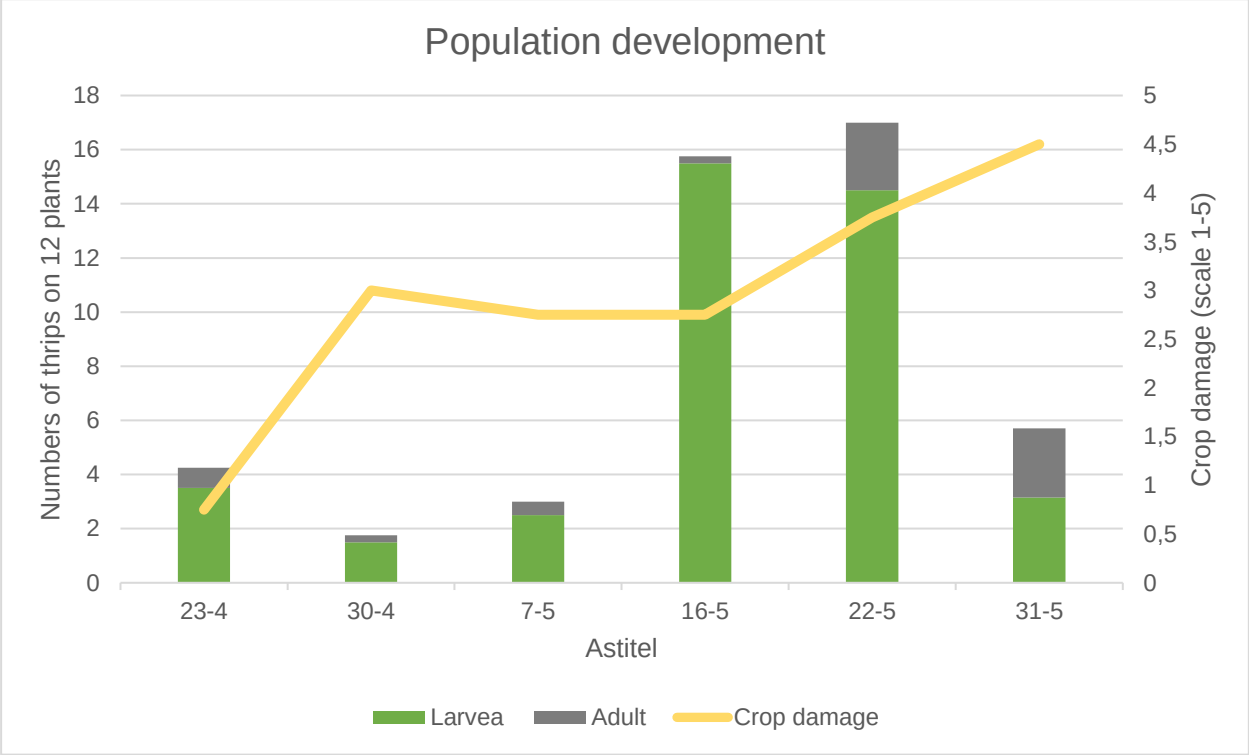


Figure 2. Population development in untreated (numbers from 31-5 are calculated to 12 plants)

At 4 days after the latest introduction of *Thrips parvispinus*, moderate infection was found with total of 4 *Thrips parvispinus* per 12 plants. Mostly larvae were found which indicates that the thrips has established. Population did not develop until 16-05 (26 days after the last introduction). Although relative low numbers of thrips were found, crop damage caused by thrips increased. From 16-05 rapid increase of larvae and when population developed further also adults were found resulting in even higher crop damage.

3.2 Efficacy insecticides

3.2.1 Numbers of thrips

At each assessment date, numbers of thrips (larvae and adults separately) were counted on 12 plants. Results are shown in table 4.

Table 4. Numbers of thrips on 12 plants in insecticide treatments.

