

SCEPTREPLUS

Final Trial Report

Trial code:	SP47b
Title:	Powdery Mildew Control in Protected Ornamentals
Crop	Honeysuckle <i>Lonicera</i>
Target	Powdery Mildew (<i>Erysiphe lonicerae</i>)
Lead researcher:	Lauren Branfield
Organisation:	Stockbridge Technology Centre
Period:	May 2021 – July 2021
Report date:	3 rd December 2021
Report author:	Aleana Cairns
ORETO Number: (certificate should be attached)	ORETO 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

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Date

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Authors signature

Trial Summary

Introduction

Powdery Mildew continues to be a priority target for many ornamental growers, a damaging disease which can rapidly reduce the value of their crop. The trial was designed to compare the use of biopesticides individually and in combination against a standard fungicide program. The trial also worked to identify possible EAMUs for AHDB 9914 and AHDB 9926, for use in ornamentals crops. The use of biopesticides in combination offers an exciting alternative spray programme to growers and nurseries as the list of available actives continues to decrease.

Methods

A susceptible but popular variety of honeysuckle, *Lonicera Periclymenum* was chosen for the trial. During 2020 a group of 180 plants were inoculated with Powdery Mildew (*Erysiphe Ionicerae*) sourced from wild honeysuckle to produce a living culture of Powdery Mildew infector plants. These plants were maintained until trial commencement in 2021. Immediately after the first application, infector plants were evenly dispersed throughout the trial area. A fan was also installed to increase airflow and therefore aid spore dispersal throughout the glasshouse. Plants were watered via capillary matting as preliminary work had revealed that overhead watering was detrimental to Powdery Mildew development. The standard fungicides were applied every 10 -14 days, whereas the biopesticides had a 7-day interval. Disease severity, incidence and phytotoxicity were recorded every week.

Results

A summary of the trial is shown in the tables below, presented as percentage disease control for each variable, severity, and incidence relative to treatment 1 the untreated control.

Powdery Mildew Disease Incidence converted to percentage control/reduction in disease compared to the untreated control (treatment 1).

Date	Trt 2	Trt 3	Trt 4	Trt 5 ^b	Trt 6 ^b	Trt 7 ^b	Trt 8 ^b	Trt 9 ^b	Trt 10 ^b
	Standard Programme	AHDB 9914	AHDB 9926	Fylosave	Romeo	Fylosave + Sonata	Romeo+ + Sonata	Fylosave + AQ10	Romeo + AQ10
07.06.21	100	100	100	100	100	100	100	0	0.0
15.06.21	100	100	100	100	100	100	100	79.52	100
22.06.21	100	79.52	79.52	79.52	100	100	100	79.52	79.52
29.06.21	100	83	83	83	100	79.52	100	83	79.52
06.07.21	91.5	91.5	91.5	91.5	83.5	83	100	91.5	83
13.07.21	94.37	94.37	94.37	89.07	83.44	91.5	94.37	94.37	91.5
20.07.21	97.00	97.00	94.18	88.18	91.18	94.37	94.18	97.00	94.37
27.07.21	98.62	95.95	83.79	79.58	54.05	97.00	97.33	97.33	97.00
03.08.21	99.12	97.41	70.68	74.15	56.93	98.62	95.71	98.29	98.62
10.08.21	99.63	98.91	78.18	78.18	52.72	96.54	96.71	98.19	97.41
Not significantly different from the untreated control (p>0.05)									
Significantly different from the untreated control (p<0.05)									

Powdery Mildew Disease Severity converted to percentage control/reduction in disease compared to the untreated control (treatment 1).

Date	Trt 2	Trt 3	Trt 4	Trt 5 ^b	Trt 6 ^b	Trt 7 ^b	Trt 8 ^b	Trt 9 ^b	Trt 10 ^b
	Standard Programme	AHDB 9914	AHDB 9926	Fylosave	Romeo	Fylosave + Sonata	Romeo+ + Sonata	Fylosave + AQ10	Romeo + AQ10
07.06.21	100	100	100	100	100	100	100	70	100
15.06.21	100	100	100	100	100	100	100	87.5	70.83
22.06.21	100	90.32	90.32	90.32	100	90.32	100	77.42	77.42

Date	Trt 2	Trt 3	Trt 4	Trt 5 ^b	Trt 6 ^b	Trt 7 ^b	Trt 8 ^b	Trt 9 ^b	Trt 10 ^b
	Standard Programme	AHDB 9914	AHDB 9926	Fylosave	Romeo	Fylosave + Sonata	Romeo+ + Sonata	Fylosave + AQ10	Romeo + AQ10
29.06.21	100	95.16	95.16	95.16	100	88.71	100	88.71	88.71
06.07.21	97.22	97.22	97.22	97.22	90.74	93.52	100	93.52	93.52
13.07.21	97.99	97.99	97.99	95.30	85.91	95.30	97.99	95.30	95.30
20.07.21	98.63	98.63	96.80	89.04	85.84	96.80	96.80	96.80	93.61
27.07.21	99.47	97.54	75.57	64.67	46.22	97.54	96.31	97.01	97.54
03.08.21	99.69	98.55	64.04	53.99	40.62	95.34	93.16	98.24	97.10
10.08.21	99.95	99.45	72.99	64.93	45.81	97.87	94.74	98.40	98.63
Not significantly different from the untreated control (p>0.05)									
Significantly different from the untreated control (p<0.05)									

^{*b} indicates treatments with biological controls

Conclusions

All treatments 2 through 10 provided significant control against Powdery Mildew in the host honeysuckle. The two fungicides, AHDB 9926 and AHDB 9914 (treatments 3 and 4) showed promise as alternative fungicide methods for the control Powdery Mildew in ornamentals. Although all significantly different to the untreated control (UTC) treatments 4,5 and 6 were significantly different to all other treatments in the final assessments with increasing disease severity and incidence and reduced control.

Take home message:

The data from this trial is strong evidence that biological controls, when used in combination as a spray programme can significantly reduce disease levels and provide similar results to using a standard commercial fungicide programme. This trial also demonstrates the importance of using a combination of actives for ensuring long term control. Both in the case of biological control methods and conventional fungicides, better control was provided when following a spray programme rather than relying on a single product.

Objectives

To assess a selection of conventional fungicides and biopesticides for crop safety and for activity against Powdery Mildew in ornamentals, using *Lonicera* as a model species.

Methods

Prior to trial initiation a living culture of Powdery Mildew was developed to act as infector plants. *Erysiphe lonicerae* was sourced from natural infection on wild honeysuckle. This was dispersed around 180 honeysuckle plants in a glasshouse and observed for successful infection. The trial was set up in glasshouse F20 and spaced across 3 benches. In total there were 6 replicates of 10 plots each containing 12 plants. Plants were placed onto capillary matting with no overhead watering. Following the first application infector plants were evenly dispersed throughout the trial area and a fan installed to generate air movement. Standard fungicides were applied every 10 -14 days and biopesticides every 7 days. All products were foliar applied at a water volume of 500L/ha. Disease severity, incidence and phytotoxicity were recorded each week for a total of 13 weeks. More detailed information regarding the methods can be found below.

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 1/135(4)	Phytotoxicity assessment	None
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 1/239(3)	Dose expression for plant protection products	None
PP 1/224(2)	Principles of efficacy evaluation for minor uses	None

There were no deviations from EPPO guidance.

Test site

Item	Details
Location address	Glasshouse F20, Stockbridge Technology Centre, Cawood, Selby, YO8 3TZ
Crop	<i>Lonicera</i>
Cultivar	<i>Lonicera Periclymenum</i>
Soil or substrate type	Levington M2 compost
Agronomic practice	<i>Lonicera</i> plugs were planted in 1L pots in July 2020 and kept in glasshouse MFU 6 and overhead watered. In March 2021 these were moved to F20 and placed on capillary matting. Plants were pruned back on the 12.05.21. Feed was applied on 3 occasions (03.06.21, 17.06.21, 24.06.21) and a biocontrol for whitefly (<i>Encarsia</i>) was added once on the 13.07.21. No insecticides or additional fungicides apart from the test treatments were applied.
Prior history of site	No prior crops in 2021

Trial design

Item	Details
Trial design:	Randomized complete block
Number of replicates:	6
Row spacing:	50cm (separate benches)
Plot size: (w x l)	2 x 2
Plot size: (m ²)	4
Number of plants per plot:	12

Treatment details

AHDB Code	Active substance	Product name/ manufacturers code	Formulation batch number	Content of active substance in product	Formulation type	Adjuvant
	-	-	-	-	-	-
	Azoxystrobin	Amistar	GRA8000032	250 g/l (23.1% w/w)	SC	-
	Mepanipyrim	Frupica	0031218	440 g/l (40% w/w)	SC	-
	Cyprodinil + Fludioxonil	Switch	CHE91028	37.5% w/w 25% w/w	WG	-
	Bupirimate	Nimrod		250 g/l (26.8% w/w)	EC	-
	Boscalid + Pyraclostrobin	Signum	12000743	267g/kg 67g/kg	WG	-
	Cyprodinil + Fludioxonil	Switch	CHE91028	37.5% w/w 25% w/w	WG	-
AHDB 9914	Fluopyram + trifloxystrobin	Confidential				-
AHDB 9926	Isofetamid	Confidential				-
	Cos-oga	Fytosave	190124	12.5 g/l	SC	-
	Cerevisane	Romeo	AC18Q00310	941 g/kg	WP	-
	Cos-oga	Fytosave	190124	12.5 g/l	SC	-
	<i>Bacillus pumilus</i> (QST 2808)	Sonata	LJEL001386+1, 0	1016.1 g/l	SC	-
	Cerevisane	Romeo	AC18Q00310	941 g/kg	WP	-
	<i>Bacillus pumilus</i> (QST 2808)	Sonata	LJEL001386+1, 0	1016.1 g/l	SC	-
	Cos-oga	Fytosave	190124	12.5 g/l	SC	-
	<i>Ampelomyces quisquails</i> strain AQ10	AQ10	3219668	58% w/w	WG	Activator 90
	Cerevisane	Romeo	AC18Q00310	941 g/kg	WP	-
	<i>Ampelomyces quisquails</i> strain AQ10	AQ10	3219668	58% w/w	WG	Activator 90

*Batch code for Nimrod missing.

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	Untreated Control	-	-	-
2	Amistar Frupica Switch Nimrod Signum Switch	250 g a.s./ha 352 g a.s./ha 300 g a.s./ha 200 g a.s./ha 250 g a.s./ha 360.5 g a.s./ha 90.5 g a.s./ha 300 g a.s./ha 200 g a.s./ha	1.0 l/ha 0.9 l/ha 0.8 kg/ha 1.0 l/ha 1.35 kg/ha 0.8 kg/ha	A D F H J L
3	AHDB 9914			A, D
4	AHDB 9926			A, C
5	Fytosave	38 g a.s./ha	3.04 l/ha	A, B, D
6	Romeo	705.8 g a.s./ha	0.75 kg/ha	A, B, D
7	Fytosave Sonata	38 g a.s./ha 10161 g a.s./ha	3.04 l/ha 10 l/ha	A, B, D E – L
8	Romeo Sonata	705.8 g a.s./ha 10161 g a.s./ha	0.75 kg/ha 10 l/ha	A, B, D E – L
9	Fytosave	38 g a.s./ha	3.04 l/ha	A, B, D

	AQ10 + Activator 90	0.0406 g a.s/ha	0.07 kg/ha + 0.05%	E – L
10	Romeo AQ10 + Activator 90	705.8 g a.s/ha 0.0406 g a.s/ha	0.75 kg/ha 0.07 kg/ha + 0.05%	A, B, D E – L

Application details

	Application A	Application B	Application C	Application D
Application date	18.05.21	25.05.21	28.05.21	02.06.21
Time of day	13:30 – 15:40	9:10 – 9:45	8:45 – 9:00	14:30 – 15:00
Crop growth stage (Max, min average BBCH)	36 -39	36 - 39	36 - 39	36 - 39
Crop height (cm)	45 – 50			50 - 60
Crop coverage (%)	N/A	N/A	N/A	N/A
Application Method	Spray	Spray	Spray	Spray
Application Placement	Foliar	Foliar	Foliar	Foliar
Application equipment	AZ01 AZ02	AZ01	AZ02	AZ01 AZ02
Nozzle pressure	2.5 bar	4.5 bar	4 bar	4 bar
Nozzle type	Flat Fan	Flat Fan	Flat Fan	Flat Fan
Nozzle size	F110-03	F110-04	F110-04	F110-04
Application water volume/ha	500 l/ha	500 l/ha	500 l/ha	500 l/ha
Temperature of air - shade (°C)	16	11	12	21
Relative humidity (%)			83	57
Wind speed range (m/s)	-	-	0.6	0.8
Dew presence (Y/N)	N	N	N	N
Cloud cover (%)	60	80	90	10

*Recording of relative humidity was missed at A and B.

