SCEPTREPLUS

Final Trial Report

Trial code:	SP49 Tr1
Title:	**Screening of efficacy and crop safety of novel products for the control of *Pseudococcus viburni* (glasshouse mealybug) on tomatoes**
Crop:	Tomato (Solanaceae) / PE
Target:	Glasshouse mealybug, *Pseudococcus viburni*, PSECOB
Lead researcher:	Dr Jennifer Banfield-Zanin
Organisation:	Stockbridge Technology Centre, Cawood, Selby, YO8 3TZ
Period:	September 2021 to November 2021
Report date:	06th December 2021
Report author:	Dr Jennifer Banfield-Zanin
ORETO Number: (certificate should be attached)	435

I the undersigned, hereby declare that the work was performed according to the procedures herein described and that this report is an accurate and faithful record of the results obtained.

10.01.2022 J. A. Banfield-Zanin
Date ..... Authors signature

Trial Summary

Introduction

The glasshouse mealybug (*Pseudococcus viburni*) is an important, frequently chronic, pest of many protected edible crops, capable of causing considerable damage to plants through both direct feeding damage and visual fouling to crop products. Control options are limited, and efficacy can often be restricted by a combination of morphological and behavioural characteristics. The aim of this trial was to evaluate the efficacy of selected plant protection products against glasshouse mealybug in glasshouse tomatoes, for incorporation into future integrated control strategies.

Methods

Tomatoes were grown under glasshouse conditions and artificially infested with glasshouse mealybug egg sacs and plant segments with mixed clusters in September 2021. Spray programmes started on the 28th October, based on three applications and with water rates set to suit crop size. Conventional pesticide products were applied at the first application only. The remaining products were re-applied after eight days, in line with manufacturer recommendations, with the exception of Prev-Gold for which there were two application regimes (one at an eight-day interval, the other with a more frequent four-day interval). Efficacy was determined by counting the number of live adult and juvenile mealybugs on tomato stems, with additional counts of egg sacs. Assessments were made pre-application, and on four further occasions (three days after application, and a final count made seven days after the final application). The crop was also monitored for evidence of phytotoxicity at each assessment.

Results

Moderate to high numbers of glasshouse mealybug were observed throughout the trial on untreated control plots. No treatments caused phytotoxic effects at the tested rates or application intervals. All products mixed well in deionised water. Means presented in the table below are back-transformed following square root transformation (specifically, square root of $x + 0.5$) for analyses.

	Mean total live numbers of glasshouse mealybug per plot				
Date	**27.10.2021**	**31.10.2021**	**04.11.2021**	**08.11.2021**	**12.11.2021**
Treatment					
Untreated	223.4	238.1	233.8	296.4	301.4
Decis ProTech (industry standard)	318.4	89.4	133.4	115.3	112.2
AHDB9821	173.5	109.8	92.2	82.9	42.6
FLiPPER (Bio)	241.6	187.8	147.4	192.3	161.4
Azatin (Bio)	197.8	187.7	193.4	221.0	203.8
Prev-Gold (8-day interval) (Bio)	290.7	216.9	241.6	236.2	237.1
Prev-Gold (4-day interval) (Bio)	214.4	192.8	199.3	207.8	218.3
	Not significantly different from untreated control ($p > 0.05$)				
	Significantly different from untreated control ($p < 0.05$)				

** Bio = biopesticide*

Conclusions

Only the industry standard, Decis ProTech, and the conventional coded pesticide treatment tested (AHDB9821) caused statistically significant reductions in total mealybug numbers at the end of the trial. No treatments caused phytotoxic effects at the tested rates or application intervals. By the final assessment date:

- Decis ProTech reduced mealybug numbers by 73%, while AHDB9821 reduced them by 81%.
- The physically acting FLiPPER reduced total mealybug numbers by 50%.
- Azatin, a biological Insect Growth Regulator (IGR), reduced total mealybug numbers by 23%.
- The botanically derived Prev-Gold reduced total mealybug numbers by 39% and 24% at 8-day and 4-day application intervals, respectively.
- Increased frequency of application of Prev-Gold was not found to improve efficacy of control.

Take home message

This trial has identified a number of safe products, although only one addition potentially effective product for controlling glasshouse mealybug in tomato crops. The conventional chemistries tested produced statistically significant reductions in numbers by the end of the trial. The low-risk bioinsecticides did not achieve statistically significant reductions.

Objectives

1. To evaluate the effectiveness of selected plant protection products against glasshouse mealybug on tomatoes as measured by pest occurrence.
2. To monitor the treated crop for phytotoxicity.

Trial conduct

UK regulatory guidelines were followed but EPPO guidelines took precedence. The following EPPO guidelines were followed:

Relevant EPPO guideline(s)		**Variation from EPPO**
PP 1/152(4)	Design and analysis of efficacy evaluation trials	None
PP 1/181(4)	Conduct and reporting of efficacy evaluation trials including GEP	None
PP 1/135(4)	Phytotoxicity assessment	None
PP 1/239(2)	Dose expression for plant protection products	None

There were no deviations from EPPO guidance. There were no specific EPPO guidelines for *Pseudococcus viburni* or other mealybug on tomato or other Solanaceous crops.

Test site

Item	**Details**
Location address	M9 and M10, STC, Cawood, Selby, YO8 3TZ
Crop	Tomato (*Solanum lycopersicum*)
Cultivar	Dometica
Soil or substrate type	Rockwool (Grotop Master, Grodan)
Agronomic practice	Highwire on gutters. Drip irrigation. Applied STC Tomato Main Feed (EC 3.3, pH 5.5). Standard glasshouse tomato crop management. One application of Nimrod fungicide for powdery mildew control.
Prior history of site	Tomato. Highwire on gutters. Drip irrigation. Applied STC Tomato Main Feed. Standard glasshouse tomato management.

Trial design

Item	**Details**
Trial design:	Incomplete Trojan square
Number of replicates:	6
Row spacing:	1.6m
Plot size: (w x l)	0.75m x 2.8m
Plot size: (m^2)	2.1m^2
Number of plants per plot:	6
Leaf Wall Area calculations	A & B: 6.83m^2 *[Calculation = 2 x 2.6m x (2.1m^2 ÷ 1.6m)]* C: 7.09m^2 *[Calculation = 2 x 2.7m x (2.1m^2 ÷ 1.6m)]*

Treatment details

AHDB Code	Active substance	Product name/ manufacturers code	Formulation batch number	Content of active substance in product	Formulation type	Adjuvant
Untreated	Water only	NA	NA	NA	NA	None
AHDB9780	Deltamethrin	Decis ProTech	EM4L018889	15g/L	EW	None
AHDB9821	Confidential					
AHDB9970	Fatty acids	FLiPPER	B064A	479.8g/L	EW	None
AHDB9971	Azadirachtin	Azatin	H18161072	26g/L	EC	None
AHDB9967	Orange oil	Prev-Gold (8-day interval)	BP00103321 OG	60g/L	OD	None
AHDB9967	Orange oil	Prev-Gold (4-day interval)	BP0010221O G	60g/L	OD	None

A planned eighth treatment product was not received, and as such plots designated for Treatment 8 were absorbed into, and treated as additional, untreated control plots. All treatment products were mixed for application using deionised water.

Application schedule

Treatment number	Treatment: product name or AHDB code	Rate of active substance (ml or g a.s./ha)	Rate of product (l or kg/ha)	Application code
1	Water only	NA	NA	ABC
2	Decis ProTech	12.45 g a.s./ha	0.83 L/ha	A
3	AHDB9821	150 g a.s./ha	1.25 L/ha	A
4	FLiPPER	4798 g a.s./ha	10 L/ha	AC
5	Azatin	14.56 g a.s./ha	0.56 L/ha	AC
6	Prev-Gold	180 g a.s./ha	3 L/ha	AC
7	Prev-Gold	180 g a.s./ha	3 L/ha	ABC

Application details

	Application A	Application B	Application C
Application date	28.10.2021	01.11.2021	05.11.2021
Time of day	11:30	09:30	11:00
Crop growth stage (Max, min average BBCH)	77-80 av. 79	77-81 av. 79	81-82 av. 81
Crop height (cm)	260	260	270
Crop coverage (%)	100	100	100
Application Method	Spray	Spray	Spray
Application Placement	Foliar	Foliar	Foliar
Application equipment	Oxford Precision Sprayer	Oxford Precision Sprayer	Oxford Precision Sprayer
Nozzle pressure	2 bar	2 bar	2 bar

	Application A	Application B	Application C
Nozzle type	Hollow cone (HC)	Hollow cone (HC)	Hollow cone (HC)
Nozzle size	30HCX4	30HCX4	30HCX4
Application water volume/ha	1000L/ha	1000L/ha	1000L/ha
Temperature of air - shade (°C)	M9: 21.0 M10: 20.7	M9: 19.2 M10: 19.3	M9: 20.3 M10: 20.9
Relative humidity (%)	M9: 97 M10: 91	M9: 99 M10: 91	M9: 97 M10: 90
Wind speed range (m/s)	0	0	0
Dew presence (Y/N)	N	N	N
Temperature of soil - 2-5 cm (°C)	Ambient	Ambient	Ambient
Wetness of soil - 2-5 cm	Damp	Damp	Damp
Cloud cover (%)	75	100	50

Untreated levels of pests/pathogens at application and through the assessment period

Common name	Scientific Name	EPPO Code	Infestation level pre-application	Infestation level at start of assessment period	Infestation level at end of assessment period
Glasshouse mealybug	*Pseudococcus viburni*	PSECOB	240[1]	247[1]	309[1]

[1] Mean total number live mealybug per plot.

Assessment details

Assessments of efficacy were made by counting the number of live adult and juvenile mealybugs on the bottom 100cm section of stem (infestation plant segments with mixed clusters of mealybugs as well as egg sacs having been placed at the base of each stem) on each of four tomato plants in the middle of each plot, to assess levels of infestation. A pre-treatment assessment was made one day prior to the first spray application. Subsequently, assessments across all trial plots were then completed three days after each spray (effectively at four-day intervals), with an additional final assessment taking place seven days after the final treatment application. Phytotoxicity was assessed at each assessment point by examining leaves for evidence of damage (e.g. scorch).

	Evaluation Timing (DA)*				
Evaluation date	**After conventional insecticides**	**After Bio-insecticides**	**Crop Growth Stage (BBCH)**	**Evaluation type (efficacy, phytotox)**	**Assessment**
27.10.2021	-1	-1	79	Infestation level, phytotoxicity	Number of live mealybug adults, juveniles, and egg sacs. Phytotoxic leaf damage.
31.10.2021	3	3	79	Infestation level, phytotoxicity	Number of live mealybug adults, juveniles, and egg sacs. Phytotoxic leaf damage.
04.11.2021	7	7 / 3	81	Infestation level, phytotoxicity	Number of live mealybug adults, juveniles, and egg sacs. Phytotoxic leaf damage.
08.11.2021	11	3	81	Infestation level, phytotoxicity	Number of live mealybug adults, juveniles, and egg sacs. Phytotoxic leaf damage.
12.11.2021	15	7	82	Infestation level, phytotoxicity	Number of live mealybug adults, juveniles, and egg sacs. Phytotoxic leaf damage.

* DA – days after application

Statistical analysis

The trial layout was designed as an incomplete Trojan Square for eight treatments, each replicated six times, and confirmed by Andrew Jukes and Rosemary Collier (Warwick University). Statistical analyses were completed by Steve Langton (Steve Langton Statistical Consultancy).

Data were analysed by *anova* using terms for treatments and replicates (blocks). Analysis was based on the total number for each plot using a square root transformation (specifically square root of x + 0.5). Comparisons between each treatment and the untreated control used Dunnett's test (also used to obtain L.S.D. values). Residuals from the analysis of variance were checked graphically for non-normality, heteroscedasticity, and spatial correlation. Residuals were approximately normally distributed for most variables using the square root transformation. As a further check a non-parametric Friedman's test was also performed on each variable. All analyses were carried out in Genstat (21st ed.).

It was confirmed by means of an *anova* that the data obtained from planned Treatment 8 plots, which were treated as additional untreated controls (Treatment 1) following non-receipt of planned trial product, were no more different than that data obtained

from Treatment 1 plots than would be expected by chance. As such, it was statistically viable to combine the two treatments for analysis.

There were some moderate spatial patterns in this dataset. Differences between replicate blocks were only significant for one variable, whereas a covariate for column number was significant for seven variables. Examination of residual plots showed there was sometimes a trend from left to right, and as such, results below are therefore based on *anova* models including a covariate term for column number as well as the term for replicate blocks.

Results

Phytotoxicity

There was no evidence of phytotoxicity with any treatment.

Efficacy

Numbers of mealybugs remained moderate to high throughout the trial assessment phase in untreated plots. The results for the mean number of total live mealybugs (combined adults and nymphs) per plot on the five assessment dates are shown in Table 1 and Figure 1. Results for adults (Table 2, Figure 2), nymphs (Table 3, Figure 3), and eggs sacs (Table 4, Figure 4), are then shown separately below.