	23-4-2024			30-4-2024			7-5-2024			16-5-2024			22-5-2024		
Treatment	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total
Untreated	3,5	0,8	4,3	1,5	0,3	1,8	2,5	0,5	3,0	15,5	0,3	15,8	14,5	2,5	17,0
NoFly	2,0	0,0	2,0	0,8	0,3	1,0	0,8	0,5	1,3	8,0	0,8	8,8	25,0	3,5	28,5
Code A	1,5	0,0	1,5	2,0	0,0	2,0	2,3	1,0	3,3	4,0	0,3	4,3	8,0	0,5	8,5
Neudosan	2,5	0,0	2,5	0,5	0,3	0,8	1,3	0,8	2,0	4,5	0,0	4,5	5,0	0,5	5,5
Spruzit	5,0	0,0	5,0	2,8	0,0	2,8	3,5	0,3	3,8	18,0	0,8	18,8	30,8	1,8	32,5
Code B	2,8	0,0	2,8	4,0	0,0	4,0	0,8	0,5	1,3	11,3	0,5	11,8	23,0	3,3	26,3
Velifer	2,3	0,0	2,3	1,5	1,0	2,5	1,5	0,3	1,8	8,5	0,0	8,5	9,5	1,8	11,3
Botanigard (WP)	8,0	0,0	8,0	4,5	0,8	5,3	3,0	0,8	3,8	8,3	0,0	8,3	9,5	2,3	11,8
Code C	4,5	0,0	4,5	4,8	0,5	5,3	4,3	0,3	4,5	11,8	0,0	11,8	16,5	4,0	20,5
Entonem	1,5	0,5	2,0	3,0	1,0	4,0	2,5	0,5	3,0	9,5	0,3	9,8	18,3	3,0	21,3
NeemAzal-T/S	3,8	0,0	3,8	1,0	0,0	1,0	2,5	1,0	3,5	8,5	0,3	8,8	15,8	1,8	17,5
Code D	1,8	0,0	1,8	0,5	0,0	0,5	0,0	0,0	0,0	0,3	0,0	0,3	1,5	0,5	2,0
fprob	0,334	0,180	0,342	0,479	0,185	0,349	0,433	0,827	0,612	0,577	0,454	0,544	0,314	0,770	0,325
lsd	5,0	0,9	5,0	4,5	0,9	4,6	3,5	1,2	4,2	15,0	0,8	15,1	22,5	4,3	24,8

After repeated applications, none of the treatments showed significant reduction of *Thrips parvispinus* population. With Code A, Neudosan, and Code D (chemical reference), a trend is visible in which a relatively low number of thrips were found at all assessment moment.

3.2.2 Crop damage caused by thrips

At each assessment date, cop damage caused by thrips was scored in a scale from 1-5 (1=no infection 5=high infection) (figure 2). Results are shown in table 5.

Figure 2. Crop damage caused by thrips with adult females visible.

Table 5. Crop damage caused by thrips.

	Crop damage (1-5)						
Treatment	23-4	30-4	7-5	16-5	22-5	31-5	
Untreated	0,8	3,0	2,8	2,8	3,8	4,5	c
NoFly	1,0	2,5	3,0	3,0	3,5	4,5	bc
Code A	1,5	2,3	2,8	2,5	3,3	4,3	bc
Neudosan	1,3	3,0	3,3	2,5	3,0	3,3	ab
Spruzit	1,3	3,0	3,3	3,0	4,3	5,0	c
Code B	0,5	3,0	3,5	2,8	3,8	4,8	c
Velifer	1,3	2,8	3,5	3,3	4,0	4,8	c
Botanigard (WP)	1,0	3,8	4,3	3,8	4,5	5,0	c
Code C	0,8	3,5	3,8	3,5	4,3	4,8	c
Entonem	1,5	2,8	3,0	3,8	4,0	4,8	c
NeemAzal-T/S	1,0	2,3	2,3	4,3	3,0	3,3	ab
Code D	1,0	2,5	2,0	3,8	2,3	2,5	a
fprob	0,242	0,366	0,053	0,148	0,058	0,003	
lsd	0,8	1,2	1,3	1,3	1,3	1,2	

At the end of the trial (16 days after the latest application) , significant differences were found in crop damage caused by thrips with treatments Code D, Neudosan and NeemAzal-T/S resulting in the lowest crop damage. All other treatments did not differ from untreated.

