SCEPTREPLUS

Final Trial Report

Trial code:	2019.SP27
Title:	AHDB SCEPTREplus brassica herbicide screens – cauliflower (post-plant)
Crop	Group: field vegetables – Brassicas (cauliflower)
Target	General broadleaf weeds and grasses, 3WEEDT EPPO1/089(3) Weeds in leafy and brassica vegetables
Lead researcher:	Angela Huckle
Organisation:	RSK ADAS
Period:	1st April 2019 – 31st March 2020
Report date:	29th February 2020
Report author:	Angela Huckle Emily Lawrence
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

31st March 2020
Date

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Authors signature

ADAS

AHDB HORTICULTURE

Trial Summary

Introduction

The limited range of herbicides currently available for use in brassica crops leaves gaps in the weed control spectrum, and growers experience problems with a wide range of weeds. In addition to having a short list of approved actives, only a small subset of these offer the longevity of control required to protect longer season brassicas, such as cabbage.

In predominantly hand harvested crops such as brassicas, weeds are a physical impediment to those working in the crop, and species such as nettles can deter pickers. Weeds which obscure the crop further reduce harvesting efficiency; where excessive weeds mean heads are missed, harvested yields can be reduced by up to 30%. The increased humidity in the crop canopy can also increase the risk of disease and weed seeds can contaminate the fresh product.

While mechanical hoeing can be successfully used as an alternative weed control method, it is limited by crop growth stage and ground conditions—if soil conditions are not suitable, this approach cannot always be used. Therefore, further options for weed control are required.

The objective of these trials was to identify crop-safe and effective herbicides for weed control in brassica crops, aiming to expand the options available to growers.

Method

The trial was sited at Elsoms Trial Ground in Lincolnshire and was planted on 1st August 2019 with cauliflower (variety 'Liria').

Treatments were applied at two timings. The first were applied on 2nd September 2019 (BBCH17), with a second treatment applied to select plots on 13th September (BBCH19). All treatments were applied with a 2 m boom, using a knapsack sprayed at 300 L/ha water volume. A randomised block design was used for the trial layout, with three replicates of twelve treatments, including an untreated control. There were twenty-four plots in total, each measuring 2 m x 6 m.

The plots were assessed on four occasions (see 'Assessment details'), focussing on weed cover and species presence, and crop phytotoxicity (i.e. treatment safety). Assessments were carried out approximately two, four, eight, and twelve weeks after treatments were applied.

Results and discussion

Of the treatments assessed in this trial, none gave both statistically significant weed control or appeared crop safe (**Table 1**, **Table 2**). However, there were significant environmental factors which impacted crop quality and confounded assessments.

This trial was sited in a challenging field, which featured a soil pan across its centre where the post-planting trial was sited. This pan may have been created at the time of planting due to the wet conditions in the week beforehand and would therefore have been difficult to avoid. The compaction in this area meant that the growth of cauliflower planted was stunted, regardless of the treatment applied. Additionally, the trial received excessive rainfall for the time of year and the ground was waterlogged for at least the final two months of the trial, which was exacerbated by the poor drainage. Disease progression was promoted in these conditions, and by the final assessment, some curds were rotting. Grazing and pest damage was a further issue, despite the implementation of bird scarers and flags, and insecticide treatment. There was also a clear difference in weed cover between the top and bottom areas of the trial area, with relatively few weeds in the first block of plots, and considerable cover in the third block. This is likely attributable to the site's history as a trial field.

It is unfortunate that the trial site presented these issues, as they had a confounding effect on the crop quality results—with stunting and foliar damage common across the trial—which were difficult to overlook in quality assessments. The challenging growing conditions affected the

weeds as well as the crop, with weed cover influenced by long-term standing water in the trial area. In order to determine the crop safety and efficacy of the products in this trial, repeat trial work is recommended.

Table 1. Mean percentage weed cover values (transformed) at two, four, eight, and twelve weeks after post-planting treatment application.

