SCEPTREPLUS

Final Trial Report

Trial code:	SP31
Title:	AHDB SCEPTREplus blackcurrant residual herbicide screen
Crop	Blackcurrant, *Ribes,* Bush fruit
Target	General broadleaf weeds and grasses, 3WEEDT Black nightshade, *Solanum nigrum*, SOLNI
Lead researcher:	Sonia Newman
Organisation:	RSK ADAS Ltd, ADAS Boxworth, Cambridgeshire, CB23 4NN
Period:	April 2018 to Oct 2018
Report date:	31/10/2018
Report author:	Sonia Newman
ORETO Number: (certificate should be attached)	409

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

……29/10/2018…… …… ….

Date Authors signature

Grower Summary

Introduction

New options for weed control are sought by blackcurrant growers, with herbicide resistance a constant threat and approvals for effective actives regularly being lost.

The limited availability of herbicides currently available to blackcurrant growers leaves gaps in the weed control spectrum. There are a wide range of weed species that are problematic to blackcurrant, although grasses have become less of an issue due to a recent EAMU for clethodim. Black nightshade is an annual weed which is not well controlled by the residual herbicides currently applied just prior to bud burst in March. Lack of control is due to partial resistance to the herbicides currently available and the germination period of the weed being late spring when the herbicides have lost some residual activity. In the future if growers weren't able to effectively control blacknightshade the berries of black nightshade could be harvested alongside blackcurrants by the mechanised harvester making it an undesirable contaminant.

The objective of this trial was to identify crop safe and effective residual herbicides for blackcurrant weed control with a later application date, aiming to expand the options available to growers with a focus on black nightshade control.

Methods

A trial was sited at a commercial blackcurrant grower in Suffolk. Treatments were applied to the soil after bud break in the blackcurrants. The blackcurrant crop (Ben Hope) was planted in 2003. The first treatments (application A) were applied on 20th April, and the application B treatment was applied on 18th June. The treatments were applied with a single nozzle hooded lance and an Oxford Precision Sprayer knapsack at 400 L/ha water volume with plots 1.5 m wide by 8 m long.

A randomised block design was used with four replicates of seven treatments, including an untreated control for comparison, totaling 28 plots. Plots were assessed for weed control on four occasions, recording the percentage of weed ground cover. Crop damage was also assessed; recorded first at two weeks after the first treatment application, and on two subsequent occasions (6 and 12 weeks after treatment). Due to low black nightshade levels in the trial, sub-plots were sown with black nightshade. Despite repeated watering there was not sufficient germination to evaluate the effectiveness of the treatments against black nightshade.

Results and discussion

All treatments were shown to be crop safe during the trial, and although some phytotoxicity effects were noted, the damage was transient and the blackcurrant bushes showed no effects from the herbicides at six weeks after application. After six weeks there were no significant differences in the phytotoxicity symptoms shown by the bushes compared to the control (Table 1). Due to the extremely dry conditions following the application of the treatments these results should be treated with caution as herbicide activity and movement may have been reduced. However in terms of crop safety, based on the results of this trial all of the treatments appear to be suitable for further investigation.

All of the treatments resulted in plots with significantly lower weed cover compared to the control, this was despite all plots having had a residual already applied to them. The standard generally performed as expected in the trial, although efficacy of this treatment was reducing when assessed at six weeks. This may in part be due to the drought conditions experienced during the trial period, as well as a high burden of perennial weeds in all of the plots.

The weed cover in all of the treatments was not significantly different to the grower standard, Artist + Stomp Aqua, at any of the assessment dates during the trial. AHDB9975 showed

good initial efficacy at the two week assessment, which was comparable to the standard, although this was not carried all the way through to harvest. AHDB9898 was showing the best efficacy six weeks after treatment. Of the treatments tested, AHDB9920 generally had the lowest reduction of weeds particularly at six weeks compared to the control, but it would add control of black nightshade, according to the product label.