3.2.3 Fresh weight

At 16 days after the latest application, fresh weight of 15 plants per plot was measured. Results are shown in table 6.

Table 6. Fresh weight of 15 plants per plot

Treatment	Fresh weight (g)
Untreated	39,6
NoFly	38,1
Code A	42,9
Neudosan	39,7
Spruzit	37,5
Code B	40,6
Velifer	39,6
Botanigard (WP)	40,0
Code C	37,0
Entonem	38,2
NeemAzal-T/S	42,0
Code D	46,5
fprob	0,419
lsd	7,4

No significant differences were found in fresh weight between the treatments.

3.2.4 Selectivity

With none of the treatments any spray residue or phytotoxicity was observed.

3.3 Efficacy natural enemies

3.3.1 Numbers of thrips

At each assessment date, numbers of thrips (larvae and adults separately) were counted on 12 plants. Results are shown in table 7.

Table 7. Numbers of thrips on 12 plants in natural enemies treatments.

	23-4-2024			30-4-2024			16-5-2024			22-5-2024						31-5-2024					
Treatment	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total	Larvae		Adult		Total		Larvae		Adult		Total	
Untreated	3,5	0,8	4,3	1,5	0,3	1,8	15,5	0,3	15,8	14,5	b	2,5	b	17,0	b	3,2	b	2,6	b	5,7	b
Predatorythrips Franklinothrips	2,3	0,5	2,8	0,8	0,3	1,0	0,8	0,0	0,8	1,0	a	0,0	a	1,0	a	0,3	a	0,0	a	0,3	a
Amblyseius Swirskii + Carpoglyphus lactis/artemia	2,8	0,0	2,8	0,3	0,0	0,3	0,5	0,0	0,5	0,8	a	0,0	a	0,8	a	0,5	a	0,2	a	0,6	a
Transeius montdorensis + Carpoglyphus lactis/artemia	1,0	0,3	1,3	6,5	0,0	6,5	0,0	0,0	0,0	0,0	a	0,0	a	0,0	a	0,0	a	0,0	a	0,0	a
Chrysopearla carnea (egg)	3,0	0,3	3,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	a	0,0	a	0,0	a	0,7	a	0,2	a	0,8	a
Amblydromalus limonicus + Carpoglyphus lactis/artemia	2,0	0,0	2,0	0,0	0,3	0,3	0,3	0,0	0,3	0,0	a	0,3	a	0,3	a	0,8	a	0,2	a	1,1	a
fprob	0,614	0,515	0,584	0,460	0,681	0,469	0,084	0,451	0,071	0,001		0,037		0,001		0,003		<0,001		<0,001	
lsd	3,1	0,9	3,5	7,7	0,5	7,6	12,0	0,3	11,9	6,6		1,7		7,3		4,6		1,9		1,8	

After 2 preventative and 6 curative introductions of natural enemies, significant reduction in numbers of thrips (both Larvae, adults and total numbers of thrips) were found with all treatments compared to untreated. No significant differences were found between the treatments with natural enemies.

3.3.2 Crop damage caused by thrips

At each assessment date, cop damage caused by thrips was scored in a scale from 1-5 (1=no infection 5=high infection). Results are shown in table 8.

Table 8. Crop damage caused by thrips.

	Crop damage (1-5)											
Treatment	23-4	30-4		7-5	16-5		22-5		31-5			
Untreated	0,8	3,0	b	2,8	2,8	c	3,8	b	4,5	b		
Predatorythrips Franklinothrips	0,8	1,3	a	1,8	2,0	ab	2,0	a	2,3	a		
Amblyseius Swirskii + Carpoglyphus lactis/artemia	1,0	1,5	a	1,5	1,5	a	2,0	a	2,3	a		
Transeius montdorensis + Carpoglyphus lactis/artemia	1,0	1,3	a	1,8	1,8	ab	1,8	a	2,0	a		
Chrysopearla carnea (egg)	1,0	2,0	a	1,8	1,8	ab	2,0	a	2,3	a		
Amblydromalus limonicus + Carpoglyphus lactis/artemia	1,0	1,8	a	1,8	2,3	bc	2,5	a	2,8	a		
fprob	0,156	0,002		0,076	0,017		0,001		<0,001			
lsd	0,5	0,8		0,8	0,7		0,8		0,9			