**A, B, and I, due to unsuitable weather conditions were sprayed inside glasshouse M18. Therefore, windspeed was not recorded.

	Application E	Application F	Application G	Application H
Application date	09.06.21	16.06.21	23.06.21	30.06.21
Time of day	11:00 – 11:30	12:00 – 12:45	11:30 – 12:10	11:05 – 11:45
Crop growth stage (Max, min average BBCH)	36 - 39	36 -39	39 -51 (5-10% 51)	39 - 51
Crop height (cm)	50 - 65			60 - 65
Crop coverage (%)	N/A	N/A	N/A	N/A
Application Method	Spray	Spray	Spray	Spray
Application Placement	Foliar	Foliar	Foliar	Foliar
Application equipment	AZ01	AZ01 STC1	AZ01	AZ01 AZ02
Nozzle pressure	4.5 bar	4.5 bar	4.5 bar	4.5
Nozzle type	Flat Fan	Flat Fan	Flat Fan	Flat Fan
Nozzle size	F110-04	F110-04	F110-04	F110-04
Application water volume/ha	500 l/ha	500 l/ha	500 l/ha	500 l/ha
Temperature of air - shade (°C)	22	24	19	15
Relative humidity (%)	50	30	58	65
Wind speed range (m/s)	0.5	1.2	0.5	0.8
Dew presence (Y/N)	N	N	N	N
Cloud cover (%)	10	5	5	100

	Application I	Application J	Application K	Application L
Application date	07.07.21	14.07.21	21.07.21	28.07.21
Time of day	10:30 – 11:00	11:30 -12:00	8:30 – 9:00	10:00 – 10:30
Crop growth stage (Max, min average BBCH)	36 -61	36 – 61 (10% 61)	39 - 61	39 - 62
Crop height (cm)	60 - 70	60 - 70	60 -70	65 - 75
Crop coverage (%)	N/A	N/A	N/A	N/A
Application Method	Spray	Spray	Spray	Spray
Application Placement	Foliar	Foliar	Foliar	Foliar
Application equipment	AZ01	AZ01 STC1	AZ01	AZ01 STC1
Nozzle pressure	4.6 bar	4.5 bar	4.5 bar	4 bar
Nozzle type	Flat Fan	Flat Fan	Flat Fan	Flat Fan
Nozzle size	F110-04	F110-04	F110-04	F110-04
Application water volume/ha	500 l/ha	500 l/ha	500 l/ha	500 l/ha
Temperature of air - shade (°C)	17	21	20	16
Relative humidity (%)	78	66	75	79
Wind speed range (m/s)	-	1.1	0	1
Dew presence (Y/N)	N	N	N	N
Cloud cover (%)	90	30	100	90

Untreated levels of 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
Powdery Mildew	<i>Erysiphe lonicerae</i>	MCRSLO	0	0	45.8*

* Mean pest incidence of untreated plots at the final assessment (score of 4.8 converted to %)

Assessment details

Evaluation date	Evaluation Timing (Days after application A)		Crop Growth Stage (BBCH)	Evaluation type (efficacy, phytotoxicity)	Assessment
	After conventional fungicides	After Bio-fungicides			
18.05.21	0	0	36-39	Pre-application disease levels	0-5 0-3
24.05.21	6	6	36-39	Efficacy & phytotoxicity	0-5 0-3
01.06.21	14	14	36-39	Efficacy & phytotoxicity	0-5 0-3
07.06.21	20	20	36-39	Efficacy & phytotoxicity	0-5 0-3
15.06.21	28	28	36-39	Efficacy & phytotoxicity	0-5 0-3
22.06.21	35	35	39-51	Efficacy & phytotoxicity	0-5 0-3
29.06.21	42	42	39-51	Efficacy & phytotoxicity	0-5 0-3
06.07.21	49	49	39-61	Efficacy & phytotoxicity	0-5 0-3
13.07.21	56	56	39-61	Efficacy & phytotoxicity	0-5 0-3
20.07.21	63	63	39-61	Efficacy & phytotoxicity	0-5 0-3
27.07.21	70	70	39-62	Efficacy & phytotoxicity	0-5 0-3
03.08.21	77	77	39-62	Efficacy & phytotoxicity	0-5 0-3
10.08.21	84	84	39-62	Efficacy & phytotoxicity	0-5 0-3

* DA – days after application

Prior to the first application (A) an initial assessment of disease was carried out. Following this, evaluations repeated every 7 days (+/- 1 day) until two weeks after the final application (L). At each assessment disease severity was assessed using a 0-5 scale (see below), across 4 levels (bottom,

middle, top, stem) on each of the 12 plants per plot. A total plot score of 0-5 (see below) was given for disease incidence. Phytotoxicity was also recorded at each evaluation using a 0-3 scale (see below).

Powdery Mildew Disease Severity

- 0 = No Mildew present
- 1 = Slight infection, affecting 1-4% of leaf area
- 2 = Slight to moderate infection, affecting 5-9% of leaf area
- 3 = Moderate infection, affecting 10-24% of leaf area
- 4 = Moderate to severe infection, affecting 25-49% of leaf area
- 5 = Severe infection, affecting >50% of leaf area

Powdery Mildew Disease Incidence

- 0 = 0% of the plot infected
- 1 = 1-4 % of the plot infected
- 2 = 5-9% of the plot infected
- 3 = 10 -24% of the plot infected
- 4 = 25-49% of the plot infected
- 5= >50% of the plot infected

Phytotoxicity

- 0 = None
- 1 = 1-10 lesions over the whole plant, very slight stunting, or malformation of leaves
- 2 = Whole plants showing severe symptoms of bleaching, scorch, stunting or dead plant

Statistical analysis

Data were analysed by analysis of variance (anova) using terms for treatments and blocks (reps). Analysis was based on the observed scores (0-5 values), without attempting to relate this to the percentage affected. For disease severity, the 12 values for each plot were averaged prior to analysis.

For comparisons between each treatment and the untreated control a Dunnett's test was used. Residuals from the analysis of variance were checked graphically for non-normality, heteroscedasticity, and spatial correlation. There was a degree of non-normality of the residuals, but this was largely due to the number of zero values and would not be improved by transformation. As a further check a non-parametric Friedman's test was also performed on each variable. All analyses were carried out in Genstat¹ (21st Edition).

There are no very strong spatial patterns in this dataset. Differences between blocks (reps) were only significant for a minority of the variables.

Results

Results are described in both terms crop safety, phytotoxicity and product efficacy, disease severity and incidence. In summary all treatments 2 through 10 were significantly different to the untreated control in both terms of mean severity and incidence from the 15.06.21, one week from the first appearance of disease. Treatments 4,5 and 6 were significantly different to all other treatments in the final assessments, from the 27.07.21 to 10.08.21. No treatments caused any phytotoxic effects on the crop.

Phytotoxicity

No evidence of phytotoxicity was observed during the course of the trial.

Efficacy

Disease was first seen at low levels in the untreated plots on the 07.06.21 for ease of reporting assessments before this date have been omitted from the following tables, although they were considered when analysing the data. In the following tables blank values indicate no tests were possible as all scores were 0. Table 1 and 3 illustrate the results of a Friedman's test. Tables 2 and 4 show results from a Dunnett's test. Results from the tables can be seen more visually in figures 1 – 4.

Table 1: Disease Severity, treatment differences from analysis of variance and Friedman's test. Overall F tests have 9 and 45 d.f. 'P UTC v rest' is the P-value for comparing treatment 1 with the other 9 treatments. 'P other' is testing for significant differences between treatments 2-10. p<0.05 significant p<0.001 highly significant.

Variable	Date	anova				Friedman
		F	P	P UTC v rest	P other	P
Bottom	07.06.21					
Middle		1	0.454	0.004	1	0.437
Top		1	0.454	0.004	1	0.437
Stem		1	0.454	0.74	0.374	0.437
Mean		0.92	0.516	0.009	0.999	0.534
Bottom	15.06.21	1.88	0.08	0.001	0.878	0.098
Middle		3.47	0.003	<0.001	0.981	0.006
Top		1	0.454	0.004	1	0.437
Stem		1	0.454	0.74	0.374	0.437
Mean		4.91	<0.001	<0.001	0.848	<0.001
Bottom	22.06.21	1.62	0.139	0.004	0.737	0.154
Middle		2.91	0.008	<0.001	0.978	0.114
Top		1	0.454	0.004	1	0.437
Stem		1	0.454	0.74	0.374	0.437
Mean		4.60	<0.001	<0.001	0.918	0.002
Bottom	29.06.21	2.86	0.009	<0.001	0.942	0.02
Middle		5.71	<0.001	<0.001	0.987	0.001
Top		2.5	0.021	<0.001	1	0.035
Stem		1	0.454	0.74	0.374	0.437
Mean		7.88	<0.001	<0.001	0.989	<0.001
Bottom	06.07.21	1.96	0.067	<0.001	0.997	0.072
Middle		6.77	<0.001	<0.001	1	0.003
Top		1.69	0.119	0.001	0.907	0.135
Stem		1	0.454	0.74	0.374	0.437
Mean		6.61	<0.001	<0.001	1.000	0.001
Bottom	13.07.21	2.8	0.011	<0.001	0.998	0.072
Middle		8.13	<0.001	<0.001	1	0.007
Top		1.94	0.07	0.002	0.573	0.029
Stem		1	0.454	0.74	0.374	0.437
Mean		7.37	<0.001	<0.001	0.999	0.003
Bottom	20.07.21	4.42	<0.001	<0.001	0.989	0.003
Middle		11.09	<0.001	<0.001	0.981	<0.001
Top		1.63	0.136	0.002	0.864	0.243
Stem		1.88	0.08	0.001	0.878	0.098
Mean		8.98	<0.001	<0.001	0.990	0.001
Bottom	27.07.21	15.53	<0.001	<0.001	0.547	<0.001
Middle		18.17	<0.001	<0.001	<0.001	<0.001
Top		3.49	0.002	0.001	0.03	0.002
Stem		1.82	0.09	0.001	0.928	0.112
Mean		16.14	<0.001	<0.001	<0.001	<0.001
Bottom	03.08.21	7.21	<0.001	<0.001	0.917	<0.001
Middle		26.82	<0.001	<0.001	<0.001	<0.001

Variable	Date	anova				Friedman
		F	P	P UTC v rest	P other	P
Top		9.33	<0.001	<0.001	<0.001	<0.001
Stem		2.76	0.012	<0.001	0.47	0.042
Mean		20.79	<0.001	<0.001	<0.001	<0.001
Bottom	10.08.21	25.2	<0.001	<0.001	<0.001	<0.001
Middle		58.27	<0.001	<0.001	<0.001	<0.001
Top		34.19	<0.001	<0.001	<0.001	<0.001
Stem		8.37	<0.001	<0.001	<0.001	<0.001
Mean		44.66	<0.001	<0.001	<0.001	<0.001

Table 2: Powdery Mildew Disease Severity: treatment means of Powdery Mildew severity (0-5 scale) for each plant level at each assessment date. The overall mean at each date is also presented. Upper and Lower refer to 95% critical values for control using the Dunnett's test. Any values which do not lie between these values is significantly different to the control. This is indicated by shading.