Table 1. Summary of crop damage and percentage weed cover from key assessment timings (8th May 2018, 2 weeks post-treatment and 1st June 2018, 6 weeks post-treatment)

Application A	Application B	Crop damage (0-10) 2 weeks post-treatment	Weed cover (%) 2 weeks post-treatment	Weed cover (%) 6 weeks post-treatment
Untreated	-	10	39.97	91.68
Artist + Stomp Aqua	-	8.75	19.68	64.61
AHDB9900	-	9.25	21.09	68.19
AHDB9975	-	9	13.5	67.61
AHDB9898	-	9	22.24	59.01
Artist + Stomp Aqua	Shark	8.5	15.35	67.82
AHDB9920	-	8.5	21.21	74.34
	F prob. value	0.001	<0.001	0.042
	d.f.	18	18	18
	S.E.D.	0.2988	2.869	6.29
	L.S.D.	0.6278	6.027	13.22

Conclusions

- All treatments were crop safe, despite the later than usual application date.
- All treatments resulted in significantly lower weed cover compared to the control plots. **AHDB9975**, **AHDB9898** and **AHDB9900** show promise for future wok.
- The standard performed generally as expected, though the drought conditions are likely to have affected the efficacy of all treatments in the trial.
- Further studies should be carried out to assess the performance of the most promising products under more normal meteorological conditions.

Take Home Message

AHDB 9975, AHDB 9898 or AHDB 9900 could give growers alternative options for residual weed control and improve control of black nightshade if approved for use on blackcurrants. However, a further year of trials would be useful to give confidence in crop safety of the products.

Objectives

1. To evaluate the effectiveness of six herbicide treatments, applied to an actively growing crop, for the control of broadleaved weeds and grasses in blackcurrants as measured by crop safety and weed control efficacy.
2. To compare the performance of novel treatments against the commercial standard (Artist + Stomp Aqua).
3. To monitor the treated crop for phytotoxicity

Trial conduct

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

Relevant EPPO guideline(s)		**Variation from EPPO**
PP 1/152(4)	Guideline on design and analysis of efficacy evaluation trials	None
PP 1/135(4)	Phytotoxicity assessment	None
PP 1/181(4)	Conduct and reporting of efficacy evaluation trials including good experimental practice	None
PP 1/119(3)	Weed control in *Ribes* and *Rubus*	None

Test site

Item	**Details**
Location address	Hall Farm, Woodbridge, Suffolk IP13 7PW
Crop	Blackcurrants
Cultivar	Ben Hope
Soil or substrate type	Sandy clay loam
Agronomic practice	See appendix
Prior history of site	Blackcurrants since 2003

Trial design

Item	**Details**
Trial design:	Randomised block design
Number of replicates:	4
Row spacing:	1.5 m
Plot size: (w x l)	3 x 8 m
Plot size: (m^2)	24
Number of plants per plot:	Approx. 26
Leaf Wall Area calculations	N/A

Treatment details

AHDB Code	**Active substance**	**Product name or manufacturers code**	**Formulation batch number**	**Content of active substance in product**	**Formulation type**
N/A	flufenacet + metribuzin	Artist	EH3H002306	240 g/kg 175 g/kg	Water dispersible granule
N/A	pendimethalin	Stomp aqua	16724770	455 g/l	Capsule suspension
N/A	carfentrazone-ethyl	Shark		60 g/l	Micro emulsion

AHDB9900	N/D	N/D	N/D	N/D	N/D
AHDB9975	N/D	N/D	N/D	N/D	N/D
AHDB9898	N/D	N/D	N/D	N/D	N/D
AHDB9920	N/D	N/D	N/D	N/D	N/D

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	Control	N/A	N/A	N/A
2	Artist + Stomp aqua	600 437.5 + 1319.5	2.5 + 2.9	A
3	AHDB9900	19.1	0.1	A
4	AHDB9975	743.8 875	3.5	A
5	AHDB9898	864	1.2	A
6	Artist + Stomp aqua	600 437.5 + 1319.5	2.5 + 2.9	A
	Shark	48	0.8	B
7	AHDB9920	800	1.0	A