Table 1. Live total numbers (adults and nymphs combined) of glasshouse mealybug (*Pseudococcus viburni*) as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Means are shown as transformed (square root of *x* + 0.5) for analysis, and back-transformed (i.e. not raw means). Shading indicates significant differences from the untreated control (at $p < 0.05$). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

Date	**27.10.2021 (A0)**		**31.10.2021 (A1)**		**04.11.2021 (A2 / B1)**		**08.11.2021 (A3 / C1)**		**12.11.2021 (A4)**	
	Sqrt *x* + 0.5	**Back-trans.**	**Sqrt *x* + 0.5**	**Back-trans.**	**Sqrt *x* + 0.5**	**Back-trans.**	**Sqrt *x* + 0.5**	**Back-trans.**	**Sqrt *x* + 0.5**	**Back-trans.**
Treatment										
Untreated	14.96	223.4	15.45	238.1	15.31	233.8	17.23	296.4	17.38	301.4
Decis ProTech	17.86	318.4	9.48	89.4	11.57	133.4	10.76	115.3	10.62	112.2
AHDB9821	13.19	173.5	10.50	109.8	9.63	92.2	9.13	82.9	6.56	42.6
FLiPPER	15.56	241.6	13.72	187.8	12.17	147.4	13.89	192.3	12.72	161.4
Azatin	14.08	197.8	13.72	187.7	13.92	193.4	14.88	221.0	14.29	203.8
Prev-Gold (8-day interval) (Bio)	17.07	290.7	14.74	216.9	15.56	241.6	15.38	236.2	15.41	237.1
Prev-Gold (4-day interval) (Bio)	14.66	214.4	13.90	192.8	14.14	199.3	14.43	207.8	14.79	218.3
F value	1.08	-	4.54	-	2.43	-	4.89	-	7.09	-
p-value	0.395	-	0.002	-	0.046	-	0.001	-	<0.001	-

Date	27.10.2021 (A0)		31.10.2021 (A1)		04.11.2021 (A2 / B1)		08.11.2021 (A3 / C1)		12.11.2021 (A4)	
	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.
Treatment										
d.f.	6, 35	-	6, 35	-	6, 35	-	6, 35	-	6, 35	-
L.S.D.	6.15	-	4.37	-	5.74	-	5.46	-	5.74	-
Friedman's *P*	0.613	-	0.011	-	0.097	-	0.017	-	0.001	-

	Not significantly different from untreated control ($p > 0.05$)
	Significantly different from untreated control ($p < 0.05$)

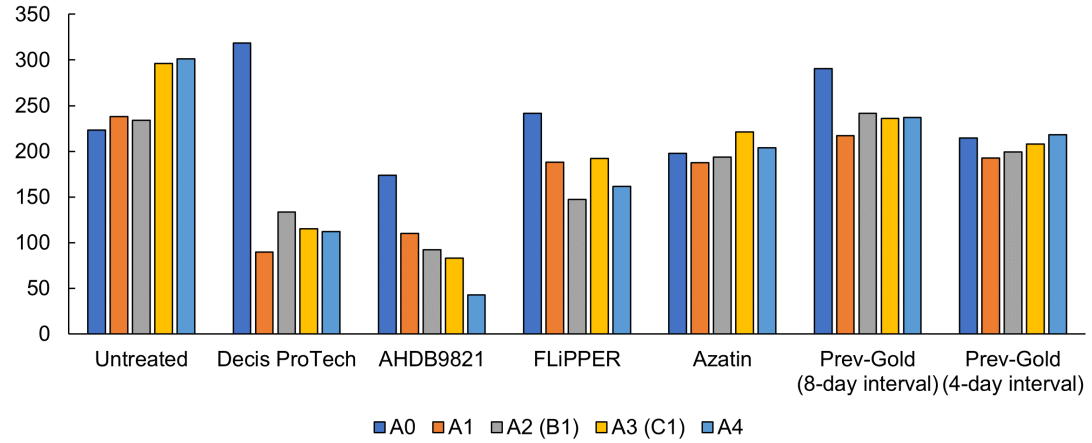


Figure 1. Live total numbers (adults and nymphs combined) of glasshouse mealybug (*Pseudococcus viburni*) as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Back-transformed means are shown (i.e. not raw means). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application.

Table 2. Numbers of live adult glasshouse mealybug (*Pseudococcus viburni*) as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Means are shown as transformed (square root of *x* + 0.5) for analysis, and back-transformed (i.e. not raw means). Shading indicates significant differences from the untreated control (at $p < 0.05$). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

Date	27.10.2021 (A0)		31.10.2021 (A1)		04.11.2021 (A2 / B1)		08.11.2021 (A3 / C1)		12.11.2021 (A4)	
	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.
Treatment										
Untreated	2.40	5.25	1.67	2.29	2.85	7.62	2.39	5.20	2.58	6.17
Decis ProTech	2.78	7.21	1.16	0.84	2.44	5.47	2.08	3.81	2.98	8.37
AHDB9821	1.90	3.09	1.30	1.19	1.58	2.00	1.53	1.84	1.44	1.58
FLiPPER	2.41	5.31	1.21	0.95	2.51	5.82	2.18	4.26	3.01	8.57
Azatin	1.53	1.84	1.14	0.79	2.17	4.20	1.92	3.19	2.17	4.20

Date	27.10.2021 (A0)		31.10.2021 (A1)		04.11.2021 (A2 / B1)		08.11.2021 (A3 / C1)		12.11.2021 (A4)	
	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.
Treatment										
Prev-Gold (8-day interval) (Bio)	2.50	5.75	1.41	1.50	2.53	5.92	2.24	4.53	2.22	4.43
Prev-Gold (4-day interval) (Bio)	1.93	3.23	1.18	0.90	2.58	6.13	1.93	3.21	2.38	5.17
F value	0.94	-	1.58	-	1.47	-	1.27	-	1.83	-
p-value	0.477	-	0.181	-	0.218	-	0.298	-	0.122	-
d.f.	6, 35	-	6, 35	-	6, 35	-	6, 35	-	6, 35	-
L.S.D.	1.74	-	0.74	-	1.42	-	1.07	-	1.56	-
Friedman's *P*	0.380	-	0.135	-	0.311	-	0.136	-	0.257	-

	Not significantly different from untreated control ($p > 0.05$)
	Significantly different from untreated control ($p < 0.05$)

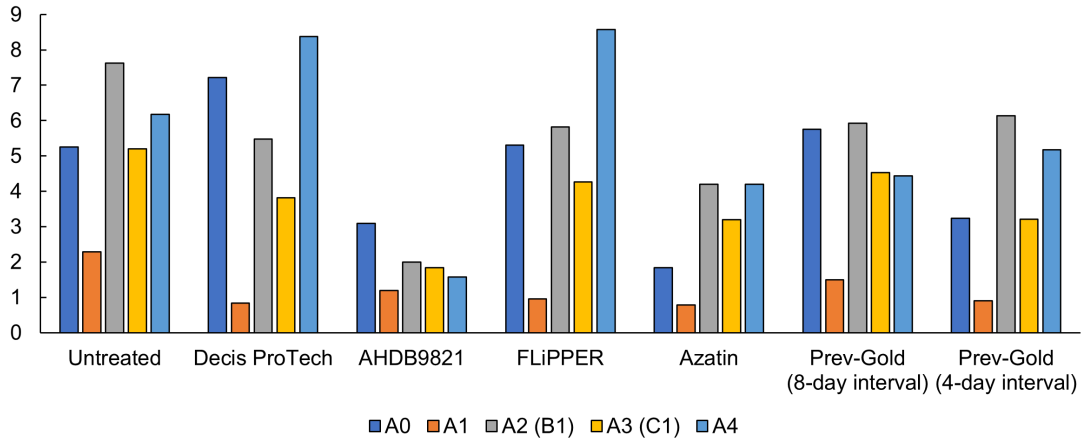


Figure 2. Numbers of live adult glasshouse mealybug (*Pseudococcus viburni*) as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Back-transformed means are shown (i.e. not raw means). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application.

Table 3. Numbers of live glasshouse mealybug (*Pseudococcus viburni*) nymphs as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Means are shown as transformed (square root of *x* + 0.5) for analysis, and back-transformed (i.e. not raw means). Shading indicates significant differences from the untreated control (at $p < 0.05$). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

Date	27.10.2021 (A0)		31.10.2021 (A1)		04.11.2021 (A2 / B1)		08.11.2021 (A3 / C1)		12.11.2021 (A4)	
	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.
Treatment										
Untreated	14.75	217.1	15.36	235.6	15.00	224.6	17.05	290.2	17.18	294.7
Decis ProTech	17.61	309.5	9.43	88.4	11.32	127.7	10.56	111.1	10.17	102.8
AHDB9821	13.05	169.9	10.43	108.2	9.49	89.5	9.02	80.8	6.41	40.5
FLiPPER	15.35	235.3	13.68	186.7	11.89	140.8	13.72	187.6	12.29	150.6
Azatin	13.99	195.4	13.68	186.8	13.74	188.2	14.74	216.8	14.08	197.7
Prev-Gold (8-day interval) (Bio)	16.84	283.0	14.69	215.3	15.32	234.3	15.22	231.2	15.26	232.3
Prev-Gold (4-day interval) (Bio)	14.54	210.8	13.87	191.8	13.88	192.3	14.30	203.9	14.58	211.9
F value	1.02	-	4.56	-	2.30	-	4.73	-	6.97	-
p-value	0.431	-	0.002	-	0.056	-	0.001	-	<0.001	-
d.f.	6, 35	-	6, 35	-	6, 35	-	6, 35	-	6, 35	-
L.S.D.	6.14	-	4.35	-	5.80	-	5.53	-	5.84	-
Friedman's *P*	0.737	-	0.010	-	0.123	-	0.017	-	0.001	-

	Not significantly different from untreated control ($p > 0.05$)
	Significantly different from untreated control ($p < 0.05$)

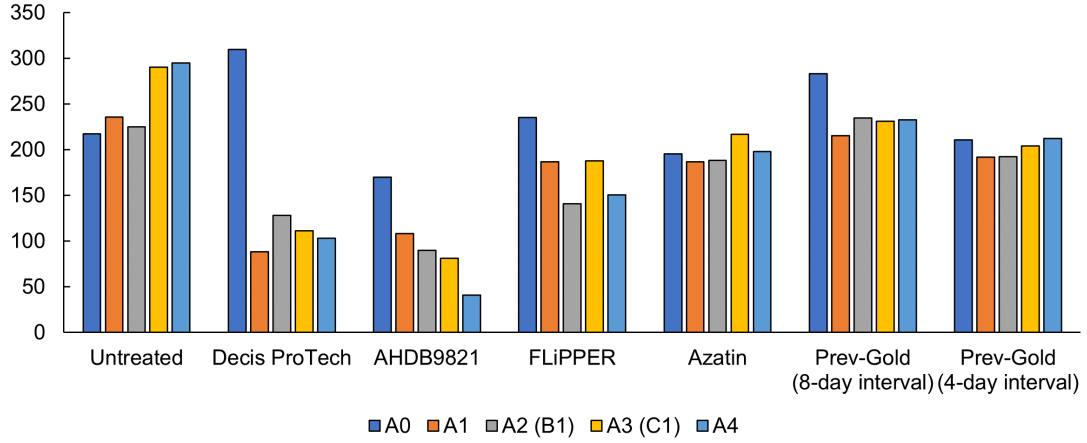


Figure 3. Numbers of live glasshouse mealybug (*Pseudococcus viburni*) nymphs as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Back-transformed means are shown (i.e. not raw means). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application.

Table 4. Glasshouse mealybug (*Pseudococcus viburni*) egg sac numbers as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Means are shown as transformed (square root of *x* + 0.5) for analysis, and back-transformed (i.e. not raw means). Shading indicates significant differences from the untreated control (at $p < 0.05$). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3

= 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

Date	27.10.2021 (A0)		31.10.2021 (A1)		04.11.2021 (A2 / B1)		08.11.2021 (A3 / C1)		12.11.2021 (A4)	
	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.	Sqrt *x* + 0.5	Back-trans.
Treatment										
Untreated	2.19	4.29	2.03	3.60	2.65	6.51	2.36	5.06	2.58	6.14
Decis ProTech	2.69	6.72	1.48	1.69	2.33	4.93	2.19	4.30	2.39	5.22
AHDB9821	2.64	6.45	1.84	2.90	2.77	7.19	2.24	4.51	2.04	3.66
FLiPPER	1.90	3.10	1.23	1.01	1.96	3.33	1.69	2.37	2.07	3.77
Azatin	2.44	5.45	1.65	2.22	2.09	3.86	1.84	2.89	2.30	4.81
Prev-Gold (8-day interval) (Bio)	2.48	5.66	1.70	2.38	2.07	3.81	2.20	4.33	2.01	3.53
Prev-Gold (4-day interval) (Bio)	2.39	5.22	1.61	2.10	1.93	3.22	1.77	2.65	1.94	3.27
F value	0.68	-	1.53	-	1.06	-	1.11	-	0.92	-
p-value	0.666	-	0.196	-	0.404	-	0.374	-	0.494	-
d.f.	6, 35	-	6, 35	-	6, 35	-	6, 35	-	6, 35	-
L.S.D.	1.33	-	0.92	-	1.39	-	1.07	-	1.13	-
Friedman's *P*	0.690	-	0.371	-	0.615	-	0.616	-	0.635	-

	Not significantly different from untreated control ($p > 0.05$)
	Significantly different from untreated control ($p < 0.05$)

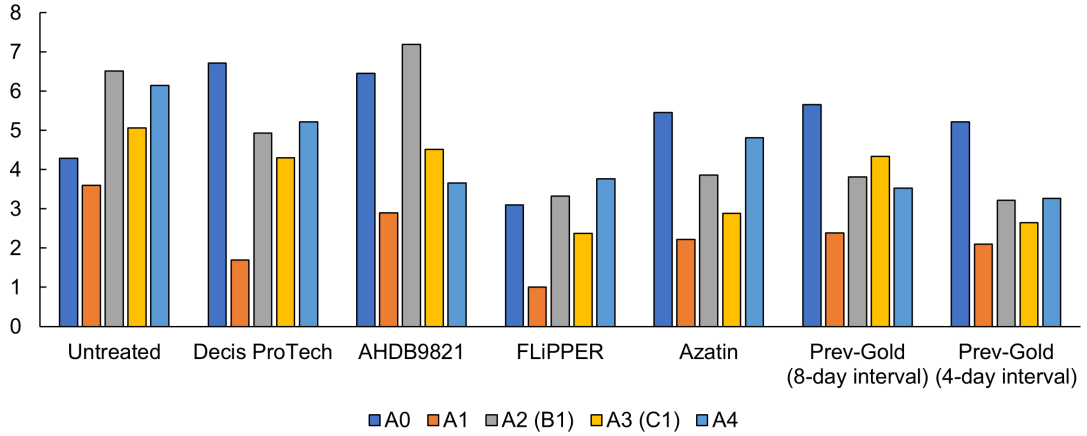


Figure 4. Glasshouse mealybug (*Pseudococcus viburni*) egg sac numbers as a mean of the total numbers per plot, by treatment, on five assessment dates during the trial. Back-transformed means are shown (i.e. not raw means). A0 = one day before first treatment application; A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application.