Variable	Date	Trt 1	Lower	Upper	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8	Trt 9	Trt 10
Bottom	07.06.21	0			0	0	0	0	0	0	0	0	0
Middle		0.028	-0.007	0.063	0	0	0	0	0	0	0	0	0
Top		0.014	-0.003	0.031	0	0	0	0	0	0	0	0	0
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.010	-0.003	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Bottom	15.06.21	0.028	0.001	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Middle		0.056	0.018	0.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Top		0.014	-0.003	0.031	0	0	0	0	0	0	0	0	0
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.024	0.011	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Bottom	22.06.21	0.028	-0.002	0.058	0	0.014	0	0	0	0	0	0	0.014
Middle		0.083	0.026	0.141	0.000	0.000	0.014	0.014	0.000	0.014	0.000	0.014	0.014
Top		0.014	-0.003	0.031	0	0	0	0	0	0	0	0	0
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.031	0.014	0.048	0.000	0.003	0.003	0.003	0.000	0.003	0.000	0.000	0.007
Bottom	29.06.21	0.056	0.014	0.097	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Middle		0.167	0.083	0.251	0.000	0.000	0.014	0.014	0.000	0.028	0.000	0.014	0.014
Top		0.028	0.006	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.062	0.036	0.089	0.000	0.003	0.003	0.003	0.000	0.007	0.000	0.000	0.007
Bottom	06.07.21	0.083	0.011	0.156	0.000	0.014	0.000	0.000	0.014	0.000	0.000	0.000	0.014
Middle		0.319	0.171	0.468	0.000	0.000	0.014	0.014	0.028	0.028	0.000	0.014	0.014
Top		0.028	-0.001	0.056	0.014	0	0	0	0	0	0	0	0
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.108	0.057	0.158	0.003	0.003	0.003	0.003	0.010	0.007	0.000	0.000	0.007
Bottom	13.07.21	0.111	0.03	0.192	0.000	0.014	0.000	0.000	0.014	0.000	0.000	0.000	0.014
Middle		0.444	0.256	0.633	0.000	0.000	0.014	0.028	0.042	0.028	0.014	0.014	0.014
Top		0.042	-0.001	0.084	0.014	0	0	0	0.028	0	0	0	0
Stem		0	-0.017	0.017	0	0	0	0	0	0	0	0.014	0
Mean		0.149	0.083	0.215	0.003	0.003	0.003	0.007	0.021	0.007	0.003	0.000	0.007
Bottom	20.07.21	0.153	0.064	0.242	0.000	0.014	0.000	0.000	0.028	0.000	0.000	0.000	0.014
Middle		0.611	0.389	0.834	0.000	0.000	0.014	0.083	0.056	0.028	0.014	0.014	0.014

Variable	Date	Trt 1	Lower	Upper	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8	Trt 9	Trt 10
Top		0.083	0.004	0.163	0.014	0.000	0.014	0.014	0.042	0.000	0.014	0.000	0.028
Stem		0.028	0.001	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000
Mean		0.219	0.131	0.306	0.003	0.003	0.007	0.024	0.031	0.007	0.007	0.007	0.014
Bottom	27.07.21	0.347	0.241	0.454	0.000	0.014	0.042	0.042	0.069	0.000	0.000	0.000	0.014
Middle		1.625	1.119	2.131	0.000	0.000	0.403	0.528	0.972	0.056	0.069	0.028	0.014
Top		0.264	0.057	0.471	0.014	0.042	0.111	0.222	0.181	0.000	0.014	0.028	0.028
Stem		0.042	0.002	0.081	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.014	0.000
Mean		0.569	0.387	0.752	0.003	0.014	0.139	0.201	0.306	0.014	0.021	0.017	0.014
Bottom	03.08.21	0.611	0.335	0.887	0.000	0.014	0.042	0.083	0.125	0.014	0.000	0.000	0.014
Middle		2.528	1.842	3.214	0.000	0.000	0.875	1.139	1.819	0.125	0.194	0.028	0.042
Top		0.583	0.289	0.877	0.014	0.042	0.417	0.486	0.319	0.042	0.028	0.028	0.028
Stem		0.139	0.037	0.241	0.000	0.000	0.056	0.069	0.028	0.000	0.042	0.014	0.028
Mean		0.965	0.682	1.249	0.003	0.014	0.347	0.444	0.573	0.045	0.066	0.017	0.028
Bottom	10.08.21	2.319	1.672	2.967	0.000	0.014	0.681	1.042	1.528	0.014	0.028	0.000	0.028
Middle		3.889	3.105	4.673	0.000	0.042	2.333	2.542	3.278	0.236	0.694	0.222	0.097
Top		2.5	1.866	3.134	0.014	0.083	1.583	1.556	1.958	0.208	0.458	0.125	0.111
Stem		0.625	0.32	0.93	0.000	0.000	0.333	0.472	0.444	0.083	0.153	0.056	0.111
Mean		2.333	1.820	2.846	0.003	0.035	1.233	1.403	1.802	0.135	0.333	0.101	0.087
Not significantly different from the untreated control (p>0.05)													
Significantly different from the untreated control (p<0.05)													

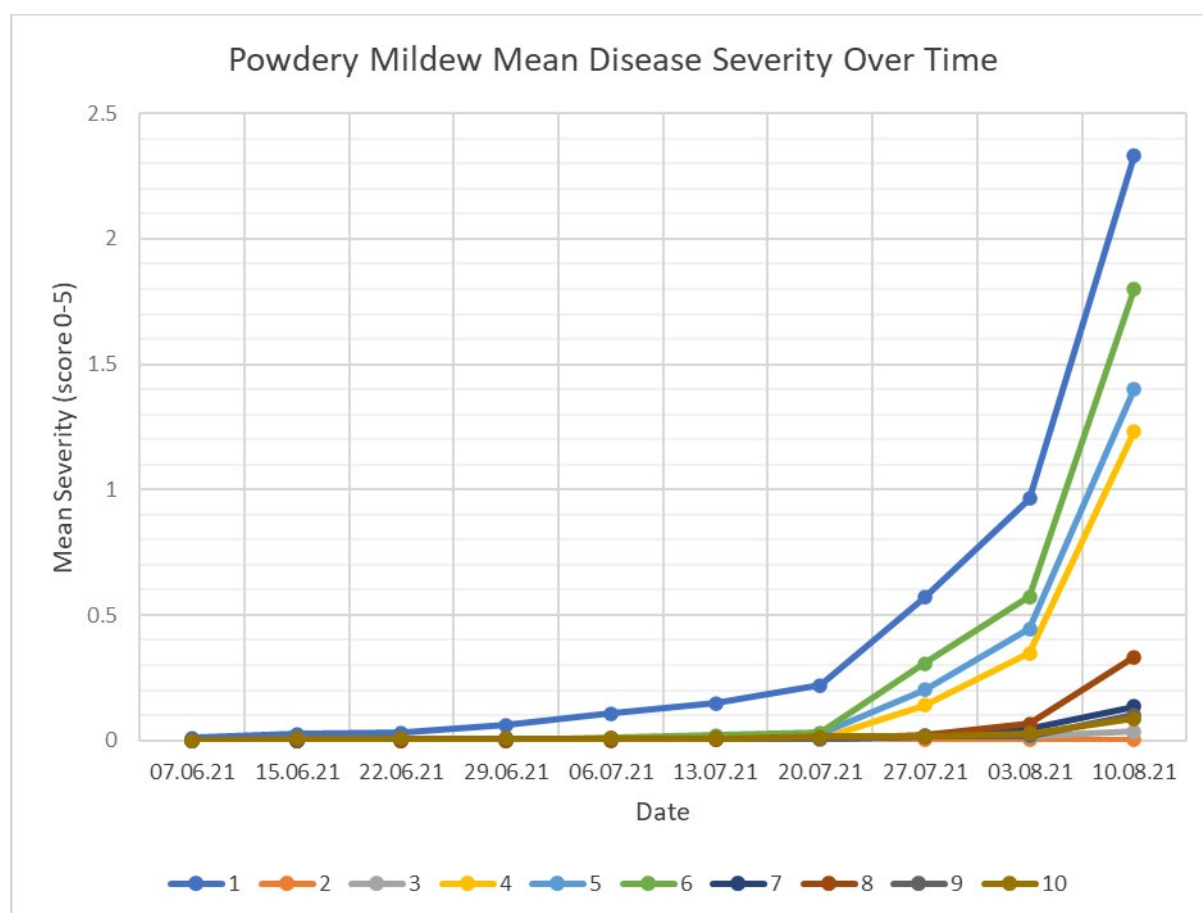


Figure 1: Graph showing mean disease severity for each treatment (1-10) over time. From each assessment following the presence of disease (07.06.21) to the final assessment (10.08.21)

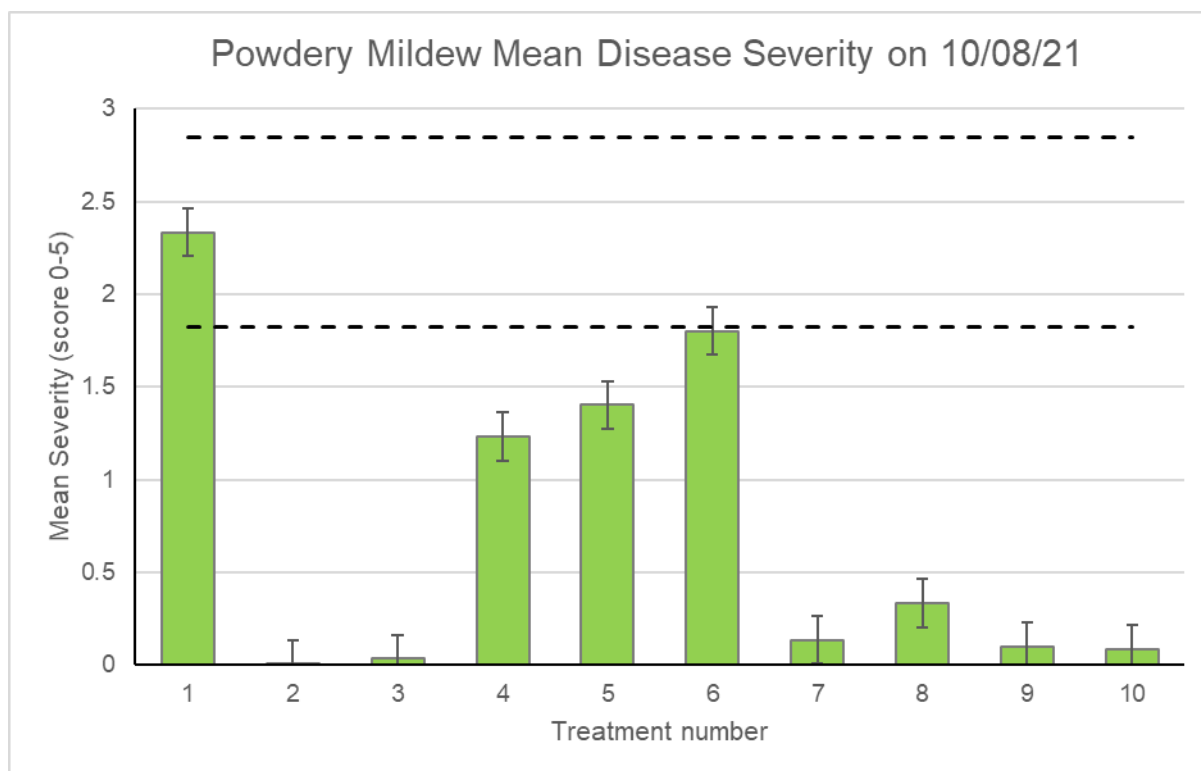


Figure 2: Graph showing mean disease severity against treatment (1-10) at the final assessment (10.08.21) Horizontal dashed lines indicate 95% critical values for Dunnett's test. Any mean for treatments 2-10 that does not lie between the two horizontal lines is significantly different to the control at P<0.05.

Table 3: Disease Incidence, treatment differences from analysis of variance and Friedman's test. Overall F tests have 9 and 45 d.f. 'P UTC v rest' is the P-value for comparing treatment 1 with the other 9 treatments, whilst 'P other' is testing for significant differences between treatments 2-10. p<0.05 significant p<0.001 highly significant.

Date	anova				Friedman
	F	P	P UTC v rest	P other	P
07.06.21	0.87	0.559	0.069	0.817	0.534
15.06.21	8.31	<0.001	<0.001	0.725	<0.001
22.06.21	3.62	0.002	<0.001	0.896	0.007
29.06.21	6.05	<0.001	<0.001	0.854	0.001
06.07.21	5.48	<0.001	<0.001	0.973	0.004
13.07.21	5.81	<0.001	<0.001	0.933	0.006
20.07.21	8.67	<0.001	<0.001	0.641	0.002
27.07.21	20.82	<0.001	<0.001	<0.001	<0.001
03.08.21	20.31	<0.001	<0.001	<0.001	<0.001
10.08.21	48.16	<0.001	<0.001	<0.001	<0.001

Table 4: Disease incidence means for each treatment for each variable. Upper and Lower refer to 95% critical values for control using the Dunnett's test. Any values which do not lie between these values is significantly different to the control. This is indicated by shading.