Treatment	(rate)	Mean weed cover							
		+ 2 weeks		+ 4 weeks		+ 8 weeks		+ 12 weeks	
		Ang	Back-trans	Ang	Back-trans	Ang	Back-trans	Ang	Back-trans
Untreated		39.3	40.1	49.1	57.1	48.9	56.8	51.1	60.6
AHDB9875	(-)	32.7	29.2	34.3	31.8	34.5	32.1	39.0	39.7
AHDB9917	(-)	34.3	31.8	40.2	41.6	39.9	41.1	44.9	49.8
AHDB9874	(-)	33.4	30.2	40.3	41.9	5.0	32.9	35.0	32.9
AHDB9874 x2	(-)	30.6	25.9	29.8	24.7	25.0	17.9	31.1	26.8
AHDB9887	(½ N)	37.5	37.1	41.3	43.6	34.0	31.2	36.1	34.7
AHDB9887	(N)	38.7	39.0	39.6	40.6	25.8	19.0	30.7	26.0
Dow Shield	(0.5 L/ha)	31.4	27.1	39.7	40.9	40.7	42.5	43.3	47.0
AHDB9840	(½ N)	33.1	29.8	35.6	33.9	35.1	33.1	41.0	43.0
AHDB9840	(N)	34.3	31.8	41.6	44.1	44.7	49.4	45.9	51.6
AHDB9840	(2N)	28.1	22.1	30.5	25.7	35.0	32.9	38.9	39.4
Lentagran	(2.0 kg/ha)	27.5	21.3	28.6	22.9	45.0	50.0	46.0	51.8
p-value			0.668		0.203		0.088		0.087
d.f.			22		22		22		22
L.S.D.			12.68		14.31		15.29		13.24

Table 2. Mean crop phytotoxicity scores at two, four, eight, and twelve weeks after post-planting treatment application in cauliflower. Scored on 0 to 10 scale, with 0 being 'no effect', and 10 being 'dead'; scores ≤2 deemed commercially acceptable level of damage.

Treatment	(rate)	Mean crop damage scores			
		+ 2 weeks	+ 4 weeks	+ 8 weeks	+ 12 weeks
Untreated		0.0	0.0	7.0	6.7
AHDB9875	(-)	0.0	0.0	5.7	6.0
AHDB9917	(-)	0.0	0.0	3.0	2.0
AHDB9874	(-)	0.0	0.0	6.0	5.0
AHDB9874 x2	(-)	0.0	0.0	3.3	3.3
AHDB9887	(½ N)	0.0	0.0	5.7	4.7
AHDB9887	(N)	0.0	0.0	6.3	6.3
Dow Shield	(0.5 L/ha)	0.0	0.0	5.3	4.7
AHDB9840	(½ N)	0.7	0.0	6.3	6.0
AHDB9840	(N)	0.3	0.0	3.0	2.7
AHDB9840	(2N)	1.0	0.0	7.3	6.7
Lentagran	(2.0 kg/ha)	0.7	0.0	5.0	5.0
p-value		0.043	-	0.075	0.048
d.f.		22	-	22	22
L.S.D.		0.6860	-	3.0630	3.0240

Conclusion

- Further work with the trial treatments is required to assess their safety and efficacy as post-planting weed control products in cauliflower.

Take home message

No conclusions or messages could be drawn from the trial due to the confounding environmental issues.

Objectives

To compare a number of new and novel herbicides at the post-planting application timing for selectivity (crop safety) and efficacy in cauliflowers.

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
EPPO PP1/135(4)	Phytotoxicity assessment	None
EPPO PP1/152(4)	Guideline on design and analysis of efficacy evaluation trials	None
EPPO PP1/181(4)	Conduct and reporting of efficacy evaluation trials including good experimental practice	None
EPPO PP1/214(3)	Principles of acceptable efficacy	None
EPPO PP1/224(2)	Principles of efficacy evaluation for minor uses	None
EPPO PP1/225(2)	Minimum effective dose	None

There were no deviations from EPPO guidance.

Test site

Item	Details
Location address	Field: Elsoms Trial Ground off A16 PE11 3JG Lincolnshire Grid reference: TF 25745 25975
Crop ('cultivar')	Cauliflower ('Liria')
Soil or substrate type	Loamy and clayey soil of coastal flats with naturally high groundwater
Agronomic practice	See Appendix
Prior history of site	See Appendix

Trial design

Item	Details
Trial design:	Fully randomised block
Number of replicates:	3
Row spacing:	0.61 m (3 rows per 2 m wide plot)
Plot size: (w x l)	2.4 m x 5 m
Plot size:	12 m^2
Number of plants per plot:	approx. 33