Application details

	Application A	Application B
Application date	20/04/2018	18/06/2018
Time of day	12:00 - 13:30	14:05 - 14:15
Crop growth stage (Max, min average BBCH)	56-59, average 57	77-79, average 78
Crop height (cm)	1.2	1.6
Crop coverage (%)	60	80
Application Method	Spray	Spray
Application Placement	Soil	Foliar
Application equipment	Oxford Precision Sprayer (knapsack)	Oxford Precision Sprayer (knapsack)
Nozzle pressure	2.5 Bar	2.5 Bar
Nozzle type	Flat fan	Flat fan
Nozzle size	02F110	02F110
Application water volume/ha	400	400
Temperature of air - shade (°C)	26.3	27.0
Relative humidity (%)	54.1	58.0
Wind speed range (m/s)	1.2	0
Dew presence (Y/N)	N	N
Temperature of soil - 2-5 cm (°C)	21.0	21.0
Wetness of soil - 2-5 cm	Dry	Dry

Cloud cover (%)	5	55

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

Common name	Scientific Name	EPPO Code	Infection level pre-application	Infection level at start of assessment period	Infection level at end of assessment period
Broad leaved weeds and grasses	*N/A*	3WEEDT	9.2% *(untreated average)*	39.9% *(untreated average)*	97.6% *(untreated average)*

The levels of black nightshade in the plots was very low, as a result black nightshade seeds were sown into three sub-plots in each plot. The seed was tested for germination viability before sowing, with seed showing adequate germination rates. The seed in the sub-plots were watered in at sowing and again two weeks later. Despite this, unfortunately due to the extremely dry weather during the trial period there was insufficient germination to evaluate the effectiveness of the treatments against black nightshade in the trial.

Assessment details

Evaluation date	Evaluation Timing (DA)*	Crop Growth Stage (BBCH)	Evaluation type (efficacy, phytotox)	What was assessed and how (e.g. dead or live pest; disease incidence and severity; yield, marketable quality)
20/04/2018	0	59	efficacy	Percentage of weed cover (whole plot score)
08/05/2018	18	71	efficacy, phytotox	Percentage of weed cover (whole plot score) Phytotox (scale 0-10, 0 = dead)
01/06/2018	42	75	efficacy, phytotox	Percentage of weed cover (whole plot score) Phytotox (scale 0-10, 0 = dead)
13/07/2018	84	87	efficacy, phytotox	Percentage of weed cover (whole plot score) Phytotox (scale 0-10, 0 = dead)

* DA – days after application

Statistical analysis

The trial design was a randomised block design, with four replicates of seven treatments, including one control.

As the distribution of weeds was uneven across the trial, which is not unexpected in field situations, there was a need to transform these variables prior to analysis. An angular transformation was used. The levels of black nightshade were extremely low and uneven in the trial and as such were unable to be analysed.

All data were analysed by ANOVA using Genstat 18.4 by Chris Dyer at RSK ADAS. For the % efficacy data, calculated by Abbotts formula, an angular transformation was carried out and then the back transformed means are presented from which the Abbotts Formula was used to calculate the % reduction in weeds.

Results

Due to the late start of the trial, all of the plots had already had the grower standard of Artist + Stomp aqua applied in mid-March 2018. After consultation with the industry representative it was decided to continue with the trial to investigate the effects of an additional residual herbicide application at a later than normal application date.

Phytotoxicity

The results of phytotoxicity assessments from three dates are presented in Table 2, and from three dates in Figure 1. These were scored on a scale of 0 to 10, with 0 being 'dead', and 10 being 'no effect'. Those scores at 8 or above were deemed to be commercially acceptable damage.

Phytotoxicity was recorded using the following scale:

Crop tolerance score	Equivalent to crop damage (% phytotoxicity)
0	complete crop kill 100%
1	80-95% damage
2	70-80%
3	60-70%
4	50-60%
5	40-50%
6	25-40%
7	15-25%
8*	10-15%
9	5-10%
10	no damage

* 8 = acceptable damage, i.e. damage unlikely to reduce yield, and acceptable to the farmer.