Percentage reduction in numbers of glasshouse mealybug (Henderson-Tilton formula)

The Henderson-Tilton formula (Eq.1) was used to calculate percentage efficacy based on the back-transformed means of the total numbers of live glasshouse mealybugs and egg sacs per plot (Tables 5-8). Percentage reductions in number were calculated relative to the pre-application assessment (A0; 27.10.2021), and also relative to the previous assessment.

Equation 1. Henderson-Tilton formula.

$$\textit{Corrected \% efficacy} = \left(1 - \frac{(\textit{n. on control before spray} \times \textit{n. on treatment plot after spray})}{(\textit{n. on control after spray} \times \textit{n. on treatment plot before spray})}\right) \times 100$$

Table 5. Percentage reduction in back-transformed mean total numbers of live (adults and nymphs combined) glasshouse mealybug (*Pseudococcus vibruni*) per plot, compared to both the baseline count (A0, count made on 27.10.2021), and previous assessment count. A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

	Compared with A0 assessment (pre-treatment; 27.10.2021)				Compared with previous assessment			
Treatment	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Decis ProTech	73.7	60.0	72.7	73.9	73.7	-52.0	31.8	4.3
AHDB9821	40.6	49.2	64.0	81.8	40.6	14.5	29.1	49.5
FLiPPER	27.1	41.7	40.0	50.5	27.1	20.1	-2.9	17.5
Azatin	11.0	6.6	15.8	23.6	11.0	-4.9	9.9	9.3
Prev-Gold (8-day interval) (Bio)	30.0	20.6	38.8	39.5	30.0	-13.4	22.9	1.3
Prev-Gold (4-day interval) (Bio)	15.6	11.2	26.9	24.5	15.6	-5.3	17.8	-3.3

Table 6. Percentage reduction in the back-transformed mean total numbers of adult glasshouse mealybugs (*Pseudococcus vibruni*) per plot, compared to both the baseline count (A0, count made on 27.10.2021), and the previous assessment count. A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

	Compared with A0 assessment (pre-treatment; 27.10.2021)				Compared with previous assessment			
Treatment	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Decis ProTech	73.3	47.7	46.6	1.2	73.3	-95.7	-2.1	-85.1
AHDB9821	11.7	55.4	39.9	56.5	11.7	49.5	-34.8	27.6
FLiPPER	59.0	24.5	19.0	-37.3	59.0	-84.1	-7.3	-69.5
Azatin	1.6	-57.3	-75.0	-94.2	1.6	-59.8	-11.3	-11.0

	Compared with A0 assessment (pre-treatment; 27.10.2021)				Compared with previous assessment			
Treatment	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Prev-Gold (8-day interval) (Bio)	40.2	29.1	20.5	34.4	40.2	-18.6	-12.1	17.6
Prev-Gold (4-day interval) (Bio)	36.1	-30.8	-0.3	-36.2	36.1	-104.7	23.3	-35.7

Table 7. Percentage reduction in the back-transformed mean total numbers of live glasshouse mealybug (*Pseudococcus vibruni*) nymphs per plot, compared to both the baseline count (A0, count made on 27.10.2021), and the previous assessment count. A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

	Compared with A0 assessment (pre-treatment; 27.10.2021)				Compared with previous assessment			
Treatment	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Decis ProTech	73.7	60.1	73.1	75.5	73.7	-51.5	32.7	8.9
AHDB9821	41.3	49.1	64.4	82.4	41.3	13.2	30.1	50.6
FLiPPER	26.9	42.2	40.4	52.8	26.9	20.9	-3.1	20.9
Azatin	11.9	6.9	17.0	25.5	11.9	-5.7	10.8	10.2
Prev-Gold (8-day interval) (Bio)	29.9	20.0	38.9	39.5	29.9	-14.2	23.6	1.1
Prev-Gold (4-day interval) (Bio)	16.2	11.8	27.6	25.9	16.2	-5.2	17.9	-2.3

Table 8. Percentage reduction in the back-transformed mean total number of glasshouse mealybug (*Pseudococcus vibruni*) egg sacs per plot, compared to both the baseline count (A0, count made on 27.10.2021), and the previous assessment count. A1 = 3 days after first treatment application; A2 = 7 days after first treatment application; A3 = 11 days after first treatment application; A4 = 15 days after first treatment application. Bio = biopesticide.

	Compared with A0 assessment (pre-treatment; 27.10.2021)				Compared with previous assessment			
Treatment	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Decis ProTech	70.0	51.7	45.7	45.7	70.0	-61.3	-12.2	0.0
AHDB9821	46.4	26.5	40.7	60.4	46.4	-37.1	19.3	33.1
FLiPPER	61.2	29.2	35.2	15.0	61.2	-82.3	8.4	-31.1
Azatin	51.5	53.3	55.0	38.3	51.5	3.8	3.7	-37.2
Prev-Gold (8-day interval) (Bio)	49.9	55.6	35.1	56.4	49.9	11.5	-46.2	32.8
Prev-Gold (4-day interval) (Bio)	52.1	59.3	57.0	56.2	52.1	15.2	-5.9	-1.7

Discussion

The level of glasshouse mealybug present in the crop throughout the trial was moderate to high, increasing in the untreated control plots throughout the trial assessment period. The total number of mealybugs (adult and nymph numbers combined) was driven by the number of nymphs, which were far more numerous than the adults, leading to a high degree of correlation between the number of nymphs and total number of mealybug variables and resulting in similar results for the two at each assessment point.

The industry standard, Decis ProTech, performed as expected. This conventional pesticide significantly decreased total and nymph-stage mealybug numbers at the first, third and final (fourth) post-treatment assessments (A1, A4, and A4), achieving 73% and 75% corrected percentage efficacy for total and nymph numbers respectively, relative to the untreated control. The impact on adult and egg sac numbers was not, however, statistically significant (with reductions over the assessment period of around 1% and 45%, respectively), but may have been driven by the relatively low numbers of these life stages observed in comparison to those of the nymphs.

An additional conventional experimental treatment, AHDB9821, was trialled, and led to statistically significant reductions in the total and nymph-stage numbers of glasshouse mealybugs when compared to numbers in the untreated control. Corrected percentage efficacies of 81% and 82% were achieved by the final assessment of the trial for these two variables, while efficacies of 56% and 60% were observed for the number of adult mealybugs and egg sac numbers present in the plots (though these reductions were not found to be statistically significant). Also notable, although differences in mealybug numbers were not statistically significant at the second post-treatment assessment (A2), this treatment was found to approach significance for nymph, adult, and total numbers of mealybugs.

Of the three bioinsecticides tested as part of the trial none were found to significantly reduce the numbers of mealybugs in comparison to the untreated control. The physically acting FLiPPER reduced total mealybug numbers relative to the untreated control by 50%, with nymph numbers reduced by 52% (although adult numbers were found to increase, and egg sac numbers were only reduced by 15%). Although an outlier was present for this treatment in one plot, removal of the plot was not found to alter the conclusions drawn (and as such the specific plot values were left in). Azatin, a biological insect growth regulator, led to decreases in total mealybug numbers of 23% during the trial assessment phase, with reductions of 25% in nymph numbers and 38% in the number of egg sacs (although again, adult numbers were noted to increase). As an insect growth regulator (IGR), it may be that greater levels of control would be achieved in a longer timeframe, with repeated applications. The efficacy of the botanically derived Prev-Gold was not found to be improved by an increased frequency of application. On an 8-day application interval, total mealybug numbers showed a corrected percentage efficacy of 39% relative to the untreated control (the percentage also matching the efficacy against nymphs), while egg sac numbers were reduced by 56%. In terms of adult numbers, a corrected percentage efficacy of 34% was noted at this application frequency. On the 4-day application interval, the product achieved corrected percentage efficacies of 24% and 25% for total and nymph-stage mealybug numbers, with egg sac numbers again reduced by 56%, although adult numbers were noted to increase. It is possible that Prev-Gold could be expected to have greater impact in terms of control through repeated applications over a longer

time span, as the reductions in egg sac numbers approached those observed for the conventional chemistries tested as part of the trial, however the low levels of control on other life stages may well preclude this.

All treatments mixed well with deionised water, and no adjuvants were required.

Conclusions

- By the final assessment date, only the two conventional chemistries tested – the industry standard Decis ProTech and AHDB9821 – were found to have significantly reduced total mealybug numbers by 73% and 81%, respectively.
- No bioinsecticide tested significantly reduced the numbers of mealybugs present in the crop, with reductions of total numbers between 23% and 50%, depending on product. Additional repeat applications over a longer timeframe may, however, check or limit population growth.
- Increased frequency of application of Prev-Gold was not found to improve efficacy of control.
- No treatments caused phytotoxic effects at the tested rates or application intervals.

Acknowledgements

We would like to thank AHDB for funding and supporting this project, and are grateful for the financial and in-kind contributions from the crop protection manufactures and distributors involved with the SCEPTREplus programme.

We would also like to thank the SCEPTREplus consortium for input into trial design and product selection, as well as industry representative Phil Morley for useful discussion on selection of crop variety.

Appendix

a. Crop diary

Date	Event
23.07.2021	Tomato seeds (*var.* Dometica) sown into rockwool blocks.
24.08.2021	Tomatoes planted out into rockwool slabs in trial location.
25.08.2021	Crop strung up and side-shoots removed (M9).
26.08.2021	Crop strung up and side-shoots removed (M10).
14.09.2021	Crop strung up and side-shoots removed (M9 & M10).
29.09.2021	Crop strung up (M9 & M10).
30.09.2021	Side shoots removed (M10).
01.10.2021	Side shoots removed (M9).
18.10.2021	Fungicide applied against powdery mildew – Nimrod (a.i. 250g/L bupirimate, n-butanol, hydrocarbons), rate = 1ml/L, 100L water per glasshouse unit.
21.10.2021	Crop strung up and side-shoots removed (M9 & M10).
28.10.2021	Crop lead stem stopped (trimmed) at approximately 2.6m height per plant. Crop strung up and side shoots removed (M9 & M10).
03.11.2021	Crop strung up and side-shoots removed (M9 & M10).

b. Trial diary

Date	Event
23.07.2021	Tomato seeds (*var.* Dometica) sown into rockwool blocks.
24.08.2021	Tomatoes planted out into rockwool slabs in trial location.
21.09.2021	Plots marked out. Tomato stems infested with glasshouse mealybug from stock culture.
01.10.2021	Plants and pest levels checked.
20.10.2021	Plants and pest levels checked.
24.10.2021	Plants and pest levels checked.
27.10.2021	Assessment A0 (pre-treatment) – initial count of mealybug numbers. Phytotoxicity assessment. Infestation material removed.
28.10.2021	Treatment application 1 (T1(A)) – all sprays applied.
31.10.2021	Assessment A1 – efficacy assessment (mealybug counts) and phytotoxicity assessment.
01.11.2021	Treatment application 2 (T2(B)) – Treatment 7 spray applied (botanical). All other treatments sprayed with water.
04.11.2021	Assessment A2 (B1) – efficacy assessment (mealybug counts) and phytotoxicity assessment.
05.11.2021	Treatment application 3 (T3(C)) – Treatments 4 (physically acting), 5 (biological IGR), 6 (botanical), and 7 (botanical) sprays applied. All other treatments sprayed with water.
08.11.2021	Assessment A3 (C1) – efficacy assessment (mealybug counts) and phytotoxicity assessment.
12.11.2021	Assessment A4 – final efficacy assessment (mealybug counts) and phytotoxicity assessment.

c. Trial photographs

Figure A1. Rows of tomato (*var.* Dometica) plots *in situ*, shown down walkway aisle.