Treatment details

AHDB Code	Product name	Active substance	Formulation batch number	Content of active substance (g/L)	Formulation type
N/A†	Lentagran	pyridate	N/K *(grower stock)*	45 % w/w	Wettable Powder
N/A*	Dow Shield	clopyralid	N/K *(grower stock)*	400	Soluble Concentrate
AHDB9875	N/D	N/D	N/D	N/D	N/D
AHDB9917	N/D	N/D	N/D	N/D	N/D
AHDB9874	N/D	N/D	N/D	N/D	N/D
AHDB9887	N/D	N/D	N/D	N/D	N/D
AHDB9840	N/D	N/D	N/D	N/D	N/D

* label approval
† EAMU approval

Application schedule

Trt. No.	Treatment: product name or AHDB code	Application timing code	Rate of active substance(s) (g/ha)	Rate of product (L/ha)
1	Untreated	-	-	-
2	AHDB9875	A	1200 24	3.00
3	AHDB9917	A	N/K	0.70
4	AHDB9874	A	2.5 12	0.25
5	AHDB9874	A, B	2.5 12	0.25
6	AHDB9887	A	N/K	(kg/ha) 0.50
7	AHDB9887	A	N/K	(kg/ha) 1.00
*8	Dow Shield	A	200	0.50
9	AHDB9840	A	2.5 60	0.50
10	AHDB9840	A	5 120	1.00
11	AHDB9840	A	10 240	2.00
12	Lentagran	A	900	(kg/ha) 2.00

* grower standard

Application details

	Timing A	Timing B
Application date	02/09/2019	13/09/2019
Time of day	11:00 – 13:00	12:30 – 13:00
Crop growth stage (Max, min average BBCH)	BBCH17	BBCH19
Crop height (cm)	N/K	N/K
Crop coverage (%)	N/K	N/K
Application Method	spray	spray
Application Placement	foliar	foliar
Application equipment	AZO Plot	AZO Plot
Nozzle pressure (bar)	2.5	2.5
Nozzle type	Flat fan	Flat fan
Nozzle size	02-F110	02-F110
Application water volume (L/ha)	300	300
Temperature of air (°C)	18.0	18.0
Relative humidity (%)	55	49
Wind speed range (kph)	(N) 14.0	(N) 12.0
Dew presence	N	N

(Y/N)		
Temperature of soil (°C)	17.0	18.0
Wetness of soil	normal	normal
Cloud cover (%)	75	70

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

Common name	**Scientific Name**	**EPPO Code**	**Infection level* at start of assessment period** (Timing A + 2 weeks)	**Infection level* mid-assessment period** (Timing A + 8 weeks)	**Infection level* at end of assessment period** (Timing A + 12 weeks)
Broad leaved weeds and grasses	*N/A*	3WEEDT	40.1%	56.8%	60.6%

* average weed cover (back-transformed).

Assessment details

Evaluation date	**Evaluation Timing** (DA)*	**Evaluation type**	**What was assessed and how** (e.g. dead or live pest; disease incidence and severity; yield, marketable quality)
17/09/2019	15	Efficacy, Phyto	Percentage of weed cover (whole plot score), weed species presence. Phyto (scale 0-10, 10 = Dead).
30/09/2019	28	Efficacy Phyto	Percentage of weed cover (whole plot score), weed species presence. Phyto (scale 0-10, 10 = Dead).
28/10/2019	56	Efficacy Phyto	Percentage of weed cover (whole plot score), weed species presence. Phyto (scale 0-10, 10 = Dead).
27/11/2019	86	Efficacy Phyto	Percentage of weed cover (whole plot score), weed species presence. Phyto (scale 0-10, 10 = Dead).

* DA – days after Timing A application.

Statistical analysis

This trial had a randomised block design and comprised twelve treatments, including an untreated control and grower standard treatment. Treatments were replicated three times.

As the distribution of weeds was uneven across the trial—which is not unexpected in field situations—there was a need to transform the data prior to analysis. To determine treatment efficacy, an angular transformation was performed and the back transformed means presented, from which the % reduction in weeds was calculated using Abbott's formula.

All data were analysed by ANOVA using Genstat (18th edition) by Emily Lawrence (ADAS).

Results

Phytotoxicity

The results of phytotoxicity assessments from four dates are presented in **Table 1** and **Figure 1**. These were scored on a scale from 0 to 10, with 0 being 'no effect', and 10 being 'dead'. Plots scored 2 or less were deemed to have a commercially acceptable level of damage.