Date	Trt 1	Lower	Upper	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8	Trt 9	Trt 10
07.06.21	0.167	-0.131	0.465	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000
15.06.21	0.833	0.475	1.192	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.167
22.06.21	0.833	0.331	1.336	0.000	0.167	0.167	0.167	0.000	0.167	0.000	0.167	0.167
29.06.21	1.000	0.531	1.469	0.000	0.167	0.167	0.167	0.000	0.167	0.000	0.167	0.167
06.07.21	1.333	0.696	1.971	0.167	0.167	0.167	0.167	0.333	0.167	0.000	0.167	0.167

Date	Trt 1	Lower	Upper	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8	Trt 9	Trt 10
13.07.21	1.667	0.895	2.438	0.167	0.167	0.167	0.333	0.500	0.167	0.167	0.167	0.167
20.07.21	2.167	1.339	2.994	0.167	0.167	0.333	0.667	0.500	0.167	0.333	0.167	0.167
27.07.21	3.167	2.270	4.064	0.167	0.500	1.333	1.500	2.167	0.167	0.333	0.333	0.167
03.08.21	3.667	2.601	4.733	0.167	0.500	2.167	2.000	2.833	0.667	0.833	0.333	0.500
10.08.21	4.833	3.922	5.745	0.167	0.500	3.000	3.000	3.833	1.000	1.167	0.833	1.000
Not significantly different from the untreated control ($p > 0.05$)												
Significantly different from the untreated control ($p < 0.05$)												

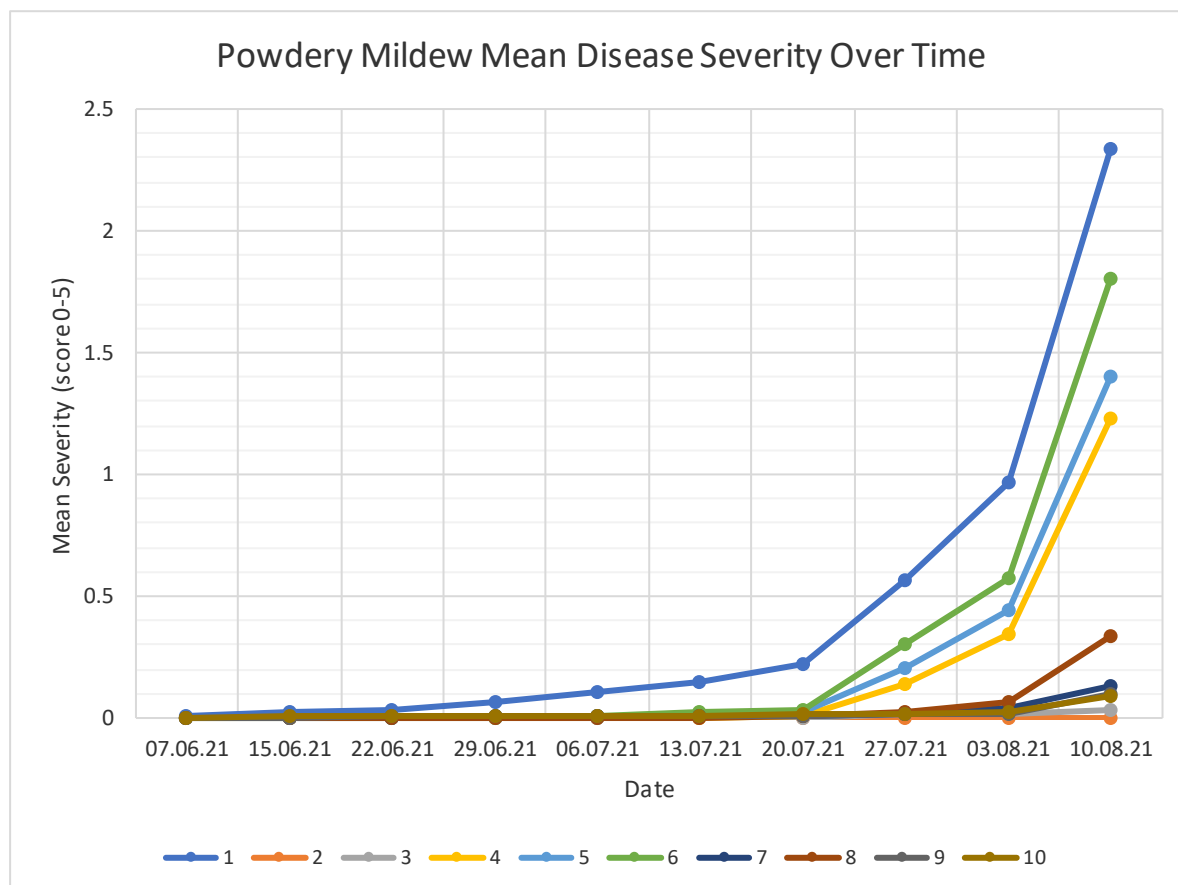


Figure 3: Graph showing mean disease severity for each treatment (1-10) over time. From each assessment following the presence of disease (07.06.21) to the final assessment (10.08.21)

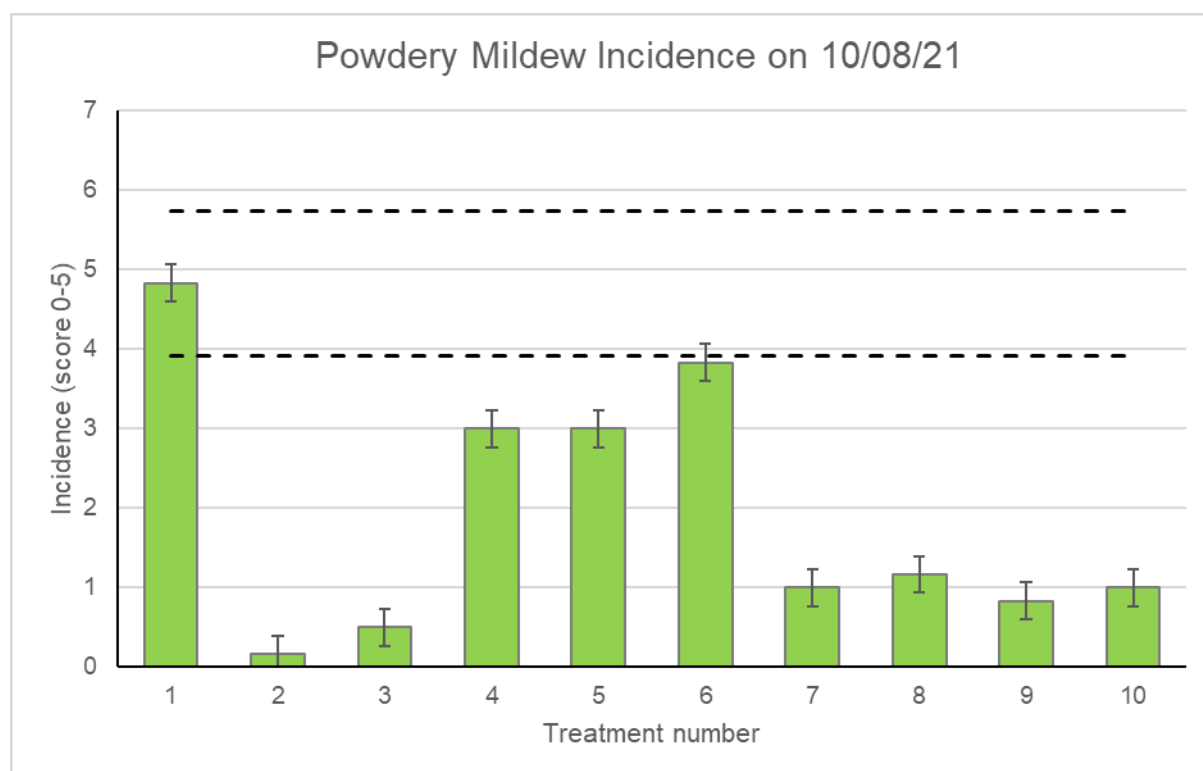


Figure 4: Graph showing disease incidence against treatment (1-10) at the final assessment (10.08.21). Horizontal dashed lines indicate 95% critical values for Dunnett's test. Any mean for treatments 2-10 that does not lie between the two horizontal lines is significantly different to the control at $P < 0.05$.

Discussion

Disease establishment was slow at the beginning of the trial, with very low levels of disease recorded in the untreated plots from the 07.06.21. Disease continued to steadily increase in the following weeks until the 20.07.21 from which point disease rapidly spreads. At the final assessment all the untreated plots (treatment 1) were heavily infected with plots: 207, 308, 403, 505 and 605 all showing >50% infection across the total plot.

For ease of reporting and understanding it is fair to look at the mean severity scores and total plot disease incidence. Looking at the mean severity and incidence, all treatments were highly significant ($p < 0.001$) from the untreated (treatment 1) from the second assessment following disease establishment (15.06.21). This is strong evidence that all treatments are effective in controlling Powdery Mildew in ornamental crops.

Treatments 2 through 10 are not significantly different from one another for the first 10 assessments (18.05.21 – 20.07.21). However, from the 27.07.21, treatments 4, 5 and 6 are highly significant ($p < 0.001$) from treatments 2,3,7- 10. Although significantly different to the untreated, the control provided by treatments 4,5 and 6 is less effective long term. This poses the question that if the trial had run for a longer period of time whether or not these treatments would have remained significantly different to the untreated.

Treatments 5 (Fytosave) and 6 (Romeo) were both biological controls - plant elicitors. Our results suggest that these acting on their own may not provide long term protection from Powdery Mildew. In this trial treatments 5 and 6 were only applied 3 times until disease was seen. This was done to assess if there was any added benefit of following the elicitors with a different mode of action biopesticide. Comparing treatments 5 and 6 to treatments 7-10 we can see a clear benefit of using a combined approach. The addition of a different acting biopesticide increases the effectiveness of control by maintaining disease levels at a similar level to the conventional fungicide control. Romeo can be applied up to 8-10 times per annum depending on the crop and Fytosave 8 times per annum for ornamentals. It may be that further applications, with larger intervals (14 days between applications) may be a better approach when using plant elicitors individually.

Treatment 4, AHDB 9926 has a maximum of 2 applications per annum as per the product label. Whilst still significant to the untreated and providing good control for 4 weeks after application. Disease incidence and severity begins to climb following this point. From this we can infer that AHDB 9926 acting alone may not be sufficient control for growers but provides an additional fungicide option within a rotating spray programme.

Conclusions

In conclusion all treatments 2-10 provided effective and significant control against Powdery Mildew in the host honeysuckle compared to the untreated control (treatment 1). The two fungicides, AHDB 9926 and AHDB 9914 (treatments 3 and 4) which were used also showed promise as alternative fungicides to treat Powdery Mildew in ornamentals. Whilst all significantly different to the untreated, treatments 4,5 and 6 were significantly different to all other treatments with decreasing effectiveness and increasing disease severity and incidence as the trial progressed. This report suggests that biological controls, when used in combination as a spray programme can significantly reduce disease and hold their own against commercial fungicide programmes. This trial has also identified two fungicides AHDB 9926 and AHDB 9914 which could provide ornamental growers another effective chemical fungicide. However, their use is limited due to two applications per annum and therefore should be considered as part of a spray programme rather than single reliant fungicides.

Acknowledgements

We would like to thank AHDB and the participating crop protection companies for project funding. We would also like to thank Dr Roma L Gwynn and Dr Clarkson for their invaluable technical advice and guidance.