Figure A2. Multiple rows of tomato (*var.* Dometica) plots, shown within single glasshouse unit.

d. Climatological data during study period

M9 glasshouse unit:

Day	August 2021			September 2021			October 2021			November 2021		
	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)
1				17.5	24.8	72.8	18.5	22.4	91.0	17.8	20.4	96.4
2				19.0	26.5	70.4	18.4	20.4	92.3	16.8	21.7	96.1
3				19.4	22.7	80.3	18.1	22.8	89.9	17.2	20.8	96.8
4				19.0	24.0	79.0	18.8	22.6	90.8	15.9	21.0	96.2
5				18.9	28.4	71.2	18.2	21.2	93.2	15.0	21.3	96.3
6				19.4	29.5	74.5	18.3	23.3	92.1	15.4	19.8	97.9
7				19.2	33.3	72.6	18.5	24.5	93.9	17.6	20.5	96.3
8				19.2	32.9	70.8	18.7	25.2	93.5	16.7	22.0	97.2
9				20.6	30.1	78.0	19.2	24.2	96.6	18.7	22.1	98.3
10				20.8	28.8	79.9	18.2	23.0	93.9	18.6	20.9	91.5
11				19.7	26.0	78.4	18.6	22.2	93.3	18.5	21.7	84.8
12				18.4	24.9	82.1	18.4	22.6	95.5	16.8	20.3	81.1
13				18.8	22.9	87.1	18.5	21.8	94.0			
14				18.7	21.0	91.1	18.6	20.6	92.5			
15				17.6	26.6	84.9	17.3	23.4	88.9			
16				18.3	26.3	81.7	18.0	22.1	92.9			
17				18.6	25.6	81.8	18.4	21.6	96.1			
18				18.6	26.5	83.2	18.6	20.4	97.4			
19				19.3	25.3	87.2	18.5	22.2	97.2			
20				18.5	25.4	81.8	18.0	22.4	95.3			
21				18.6	24.8	85.3	16.2	21.6	92.8			
22				18.6	23.9	87.8	18.2	22.1	95.2			
23				18.7	21.6	92.6	18.5	21.2	96.2			
24	17.9	25.8	NA	18.5	23.3	91.4	18.6	20.6	96.8			
25	16.5	26.4	81.8	20.0	23.6	92.5	18.5	21.2	95.2			
26	19.4	24.1	65.6	18.6	24.8	90.3	18.6	20.9	97.2			
27	18.5	24.3	68.3	15.4	22.4	93.4	18.5	21.3	98.5			
28	17.8	30.0	58.0	18.9	21.8	90.8	15.8	22.3	98.2			
29	17.8	24.2	66.5	18.8	22.5	88.9	14.3	20.7	98.3			
30	19.1	24.5	71.1	18.7	21.4	92.6	11.8	20.7	98.1			
31	17.6	24.5	73.0				16.7	21.9	95.4			

M10 glasshouse unit:

Day	August 2021			September 2021			October 2021			November 2021		
	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)	Air min. (°C)	Air max. (°C)	RH (%)
1				17.8	24.1	72.3	18.6	23.1	82.6	18.7	19.9	85.1
2				18.8	26.0	69.4	18.8	19.7	82.1	17.7	21.7	85.1
3				18.7	22.2	81.4	18.2	23.4	79.5	18.0	19.8	85.5
4				18.8	23.4	77.7	18.7	24.0	80.4	16.8	20.1	84.4
5				18.9	27.8	67.0	18.5	21.4	83.3	16.1	21.2	85.6
6				18.8	29.7	71.8	18.8	23.8	82.7	15.8	19.6	89.5
7				18.8	33.4	67.9	18.7	25.0	85.9	18.4	20.5	85.6
8				18.8	32.6	63.8	18.7	25.3	85.2	17.7	21.4	87.5
9				19.5	30.8	73.2	18.8	23.7	90.4	18.7	21.8	91.0
10				20.0	29.7	75.4	18.5	23.9	84.7	18.7	20.8	88.0
11				18.6	26.7	73.0	18.6	22.0	82.8	18.7	21.7	83.1
12				18.8	24.8	73.0	18.7	22.5	86.1	15.1	19.6	83.4
13				18.8	22.6	80.8	18.5	22.7	87.4			
14				18.8	20.3	86.4	18.6	20.6	89.4			
15				17.4	26.8	78.6	18.1	23.4	81.7			
16				18.8	26.4	74.4	18.5	21.2	85.5			
17				18.7	25.4	73.5	18.6	21.6	90.0			
18				18.7	26.3	73.9	18.6	19.5	92.2			
19				18.7	24.6	83.7	18.7	22.3	93.6			
20				18.7	25.3	71.2	18.5	22.1	87.4			
21				18.6	25.0	77.6	16.8	21.8	80.8			
22				18.7	23.8	79.8	18.6	22.5	85.5			
23				18.6	22.1	87.3	18.7	21.7	87.3			
24	18.4	26.2	NA	18.9	23.7	85.2	18.5	20.5	87.4			
25	16.7	26.0	81.9	18.9	23.7	89.0	18.8	21.6	85.0			
26	17.9	24.2	67.5	18.5	25.1	84.6	18.6	21.1	88.4			
27	17.8	24.1	69.1	15.5	22.9	87.1	18.7	21.3	91.9			
28	17.8	31.0	55.6	18.8	22.5	81.4	15.8	22.6	91.3			
29	17.7	23.9	65.3	18.5	23.4	79.4	14.6	20.3	91.8			
30	17.8	24.0	70.8	18.6	22.6	84.1	11.7	20.9	91.0			
31	17.7	24.3	71.2				17.2	22.6	83.9			