At the assessment 2 weeks after treatment (8th May) some phytotoxicity symptoms were seen in all of the treatments applied to the blackcurrants (Table 2, Figure 1). The majority of this damage was slight scorch to foliage that had been hit during application (Figure 4; Appendix E). The treatments with the lowest scores were Artist + Stomp Aqua and AHDB9920. None of the damage was below the score of 8 which would signify an unacceptable level of damage.

At the 6 week assessment (1st June) all of the bushes had grown through the damage and no further symptoms were seen. In treatment 6 where there was an additional later application of Shark there was slight scorch noted again at the 12 week assessment (13th July), however this was not particularly severe and only affected bushes where branches had been hit with the treatment.

Table 2. Mean phytotoxicity scores (0-10; 0 = complete crop death, 10 = no damage) through the trial. Scores ≥ 8 deemed commercially acceptable damage, those < 8 represent unacceptable damage.

Treatment	Application	Application	Mean crop damage scores

number	A	B	8th May	1st Jun	13th Jul
1	Untreated	-	10.00	10.00	10.00
2	Artist + Stomp Aqua	-	8.75	10.00	10.00
3	AHDB9900	-	9.25	10.00	10.00
4	AHDB9975	-	9.00	10.00	10.00
5	AHDB9898	-	9.00	10.00	10.00
6	Artist + Stomp Aqua	Shark	8.50	10.00	9.00
7	AHDB9920	-	8.50	10.00	10.00
		F prob. value	0.001	N/S	0.001
		d.f.	18	18	18
		S.E.D.	0.2988	N/A	0.2182
		L.S.D.	0.6278	N/A	0.4585

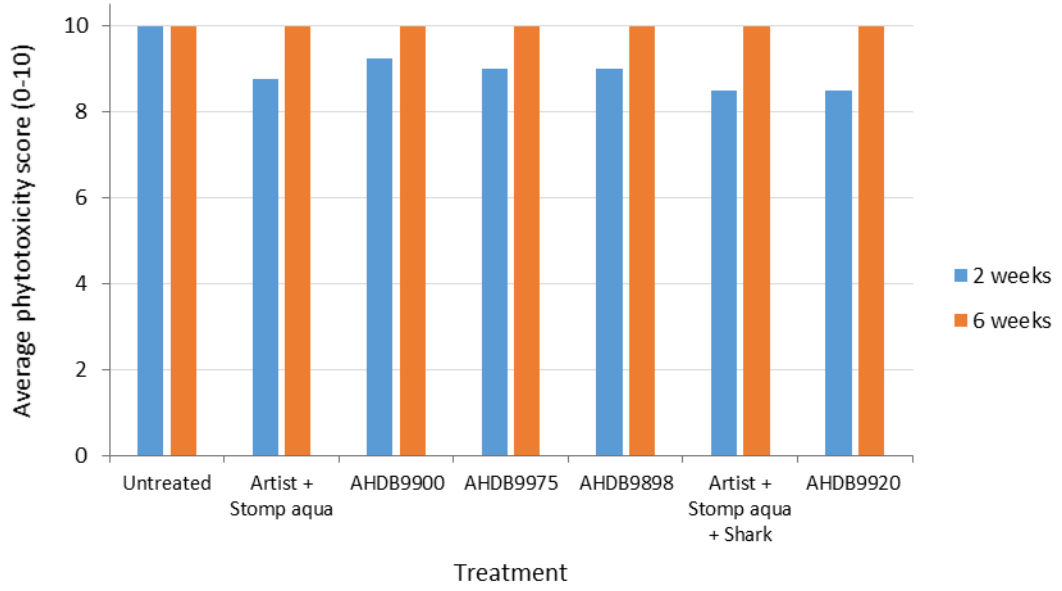


Figure 1. Mean phytotoxicity scores at 2 and 6 weeks after application of treatments.

Weed cover

The results for the mean percentage weed cover per treatment are presented in Table 3 and Figure 2. The percent reduction in weed cover compared to the untreated control was

calculated (using Abbotts formula) from these figures, and results for each treatment are listed in Table 4.