Appendix

a. Crop diary

Date	Action
07.07.21	Plugs collected from Johnsons of Whixley
09.07.21	Plugs potted into 1L pots and placed in MFU6
12.08.21	100 plugs placed on capillary matting and inoculated using naturally infected honeysuckle from the STC site. (These will become the infector plants)
17.03.21	Trial plants placed in F20 on capillary matting
29.03.21	Active mildew present on infector plants.
12.05.21	Plants pruned back
03.06.21	Feed Applied
17.06.21	Feed Applied
24.06.21	Feed Applied
13.07.21	Biocontrol Encarsia for whitefly added

b. Trial diary

Date	Action
18.05.21	First evaluation and application A. Infector plants added to trial area
24.05.21	Second evaluation (incidence, severity, phytotoxicity)
25.05.21	Application B
27.05.21	Fan added to trail area.
28.05.21	Application C
01.06.21	Third evaluation (incidence, severity, phytotoxicity)
02.06.21	Application D
07.06.21	Fourth evaluation (incidence, severity, phytotoxicity)
09.06.21	Application E
15.06.21	Fifth evaluation (incidence, severity, phytotoxicity)
16.06.21	Application F
22.06.21	Sixth evaluation (incidence, severity, phytotoxicity)
23.06.21	Application G
29.06.21	Seventh evaluation (incidence, severity, phytotoxicity)
30.06.21	Application H
06.07.21	Eighth evaluation (incidence, severity, phytotoxicity)
07.07.21	Application I
13.07.21	Ninth evaluation (incidence, severity, phytotoxicity)
14.07.21	Application J
20.07.21	Tenth evaluation (incidence, severity, phytotoxicity)
21.07.21	Application K
27.07.21	Eleventh evaluation (incidence, severity, phytotoxicity)
28.07.21	Application L
03.08.21	Twelfth evaluation (incidence, severity, phytotoxicity)
10.08.21	Thirteenth evaluation (incidence, severity, phytotoxicity)

c. Photographs

Representative photographs of each treatment taken on the 11.08.21



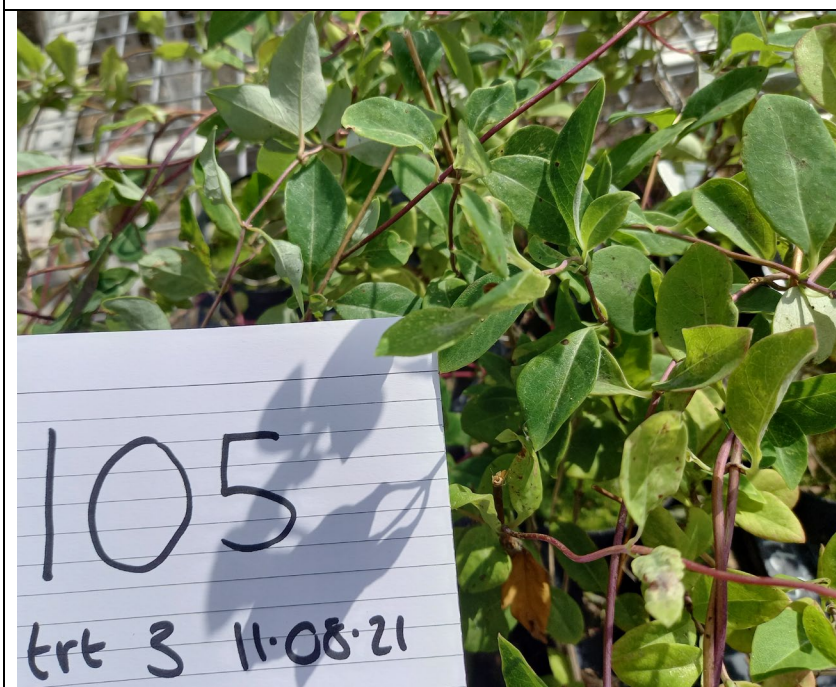
Plot 102 Treatment 1 (UTC)



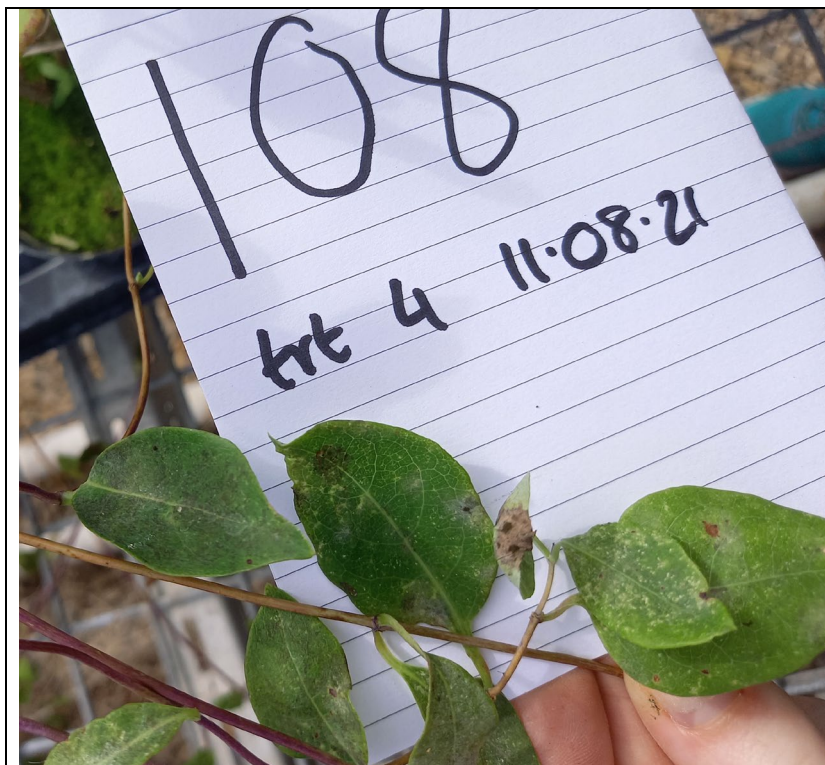
Plot 605 Treatment 1 (UTC)



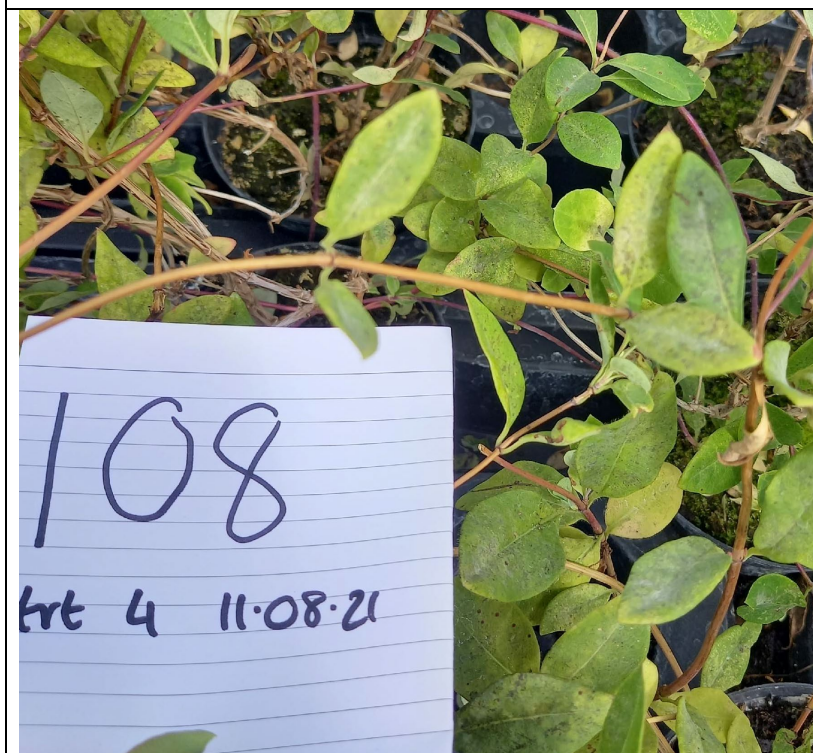
Plot 107 Treatment 2



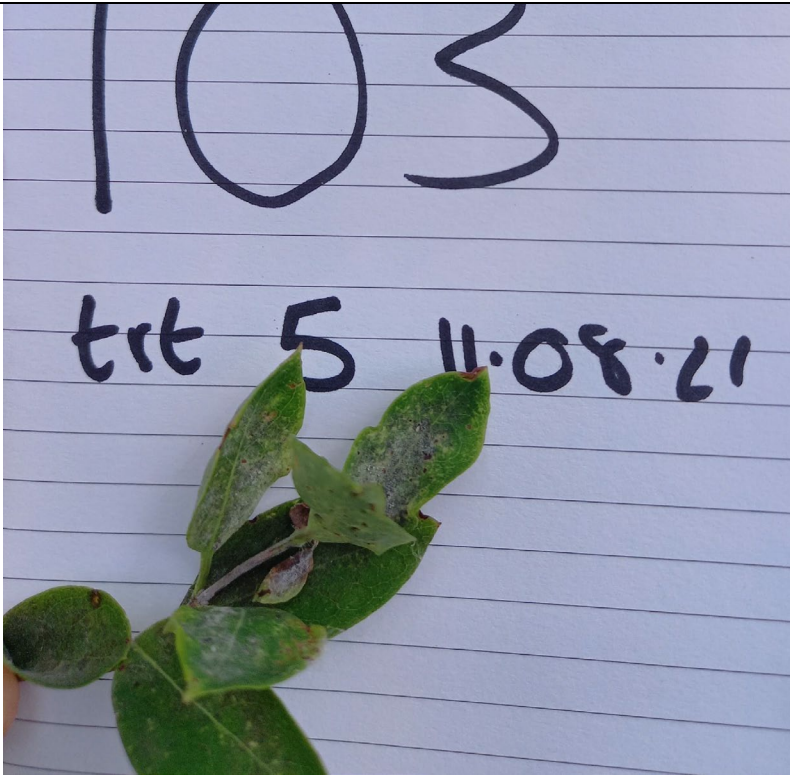

Plot 105 Treatment 3

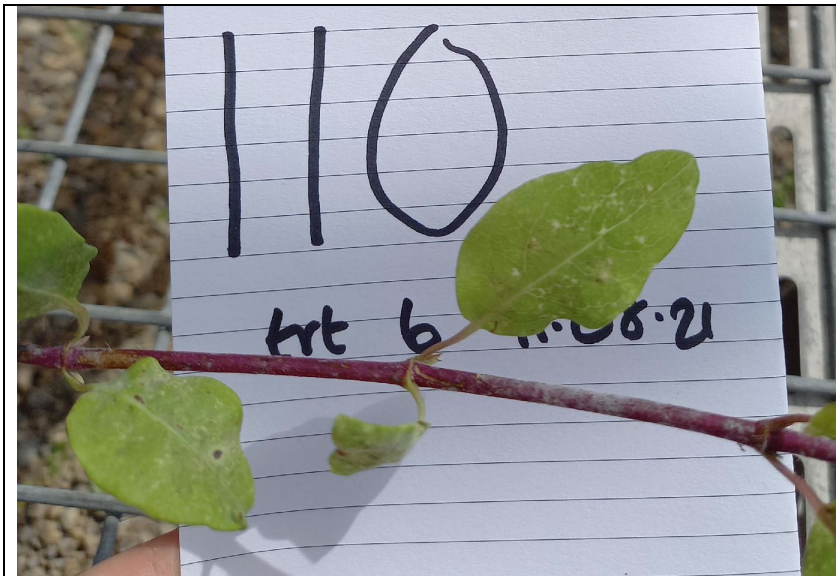


Plot 108 Treatment 4



Plot 108 Treatment 4

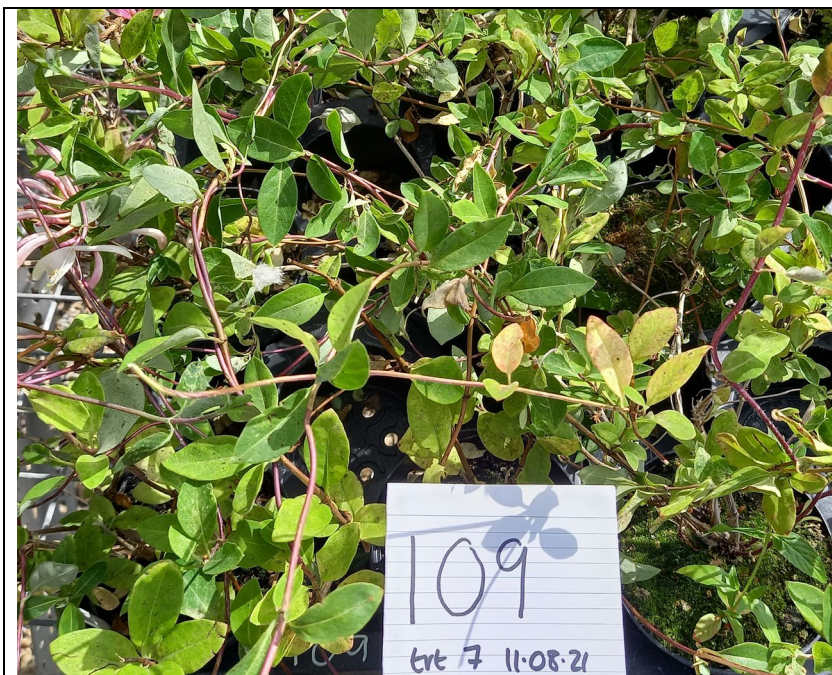
 <p>103 trt 5 11.08.21</p> <p>A photograph of a small plant branch with several green leaves, some showing signs of powdery mildew. The plant is placed against a background of lined paper with handwritten text.</p>	<p>Plot 103 Treatment 5</p>
 <p>604</p> <p>A photograph of a plant with green leaves, some showing signs of powdery mildew. A white label with the number '604' is placed in the bottom left corner of the image.</p>	<p>Plot 604 Treatment 5</p>