Phytotoxicity was recorded using the following scale:

Crop tolerance score	(% phytotoxicity) Equivalent to crop damage
0	*(no damage)* 0%
1	10%
***2**	20%
3	30%
4	40%
5	50%
6	60%
7	70%
8	80%
9	90%
10	*(complete crop kill)* 100%

* ≤2 = acceptable damage, i.e. damage unlikely to reduce yield, and acceptable to the farmer.

There were relatively few phytotoxic effects observed for any treatment when assessed two and four weeks after the final treatment application. However, when assessed eight weeks after treatment, crop damage across all treatments and the untreated control exceeded the commercially acceptable level. Similar scores were recorded at the final assessment, twelve weeks after the final treatment application. **AHDB9917** treated cauliflowers were the only crop recorded to be of commercially acceptable quality by the conclusion of the trial.

Table 1. Mean crop phytotoxicity scores at two, four, eight, and twelve weeks after post-planting treatment application in cauliflower.

Treatment	(rate)	Mean crop damage scores			
		+ 2 weeks	+ 4 weeks	+ 8 weeks	+ 12 weeks
Untreated		0.0	0.0	7.0	6.7
AHDB9875	(-)	0.0	0.0	5.7	6.0
AHDB9917	(-)	0.0	0.0	3.0	2.0
AHDB9874	(-)	0.0	0.0	6.0	5.0
AHDB9874 x2	(-)	0.0	0.0	3.3	3.3
AHDB9887	(½ N)	0.0	0.0	5.7	4.7
AHDB9887	(N)	0.0	0.0	6.3	6.3
Dow Shield	(0.5 L/ha)	0.0	0.0	5.3	4.7
AHDB9840	(½ N)	0.7	0.0	6.3	6.0
AHDB9840	(N)	0.3	0.0	3.0	2.7
AHDB9840	(2N)	1.0	0.0	7.3	6.7
Lentagran	(2.0 kg/ha)	0.7	0.0	5.0	5.0
	p-value	0.043	-	0.075	0.048
	d.f.	22	-	22	22
	L.S.D.	0.6860	-	3.0630	3.0240

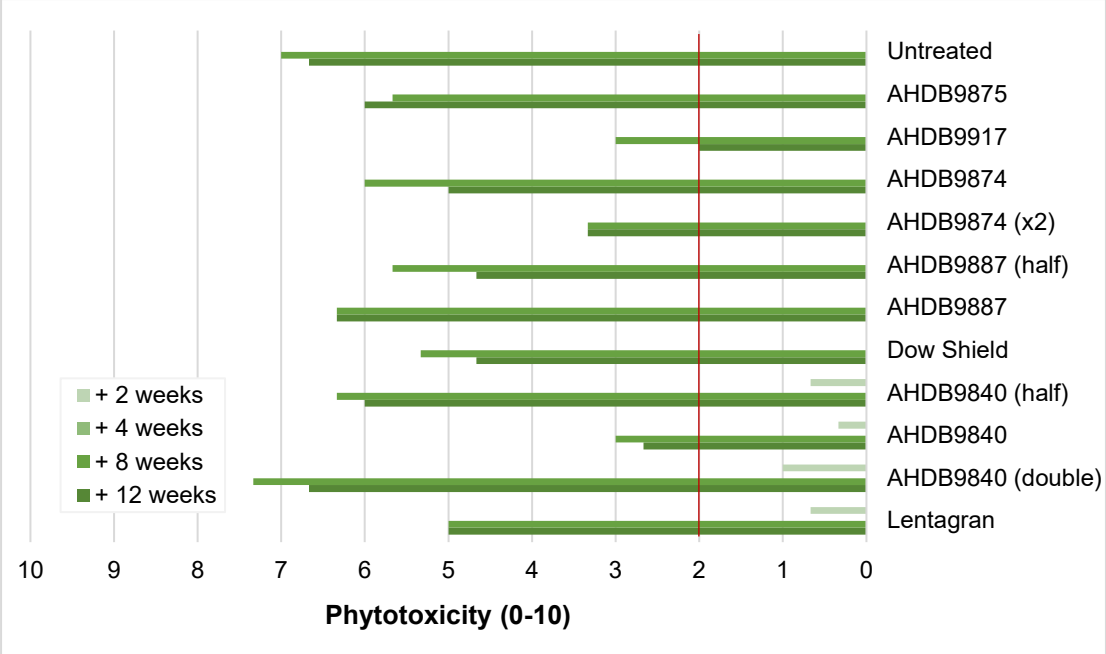


Figure 1. Mean phytotoxicity (0-10) at two, four, eight, and twelve weeks after post-planting treatment application. Scores ≤2 (marked by red line) deemed acceptable damage.