Table 3. Mean percentage weed cover values (angular and back transformed).

Trt No.	20th Apr		8th May		1st Jun		13th Jul	
	Ang.	Back-trans	Ang.	Back-trans	Ang.	Back-trans	Ang.	Back-trans
UTC*	17.66	9.21	39.22	39.97	73.23	91.68	81.07	97.59
2	16.12	7.70	26.34	19.68	53.49	64.61	57.84	71.67
3	14.13	5.96	27.34	21.09	55.67	68.19	60.11	79.24
4	12.33	4.56	21.56	13.50	55.31	67.61	62.66	81.36
5	13.53	5.47	28.14	22.24	50.19	59.01	62.90	78.91
6	12.93	5.01	23.07	15.35	55.44	67.82	64.27	75.17
7	14.74	6.47	27.42	21.21	59.57	74.34	64.42	81.15
F pr. value	0.028		<0.001		0.042		0.009	
d.f.	18		18		18		18	
S.E.D.	1.492		2.869		6.29		5.29	
L.S.D.	3.136		6.027		13.22		11.11	

* Untreated control; treatment 1

Initial weed cover in the plots was reasonably low with an average baseline value of 6.3 % across all plots (range: min 4.5 to max 9.2 %; Table 3). The majority of the weeds recorded at the start of the trial were perennials such as nettles and creeping thistles. The initial residual application (applied by the grower) appeared to have lost its efficacy by the two week assessment as there was a large increase in the weed cover in the control plots.

All of the treatments had a similar level of weed control throughout the trial, with AHDB9975 having the lowest weed cover 2 weeks after application and AHDB9898 having the lowest cover 6 weeks after application.

Over the course of the trial all treatments saw a net increase in the cover of weeds in the plots, however this was significantly lower than the cover in the control that had not had a second residual applied. There was a marked increase in weeds in all of the plots between 2 and 6 weeks of being treated and by harvest at 12 weeks after treatment weed cover had increased up to 80 % in some treatments. This was still significantly less than the control plots.

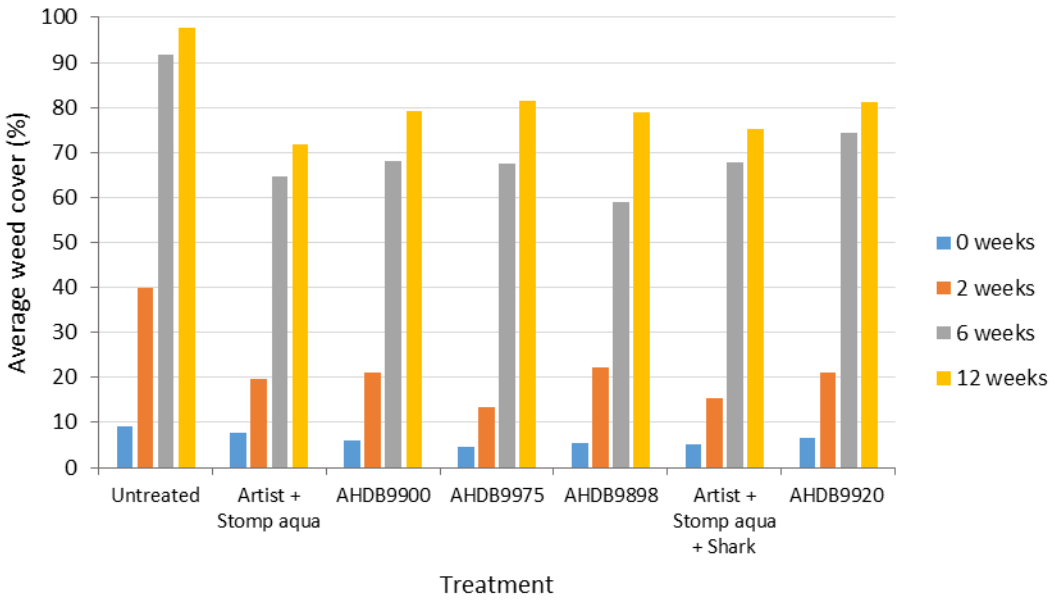


Figure 2. Mean weed cover in plots at baseline (0 week), 2 week, 6 week and 12 week assessments after treatment.