e. Raw data from assessments

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	1.1	21	1	22	0	205	51.25
27-Oct-21	A0	1.1	65	1	66	8		
27-Oct-21	A0	1.1	82	2	84	0		
27-Oct-21	A0	1.1	33	0	33	0		
27-Oct-21	A0	1.2	48	1	49	2	138	34.5
27-Oct-21	A0	1.2	82	7	89	2		
27-Oct-21	A0	1.2	0	0	0	0		
27-Oct-21	A0	1.2	0	0	0	1		
27-Oct-21	A0	1.3	2	0	2	0	187	46.75
27-Oct-21	A0	1.3	123	3	126	2		
27-Oct-21	A0	1.3	3	0	3	0		
27-Oct-21	A0	1.3	56	0	56	0		
27-Oct-21	A0	1.4	92	4	96	0	298	74.5
27-Oct-21	A0	1.4	41	0	41	0		
27-Oct-21	A0	1.4	78	1	79	0		
27-Oct-21	A0	1.4	82	0	82	0		
27-Oct-21	A0	1.5	7	1	8	1	676	169
27-Oct-21	A0	1.5	399	15	414	6		
27-Oct-21	A0	1.5	230	2	232	2		
27-Oct-21	A0	1.5	21	1	22	2		
27-Oct-21	A0	1.6	6	0	6	0	190	47.5
27-Oct-21	A0	1.6	143	4	147	3		
27-Oct-21	A0	1.6	25	0	25	1		
27-Oct-21	A0	1.6	10	2	12	0		
27-Oct-21	A0	2.1	5	0	5	0	491	122.8
27-Oct-21	A0	2.1	264	0	264	12		
27-Oct-21	A0	2.1	119	0	119	0		
27-Oct-21	A0	2.1	102	1	103	0		
27-Oct-21	A0	2.2	0	0	0	0	472	118
27-Oct-21	A0	2.2	245	4	249	6		
27-Oct-21	A0	2.2	51	5	56	0		
27-Oct-21	A0	2.2	146	21	167	3		
27-Oct-21	A0	2.3	28	4	32	4	256	64
27-Oct-21	A0	2.3	118	4	122	6		
27-Oct-21	A0	2.3	63	3	66	1		
27-Oct-21	A0	2.3	36	0	36	4		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	2.4	20	0	20	1	191	47.75
27-Oct-21	A0	2.4	34	5	39	0		
27-Oct-21	A0	2.4	125	1	126	3		
27-Oct-21	A0	2.4	5	1	6	1		
27-Oct-21	A0	2.5	190	2	192	2	268	67
27-Oct-21	A0	2.5	65	2	67	4		
27-Oct-21	A0	2.5	5	0	5	1		
27-Oct-21	A0	2.5	4	0	4	0		
27-Oct-21	A0	2.6	121	2	123	0	299	74.75
27-Oct-21	A0	2.6	16	0	16	0		
27-Oct-21	A0	2.6	20	1	21	0		
27-Oct-21	A0	2.6	138	1	139	1		
27-Oct-21	A0	3.1	28	0	28	0	121	30.25
27-Oct-21	A0	3.1	29	0	29	7		
27-Oct-21	A0	3.1	38	0	38	0		
27-Oct-21	A0	3.1	26	0	26	0		
27-Oct-21	A0	3.2	41	1	42	1	161	40.25
27-Oct-21	A0	3.2	10	0	10	0		
27-Oct-21	A0	3.2	53	0	53	0		
27-Oct-21	A0	3.2	56	0	56	0		
27-Oct-21	A0	3.3	26	0	26	0	79	19.75
27-Oct-21	A0	3.3	30	2	32	3		
27-Oct-21	A0	3.3	9	0	9	0		
27-Oct-21	A0	3.3	12	0	12	0		
27-Oct-21	A0	3.4	50	0	50	2	250	62.5
27-Oct-21	A0	3.4	91	5	96	1		
27-Oct-21	A0	3.4	29	3	32	1		
27-Oct-21	A0	3.4	69	3	72	1		
27-Oct-21	A0	3.5	49	1	50	2	238	59.5
27-Oct-21	A0	3.5	134	1	135	9		
27-Oct-21	A0	3.5	43	0	43	6		
27-Oct-21	A0	3.5	10	0	10	6		
27-Oct-21	A0	3.6	36	1	37	3	228	57
27-Oct-21	A0	3.6	22	1	23	1		
27-Oct-21	A0	3.6	37	5	42	0		
27-Oct-21	A0	3.6	126	0	126	2		
27-Oct-21	A0	4.1	34	1	35	1	129	32.25
27-Oct-21	A0	4.1	45	4	49	4		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	4.1	17	2	19	0		
27-Oct-21	A0	4.1	25	1	26	1		
27-Oct-21	A0	4.2	80	0	80	0	179	44.75
27-Oct-21	A0	4.2	46	0	46	0		
27-Oct-21	A0	4.2	45	0	45	0		
27-Oct-21	A0	4.2	8	0	8	0		
27-Oct-21	A0	4.3	30	0	30	0	303	75.75
27-Oct-21	A0	4.3	168	1	169	3		
27-Oct-21	A0	4.3	92	1	93	0		
27-Oct-21	A0	4.3	10	1	11	0		
27-Oct-21	A0	4.4	24	2	26	0	206	51.5
27-Oct-21	A0	4.4	112	4	116	2		
27-Oct-21	A0	4.4	10	2	12	0		
27-Oct-21	A0	4.4	50	2	52	2		
27-Oct-21	A0	4.5	33	1	34	1	538	134.5
27-Oct-21	A0	4.5	443	12	455	9		
27-Oct-21	A0	4.5	13	3	16	1		
27-Oct-21	A0	4.5	31	2	33	2		
27-Oct-21	A0	4.6	125	0	125	0	187	46.75
27-Oct-21	A0	4.6	22	0	22	0		
27-Oct-21	A0	4.6	7	0	7	0		
27-Oct-21	A0	4.6	31	2	33	0		
27-Oct-21	A0	5.1	46	0	46	4	270	67.5
27-Oct-21	A0	5.1	120	0	120	4		
27-Oct-21	A0	5.1	50	3	53	3		
27-Oct-21	A0	5.1	51	0	51	1		
27-Oct-21	A0	5.2	37	0	37	0	252	63
27-Oct-21	A0	5.2	151	0	151	1		
27-Oct-21	A0	5.2	14	0	14	0		
27-Oct-21	A0	5.2	50	0	50	0		
27-Oct-21	A0	5.3	22	2	24	0	172	43
27-Oct-21	A0	5.3	58	0	58	3		
27-Oct-21	A0	5.3	57	1	58	1		
27-Oct-21	A0	5.3	32	0	32	0		
27-Oct-21	A0	5.4	4	1	5	0	139	34.75
27-Oct-21	A0	5.4	69	3	72	1		
27-Oct-21	A0	5.4	53	1	54	2		
27-Oct-21	A0	5.4	8	0	8	3		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	5.5	16	0	16	0	284	71
27-Oct-21	A0	5.5	172	1	173	1		
27-Oct-21	A0	5.5	27	0	27	0		
27-Oct-21	A0	5.5	68	0	68	0		
27-Oct-21	A0	5.6	32	0	32	1	100	25
27-Oct-21	A0	5.6	18	0	18	3		
27-Oct-21	A0	5.6	30	0	30	3		
27-Oct-21	A0	5.6	20	0	20	3		
27-Oct-21	A0	6.1	16	0	16	0	275	68.75
27-Oct-21	A0	6.1	117	1	118	3		
27-Oct-21	A0	6.1	102	0	102	0		
27-Oct-21	A0	6.1	39	0	39	0		
27-Oct-21	A0	6.2	48	5	53	6	157	39.25
27-Oct-21	A0	6.2	68	3	71	6		
27-Oct-21	A0	6.2	24	0	24	1		
27-Oct-21	A0	6.2	9	0	9	1		
27-Oct-21	A0	6.3	6	0	6	0	211	52.75
27-Oct-21	A0	6.3	90	8	98	7		
27-Oct-21	A0	6.3	73	3	76	2		
27-Oct-21	A0	6.3	30	1	31	1		
27-Oct-21	A0	6.4	14	0	14	0	512	128
27-Oct-21	A0	6.4	31	0	31	0		
27-Oct-21	A0	6.4	218	0	218	0		
27-Oct-21	A0	6.4	249	0	249	0		
27-Oct-21	A0	6.5	0	0	0	1	240	60
27-Oct-21	A0	6.5	212	4	216	4		
27-Oct-21	A0	6.5	20	2	22	0		
27-Oct-21	A0	6.5	2	0	2	0		
27-Oct-21	A0	6.6	4	1	5	1	422	105.5
27-Oct-21	A0	6.6	203	6	209	4		
27-Oct-21	A0	6.6	8	1	9	0		
27-Oct-21	A0	6.6	191	8	199	3		
27-Oct-21	A0	7.1	36	0	36	0	153	38.25
27-Oct-21	A0	7.1	41	0	41	2		
27-Oct-21	A0	7.1	34	0	34	0		
27-Oct-21	A0	7.1	42	0	42	0		
27-Oct-21	A0	7.2	38	0	38	1	199	49.75
27-Oct-21	A0	7.2	122	2	124	7		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	7.2	2	0	2	0		
27-Oct-21	A0	7.2	35	0	35	0		
27-Oct-21	A0	7.3	97	0	97	2	467	116.8
27-Oct-21	A0	7.3	99	3	102	3		
27-Oct-21	A0	7.3	95	4	99	2		
27-Oct-21	A0	7.3	168	1	169	4		
27-Oct-21	A0	7.4	10	1	11	0	266	66.5
27-Oct-21	A0	7.4	142	4	146	4		
27-Oct-21	A0	7.4	46	2	48	2		
27-Oct-21	A0	7.4	60	1	61	2		
27-Oct-21	A0	7.5	47	2	49	3	88	22
27-Oct-21	A0	7.5	8	0	8	0		
27-Oct-21	A0	7.5	22	0	22	2		
27-Oct-21	A0	7.5	9	0	9	0		
27-Oct-21	A0	7.6	32	0	32	0	192	48
27-Oct-21	A0	7.6	12	1	13	0		
27-Oct-21	A0	7.6	89	0	89	0		
27-Oct-21	A0	7.6	57	1	58	0		
27-Oct-21	A0	8.1	1	0	1	0	124	31
27-Oct-21	A0	8.1	37	4	41	3		
27-Oct-21	A0	8.1	40	4	44	3		
27-Oct-21	A0	8.1	30	8	38	6		
27-Oct-21	A0	8.2	66	0	66	0	244	61
27-Oct-21	A0	8.2	48	1	49	4		
27-Oct-21	A0	8.2	75	0	75	0		
27-Oct-21	A0	8.2	53	1	54	0		
27-Oct-21	A0	8.3	56	0	56	0	258	64.5
27-Oct-21	A0	8.3	149	1	150	3		
27-Oct-21	A0	8.3	42	0	42	0		
27-Oct-21	A0	8.3	10	0	10	0		
27-Oct-21	A0	8.4	48	0	48	0	82	20.5
27-Oct-21	A0	8.4	26	2	28	4		
27-Oct-21	A0	8.4	3	0	3	0		
27-Oct-21	A0	8.4	2	1	3	2		
27-Oct-21	A0	8.5	46	0	46	0	292	73
27-Oct-21	A0	8.5	102	1	103	0		
27-Oct-21	A0	8.5	60	1	61	0		
27-Oct-21	A0	8.5	82	0	82	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
27-Oct-21	A0	8.6	24	0	24	1	191	47.75
27-Oct-21	A0	8.6	129	4	133	3		
27-Oct-21	A0	8.6	4	0	4	1		
27-Oct-21	A0	8.6	28	2	30	3		
31-Oct-21	A1	1.1	38	2	40	0	285	71.25
31-Oct-21	A1	1.1	109	0	109	10		
31-Oct-21	A1	1.1	88	3	91	0		
31-Oct-21	A1	1.1	44	1	45	0		
31-Oct-21	A1	1.2	34	0	34	0	114	28.5
31-Oct-21	A1	1.2	71	2	73	3		
31-Oct-21	A1	1.2	3	0	3	0		
31-Oct-21	A1	1.2	4	0	4	1		
31-Oct-21	A1	1.3	1	0	1	0	154	38.5
31-Oct-21	A1	1.3	96	3	99	0		
31-Oct-21	A1	1.3	4	0	4	0		
31-Oct-21	A1	1.3	49	1	50	1		
31-Oct-21	A1	1.4	88	3	91	0	318	79.5
31-Oct-21	A1	1.4	43	1	44	0		
31-Oct-21	A1	1.4	85	0	85	0		
31-Oct-21	A1	1.4	98	0	98	0		
31-Oct-21	A1	1.5	5	1	6	0	432	108
31-Oct-21	A1	1.5	264	2	266	4		
31-Oct-21	A1	1.5	134	0	134	0		
31-Oct-21	A1	1.5	26	0	26	1		
31-Oct-21	A1	1.6	12	0	12	0	270	67.5
31-Oct-21	A1	1.6	231	1	232	2		
31-Oct-21	A1	1.6	20	0	20	0		
31-Oct-21	A1	1.6	6	0	6	3		
31-Oct-21	A1	2.1	1	0	1	0	105	26.25
31-Oct-21	A1	2.1	29	0	29	3		
31-Oct-21	A1	2.1	34	0	34	0		
31-Oct-21	A1	2.1	41	0	41	0		
31-Oct-21	A1	2.2	0	0	0	0	104	26
31-Oct-21	A1	2.2	66	0	66	2		
31-Oct-21	A1	2.2	9	0	9	0		
31-Oct-21	A1	2.2	26	3	29	0		
31-Oct-21	A1	2.3	14	1	15	0	73	18.25
31-Oct-21	A1	2.3	34	0	34	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
31-Oct-21	A1	2.3	19	0	19	1		
31-Oct-21	A1	2.3	5	0	5	0		
31-Oct-21	A1	2.4	12	0	12	0	65	16.25
31-Oct-21	A1	2.4	6	0	6	1		
31-Oct-21	A1	2.4	46	0	46	0		
31-Oct-21	A1	2.4	1	0	1	0		
31-Oct-21	A1	2.5	106	0	106	0	130	32.5
31-Oct-21	A1	2.5	17	2	19	2		
31-Oct-21	A1	2.5	3	0	3	1		
31-Oct-21	A1	2.5	2	0	2	0		
31-Oct-21	A1	2.6	18	0	18	0	82	20.5
31-Oct-21	A1	2.6	9	0	9	0		
31-Oct-21	A1	2.6	11	0	11	0		
31-Oct-21	A1	2.6	44	0	44	1		
31-Oct-21	A1	3.1	8	0	8	0	44	11
31-Oct-21	A1	3.1	7	0	7	6		
31-Oct-21	A1	3.1	18	0	18	0		
31-Oct-21	A1	3.1	10	1	11	0		
31-Oct-21	A1	3.2	55	1	56	2	122	30.5
31-Oct-21	A1	3.2	4	2	6	0		
31-Oct-21	A1	3.2	32	1	33	0		
31-Oct-21	A1	3.2	27	0	27	0		
31-Oct-21	A1	3.3	10	0	10	0	67	16.75
31-Oct-21	A1	3.3	45	1	46	3		
31-Oct-21	A1	3.3	5	0	5	0		
31-Oct-21	A1	3.3	6	0	6	0		
31-Oct-21	A1	3.4	26	1	27	0	117	29.25
31-Oct-21	A1	3.4	38	0	38	2		
31-Oct-21	A1	3.4	14	1	15	0		
31-Oct-21	A1	3.4	36	1	37	0		
31-Oct-21	A1	3.5	17	0	17	0	174	43.5
31-Oct-21	A1	3.5	113	0	113	6		
31-Oct-21	A1	3.5	34	0	34	1		
31-Oct-21	A1	3.5	10	0	10	0		
31-Oct-21	A1	3.6	34	0	34	0	162	40.5
31-Oct-21	A1	3.6	14	0	14	0		
31-Oct-21	A1	3.6	32	0	32	0		
31-Oct-21	A1	3.6	82	0	82	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
31-Oct-21	A1	4.1	7	0	7	0	93	23.25
31-Oct-21	A1	4.1	73	1	74	2		
31-Oct-21	A1	4.1	8	0	8	0		
31-Oct-21	A1	4.1	4	0	4	0		
31-Oct-21	A1	4.2	79	0	79	0	181	45.25
31-Oct-21	A1	4.2	53	0	53	0		
31-Oct-21	A1	4.2	48	0	48	0		
31-Oct-21	A1	4.2	1	0	1	0		
31-Oct-21	A1	4.3	19	0	19	0	130	32.5
31-Oct-21	A1	4.3	70	0	70	0		
31-Oct-21	A1	4.3	32	0	32	0		
31-Oct-21	A1	4.3	8	1	9	0		
31-Oct-21	A1	4.4	26	0	26	0	198	49.5
31-Oct-21	A1	4.4	124	1	125	2		
31-Oct-21	A1	4.4	9	0	9	0		
31-Oct-21	A1	4.4	38	0	38	0		
31-Oct-21	A1	4.5	15	0	15	0	537	134.3
31-Oct-21	A1	4.5	26	0	26	0		
31-Oct-21	A1	4.5	472	2	474	4		
31-Oct-21	A1	4.5	22	0	22	0		
31-Oct-21	A1	4.6	79	0	79	0	115	28.75
31-Oct-21	A1	4.6	17	1	18	0		
31-Oct-21	A1	4.6	2	0	2	0		
31-Oct-21	A1	4.6	16	0	16	0		
31-Oct-21	A1	5.1	23	0	23	1	195	48.75
31-Oct-21	A1	5.1	78	1	79	2		
31-Oct-21	A1	5.1	54	0	54	1		
31-Oct-21	A1	5.1	39	0	39	0		
31-Oct-21	A1	5.2	31	0	31	0	183	45.75
31-Oct-21	A1	5.2	134	0	134	1		
31-Oct-21	A1	5.2	4	0	4	0		
31-Oct-21	A1	5.2	14	0	14	0		
31-Oct-21	A1	5.3	21	2	23	0	208	52
31-Oct-21	A1	5.3	104	0	104	2		
31-Oct-21	A1	5.3	56	1	57	1		
31-Oct-21	A1	5.3	24	0	24	0		
31-Oct-21	A1	5.4	3	0	3	0	175	43.75
31-Oct-21	A1	5.4	106	0	106	1		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
31-Oct-21	A1	5.4	51	0	51	0		
31-Oct-21	A1	5.4	15	0	15	0		
31-Oct-21	A1	5.5	3	0	3	0	191	47.75
31-Oct-21	A1	5.5	144	0	144	1		
31-Oct-21	A1	5.5	11	1	12	0		
31-Oct-21	A1	5.5	32	0	32	0		
31-Oct-21	A1	5.6	37	0	37	1	155	38.75
31-Oct-21	A1	5.6	60	0	60	3		
31-Oct-21	A1	5.6	36	0	36	0		
31-Oct-21	A1	5.6	21	1	22	0		
31-Oct-21	A1	6.1	14	0	14	0	224	56
31-Oct-21	A1	6.1	66	2	68	3		
31-Oct-21	A1	6.1	87	0	87	0		
31-Oct-21	A1	6.1	54	1	55	0		
31-Oct-21	A1	6.2	52	0	52	0	172	43
31-Oct-21	A1	6.2	89	1	90	0		
31-Oct-21	A1	6.2	18	0	18	0		
31-Oct-21	A1	6.2	12	0	12	1		
31-Oct-21	A1	6.3	7	0	7	0	156	39
31-Oct-21	A1	6.3	98	1	99	4		
31-Oct-21	A1	6.3	31	0	31	0		
31-Oct-21	A1	6.3	19	0	19	0		
31-Oct-21	A1	6.4	17	1	18	0	307	76.75
31-Oct-21	A1	6.4	30	1	31	0		
31-Oct-21	A1	6.4	158	1	159	1		
31-Oct-21	A1	6.4	99	0	99	0		
31-Oct-21	A1	6.5	136	0	136	3	167	41.75
31-Oct-21	A1	6.5	3	0	3	0		
31-Oct-21	A1	6.5	19	0	19	0		
31-Oct-21	A1	6.5	9	0	9	0		
31-Oct-21	A1	6.6	4	0	4	0	301	75.25
31-Oct-21	A1	6.6	148	1	149	3		
31-Oct-21	A1	6.6	11	1	12	0		
31-Oct-21	A1	6.6	136	0	136	0		
31-Oct-21	A1	7.1	16	0	16	0	112	28
31-Oct-21	A1	7.1	36	1	37	2		
31-Oct-21	A1	7.1	20	0	20	0		
31-Oct-21	A1	7.1	39	0	39	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
31-Oct-21	A1	7.2	29	0	29	0	271	67.75
31-Oct-21	A1	7.2	213	0	213	3		
31-Oct-21	A1	7.2	3	1	4	0		
31-Oct-21	A1	7.2	25	0	25	0		
31-Oct-21	A1	7.3	59	0	59	0	267	66.75
31-Oct-21	A1	7.3	68	0	68	1		
31-Oct-21	A1	7.3	38	1	39	1		
31-Oct-21	A1	7.3	101	0	101	1		
31-Oct-21	A1	7.4	23	0	23	1	274	68.5
31-Oct-21	A1	7.4	179	1	180	4		
31-Oct-21	A1	7.4	30	0	30	0		
31-Oct-21	A1	7.4	41	0	41	0		
31-Oct-21	A1	7.5	57	0	57	1	96	24
31-Oct-21	A1	7.5	5	0	5	0		
31-Oct-21	A1	7.5	26	0	26	0		
31-Oct-21	A1	7.5	8	0	8	0		
31-Oct-21	A1	7.6	27	0	27	0	170	42.5
31-Oct-21	A1	7.6	21	0	21	0		
31-Oct-21	A1	7.6	78	0	78	0		
31-Oct-21	A1	7.6	42	2	44	0		
31-Oct-21	A1	8.1	2	0	2	0	283	70.75
31-Oct-21	A1	8.1	117	0	117	3		
31-Oct-21	A1	8.1	76	0	76	0		
31-Oct-21	A1	8.1	87	1	88	0		
31-Oct-21	A1	8.2	80	0	80	0	275	68.75
31-Oct-21	A1	8.2	74	0	74	4		
31-Oct-21	A1	8.2	83	0	83	0		
31-Oct-21	A1	8.2	38	0	38	1		
31-Oct-21	A1	8.3	11	2	13	0	169	42.25
31-Oct-21	A1	8.3	126	1	127	3		
31-Oct-21	A1	8.3	19	0	19	0		
31-Oct-21	A1	8.3	10	0	10	0		
31-Oct-21	A1	8.4	56	0	56	0	137	34.25
31-Oct-21	A1	8.4	34	0	34	4		
31-Oct-21	A1	8.4	10	0	10	1		
31-Oct-21	A1	8.4	36	1	37	0		
31-Oct-21	A1	8.5	38	0	38	0	284	71
31-Oct-21	A1	8.5	97	0	97	1		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
31-Oct-21	A1	8.5	65	1	66	0		
31-Oct-21	A1	8.5	82	1	83	0		
31-Oct-21	A1	8.6	26	0	26	1	247	61.75
31-Oct-21	A1	8.6	162	2	164	3		
31-Oct-21	A1	8.6	5	0	5	2		
31-Oct-21	A1	8.6	51	1	52	1		
04-Nov-21	A2	1.1	32	2	34	0	366	91.5
04-Nov-21	A2	1.1	135	1	136	8		
04-Nov-21	A2	1.1	114	4	118	0		
04-Nov-21	A2	1.1	78	0	78	0		
04-Nov-21	A2	1.2	22	4	26	2	136	34
04-Nov-21	A2	1.2	58	5	63	2		
04-Nov-21	A2	1.2	42	0	42	0		
04-Nov-21	A2	1.2	5	0	5	0		
04-Nov-21	A2	1.3	4	0	4	0	104	26
04-Nov-21	A2	1.3	48	6	54	3		
04-Nov-21	A2	1.3	2	4	6	2		
04-Nov-21	A2	1.3	35	5	40	5		
04-Nov-21	A2	1.4	93	7	100	0	253	63.25
04-Nov-21	A2	1.4	36	1	37	0		
04-Nov-21	A2	1.4	77	0	77	0		
04-Nov-21	A2	1.4	38	1	39	0		
04-Nov-21	A2	1.5	2	3	5	2	362	90.5
04-Nov-21	A2	1.5	224	12	236	5		
04-Nov-21	A2	1.5	72	0	72	4		
04-Nov-21	A2	1.5	49	0	49	3		
04-Nov-21	A2	1.6	8	1	9	1	332	83
04-Nov-21	A2	1.6	249	1	250	2		
04-Nov-21	A2	1.6	38	0	38	0		
04-Nov-21	A2	1.6	35	0	35	2		
04-Nov-21	A2	2.1	0	0	0	1	196	49
04-Nov-21	A2	2.1	70	4	74	8		
04-Nov-21	A2	2.1	62	8	70	1		
04-Nov-21	A2	2.1	48	4	52	1		
04-Nov-21	A2	2.2	0	0	0	0	62	15.5
04-Nov-21	A2	2.2	21	0	21	4		
04-Nov-21	A2	2.2	10	0	10	0		
04-Nov-21	A2	2.2	28	3	31	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
04-Nov-21	A2	2.3	34	2	36	2	161	40.25
04-Nov-21	A2	2.3	82	2	84	1		
04-Nov-21	A2	2.3	25	2	27	1		
04-Nov-21	A2	2.3	13	1	14	0		
04-Nov-21	A2	2.4	8	0	8	1	75	18.75
04-Nov-21	A2	2.4	10	2	12	3		
04-Nov-21	A2	2.4	50	1	51	4		
04-Nov-21	A2	2.4	4	0	4	1		
04-Nov-21	A2	2.5	199	3	202	0	341	85.25
04-Nov-21	A2	2.5	130	4	134	5		
04-Nov-21	A2	2.5	1	1	2	2		
04-Nov-21	A2	2.5	2	1	3	0		
04-Nov-21	A2	2.6	25	0	25	0	73	18.25
04-Nov-21	A2	2.6	7	0	7	0		
04-Nov-21	A2	2.6	13	1	14	0		
04-Nov-21	A2	2.6	26	1	27	1		
04-Nov-21	A2	3.1	8	0	8	2	55	13.75
04-Nov-21	A2	3.1	12	2	14	8		
04-Nov-21	A2	3.1	8	1	9	2		
04-Nov-21	A2	3.1	22	2	24	3		
04-Nov-21	A2	3.2	12	1	13	2	36	9
04-Nov-21	A2	3.2	1	1	2	0		
04-Nov-21	A2	3.2	13	0	13	0		
04-Nov-21	A2	3.2	8	0	8	0		
04-Nov-21	A2	3.3	7	0	7	0	103	25.75
04-Nov-21	A2	3.3	85	2	87	4		
04-Nov-21	A2	3.3	0	0	0	0		
04-Nov-21	A2	3.3	9	0	9	0		
04-Nov-21	A2	3.4	16	1	17	0	63	15.75
04-Nov-21	A2	3.4	18	0	18	3		
04-Nov-21	A2	3.4	7	0	7	0		
04-Nov-21	A2	3.4	21	0	21	0		
04-Nov-21	A2	3.5	23	0	23	1	249	62.25
04-Nov-21	A2	3.5	168	0	168	10		
04-Nov-21	A2	3.5	43	0	43	2		
04-Nov-21	A2	3.5	15	0	15	1		
04-Nov-21	A2	3.6	25	1	26	2	100	25
04-Nov-21	A2	3.6	12	0	12	2		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