Weed control – mean percentage weed cover

The results for the mean percentage weed cover per treatment are presented in **Table 2** and **Figure 2**. The percent reduction in weed cover compared to the untreated control was calculated from these figures (using Abbott's formula), and results for each treatment are listed in **Table 3**.

In the trial area, the most common weed species were shepherd's purse, groundsel, speedwell, chickweed, mayweed, annual meadow grass and annual nettle.

There were no significant differences in weed control noted between any treatment and the untreated control for any assessment during this trial's twelve-week assessment period.

Table 2. Mean percentage weed cover values (transformed) at two, four, eight, and twelve weeks after post-planting treatment application.

Treatment	(rate)	Mean weed cover							
		+ 2 weeks		+ 4 weeks		+ 8 weeks		+ 12 weeks	
		Ang	Back-trans	Ang	Back-trans	Ang	Back-trans	Ang	Back-trans
Untreated		39.3	40.1	49.1	57.1	48.9	56.8	51.1	60.6
AHDB9875	(-)	32.7	29.2	34.3	31.8	34.5	32.1	39.0	39.7
AHDB9917	(-)	34.3	31.8	40.2	41.6	39.9	41.1	44.9	49.8
AHDB9874	(-)	33.4	30.2	40.3	41.9	5.0	32.9	35.0	32.9
AHDB9874 x2	(-)	30.6	25.9	29.8	24.7	25.0	17.9	31.1	26.8
AHDB9887	(½ N)	37.5	37.1	41.3	43.6	34.0	31.2	36.1	34.7
AHDB9887	(N)	38.7	39.0	39.6	40.6	25.8	19.0	30.7	26.0
Dow Shield	(0.5 L/ha)	31.4	27.1	39.7	40.9	40.7	42.5	43.3	47.0
AHDB9840	(½ N)	33.1	29.8	35.6	33.9	35.1	33.1	41.0	43.0
AHDB9840	(N)	34.3	31.8	41.6	44.1	44.7	49.4	45.9	51.6
AHDB9840	(2N)	28.1	22.1	30.5	25.7	35.0	32.9	38.9	39.4
Lentagran	(2.0 kg/ha)	27.5	21.3	28.6	22.9	45.0	50.0	46.0	51.8
	p-value		0.668		0.203		0.088		0.087
	d.f.		22		22		22		22
	L.S.D.		12.68		14.31		15.29		13.24