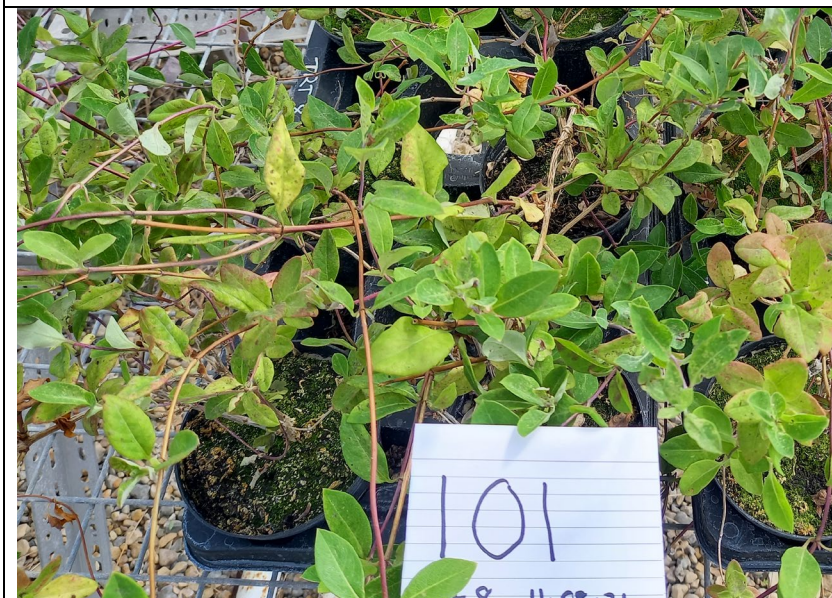
Plot 606 Treatment 6




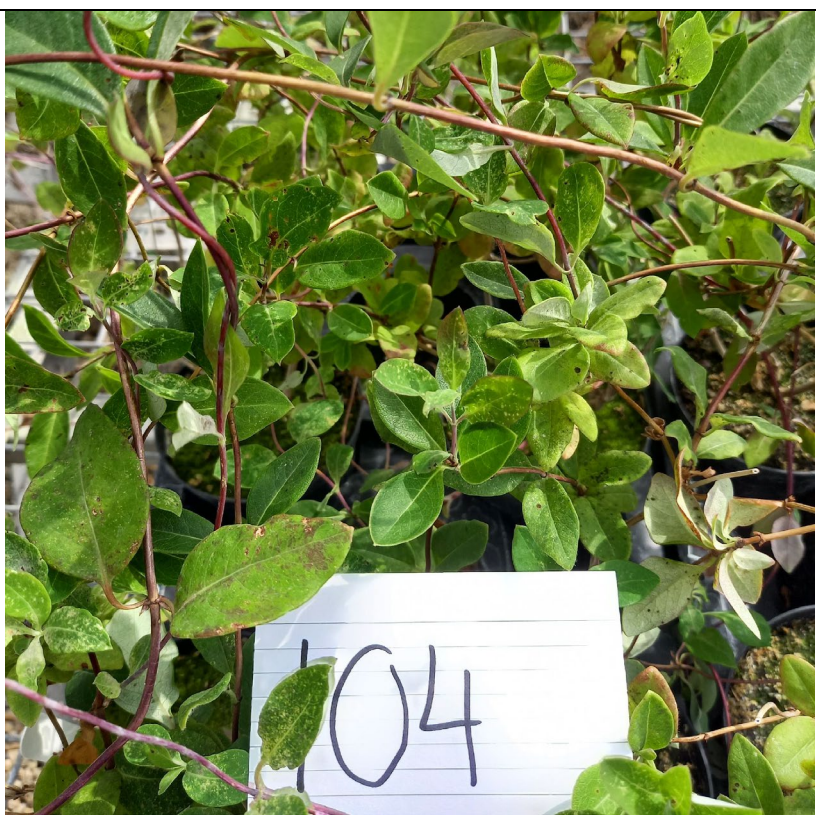
Plot 606 Treatment 6



Plot 109 Treatment 7



Plot 101 Treatment 8

	<p>Plot 106 Treatment 9</p>
	<p>Plot 104 Treatment 10</p>

d. Climatological data during study period

Date	Max Temp °C	Min Temp °C	Mean % RH	Mean J/cm ²
17/03/2021	18.62	3.01	76.59	631.06
18/03/2021	17.8	3.08	77.85	530.95
19/03/2021	13.62	7.05	87.57	336.45
20/03/2021	20.26	6.12	78.95	578.55
21/03/2021	18.81	5.13	74.76	770.53
22/03/2021	19.44	0.8	71.88	866.48
23/03/2021	16.52	7.1	75.99	600.67
24/03/2021	18.57	6.01	72.69	692.43
25/03/2021	21.13	4.4	71.36	848.01
26/03/2021	16.52	5.76	73.96	674.30

SP47b Powdery Mildew Control in Protected Ornamentals

Date	Max Temp °C	Min Temp °C	Mean % RH	Mean J/cm ²
27/03/2021	17.08	3.3	70.35	661.68
28/03/2021	19.38	8	74.81	595.14
29/03/2021	24.12	10.56	69.16	748.32
30/03/2021	25.94	3.3	65.69	973.19
31/03/2021	26.74	9.26	66.14	991.46
01/04/2021	16.86	6.15	77.24	641.95
02/04/2021	18.68	4.92	71.04	585.40
03/04/2021	19.18	4.2	67.82	752.09
04/04/2021	20.57	0.2	66.43	1059.25
05/04/2021	17.4	3.22	53.93	1168.11
06/04/2021	17.08	0.2	60.76	1070.44
07/04/2021	16.88	-0.9	57.78	975.45
08/04/2021	16.78	5.6	69.68	728.14
09/04/2021	21.12	3.62	67.71	799.87
10/04/2021	18.36	1.8	74.3	821.88
11/04/2021	19.95	0.02	67.68	907.94
12/04/2021	20.58	-1.71	63.73	1119.70
13/04/2021	20.2	-1.8	67.45	1114.53
14/04/2021	17.08	0.72	68.33	1119.47
15/04/2021	19.24	-0.58	66.78	1226.25
16/04/2021	20	-0.2	68.19	1233.73
17/04/2021	20.52	0.6	66.54	1268.10
18/04/2021	21.91	0.7	66.98	1230.12
19/04/2021	23.15	0.8	73.47	1166.67
20/04/2021	24.47	2.2	71.48	1200.07
21/04/2021	16.78	4.13	74.987	877.68
22/04/2021	22.54	-0.8	67.86	1185.83
23/04/2021	23.03	1	69.08	1402.78
24/04/2021	22.48	3.7	78.88	1251.74
25/04/2021	20.16	2	79.71	1164.11
26/04/2021	20.76	1.4	76.22	1241.41
27/04/2021	14.69	6.2	82.11	830.94
28/04/2021	14.87	4	78.52	671.83
29/04/2021	16.53	2.51	82.83	890.61
30/04/2021	15.38	1.1	86.59	838.62
01/05/2021	15.73	3.3	83.68	876.26
02/05/2021	18.48	0.5	82.85	948.50
03/05/2021	13.32	5.39	90.96	642.28
04/05/2021	11.73	4.8	89.30	413.95
05/05/2021	18.26	2.1	81.82	920.81
06/05/2021	19.86	1.8	83.78	1196.68
07/05/2021	20.34	1.5	83.52	1171.42
08/05/2021	17.45	3.4	93.31	628.53
09/05/2021	26.25	12.2	87.21	604.14
10/05/2021	21.94	8.51	86.30	957.58
11/05/2021	19.68	6	89.18	1105.78
12/05/2021	19.77	6.02	89.62	910.20
13/05/2021	24.05	7.08	85.91	1104.92
14/05/2021	14.33	7.72	90.87	750.28
15/05/2021	14.82	7.5	94.11	413.71
16/05/2021	21.3	8.6	90.86	781.88
17/05/2021	21.97	7.8	91.65	793.97
18/05/2021	21.57	6.18	87.10	955.28
19/05/2021	21.89	5.81	88.31	1068.16
20/05/2021	12.83	4.3	94.77	637.01
21/05/2021	16.25	9.5	94.84	406.425
22/05/2021	15.56	5.53	90.95	523.56
23/05/2021	19.37	3.8	91.03	729.87
24/05/2021	23.07	4.7	90.42	1042.56
25/05/2021	20.32	7.62	93.13	851.07
26/05/2021	18.88	6.9	93.47	645.27
27/05/2021	25.98	7.99	89.96	1010.53
28/05/2021	22.99	9.4	90.96	868.42
29/05/2021	30.18	8.48	88.76	1210.72
30/05/2021	27.04	8.61	91.90	1254.51
31/05/2021	25.66	8.61	91.98	1271.18
01/06/2021	28.05	7.48	91.00	1522.42
02/06/2021	28.14	8.02	92.06	1603.41
03/06/2021	28.11	12	93.41	1041.82
04/06/2021	26.36	10.3	92.46	1215.27