04-Nov-21	A2	3.6	18	2	20	3		
04-Nov-21	A2	3.6	42	0	42	2		
04-Nov-21	A2	4.1	8	1	9	1	73	18.25
04-Nov-21	A2	4.1	47	1	48	2		
04-Nov-21	A2	4.1	10	2	12	0		
04-Nov-21	A2	4.1	4	0	4	0		
04-Nov-21	A2	4.2	28	2	30	0	115	28.75
04-Nov-21	A2	4.2	32	10	42	6		
04-Nov-21	A2	4.2	35	4	39	2		
04-Nov-21	A2	4.2	4	0	4	0		
04-Nov-21	A2	4.3	14	2	16	0	158	39.5
04-Nov-21	A2	4.3	92	1	93	2		
04-Nov-21	A2	4.3	39	1	40	0		
04-Nov-21	A2	4.3	8	1	9	0		
04-Nov-21	A2	4.4	20	1	21	0	295	73.75
04-Nov-21	A2	4.4	233	0	233	5		
04-Nov-21	A2	4.4	6	2	8	0		
04-Nov-21	A2	4.4	32	1	33	0		
04-Nov-21	A2	4.5	24	2	26	0	225	56.25
04-Nov-21	A2	4.5	152	4	156	3		
04-Nov-21	A2	4.5	20	5	25	0		
04-Nov-21	A2	4.5	18	0	18	3		
04-Nov-21	A2	4.6	59	0	59	0	85	21.25
04-Nov-21	A2	4.6	8	0	8	0		
04-Nov-21	A2	4.6	4	0	4	0		
04-Nov-21	A2	4.6	13	1	14	0		
04-Nov-21	A2	5.1	34	1	35	0	246	61.5
04-Nov-21	A2	5.1	103	0	103	2		
04-Nov-21	A2	5.1	51	0	51	1		
04-Nov-21	A2	5.1	56	1	57	0		
04-Nov-21	A2	5.2	45	0	45	0	201	50.25
04-Nov-21	A2	5.2	129	0	129	1		
04-Nov-21	A2	5.2	4	1	5	0		
04-Nov-21	A2	5.2	22	0	22	0		
04-Nov-21	A2	5.3	12	6	18	0	155	38.75
04-Nov-21	A2	5.3	67	0	67	2		
04-Nov-21	A2	5.3	43	5	48	1		
04-Nov-21	A2	5.3	21	1	22	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
04-Nov-21	A2	5.4	2	0	2	0	110	27.5
04-Nov-21	A2	5.4	58	0	58	4		
04-Nov-21	A2	5.4	42	4	46	10		
04-Nov-21	A2	5.4	4	0	4	0		
04-Nov-21	A2	5.5	4	0	4	0	234	58.5
04-Nov-21	A2	5.5	175	1	176	0		
04-Nov-21	A2	5.5	15	1	16	0		
04-Nov-21	A2	5.5	37	1	38	0		
04-Nov-21	A2	5.6	27	0	27	1	207	51.75
04-Nov-21	A2	5.6	99	1	100	4		
04-Nov-21	A2	5.6	45	2	47	0		
04-Nov-21	A2	5.6	32	1	33	0		
04-Nov-21	A2	6.1	15	0	15	0	166	41.5
04-Nov-21	A2	6.1	75	1	76	3		
04-Nov-21	A2	6.1	48	2	50	0		
04-Nov-21	A2	6.1	22	3	25	0		
04-Nov-21	A2	6.2	40	3	43	0	376	94
04-Nov-21	A2	6.2	282	3	285	2		
04-Nov-21	A2	6.2	15	2	17	0		
04-Nov-21	A2	6.2	31	0	31	1		
04-Nov-21	A2	6.3	8	0	8	0	198	49.5
04-Nov-21	A2	6.3	131	1	132	4		
04-Nov-21	A2	6.3	37	2	39	0		
04-Nov-21	A2	6.3	19	0	19	0		
04-Nov-21	A2	6.4	16	1	17	0	327	81.75
04-Nov-21	A2	6.4	25	0	25	0		
04-Nov-21	A2	6.4	188	2	190	1		
04-Nov-21	A2	6.4	95	0	95	0		
04-Nov-21	A2	6.5	4	0	4	0	234	58.5
04-Nov-21	A2	6.5	193	1	194	4		
04-Nov-21	A2	6.5	21	0	21	0		
04-Nov-21	A2	6.5	14	1	15	0		
04-Nov-21	A2	6.6	5	1	6	0	183	45.75
04-Nov-21	A2	6.6	79	8	87	4		
04-Nov-21	A2	6.6	4	5	9	0		
04-Nov-21	A2	6.6	76	5	81	6		
04-Nov-21	A2	7.1	12	0	12	0	72	18
04-Nov-21	A2	7.1	17	1	18	1		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
04-Nov-21	A2	7.1	14	0	14	0		
04-Nov-21	A2	7.1	28	0	28	0		
04-Nov-21	A2	7.2	25	2	27	2	165	41.25
04-Nov-21	A2	7.2	94	8	102	6		
04-Nov-21	A2	7.2	4	0	4	1		
04-Nov-21	A2	7.2	24	8	32	0		
04-Nov-21	A2	7.3	66	0	66	0	458	114.5
04-Nov-21	A2	7.3	115	3	118	1		
04-Nov-21	A2	7.3	111	4	115	1		
04-Nov-21	A2	7.3	157	2	159	2		
04-Nov-21	A2	7.4	9	3	12	2	476	119
04-Nov-21	A2	7.4	325	5	330	4		
04-Nov-21	A2	7.4	62	2	64	0		
04-Nov-21	A2	7.4	67	3	70	1		
04-Nov-21	A2	7.5	20	0	20	0	57	14.25
04-Nov-21	A2	7.5	8	0	8	0		
04-Nov-21	A2	7.5	26	0	26	0		
04-Nov-21	A2	7.5	2	1	3	0		
04-Nov-21	A2	7.6	25	0	25	0	143	35.75
04-Nov-21	A2	7.6	17	0	17	0		
04-Nov-21	A2	7.6	56	1	57	0		
04-Nov-21	A2	7.6	43	1	44	1		
04-Nov-21	A2	8.1	1	0	1	0	218	54.5
04-Nov-21	A2	8.1	143	3	146	6		
04-Nov-21	A2	8.1	23	5	28	0		
04-Nov-21	A2	8.1	39	4	43	0		
04-Nov-21	A2	8.2	32	0	32	0	197	49.25
04-Nov-21	A2	8.2	81	1	82	4		
04-Nov-21	A2	8.2	39	0	39	0		
04-Nov-21	A2	8.2	44	0	44	0		
04-Nov-21	A2	8.3	10	5	15	4	127	31.75
04-Nov-21	A2	8.3	89	4	93	16		
04-Nov-21	A2	8.3	14	2	16	10		
04-Nov-21	A2	8.3	3	0	3	3		
04-Nov-21	A2	8.4	41	0	41	0	251	62.75
04-Nov-21	A2	8.4	116	2	118	4		
04-Nov-21	A2	8.4	18	1	19	1		
04-Nov-21	A2	8.4	72	1	73	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
04-Nov-21	A2	8.5	57	0	57	0	303	75.75
04-Nov-21	A2	8.5	83	3	86	1		
04-Nov-21	A2	8.5	82	1	83	0		
04-Nov-21	A2	8.5	77	0	77	0		
04-Nov-21	A2	8.6	30	1	31	2	277	69.25
04-Nov-21	A2	8.6	206	2	208	4		
04-Nov-21	A2	8.6	4	2	6	2		
04-Nov-21	A2	8.6	23	9	32	1		
08-Nov-21	A3	1.1	30	1	31	1	436	109
08-Nov-21	A3	1.1	164	1	165	9		
08-Nov-21	A3	1.1	150	1	151	1		
08-Nov-21	A3	1.1	89	0	89	0		
08-Nov-21	A3	1.2	29	0	29	0	270	67.5
08-Nov-21	A3	1.2	184	3	187	2		
08-Nov-21	A3	1.2	51	0	51	0		
08-Nov-21	A3	1.2	2	1	3	1		
08-Nov-21	A3	1.3	5	1	6	0	94	23.5
08-Nov-21	A3	1.3	41	6	47	5		
08-Nov-21	A3	1.3	5	1	6	2		
08-Nov-21	A3	1.3	32	3	35	1		
08-Nov-21	A3	1.4	65	6	71	2	224	56
08-Nov-21	A3	1.4	29	1	30	0		
08-Nov-21	A3	1.4	64	0	64	0		
08-Nov-21	A3	1.4	58	1	59	0		
08-Nov-21	A3	1.5	2	2	4	0	489	122.3
08-Nov-21	A3	1.5	360	15	375	8		
08-Nov-21	A3	1.5	68	0	68	3		
08-Nov-21	A3	1.5	42	0	42	1		
08-Nov-21	A3	1.6	12	1	13	0	297	74.25
08-Nov-21	A3	1.6	201	1	202	1		
08-Nov-21	A3	1.6	34	2	36	0		
08-Nov-21	A3	1.6	45	1	46	2		
08-Nov-21	A3	2.1	1	0	1	0	90	22.5
08-Nov-21	A3	2.1	17	0	17	7		
08-Nov-21	A3	2.1	34	1	35	0		
08-Nov-21	A3	2.1	37	0	37	0		
08-Nov-21	A3	2.2	0	0	0	0	94	23.5
08-Nov-21	A3	2.2	28	1	29	2		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
08-Nov-21	A3	2.2	16	0	16	0		
08-Nov-21	A3	2.2	47	2	49	2		
08-Nov-21	A3	2.3	10	6	16	1	107	26.75
08-Nov-21	A3	2.3	59	0	59	1		
08-Nov-21	A3	2.3	24	0	24	0		
08-Nov-21	A3	2.3	6	2	8	0		
08-Nov-21	A3	2.4	2	2	4	1	86	21.5
08-Nov-21	A3	2.4	6	2	8	2		
08-Nov-21	A3	2.4	62	2	64	4		
08-Nov-21	A3	2.4	10	0	10	0		
08-Nov-21	A3	2.5	132	3	135	0	223	55.75
08-Nov-21	A3	2.5	82	1	83	4		
08-Nov-21	A3	2.5	1	1	2	1		
08-Nov-21	A3	2.5	3	0	3	0		
08-Nov-21	A3	2.6	38	0	38	0	135	33.75
08-Nov-21	A3	2.6	7	0	7	0		
08-Nov-21	A3	2.6	25	2	27	1		
08-Nov-21	A3	2.6	62	1	63	2		
08-Nov-21	A3	3.1	4	0	4	4	22	5.5
08-Nov-21	A3	3.1	6	0	6	5		
08-Nov-21	A3	3.1	4	0	4	1		
08-Nov-21	A3	3.1	8	0	8	0		
08-Nov-21	A3	3.2	14	0	14	2	40	10
08-Nov-21	A3	3.2	4	1	5	0		
08-Nov-21	A3	3.2	12	0	12	0		
08-Nov-21	A3	3.2	9	0	9	0		
08-Nov-21	A3	3.3	1	0	1	0	45	11.25
08-Nov-21	A3	3.3	36	1	37	2		
08-Nov-21	A3	3.3	4	0	4	0		
08-Nov-21	A3	3.3	3	0	3	0		
08-Nov-21	A3	3.4	18	0	18	0	81	20.25
08-Nov-21	A3	3.4	30	2	32	2		
08-Nov-21	A3	3.4	5	2	7	0		
08-Nov-21	A3	3.4	23	1	24	0		
08-Nov-21	A3	3.5	19	0	19	0	242	60.5
08-Nov-21	A3	3.5	174	1	175	9		
08-Nov-21	A3	3.5	36	0	36	1		
08-Nov-21	A3	3.5	12	0	12	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
08-Nov-21	A3	3.6	24	1	25	2	144	36
08-Nov-21	A3	3.6	21	1	22	0		
08-Nov-21	A3	3.6	28	1	29	0		
08-Nov-21	A3	3.6	66	2	68	2		
08-Nov-21	A3	4.1	8	0	8	0	63	15.75
08-Nov-21	A3	4.1	32	1	33	1		
08-Nov-21	A3	4.1	15	1	16	0		
08-Nov-21	A3	4.1	6	0	6	0		
08-Nov-21	A3	4.2	42	0	42	0	131	32.75
08-Nov-21	A3	4.2	48	5	53	3		
08-Nov-21	A3	4.2	30	0	30	4		
08-Nov-21	A3	4.2	6	0	6	0		
08-Nov-21	A3	4.3	20	2	22	0	242	60.5
08-Nov-21	A3	4.3	140	0	140	2		
08-Nov-21	A3	4.3	69	1	70	0		
08-Nov-21	A3	4.3	9	1	10	0		
08-Nov-21	A3	4.4	19	1	20	0	380	95
08-Nov-21	A3	4.4	315	1	316	4		
08-Nov-21	A3	4.4	4	1	5	0		
08-Nov-21	A3	4.4	39	0	39	0		
08-Nov-21	A3	4.5	28	4	32	0	342	85.5
08-Nov-21	A3	4.5	268	5	273	2		
08-Nov-21	A3	4.5	18	5	23	0		
08-Nov-21	A3	4.5	12	2	14	1		
08-Nov-21	A3	4.6	81	0	81	0	112	28
08-Nov-21	A3	4.6	11	0	11	0		
08-Nov-21	A3	4.6	6	0	6	0		
08-Nov-21	A3	4.6	13	1	14	0		
08-Nov-21	A3	5.1	54	0	54	0	276	69
08-Nov-21	A3	5.1	112	0	112	2		
08-Nov-21	A3	5.1	54	0	54	1		
08-Nov-21	A3	5.1	56	0	56	0		
08-Nov-21	A3	5.2	84	0	84	0	232	58
08-Nov-21	A3	5.2	126	0	126	1		
08-Nov-21	A3	5.2	5	0	5	0		
08-Nov-21	A3	5.2	17	0	17	0		
08-Nov-21	A3	5.3	10	5	15	2	223	55.75
08-Nov-21	A3	5.3	108	1	109	3		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
08-Nov-21	A3	5.3	58	3	61	1		
08-Nov-21	A3	5.3	37	1	38	0		
08-Nov-21	A3	5.4	2	0	2	1	132	33
08-Nov-21	A3	5.4	84	0	84	1		
08-Nov-21	A3	5.4	40	2	42	0		
08-Nov-21	A3	5.4	3	1	4	0		
08-Nov-21	A3	5.5	9	0	9	0	216	54
08-Nov-21	A3	5.5	153	1	154	1		
08-Nov-21	A3	5.5	12	1	13	0		
08-Nov-21	A3	5.5	38	2	40	0		
08-Nov-21	A3	5.6	60	0	60	1	234	58.5
08-Nov-21	A3	5.6	98	2	100	3		
08-Nov-21	A3	5.6	39	2	41	0		
08-Nov-21	A3	5.6	31	2	33	1		
08-Nov-21	A3	6.1	17	0	17	0	249	62.25
08-Nov-21	A3	6.1	114	1	115	3		
08-Nov-21	A3	6.1	88	0	88	0		
08-Nov-21	A3	6.1	28	1	29	0		
08-Nov-21	A3	6.2	35	0	35	0	299	74.75
08-Nov-21	A3	6.2	137	3	140	3		
08-Nov-21	A3	6.2	12	1	13	0		
08-Nov-21	A3	6.2	111	0	111	1		
08-Nov-21	A3	6.3	8	0	8	0	210	52.5
08-Nov-21	A3	6.3	126	3	129	4		
08-Nov-21	A3	6.3	47	1	48	0		
08-Nov-21	A3	6.3	25	0	25	0		
08-Nov-21	A3	6.4	16	1	17	1	268	67
08-Nov-21	A3	6.4	28	2	30	0		
08-Nov-21	A3	6.4	136	1	137	2		
08-Nov-21	A3	6.4	84	0	84	0		
08-Nov-21	A3	6.5	8	0	8	0	189	47.25
08-Nov-21	A3	6.5	143	4	147	4		
08-Nov-21	A3	6.5	18	0	18	0		
08-Nov-21	A3	6.5	16	0	16	0		
08-Nov-21	A3	6.6	2	1	3	0	211	52.75
08-Nov-21	A3	6.6	108	5	113	3		
08-Nov-21	A3	6.6	4	2	6	0		
08-Nov-21	A3	6.6	86	3	89	6		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
08-Nov-21	A3	7.1	18	0	18	0	109	27.25
08-Nov-21	A3	7.1	68	1	69	1		
08-Nov-21	A3	7.1	13	0	13	0		
08-Nov-21	A3	7.1	9	0	9	0		
08-Nov-21	A3	7.2	31	0	31	0	188	47
08-Nov-21	A3	7.2	116	1	117	4		
08-Nov-21	A3	7.2	5	1	6	0		
08-Nov-21	A3	7.2	32	2	34	0		
08-Nov-21	A3	7.3	68	0	68	0	492	123
08-Nov-21	A3	7.3	116	0	116	0		
08-Nov-21	A3	7.3	113	0	113	2		
08-Nov-21	A3	7.3	194	1	195	0		
08-Nov-21	A3	7.4	5	1	6	2	353	88.25
08-Nov-21	A3	7.4	216	1	217	4		
08-Nov-21	A3	7.4	61	5	66	0		
08-Nov-21	A3	7.4	58	6	64	1		
08-Nov-21	A3	7.5	24	2	26	0	74	18.5
08-Nov-21	A3	7.5	7	0	7	0		
08-Nov-21	A3	7.5	39	0	39	1		
08-Nov-21	A3	7.5	1	1	2	0		
08-Nov-21	A3	7.6	19	0	19	0	147	36.75
08-Nov-21	A3	7.6	22	0	22	0		
08-Nov-21	A3	7.6	72	1	73	0		
08-Nov-21	A3	7.6	33	0	33	2		
08-Nov-21	A3	8.1	1	0	1	0	228	57
08-Nov-21	A3	8.1	144	0	144	2		
08-Nov-21	A3	8.1	31	1	32	0		
08-Nov-21	A3	8.1	49	2	51	0		
08-Nov-21	A3	8.2	54	0	54	1	361	90.25
08-Nov-21	A3	8.2	122	1	123	4		
08-Nov-21	A3	8.2	149	0	149	0		
08-Nov-21	A3	8.2	35	0	35	1		
08-Nov-21	A3	8.3	34	3	37	1	264	66
08-Nov-21	A3	8.3	176	1	177	3		
08-Nov-21	A3	8.3	31	1	32	0		
08-Nov-21	A3	8.3	18	0	18	0		
08-Nov-21	A3	8.4	51	1	52	0	279	69.75
08-Nov-21	A3	8.4	176	1	177	5		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
08-Nov-21	A3	8.4	21	2	23	1		
08-Nov-21	A3	8.4	27	0	27	1		
08-Nov-21	A3	8.5	80	0	80	0	398	99.5
08-Nov-21	A3	8.5	151	2	153	0		
08-Nov-21	A3	8.5	76	1	77	1		
08-Nov-21	A3	8.5	87	1	88	0		
08-Nov-21	A3	8.6	30	0	30	1	357	89.25
08-Nov-21	A3	8.6	295	1	296	5		
08-Nov-21	A3	8.6	4	0	4	2		
08-Nov-21	A3	8.6	23	4	27	1		
12-Nov-21	A4	1.1	26	1	27	0	429	107.3
12-Nov-21	A4	1.1	189	1	190	3		
12-Nov-21	A4	1.1	140	3	143	2		
12-Nov-21	A4	1.1	68	1	69	0		
12-Nov-21	A4	1.2	36	0	36	0	326	81.5
12-Nov-21	A4	1.2	240	2	242	3		
12-Nov-21	A4	1.2	46	0	46	0		
12-Nov-21	A4	1.2	1	1	2	1		
12-Nov-21	A4	1.3	2	1	3	0	240	60
12-Nov-21	A4	1.3	160	2	162	3		
12-Nov-21	A4	1.3	9	0	9	0		
12-Nov-21	A4	1.3	64	2	66	1		
12-Nov-21	A4	1.4	67	4	71	5	248	62
12-Nov-21	A4	1.4	74	0	74	2		
12-Nov-21	A4	1.4	49	1	50	0		
12-Nov-21	A4	1.4	52	1	53	0		
12-Nov-21	A4	1.5	2	2	4	2	372	93
12-Nov-21	A4	1.5	280	10	290	3		
12-Nov-21	A4	1.5	44	2	46	4		
12-Nov-21	A4	1.5	30	2	32	1		
12-Nov-21	A4	1.6	9	1	10	0	313	78.25
12-Nov-21	A4	1.6	187	0	187	2		
12-Nov-21	A4	1.6	19	4	23	0		
12-Nov-21	A4	1.6	93	0	93	1		
12-Nov-21	A4	2.1	0	1	1	1	171	42.75
12-Nov-21	A4	2.1	65	4	69	10		
12-Nov-21	A4	2.1	51	8	59	2		
12-Nov-21	A4	2.1	34	8	42	1		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
12-Nov-21	A4	2.2	0	0	0	0	103	25.75
12-Nov-21	A4	2.2	60	1	61	1		
12-Nov-21	A4	2.2	9	1	10	0		
12-Nov-21	A4	2.2	29	3	32	2		
12-Nov-21	A4	2.3	18	4	22	1	108	27
12-Nov-21	A4	2.3	51	0	51	0		
12-Nov-21	A4	2.3	21	2	23	1		
12-Nov-21	A4	2.3	11	1	12	0		
12-Nov-21	A4	2.4	0	3	3	1	58	14.5
12-Nov-21	A4	2.4	10	4	14	3		
12-Nov-21	A4	2.4	35	5	40	1		
12-Nov-21	A4	2.4	0	1	1	0		
12-Nov-21	A4	2.5	110	4	114	1	232	58
12-Nov-21	A4	2.5	108	2	110	4		
12-Nov-21	A4	2.5	4	1	5	1		
12-Nov-21	A4	2.5	2	1	3	0		
12-Nov-21	A4	2.6	17	2	19	2	76	19
12-Nov-21	A4	2.6	10	0	10	0		
12-Nov-21	A4	2.6	8	2	10	0		
12-Nov-21	A4	2.6	37	0	37	3		
12-Nov-21	A4	3.1	5	2	7	0	24	6
12-Nov-21	A4	3.1	4	0	4	5		
12-Nov-21	A4	3.1	8	0	8	0		
12-Nov-21	A4	3.1	5	0	5	1		
12-Nov-21	A4	3.2	7	0	7	2	19	4.75
12-Nov-21	A4	3.2	1	0	1	1		
12-Nov-21	A4	3.2	8	0	8	0		
12-Nov-21	A4	3.2	3	0	3	0		
12-Nov-21	A4	3.3	0	0	0	0	5	1.25
12-Nov-21	A4	3.3	5	0	5	2		
12-Nov-21	A4	3.3	0	0	0	0		
12-Nov-21	A4	3.3	0	0	0	0		
12-Nov-21	A4	3.4	10	0	10	1	44	11
12-Nov-21	A4	3.4	12	0	12	1		
12-Nov-21	A4	3.4	3	1	4	1		
12-Nov-21	A4	3.4	18	0	18	0		
12-Nov-21	A4	3.5	17	0	17	0	106	26.5
12-Nov-21	A4	3.5	64	0	64	7		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
12-Nov-21	A4	3.5	15	0	15	0		
12-Nov-21	A4	3.5	10	0	10	0		
12-Nov-21	A4	3.6	25	4	29	2	102	25.5
12-Nov-21	A4	3.6	12	1	13	0		
12-Nov-21	A4	3.6	15	5	20	0		
12-Nov-21	A4	3.6	38	2	40	0		
12-Nov-21	A4	4.1	2	1	3	0	29	7.25
12-Nov-21	A4	4.1	14	2	16	1		
12-Nov-21	A4	4.1	5	1	6	0		
12-Nov-21	A4	4.1	4	0	4	0		
12-Nov-21	A4	4.2	28	1	29	1	107	26.75
12-Nov-21	A4	4.2	16	11	27	1		
12-Nov-21	A4	4.2	28	8	36	4		
12-Nov-21	A4	4.2	15	0	15	1		
12-Nov-21	A4	4.3	23	1	24	3	233	58.25
12-Nov-21	A4	4.3	126	2	128	3		
12-Nov-21	A4	4.3	58	3	61	0		
12-Nov-21	A4	4.3	19	1	20	2		
12-Nov-21	A4	4.4	19	0	19	0	349	87.25
12-Nov-21	A4	4.4	301	0	301	3		
12-Nov-21	A4	4.4	2	2	4	0		
12-Nov-21	A4	4.4	25	0	25	1		
12-Nov-21	A4	4.5	20	5	25	0	337	84.25
12-Nov-21	A4	4.5	262	8	270	1		
12-Nov-21	A4	4.5	15	8	23	0		
12-Nov-21	A4	4.5	18	1	19	2		
12-Nov-21	A4	4.6	41	1	42	0	76	19
12-Nov-21	A4	4.6	13	0	13	0		
12-Nov-21	A4	4.6	6	2	8	1		
12-Nov-21	A4	4.6	10	3	13	1		
12-Nov-21	A4	5.1	61	0	61	1	249	62.25
12-Nov-21	A4	5.1	70	0	70	1		
12-Nov-21	A4	5.1	54	0	54	2		
12-Nov-21	A4	5.1	64	0	64	0		
12-Nov-21	A4	5.2	20	0	20	0	175	43.75
12-Nov-21	A4	5.2	129	0	129	1		
12-Nov-21	A4	5.2	3	0	3	0		
12-Nov-21	A4	5.2	23	0	23	0		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
12-Nov-21	A4	5.3	14	2	16	8	165	41.25
12-Nov-21	A4	5.3	75	2	77	2		
12-Nov-21	A4	5.3	44	1	45	2		
12-Nov-21	A4	5.3	26	1	27	1		
12-Nov-21	A4	5.4	1	0	1	0	132	33
12-Nov-21	A4	5.4	88	8	96	3		
12-Nov-21	A4	5.4	28	6	34	4		
12-Nov-21	A4	5.4	1	0	1	1		
12-Nov-21	A4	5.5	8	0	8	0	224	56
12-Nov-21	A4	5.5	127	2	129	1		
12-Nov-21	A4	5.5	16	1	17	1		
12-Nov-21	A4	5.5	69	1	70	1		
12-Nov-21	A4	5.6	42	2	44	0	247	61.75
12-Nov-21	A4	5.6	128	1	129	2		
12-Nov-21	A4	5.6	47	2	49	1		
12-Nov-21	A4	5.6	24	1	25	0		
12-Nov-21	A4	6.1	20	1	21	0	254	63.5
12-Nov-21	A4	6.1	123	0	123	3		
12-Nov-21	A4	6.1	78	2	80	2		
12-Nov-21	A4	6.1	28	2	30	0		
12-Nov-21	A4	6.2	36	0	36	0	284	71
12-Nov-21	A4	6.2	148	1	149	3		
12-Nov-21	A4	6.2	14	1	15	0		
12-Nov-21	A4	6.2	84	0	84	1		
12-Nov-21	A4	6.3	8	0	8	0	182	45.5
12-Nov-21	A4	6.3	126	1	127	5		
12-Nov-21	A4	6.3	24	2	26	1		
12-Nov-21	A4	6.3	21	0	21	0		
12-Nov-21	A4	6.4	11	2	13	1	194	48.5
12-Nov-21	A4	6.4	18	1	19	0		
12-Nov-21	A4	6.4	72	1	73	1		
12-Nov-21	A4	6.4	89	0	89	0		
12-Nov-21	A4	6.5	7	0	7	0	232	58
12-Nov-21	A4	6.5	182	1	183	3		
12-Nov-21	A4	6.5	21	1	22	0		
12-Nov-21	A4	6.5	19	1	20	0		
12-Nov-21	A4	6.6	4	2	6	0	287	71.75
12-Nov-21	A4	6.6	128	8	136	2		

Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
12-Nov-21	A4	6.6	10	1	11	0		
12-Nov-21	A4	6.6	133	1	134	0		
12-Nov-21	A4	7.1	12	0	12	0	51	12.75
12-Nov-21	A4	7.1	5	0	5	3		
12-Nov-21	A4	7.1	6	0	6	0		
12-Nov-21	A4	7.1	27	1	28	0		
12-Nov-21	A4	7.2	30	5	35	2	255	63.75
12-Nov-21	A4	7.2	186	8	194	4		
12-Nov-21	A4	7.2	0	0	0	1		
12-Nov-21	A4	7.2	16	10	26	1		
12-Nov-21	A4	7.3	75	0	75	0	442	110.5
12-Nov-21	A4	7.3	110	2	112	1		
12-Nov-21	A4	7.3	102	1	103	2		
12-Nov-21	A4	7.3	151	1	152	1		
12-Nov-21	A4	7.4	18	2	20	1	602	150.5
12-Nov-21	A4	7.4	427	2	429	3		
12-Nov-21	A4	7.4	62	0	62	0		
12-Nov-21	A4	7.4	87	4	91	1		
12-Nov-21	A4	7.5	25	1	26	0	68	17
12-Nov-21	A4	7.5	7	0	7	0		
12-Nov-21	A4	7.5	33	0	33	0		
12-Nov-21	A4	7.5	1	1	2	0		
12-Nov-21	A4	7.6	17	0	17	0	113	28.25
12-Nov-21	A4	7.6	15	0	15	0		
12-Nov-21	A4	7.6	52	1	53	0		
12-Nov-21	A4	7.6	28	0	28	2		
12-Nov-21	A4	8.1	0	0	0	0	189	47.25
12-Nov-21	A4	8.1	125	0	125	2		
12-Nov-21	A4	8.1	29	3	32	0		
12-Nov-21	A4	8.1	30	2	32	1		
12-Nov-21	A4	8.2	160	1	161	2	432	108
12-Nov-21	A4	8.2	117	1	118	4		
12-Nov-21	A4	8.2	98	1	99	1		
12-Nov-21	A4	8.2	52	2	54	0		
12-Nov-21	A4	8.3	5	3	8	2	201	50.25
12-Nov-21	A4	8.3	158	5	163	10		
12-Nov-21	A4	8.3	18	5	23	6		
12-Nov-21	A4	8.3	5	2	7	1		