Table 4. Percentage reduction in weed cover (calculated using Abbotts formula) – values indicating an increase in weed cover highlighted.

Application A	Application B	Weed cover reduction (%)			
		20th Apr*	8th May	1st Jun	13th Jul
Artist + Stomp Aqua	-	16.31	50.76	29.53	26.56
AHDB9900	-	35.24	47.24	25.62	18.80
AHDB9975	-	50.47	66.22	26.25	16.63
AHDB9898	-	40.58	44.36	35.63	19.14
Artist + Stomp Aqua	Shark	45.57	61.60	26.03	22.97
AHDB9920	-	29.70	46.94	18.91	16.85

* Baseline assessment

Discussion

All treatments were shown to be crop safe during the trial, and although some phytotoxicity effects were noted, the damage was transient and the blackcurrant bushes showed no effects from the herbicides at six weeks after application. After six weeks there were no significant differences in the phytotoxicity symptoms shown by the bushes compared to the control. Due to the extremely dry conditions following the application of the treatments these results should be treated with caution as herbicide activity and movement may have been reduced. However in terms of crop safety, based on the results of this trial all of the treatments appear to be suitable for further investigation.

All of the treatments resulted in plots with significantly lower weed cover compared to the control, this was despite all plots having had a residual already applied to them. The standard generally performed as expected in the trial, although efficacy of this treatment was reducing by the six week assessment. This may in part be due to the drought conditions experienced during the trial period, as well as a high burden of perennial weeds in all of the plots.

The weed cover in all of the treatments was not significantly different to the grower standard, Artist + Stomp Aqua, at any of the assessment dates during the trial. AHDB9975 showed good initial efficacy at the two week assessment, which was comparable to the standard, although this was not carried all the way through to harvest. AHDB9898 was showing the best efficacy six weeks after treatment.

Of the treatments tested, AHDB9920 generally had the lowest reduction of weeds particularly at 6 weeks compared to the control, however it was not significantly different to the standard in terms of weed control and would add control of black nightshade, according to the product label. Artist + Stomp Aqua + Shark did not have a significantly improved impact on the weed cover compared to the standard of Artist + Stomp Aqua.

Conclusions

- All treatments were shown to be crop safe, despite the later than usual application date.
- All treatments resulted in significantly lower weed cover compared to the control plots. AHDB9975, AHDB9898 and AHDB9900 show promise for future work.
- The standard performed generally as expected, though the drought conditions are likely to have affected the efficacy of all treatments in the trial.
- Further studies should be carried out to assess the performance of the most promising products under more normal meteorological conditions.

Acknowledgements

AHDB for funding the work, and also the crop protection companies for their financial contributions as well as providing samples for the trials. Thanks should also be given to the Harriet Prosser from Lucozade Ribena Suntory and grower Andy Youngman who provided the site and crops for the trials as well as technical input.

Appendix

a. Crop diary – events related to growing crop

Crop	Cultivar	Planting date	Row width (m)
Blackcurrant	Ben Hope	12/12/2003	1.5

Previous cropping

Year	Crop
2017	Blackcurrant
2016	Blackcurrant

Active ingredients(s)/fertiliser(s) applied to trial area

Date	Product	Rate (kg/ha)
31/03/2017	13-13-29.5	308kg
10/05/2017	34.5% AN	123kg
06/04/2018	13-13-29.5	308kg
22/05/2018	34.5% AN	123kg

Pesticides applied to trial area

Date	Product	Rate (L/ha)
26/11/2016	Kerb Flo 400	3.0
17/02/2017	Stomp Aqua	2.9
	Artist	2.5
05/04/2017	Roundup	3.5
25/05/2017	Roundup	3.5
	Shark	0.3
22/11/2017	Kerb Flo 400	3.0
23/03/2018	Stomp Aqua	2.9
	Artist	2.5
	No further chemical applied as per request of lead researcher	-

Details of irrigation regime

Date	Type, rate and duration	Amount applied (mm)
N/A	-	-

b. Table showing sequence of events by date – this relates to treatments and assessments.