SP47b Powdery Mildew Control in Protected Ornamentals

Date	Max Temp °C	Min Temp °C	Mean % RH	Mean J/cm ²
05/06/2021	30.59	8.4	92.85	1469.26
06/06/2021	27.04	13.14	95.50	973.97
07/06/2021	29.68	10.1	94.90	989.84
08/06/2021	30.9	8.98	93.78	1392.02
09/06/2021	33.08	10.79	94.69	1498.82
10/06/2021	27.45	14.11	96.07	977.04
11/06/2021	27.13	13.22	96.61	777.93
12/06/2021	27.75	10.38	96.00	1324.68
13/06/2021	29.96	10.09	96.44	1324.04
14/06/2021	24.33	12.12	97.20	1040.62
15/06/2021	29.11	8.18	96.49	1360.72
16/06/2021	34.14	12.4	96.94	1586.43
17/06/2021	28.15	15.19	98.59	1091.28
18/06/2021	20.42	12.6	98.71	708.78
19/06/2021	26.47	10.87	98.29	902.17
20/06/2021	22.58	10.52	98.21	890.58
21/06/2021	16.88	8	98.38	633.17
22/06/2021	24.35	7.2	98.57	1042.48
23/06/2021	25.9	6.69	98.33	1410.79
24/06/2021	27.48	12.8	98.48	1095.11
25/06/2021	19.13	11.53	99.22	584.39
26/06/2021	25.84	11.11	98.77	729.60
27/06/2021	22.1	12.9	98.72	655.60
28/06/2021	21.65	10.72	98.99	508.56
29/06/2021	28.37	11.9	98.61	1030.55
30/06/2021	21.18	11.48	98.98	838.43
01/07/2021	31.17	9	98.71	1147.07
02/07/2021	30.03	12.28	98.90	1178.63
03/07/2021	21.88	13.5	99.20	627.02
04/07/2021	28.22	12.9	99.06	877.29
05/07/2021	24.59	14.02	98.89	960.40
06/07/2021	23.36	13.27	98.81	901.18
07/07/2021	26.6	13.79	99.06	899.87
08/07/2021	29.28	13.18	99.44	1213.03
09/07/2021	30.12	12.23	99.79	1322.79
10/07/2021	25.86	14.92	99.75	718.67
11/07/2021	27.62	11.7	99.5	899.96
12/07/2021	20.85	15.13	99.71	528.55
13/07/2021	25.55	14.6	99.15	645.01
14/07/2021	30.64	13	99.58	1109.63
15/07/2021	27.7	13.62	99.48	1150.03
16/07/2021	32.7	11.59	99.35	1373.34
17/07/2021	37.25	14.01	99.28	1523.01
18/07/2021	34.37	15.9	99.50	1508.54
19/07/2021	34.54	14.6	99.52	1306.66
20/07/2021	35.89	14.6	71.81	1335.69
21/07/2021	32.62	15.9	74.91	1075.70
22/07/2021	36.13	14.12	69.11	1304.60
23/07/2021	22.3	14.69	79.52	840.60
24/07/2021	21.43	14.52	73.62	499.40
25/07/2021	29.97	12.47	69.31	843.38
26/07/2021	31.59	12.41	68.03	1156.50
27/07/2021	27.49	13.91	76.46	950.33
28/07/2021	26.22	12.77	82.30	782.31
29/07/2021	20.28	11.82	81.41	702.47
30/07/2021	16.73	11.9	91.19	393.61
31/07/2021	26.11	13.8	78.21	652.20
01/08/2021	22.68	13.25	74.08	767.57
02/08/2021	24.99	9.09	71.83	817.10
03/08/2021	28.97	8.91	68.14	1135.06
04/08/2021	28.19	9.9	82.67	1058.08
05/08/2021	26.27	12.5	80.91	935.98
06/08/2021	27.12	13.18	82.57	820.75
07/08/2021	22.93	11.8	76.81	786.45
08/08/2021	24.49	12.7	80.04	778.18
09/08/2021	25.8	10.2	72.76	908.04
10/08/2021	29.41	11.6	70.49	1125.74

e. Raw data from assessments

18.05.21																																			
Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity												
	Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem			Bottom	Middle	Stem	Bottom	Middle	Stem	Bottom	Middle	Stem			
101	0	0	0	0	0	201	0	0	0	0	0	301	0	0	0	0	0	401	0	0	0	0	0	501	0	0	0	0	0	601	0	0	0	0	0
102	0	0	0	0	0	202	0	0	0	0	0	302	0	0	0	0	0	402	0	0	0	0	0	502	0	0	0	0	0	602	0	0	0	0	0
103	0	0	0	0	0	203	0	0	0	0	0	303	0	0	0	0	0	403	0	0	0	0	0	503	0	0	0	0	0	603	0	0	0	0	0
104	0	0	0	0	0	204	0	0	0	0	0	304	0	0	0	0	0	404	0	0	0	0	0	504	0	0	0	0	0	604	0	0	0	0	0
105	0	0	0	0	0	205	0	0	0	0	0	305	0	0	0	0	0	405	0	0	0	0	0	505	0	0	0	0	0	605	0	0	0	0	0
106	0	0	0	0	0	206	0	0	0	0	0	306	0	0	0	0	0	406	0	0	0	0	0	506	0	0	0	0	0	606	0	0	0	0	0
107	0	0	0	0	0	207	0	0	0	0	0	307	0	0	0	0	0	407	0	0	0	0	0	507	0	0	0	0	0	607	0	0	0	0	0
108	0	0	0	0	0	208	0	0	0	0	0	308	0	0	0	0	0	408	0	0	0	0	0	508	0	0	0	0	0	608	0	0	0	0	0
109	0	0	0	0	0	209	0	0	0	0	0	309	0	0	0	0	0	409	0	0	0	0	0	509	0	0	0	0	0	609	0	0	0	0	0
110	0	0	0	0	0	210	0	0	0	0	0	310	0	0	0	0	0	410	0	0	0	0	0	510	0	0	0	0	0	610	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

24.05.21																								
Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	
	Bottom	Mid	Stem				Bottom	Mid	Stem				Bottom	Mid	Stem				Bottom	Mid	Stem			Bottom
101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

01.06.21																																									
Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Mildew Disease Severity			Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity
	Bottom	Mid	Top				Bottom	Mid	Top				Bottom	Mid	Top				Bottom	Mid	Top				Bottom	Mid	Top				Bottom	Mid	Top				Bottom	Mid	Top		
101	0	0	0	0	0	0	201	0	0	0	0	0	0	301	0	0	0	0	0	0	401	0	0	0	0	0	0	501	0	0	0	0	0	0	601	0	0	0	0	0	0
102	0	0	0	0	0	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	0	0	0	0
103	0	0	0	0	0	0	203	0	0	0	0	0	0	303	0	0	0	0	0	0	403	0	0	0	0	0	0	503	0	0	0	0	0	0	603	0	0	0	0	0	0
104	0	0	0	0	0	0	204	0	0	0	0	0	0	304	0	0	0	0	0	0	404	0	0	0	0	0	0	504	0	0	0	0	0	0	604	0	0	0	0	0	0
105	0	0	0	0	0	0	205	0	0	0	0	0	0	305	0	0	0	0	0	0	405	0	0	0	0	0	0	505	0	0	0	0	0	0	605	0	0	0	0	0	0
106	0	0	0	0	0	0	206	0	0	0	0	0	0	306	0	0	0	0	0	0	406	0	0	0	0	0	0	506	0	0	0	0	0	0	606	0	0	0	0	0	0
107	0	0	0	0	0	0	207	0	0	0	0	0	0	307	0	0	0	0	0	0	407	0	0	0	0	0	0	507	0	0	0	0	0	0	607	0	0	0	0	0	0
108	0	0	0	0	0	0	208	0	0	0	0	0	0	308	0	0	0	0	0	0	408	0	0	0	0	0	0	508	0	0	0	0	0	0	608	0	0	0	0	0	0
109	0	0	0	0	0	0	209	0	0	0	0	0	0	309	0	0	0	0	0	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	0	0	0	0	0
110	0	0	0	0	0	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	410	0	0	0	0	0	0	510	0	0	0	0	0	0	610	0	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

07.06.21																																			
Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity												
	Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem			Bottom	Middle	Stem	Bottom	Middle	Stem						
101	0	0	0	0	0	201	0	0	0	0	0	301	0	0	0	0	0	401	0	0	0	0	0	501	0	0	0	0	0	601	0	0	0	0	0
102	0	0	0	0	0	202	0	0	0	0	0	302	0	0	0	0	0	402	0	0	0	0	0	502	0	0	0	0	0	602	0	0	0	0	0
103	0	0	0	0	0	203	0	0	0	0	0	303	0	0	0	0	0	403	0	0	0	0	0	503	0	0	0	0	0	603	0	0	0	0	0
104	0	0	0	0	0	204	0	0	0	0	0	304	0	0	0	0	0	404	0	0	0	0	0	504	0	0	0	0	0	604	0	0	0	0	0
105	0	0	0	0	0	205	0	0	0	0	0	305	0	0	0	0	0	405	0	0	0	0	0	505	0	1	0	0	0	605	0	0	0	0	0
106	0	0	0	0	0	206	0	0	0	0	0	306	0	0	0	0	0	406	0	0	0	0	0	506	0	0	0	0	0	606	0	0	0	0	0
107	0	0	0	0	0	207	0	0	0	0	0	307	0	0	0	0	0	407	0	0	0	0	0	507	0	0	0	0	0	607	0	0	0	0	0
108	0	0	0	0	0	208	0	0	0	0	0	308	0	0	0	0	0	408	0	0	0	0	0	508	0	0	0	0	0	608	0	0	0	0	0
109	0	0	0	0	0	209	0	0	0	0	0	309	0	0	0	0	0	409	0	0	0	0	0	509	0	0	0	0	0	609	0	0	0	0	0
110	0	0	0	0	0	210	0	0	0	0	0	310	0	0	0	0	0	410	0	0	0	0	0	510	0	0	0	0	0	610	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

15.06.21																																			
Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity												
	Bottom	Top	Stem				Bottom	Top	Stem				Bottom	Top	Stem				Bottom	Top	Stem			Bottom	Top	Stem	Bottom	Top	Stem						
101	0	0	0	0	0	201	0	0	0	0	0	301	0	0	0	0	0	401	0	0	0	0	0	501	1	0	0	1	0	601	0	0	0	0	0
102	0	0	1	0	1	202	0	0	0	0	0	302	0	0	0	0	0	402	0	0	0	0	0	502	0	0	0	0	0	602	0	0	0	0	0
103	0	0	0	0	0	203	0	0	0	0	0	303	0	0	0	0	0	403	0	1	0	1	0	503	0	0	0	0	0	603	0	0	1	1	0
104	0	0	0	0	0	204	0	0	0	0	0	304	0	0	0	0	0	404	0	0	0	0	0	504	0	0	0	0	0	604	0	0	0	0	0
105	0	0	0	0	0	205	0	0	0	0	0	305	0	0	0	0	0	405	0	0	0	0	0	505	0	1	0	1	0	605	1	0	0	1	0
106	0	0	0	0	0	206	0	0	0	0	0	306	0	0	0	0	0	406	0	0	0	0	0	506	0	0	0	0	0	606	0	0	0	0	0
107	0	0	0	0	0	207	0	0	0	1	0	307	0	0	0	0	0	407	0	0	0	0	0	507	0	0	0	0	0	607	0	0	0	0	0
108	0	0	0	0	0	208	0	0	0	0	0	308	0	0	0	0	0	408	0	0	0	0	0	508	0	0	0	0	0	608	0	0	0	0	0
109	0	0	0	0	0	209	0	0	0	0	0	309	0	0	0	0	0	409	0	0	0	0	0	509	0	0	0	0	0	609	0	0	0	0	0
110	0	0	0	0	0	210	0	0	0	0	0	310	0	0	0	0	0	410	0	0	0	0	0	510	0	0	0	0	0	610	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

22.06.21																																			
Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity												
	Bottom	Middle	Top	Stem			Bottom	Middle	Top	Stem			Bottom	Middle	Top	Stem			Bottom	Middle	Top	Stem		Bottom	Middle	Top	Stem								
101	0	0	0	0	0	201	0	1	0	0	1	301	0	0	0	0	0	401	0	0	0	0	0	501	1	0	0	0	1	601	0	0	0	0	0
102	0	0	1	0	1	202	0	0	0	0	0	302	0	0	0	0	0	402	0	0	0	0	0	502	0	0	0	0	0	602	0	0	0	0	0
103	0	0	0	0	0	203	0	0	0	0	0	303	0	0	0	0	0	403	0	1	0	0	1	503	0	1	0	0	1	603	0	1	0	1	1
104	0	0	0	0	0	204	0	0	0	0	0	304	0	0	0	0	0	404	0	0	0	0	0	504	0	0	0	0	0	604	0	0	0	0	0
105	0	0	0	0	0	205	0	0	0	0	0	305	0	0	0	0	0	405	0	0	0	0	0	505	0	1	0	0	1	605	1	0	0	1	1
106	0	0	0	0	0	206	0	0	0	0	0	306	0	0	0	0	0	406	0	0	0	0	0	506	0	0	0	0	0	606	0	0	0	0	0
107	0	0	0	0	0	207	0	1	0	0	1	307	0	0	0	0	0	407	0	0	0	0	0	507	0	0	0	0	0	607	0	0	0	0	0
108	0	0	0	0	0	208	0	0	0	0	0	308	0	0	0	0	0	408	0	0	0	0	0	508	1	0	0	0	1	608	0	0	0	0	0
109	0	0	0	0	0	209	0	0	0	0	0	309	0	0	0	0	0	409	0	0	0	0	0	509	0	0	0	0	0	609	0	0	0	0	0
110	0	0	0	0	0	210	0	0	0	0	0	310	0	0	0	0	0	410	0	0	0	0	0	510	0	1	0	0	1	610	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