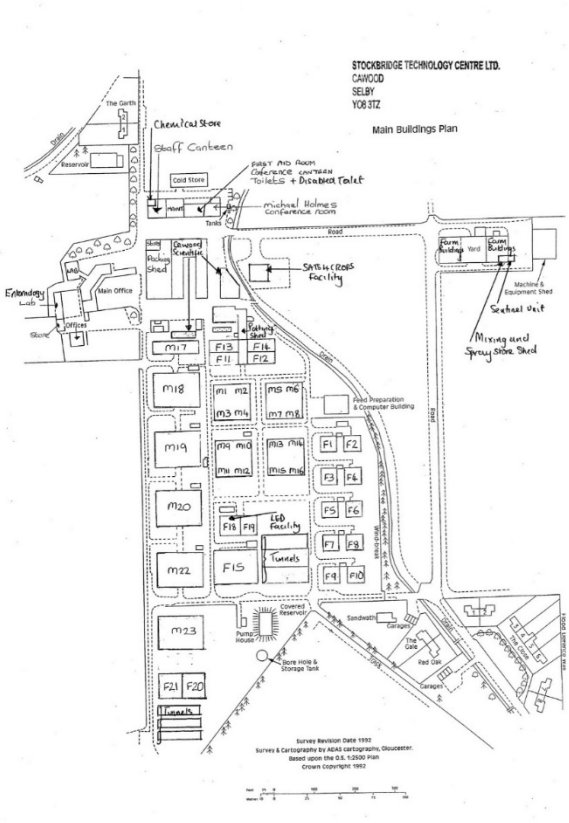
Date	Assessment	Plot	N. nymph mealybug	N. adult mealybug	Total n. mealybug	N. mealybug egg sacs	Plot total mealybug	Plot mean total mealybug
12-Nov-21	A4	8.4	59	0	59	0	334	83.5
12-Nov-21	A4	8.4	174	1	175	6		
12-Nov-21	A4	8.4	13	3	16	0		
12-Nov-21	A4	8.4	83	1	84	1		
12-Nov-21	A4	8.5	36	1	37	0	338	84.5
12-Nov-21	A4	8.5	134	1	135	1		
12-Nov-21	A4	8.5	78	1	79	1		
12-Nov-21	A4	8.5	86	1	87	0		
12-Nov-21	A4	8.6	27	1	28	1	291	72.75
12-Nov-21	A4	8.6	234	2	236	5		
12-Nov-21	A4	8.6	1	1	2	2		
12-Nov-21	A4	8.6	23	2	25	2		

f. Trial design

Layout: The trial layout was designed as an incomplete Trojan Square for eight treatments, each replicated six times, and confirmed by Andrew Jukes and Rosemary Collier (Warwick University). Each square represents a single rockwool slab containing 3 tomato plants (such that there are 6 plants per plot). Leading numbers = treatment number; post-decimal numbers = replicate block number. Replicate blocks are coloured differently. Grey blocks with an 'x' indicate buffer plots. Rows were separated by walkway aisles (1.6m width).

x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
x	3.3	6.3	5.3	4.3	8.3	1.3	7.3	2.3	x	x	7.6	2.6	4.6	5.6	8.6	1.6	6.6	3.6	x					
x	3.3	6.3	5.3	4.3	8.3	1.3	7.3	2.3	x	x	7.6	2.6	4.6	5.6	8.6	1.6	6.6	3.6	x					
x	5.2	2.2	3.2	8.2	7.2	4.2	1.2	6.2	x	x	5.5	8.5	7.5	6.5	3.5	2.5	1.5	4.5	x					
x	5.2	2.2	3.2	8.2	7.2	4.2	1.2	6.2	x	x	5.5	8.5	7.5	6.5	3.5	2.5	1.5	4.5	x					
x	1.1	4.1	7.1	6.1	2.1	3.1	5.1	8.1	x	x	1.4	6.4	3.4	8.4	4.4	7.4	2.4	5.4	x					
x	1.1	4.1	7.1	6.1	2.1	3.1	5.1	8.1	x	x	1.4	6.4	3.4	8.4	4.4	7.4	2.4	5.4	x					
M9 glasshouse compartment											**M10 glasshouse comparment**													

Site map:



g. STC Tomato Main Feed (EC 3.3, pH 5.5) recipe

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Feed Recipe

STC Tomato – Main Feed 3.3 EC

Date: 16 February 2017

Tank A		750	litres
			kg
Potassium Nitrate			25
Calcium Nitrate			75
Pure Calcium Nitrate			0
Calcium Chloride			0
Potassium Chloride			20
Ammonium Nitrate		upto<	2
Iron [FeDP]	%	7	2.8
			litres
Nitric Acid			1
Iron [liquid]	%	7	0
Dilution Rate			150
Tank Size			750

Tank B			750	litres
				kg
Potassium Nitrate				0
Magnesium Sulphate				70
Mono Potassium Phosphate				24
Magnesium Nitrate				0
Potassium Chloride				50
Phosphoric Acid			litres	0
Nitric Acid			litres	0
				gram
Manganese Sulphate		%	32	400
Borax				320
Solubor				0
Copper Sulphate		%	25	100
Zinc Sulphate		%	24	400
Sodium Molybdate				15

	molar	Feed	Water	← ppm
Conductivity (25C)	↓	3329	607	← **Mains water** 0 100
Nitrate N	10.9	153	5.4	NRM 25/05/16
Ammonium N	0.8	12	0	
Phosphorus	1.6	50	0.9	
Potassium	11.8	460	3.8	
Magnesium	3.1	76	14.1	
Calcium	5.0	201	74.8	
Sulphur	3.4	107	26.6	
Sodium	1.3	29	19.5	
Chloride	23.8	333	34.5	
Iron	31.2	1.74	0.1	
Manganese	20.9	1.15	0.01	
Boron	30.8	0.33	0.02	
Copper	3.5	0.22	0	
Zinc	14.0	0.91	0.06	
Molybdenum	0.6	0.05		
Bicarbonate		104	196	

Ratios	
K:N	2.79
K:Ca	2.28
K:Mg	6.03

Potassium Chloride	312	ppm K
Calcium Chloride	0	ppm Ca

16 February 2017

Supplied strictly E & O E

1/02/17

STC - Tomato Feed
Main feed

FACTS CERTIFICATION

BASIS

VEGETABLE CONSULTANTS ASSOCIATION

h. ORETO certificate

Certificate of

Official Recognition of Efficacy Testing Facilities or Organisations in Great Britain

This certifies that

Stockbridge Technology Centre Limited

complies with the minimum standards laid down in Regulation (EC) 1107/2009[1] for efficacy testing.

The above Facility/Organisation has been officially recognised as being competent to carry out efficacy trials/tests in Great Britain in the following categories:

Agriculture/Horticulture
Biologicals and Semiochemicals
Stored Crops

Date of issue: **19 July 2021**
Effective date: **1 April 2021**
Expiry date: **31 March 2026**

Date: 2021.07.19 14:59:55 Z
HSE Digital Signature

HSE
Chemicals Regulation Division

Certification Number
ORETO 435

Department of Agriculture and Rural Development

[1] Regulation (EC) 1107/2009 as it has effect in Great Britain