Date	Event
20/04/2018	Trial marked out and temperature/relative humidity data logger set up in centre of trial. Weed levels assessed.
08/05/2018	Weed levels and crop safety assessed.
01/06/2018	Weed levels and crop safety assessed.

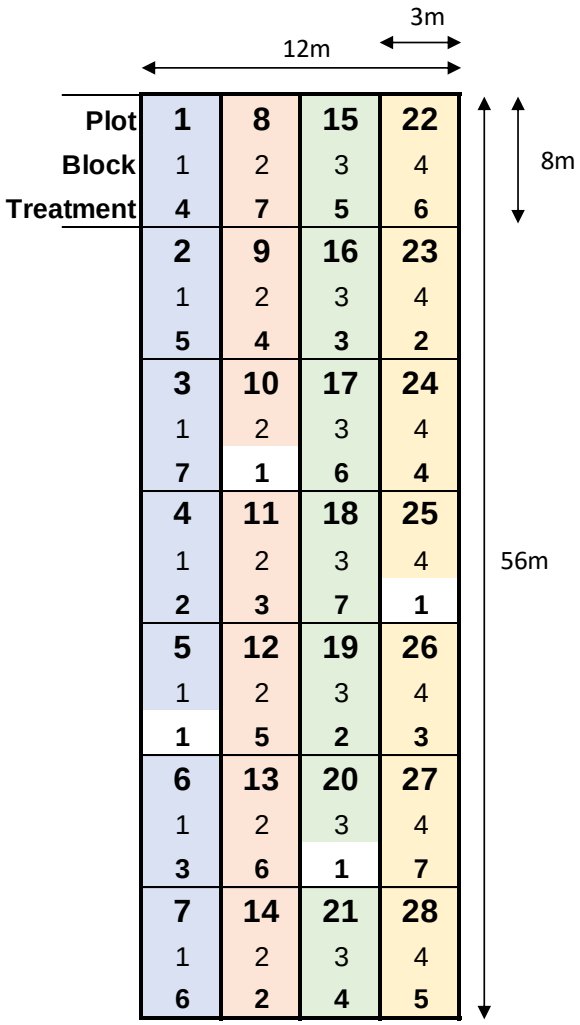
13/07/2018	Weed levels and crop safety assessed before harvest.

c. Table showing climatological data during study period.

Date	Temperature °C (maximum)	Temperature °C (minimum)	Rainfall (mm)
20/4/2018	30.0	9.0	0.0
21/4/2018	21.0	7.0	0.0
22/4/2018	28.5	9.5	0.0
23/4/2018	21.5	5.0	0.0
24/4/2018	17.0	10.5	0.0
25/4/2018	21.0	6.5	0.8
26/4/2018	19.5	4.5	0.0
27/4/2018	10.5	4.0	5.1
28/4/2018	9.5	7.0	7.9
29/4/2018	7.5	5.5	0.5
30/4/2018	6.0	5.0	16.3
01/5/2018	19.0	2.5	0.0
02/5/2018	13.5	3.0	3.8
03/5/2018	20.5	1.0	0.0
04/5/2018	23.0	6.0	0.0
05/5/2018	23.0	3.0	0.0
06/5/2018	24.5	3.5	0.0
07/5/2018	28.0	5.0	0.0
08/5/2018	29.5	5.5	0.0
09/5/2018	25.0	8.0	0.0
10/5/2018	21.0	8.0	0.0
11/5/2018	20.0	6.0	0.0
12/5/2018	22.0	7.5	5.8
13/5/2018	19.0	7.5	2.0
14/5/2018	21.0	6.5	0.0
15/5/2018	25.0	9.5	0.0
16/5/2018	15.0	7.0	0.0
17/5/2018	18.5	3.5	0.0
18/5/2018	20.5	4.0	0.0
19/5/2018	21.0	1.0	0.0
20/5/2018	22.0	6.5	0.0
21/5/2018	23.5	5.0	0.0
22/5/2018	24.5	8.5	0.0
23/5/2018	21.0	9.5	0.0
24/5/2018	24.0	11.0	1.8
25/5/2018	21.0	12.5	2.5
26/5/2018	24.5	13.0	0.0
27/5/2018	25.0	12.5	0.0
28/5/2018	29.0	10.5	0.0
29/5/2018	25.0	13.0	2.3
30/5/2018	23.0	12.5	2.3
31/5/2018	21.5	12.0	0.0
01/6/2018	24.0	14.0	0.3
02/6/2018	25.5	15.5	2.3
03/6/2018	27.0	12.0	0.3