29.06.21																										
Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Phytotoxicity	Powdery Mildew Disease Incidence			
	Bottom	Middle	Top				Bottom	Middle	Top				Bottom	Middle	Top				Bottom	Middle	Top			Bottom	Middle	Top
101	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
102	0	0	0	1	0	202	0	0	0	0	0	302	0	0	0	0	0	0	0	0	0	0	0	0	0	
103	0	0	0	0	0	203	0	0	0	0	0	303	0	0	0	0	0	0	0	0	0	0	0	0	0	
104	0	0	0	0	0	204	0	0	0	0	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0	
105	0	0	0	0	0	205	0	0	0	0	0	305	0	0	0	0	0	0	0	0	0	0	0	0	0	
106	0	0	0	0	0	206	0	0	0	0	0	306	0	0	0	0	0	0	0	0	0	0	0	0	0	
107	0	0	0	0	0	207	1	1	0	1	0	307	0	0	0	0	0	0	0	0	0	0	0	0	0	
108	0	0	0	0	0	208	0	0	0	0	0	308	0	1	0	1	0	408	0	0	0	0	0	0	0	0
109	0	0	0	0	0	209	0	0	0	0	0	309	0	0	0	0	0	409	0	0	0	0	0	0	0	
110	0	0	0	0	0	210	0	0	0	0	0	310	0	0	0	0	0	410	0	0	0	0	0	0	0	

SP47b Powdery Mildew Control in Protected Ornamentals

08.06.21																																									
Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity														
	Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem			Bottom	Middle	Top	Stem	Bottom	Middle	Top	Stem						
101	0	0	0	0	0	0	201	0	1	0	0	1	0	301	0	0	0	0	0	0	401	0	0	0	0	0	0	501	1	0	0	0	1	0	601	0	0	0	0	0	0
102	0	0	1	0	1	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	0	0	0	0
103	0	0	0	0	0	0	203	0	0	0	0	0	0	303	0	0	0	0	0	0	403	0	2	0	0	1	0	503	0	1	0	0	1	0	603	0	0	0	1	1	0
104	0	0	0	0	0	0	204	0	0	0	0	0	0	304	0	0	0	0	0	0	404	0	0	0	0	0	0	504	0	0	0	0	0	0	604	0	0	0	0	0	0
105	0	0	0	0	0	0	205	0	0	0	0	0	0	305	0	0	0	0	0	0	405	0	0	0	0	0	0	505	0	2	0	0	1	0	605	0	0	1	0	2	0
106	0	0	0	0	0	0	206	0	0	0	0	0	0	306	0	0	0	0	0	0	406	0	0	1	0	1	0	506	0	1	0	0	1	0	606	0	0	0	0	0	0
107	0	0	0	0	0	0	207	0	2	0	0	2	0	307	0	0	0	0	0	0	407	0	0	0	0	0	0	507	0	0	0	0	0	0	607	0	0	0	0	0	0
108	0	0	0	0	0	0	208	0	0	0	0	0	0	308	0	1	0	0	1	0	408	0	0	0	0	0	0	508	1	0	0	0	1	0	608	0	0	0	0	0	0
109	0	0	0	0	0	0	209	0	0	0	0	0	0	309	0	0	0	0	0	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	0	0	0	0	0
110	1	0	0	0	1	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	410	0	0	0	0	0	0	510	0	1	0	0	1	0	610	0	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

13.07.21																																													
Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity				Powdery Mildew Disease Incidence	Phytotoxicity																		
	Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem				Bottom	Middle	Top	Stem			Bottom	Middle	Top	Stem	Bottom	Middle	Top	Stem										
101	0	0	0	0	0	0	201	0	1	0	0	1	0	301	0	0	0	0	0	0	0	0	0	0	401	0	0	0	0	0	0	501	1	0	0	0	1	0	601	0	0	0	0	0	0
102	0	0	1	0	1	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	0	0	0	0
103	0	0	0	0	0	0	203	0	0	0	0	0	0	303	0	0	0	0	0	0	0	0	0	0	403	0	2	0	0	2	0	503	0	1	0	0	1	0	603	0	0	0	1	1	0
104	0	0	0	0	0	0	204	0	0	0	0	0	0	304	0	0	0	0	0	0	0	0	0	0	404	0	0	0	0	0	0	504	0	0	0	0	0	0	604	0	0	0	0	0	0
105	0	0	0	0	0	0	205	0	0	0	0	0	0	305	0	0	0	0	0	0	0	0	0	0	405	0	0	0	0	0	0	505	0	2	0	0	1	0	605	3	3	0	0	3	0
106	0	0	0	0	0	0	206	0	0	0	0	0	0	306	0	0	0	0	0	0	0	0	0	0	406	0	0	1	0	1	0	506	0	1	0	0	1	0	606	0	0	0	0	0	0
107	0	0	0	0	0	0	207	0	2	0	0	2	0	307	0	0	0	0	0	0	0	0	0	0	407	0	0	0	0	0	0	507	0	0	0	0	0	0	607	0	1	0	0	1	0
108	0	0	0	0	0	0	208	0	0	0	0	0	0	308	0	1	0	0	1	0	0	0	0	0	408	0	0	1	0	1	0	508	1	0	0	0	1	0	608	0	0	0	0	0	0
109	0	0	0	0	0	0	209	0	1	0	0	1	0	309	0	0	0	0	0	0	0	0	0	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	0	0	0	0	0
110	1	1	0	0	1	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	0	0	0	0	410	0	0	0	0	0	0	510	0	1	0	0	1	0	610	0	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

20.07.21

Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot	Powdery Mildew Disease Severity				Phytotoxicity	Plot
	Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence			Midrib	Top	Stems	Incidence		
101	0	0	1	0	1	0	201	0	1	0	0	1	0	301	0	0	0	0	1	0	401	0	0	0	0	1	0	501	1	0	0	0	1	0	601	0	0	0	0	0	0	
102	0	2	1	0	1	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	0	0	0	0	
103	0	1	0	0	1	0	203	0	0	0	0	0	0	303	0	0	0	0	0	0	403	0	2	1	0	3	0	503	0	1	0	0	1	0	603	0	0	0	1	1	0	
104	0	0	0	0	0	0	204	0	0	0	0	0	0	304	0	0	0	0	0	0	404	0	0	0	0	0	0	504	0	0	1	0	1	0	604	0	0	0	0	0	0	
105	0	0	0	0	0	0	205	0	0	0	0	0	0	305	0	0	0	0	0	0	405	0	0	1	0	1	0	505	0	2	0	0	2	0	605	3	3	2	0	3	0	
106	0	0	0	0	0	0	206	0	0	0	0	0	0	306	0	0	0	0	0	0	406	0	0	1	0	1	0	506	0	1	0	0	1	0	606	0	0	0	0	0	0	
107	0	0	0	0	0	0	207	2	3	0	0	3	0	307	0	0	0	0	0	0	407	0	0	0	0	0	0	507	0	0	0	0	0	0	607	0	1	0	0	1	0	
108	0	0	0	0	0	0	208	0	0	0	0	0	0	308	0	1	0	0	1	0	408	0	0	1	0	1	0	508	1	0	0	0	1	0	608	0	0	0	0	0	0	
109	0	0	0	0	0	0	209	0	2	0	0	1	0	309	0	0	0	0	0	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	0	0	0	0	0	
110	1	1	0	0	1	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	410	0	0	0	0	0	0	510	0	1	0	0	1	0	610	0	0	0	0	0	0	

SP47b Powdery Mildew Control in Protected Ornamentals

27.07.21

Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Phytotoxicity																		
	Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem				Bottom	Middle	Stem			Bottom	Middle	Stem	Bottom	Middle	Stem												
101	0	1	1	0	1	0	201	0	1	0	0	2	0	301	0	0	0	0	0	0	401	0	0	0	0	0	0	501	1	0	0	0	1	0	601	0	0	0	0	0	0
102	2	2	0	0	3	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	0	0	0	0
103	0	2	1	0	2	0	203	0	2	0	0	1	0	303	0	1	1	0	1	0	403	2	3	0	0	3	0	503	0	1	0	0	1	0	603	0	0	0	1	1	0
104	0	0	0	0	0	0	204	0	0	0	0	0	0	304	0	1	0	0	3	0	404	0	0	0	0	0	0	504	0	0	1	0	1	0	604	0	0	1	0	2	0
105	0	0	1	0	1	0	205	0	0	0	0	0	0	305	0	0	0	0	0	0	405	0	1	1	0	2	0	505	0	1	0	0	3	0	605	0	2	2	1	4	0
106	0	0	0	0	0	0	206	0	0	0	0	0	0	306	0	1	0	0	1	0	406	0	0	1	0	1	0	506	0	2	0	0	2	0	606	0	3	0	0	3	0
107	0	0	0	0	0	0	207	0	3	0	0	4	0	307	0	0	0	0	0	0	407	0	1	0	0	1	0	507	0	0	0	0	0	0	607	0	0	0	0	1	0
108	0	0	1	0	2	0	208	0	0	0	0	0	0	308	0	1	0	0	2	0	408	0	0	1	0	2	0	508	1	0	0	0	1	0	608	0	0	0	0	0	0
109	0	0	0	0	0	0	209	0	1	0	0	1	0	309	0	1	0	0	1	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	1	0	0	1	0
110	0	0	1	0	2	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	410	0	0	1	0	1	0	510	0	1	0	0	1	0	610	0	0	0	0	0	0

SP47b Powdery Mildew Control in Protected Ornamentals

03.08.21																																															
Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence	Plot	Powdery Mildew Disease Severity			Powdery Mildew Disease Incidence																							
	Bottom	Midc	Top			Stem	Bottom	Midc			Top	Stem	Bottom			Midc	Top	Stem			Bottom	Midc	Top		Stem	Bottom	Midc	Top	Stem																		
101	0	1	0	0	1	0	201	0	1	0	0	2	0	301	0	0	0	0	0	0	0	0	401	0	0	0	0	0	0	0	0	501	0	0	1	0	1	0	601	0	0	0	0	0	0	0	0
102	0	3	1	0	3	0	202	0	0	0	0	0	0	302	0	0	0	0	0	0	0	0	402	0	0	0	0	0	0	502	0	0	0	0	0	0	602	0	0	2	0	1	0				
103	0	2	0	0	3	0	203	0	2	0	0	2	0	303	0	1	1	0	1	0	403	2	3	0	0	4	0	503	0	1	1	0	1	0	603	0	0	0	1	1	0						
104	0	1	0	0	1	0	204	0	0	0	0	0	0	304	0	2	0	0	3	0	404	0	0	0	1	1	0	504	0	0	1	0	1	0	604	0	3	0	0	3	0						
105	0	0	1	0	1	0	205	0	1	0	0	1	0	305	0	1	0	0	1	0	405	0	2	1	0	3	0	505	0	2	0	0	3	0	605	2	4	2	0	5	0						
106	0	0	0	0	0	0	206	0	0	0	1	1	0	306	0	2	1	0	3	0	406	0	0	1	0	1	0	506	0	1	0	1	3	0	606	1	3	2	1	4	0						
107	0	0	0	0	0	0	207	3	3	0	0	4	0	307	0	0	0	0	0	0	407	0	1	1	0	2	0	507	0	1	0	0	1	0	607	0	1	0	0	1	0						
108	0	0	2	1	3	0	208	0	0	0	0	0	0	308	0	2	0	0	3	0	408	0	1	0	0	3	0	508	1	0	0	0	1	0	608	0	0	0	0	0	0						
109	0	0	0	0	1	0	209	0	1	2	1	1	0	309	0	2	0	0	1	0	409	0	0	0	0	0	0	509	0	0	0	0	0	0	609	0	2	0	0	2	0						
110	0	2	1	0	2	0	210	0	0	0	0	0	0	310	0	0	0	0	0	0	410	0	0	1	0	1	0	510	0	0	0	0	1	0	610	0	0	0	0	0	0						

f. Trial design

Bench 1	Bench 2	Bench 3
Plot: 101 Trt: 8	301 3	501 10
102 1	302 7	502 2
103 5	303 9	503 7
104 10	304 6	504 4
105 3	305 8	505 1
106 9	306 4	506 6
107 2	307 10	507 8
108 4	308 1	508 3
109 7	309 5	509 9
110 6	310 2	510 5
201 4	401 7	601 3
202 2	402 10	602 7
203 6	403 1	603 9
204 3	404 8	604 5
205 7	405 5	605 1
206 10	406 2	606 6
207 1	407 4	607 8
208 9	408 6	608 2
209 5	409 9	609 4
210 8	410 3	610 10

g. 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) 1107/2009¹ 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



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