After 2 preventative and 2 curative introductions of natural enemies (30-04), significant reduction in crop damage was found in all treatments compared to untreated. At 16-05 (after 7 introductions) significant differences were found with treatment Amblyseius Swirskii + Carpoglyphus lactis/artemia resulting in relative low crop damage and treatment Amblydromalus limonicus + Carpoglyphus lactis/artemia resulting in a relative high crop damage. However, after 8 introductions of natural enemies no significant differences were found between the treatments (except untreated).

3.3.3 Fresh weight

At 11 days after the latest introduction of natural enemies, fresh weight of 15 plants per plot was measured. Results are shown in table 9.

Table 9. Fresh weight of 15 plants per plot

Treatment	Fresh weight (g)
Untreated	39,6
Predatorythrips Franklinothrips	43,8
Amblyseius Swirskii + Carpoglyphus lactis/artemia	41,5
Transeius montdorensis + Carpoglyphus lactis/artemia	41,7
Chrysopearla carnea (egg)	44,1
Amblydromalus limonicus + Carpoglyphus lactis/artemia	42,1
fprob	0,730
lsd	6,6

No significant differences were found in fresh weight between the treatments.

4. CONCLUSIONS

After two introductions with *Thrips parvispinus,* moderate infestation was achieved. First applications with insecticides were performed on relative low numbers of *Thrips parvispinus.*

After repeated applications with insecticides, none of the treatments showed significant reduction of *Thrips parvispinus* population. With Code A, Neudosan, and Code D (chemical reference), a trend is visible in which a relatively low number of thrips were found at all assessment moment

At the end of the trial (16 days after the latest application) , significant differences were found in crop damage caused by thrips with treatments Code D, Neudosan and NeemAzal-T/S resulting in the lowest crop damage. All other treatments did not differ from untreated.

With none of the treatments any spray residue or phytotoxicity was observed.

After 2 preventative and 6 curative introductions of natural enemies, significant reduction in numbers of thrips (both Larvae, adults and total numbers of thrips) were found with all treatments compared to untreated. No significant differences were found between the treatments with natural enemies.

After 2 preventative and 2 curative introductions of natural enemies, significant reduction in crop damage was found in all treatments compared to untreated. After 7 introductions, significant differences were found with treatment Amblyseius Swirskii + Carpoglyphus lactis/artemia resulting in relative low crop damage and treatment Amblydromalus limonicus + Carpoglyphus lactis/artemia resulting in a relative high crop damage. However, after 8 introductions of natural enemies no significant differences were found between the treatments (except untreated).

Appendix 1: Trial details

Treatments

Treatment		Dosage	Timing	Time of the day
1	Motto + Attracker (untreated)	0,03% + 0,1%	T1, T3, T5	-
2	NoFly + Motto + Attracker	0,25%+ 0,03% + 0,1%	T1, T2, T4, T6	End
3	Code A +Motto + Attracker	0,125%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
4	Neudosan + Motto + Attracker	2%+ 0,03% + 0,1%	T1, T2, T4, T6	Morning
5	Spruzit + Motto + Attracker	0,6l/ha+ 0,03% + 0,1%	T1, T3, T5	Morning
6	Code B+ Motto + Attracker	10L/ha + 0,03% + 0,01%	T1, T2, T4, T6	Morning
7	Velifer + Motto + Attracker	0,05%+ 0,03% + 0,1%	T1, T2, T4, T6	End
8	Botanigard (WP) + Motto + Attracker	0,0625% + 0,03% + 0,1%	T1, T2, T4, T6	End
9	Code C + Motto + Attracker	2 kg/ha + 0,03% + 0,1%	T1, T2, T4, T6	End
10	Entonem + Motto + Attracker	*500.000 / m²* + 0,03% + 0,1%	T1, T2, T4, T6	End
11	NeemAzal-T/S + Motto + Attracker	0,25% + 0,03% + 0,1%	(6 applications at Anthura) T1, T3, T5	Morning
12	Code D + Motto + Attracker (Chemical reference)	0,15% + 0,03% + 0,1%	T1, T3, T5	Morning