Date	Temperature °C (maximum)	Temperature °C (minimum)	Rainfall (mm)
04/6/2018	18.0	11.0	0.5
05/6/2018	19.0	8.0	0.3
06/6/2018	22.5	6.5	0.0
07/6/2018	23.0	10.0	0.0
08/6/2018	21.0	9.0	0.0
09/6/2018	23.0	9.0	0.3
10/6/2018	22.0	10.0	0.3
11/6/2018	23.5	6.0	0.3
12/6/2018	17.0	11.5	0.3
13/6/2018	24.5	7.5	0.0
14/6/2018	25.0	11.0	0.0
15/6/2018	25.5	8.0	0.0
16/6/2018	24.0	11.0	0.0
17/6/2018	22.0	9.5	0.0
18/6/2018	29.0	14.5	0.3
19/6/2018	28.5	16.0	0.0
20/6/2018	29.0	13.0	0.0
21/6/2018	21.5	8.5	0.0
22/6/2018	23.5	6.0	0.0
23/6/2018	27.0	6.5	0.0
24/6/2018	25.0	6.5	0.0
25/6/2018	30.0	9.0	0.0
26/6/2018	27.5	9.0	0.0
27/6/2018	24.5	11.5	0.0
28/6/2018	28.0	10.5	0.0
29/6/2018	28	11.5	0.0
30/6/2018	27.5	12.5	0.0
01/7/2018	27.5	12	0.0
02/7/2018	27.5	9.5	0.0
03/7/2018	27	10	0.0
04/7/2018	27	8.5	0.0
05/7/2018	30	9	0.0
06/7/2018	31	12	0.0
07/7/2018	30.5	14	0.0
08/7/2018	32	10	0.0
09/7/2018	29	10.5	0.0
10/7/2018	23.5	13.5	0.0
11/7/2018	25.5	13.5	0.0
12/7/2018	26.5	10.5	0.0
13/7/2018	31.5	8.5	0.0

d. Trial plan



Plot	**1**	**8**	**15**	**22**
Block	1	2	3	4
Treatment	**4**	**7**	**5**	**6**
	2	**9**	**16**	**23**
	1	2	3	4
	5	**4**	**3**	**2**
	3	**10**	**17**	**24**
	1	2	3	4
	7	**1**	**6**	**4**
	4	**11**	**18**	**25**
	1	2	3	4
	2	**3**	**7**	**1**
	5	**12**	**19**	**26**
	1	2	3	4
	1	**5**	**2**	**3**
	6	**13**	**20**	**27**
	1	2	3	4
	3	**6**	**1**	**7**
	7	**14**	**21**	**28**
	1	2	3	4
	6	**2**	**4**	**5**

e. Phytotoxic effects

Figure 4. Scorch to blackcurrant leaves from AHDB9920 (1.0 l/ha) (2 weeks after treatment – 08/05/2018)

f. ORETO certificate

Certificate of

Official Recognition of Efficacy Testing Facilities or Organisations in the United Kingdom

This certifies that

RSK ADAS Ltd

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

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

Agriculture/Horticulture
Stored Crops
Biologicals and Semiochemicals

Date of issue: 1 June 2018
Effective date: 18 March 2018
Expiry date: 17 March 2023

Signature Alison Richardson
Authorised signatory

Certification Number
ORETO 409

HSE
Chemicals Regulation Division

Department of Agriculture and Rural Development