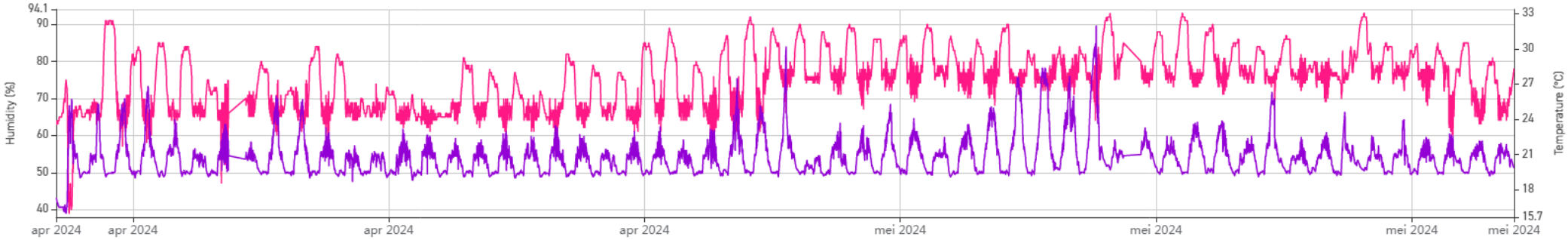
Treatment		Dosage
13	Rooftrips Franklinothrips	10/m2
14	Amblyseius Swirskii + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
15	Transeius montdorensis + Carpoglyphus lactis/artemia	200/m2 + 2000/m2
16	Chrysopearla carnea (egg)	100/ m2
17	Amblydromalus limonicus + Carpoglyphus lactis/artemia	200/m2 + 2000/m2

Application and assessment details

Location:	Europa 1 2672 ZX Naaldwijk
Crop:	Anthurium (Zizou)
Date of planting:	04-04-2024
Introduction *Thrips parvispinus*	12-04-2024 (17 female adults) 19-04-2024 (11 female adults)
Application dates insecticides:	T1 23-4-2024 T2 29-4-2024 T3 1-5-2024 T4 3-5-2024 T5 8-5-2024 T6 15-5-2024
Introduction dates natural enemies	I1 4-4-2024 I2 10-4-2024 I3 17-4-2024 I4 25-4-2024 I5 2-5-2024 I6 8-5-2024 I7 14-5-2024 I8 20-5-2024
Assessment moments	23-04-2024 30-04-2024 07-05-2024 (only insecticides) 16-05-2024 22-05-2024 31-05-2024 (fresh weight)

Trial map

17A 14	16B 28	14C 42	15D 56	70
16A 13	14B 27	15C 41	17D 55	69
15A 12	17B 26	16C 40	14D 54	16D 68
14A 11	15B 25	17C 39	2D 53	12D 67
9D 10	8D 24	3D 38	5D 52	1D 66
10D 9	4D 23	13D 37	7D 51	6D 65
11D 8	6C 22	2C 36	11C 50	9C 64
3C 7	1C 21	10C 35	8C 49	5C 63
13C 6	12C 20	7C 34	4C 48	2B 62
4B 5	10B 19	6B 33	12B 47	7B 61
8B 4	3B 18	5B 32	1B 46	13B 60
7A 3	13A 17	4A 31	9B 45	11B 59
2A 2	9A 16	12A 30	6A 44	3A 58
5A 1	11A 15	1A 29	10A 43	8A 57

Appendix 2: Climate details

Climate data during trail period. Purple shows temperature (°C). Pink line shows relative humidity (%).