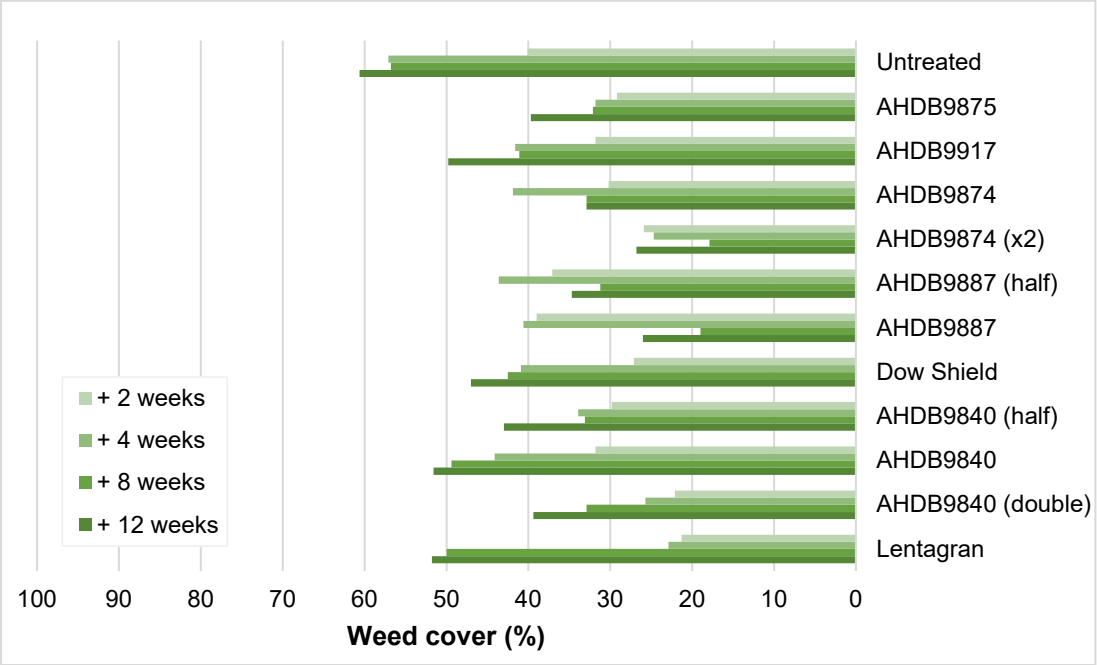


Figure 2. Mean weed cover (back transformed, %) at two, four, eight, and twelve weeks after post-planting treatment application.

Table 3. Percentage reduction in weed cover compared to the untreated control at two, four, eight and twelve weeks after post-planting treatment application.

Treatment	(rate)	Weed cover reduction (%)			
		+ 2 weeks	+ 4 weeks	+ 8 weeks	+ 12 weeks
AHDB9875	(-)	27.2	44.3	43.5	34.6
AHDB9917	(-)	20.8	27.0	27.7	17.9
AHDB9874	(-)	24.7	26.6	42.1	45.8
AHDB9874 x2	(-)	35.4	56.7	68.6	55.9
AHDB9887	(½ N)	7.5	23.7	45.1	42.8
AHDB9887	(N)	2.8	28.9	66.6	57.1
Dow Shield	(0.5 L/ha)	32.5	28.4	25.3	22.5
AHDB9840	(½ N)	25.8	40.5	41.8	29.1
AHDB9840	(N)	20.7	22.8	13.0	14.9
AHDB9840	(2N)	44.9	55.0	42.2	35.1
Lentagran	(2.0 kg/ha)	47.0	59.9	12.0	14.6

Discussion

Of the treatments assessed in this trial, none gave both statistically significant weed control or appeared crop safe. However, there were significant environmental factors which impacted crop quality and confounded assessments.

This trial was sited in a challenging field, which featured a soil pan across its centre where the post-planting trial was sited. This pan may have been created at the time of planting due to the wet conditions in the week beforehand and would therefore have been difficult to avoid. The compaction in this area meant that the growth of cauliflower planted was stunted, regardless of the treatment applied. Additionally, the trial received excessive rainfall for the time of year and the ground was waterlogged for at least the final two months of the trial, which was exacerbated

by the poor drainage. Disease progression was promoted in these conditions, and by the final assessment, some curds were rotting. Grazing and pest damage was a further issue, despite the implementation of bird scarers and flags, and insecticide treatment. There was also a clear difference in weed cover between the top and bottom areas of the trial area, with relatively few weeds in the first block of plots, and considerable cover in the third block. This is likely attributable to the site's history as a trial field.

It is unfortunate that the trial site presented these issues, as they had a confounding effect on the crop quality results—with stunting and foliar damage common across the trial—which were difficult to overlook in quality assessments. The challenging growing conditions affected the weeds as well as the crop, with weed cover influenced by long-term standing water in the trial area. In order to determine the crop safety and efficacy of the products in this trial, repeat trial work is recommended.

Conclusions

- Further work with the trial treatments is required to assess their safety and efficacy as post-planting weed control products in cauliflower.

Acknowledgements

AHDB for funding the work, and the crop protection companies for their financial contributions and provision of samples for the trials. Thanks too to Elsoms Seeds, who provided sites and crop for the trials, and to Carl Sharp of the Allium and Brassica Centre, for site management and treatment application.

Appendix

a. Crop diary – events related to growing crop

Crop	**Cultivar**	**Planting date**	**Row width** (m)
Cauliflower	Liria	01/08/2019	0.61 m

Previous cropping

Year	**Crop**
2018	PSB/cauliflower (half of the trial area)
2017	Rye (cover crop)
2016	Bare ground

Cultivations

Date	**Description**
Mar 2019	Power harrowed and rolled prior to planting.
Dec 2018	Subsoiled and winter ploughed.

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

Date	**Product**	**Rate** (kg/ha)
Mar 2019	Base fertiliser	250 kg/ha 10-15-21 + 20SO_3
Mar 2019	Top dressing	80 kg/ha N 26N + 35SO_3

Pesticides applied to trial area

Date	Product	Rate (L/ha)
15/10/19	Biscaya	0.4
	Tracer	0.2

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

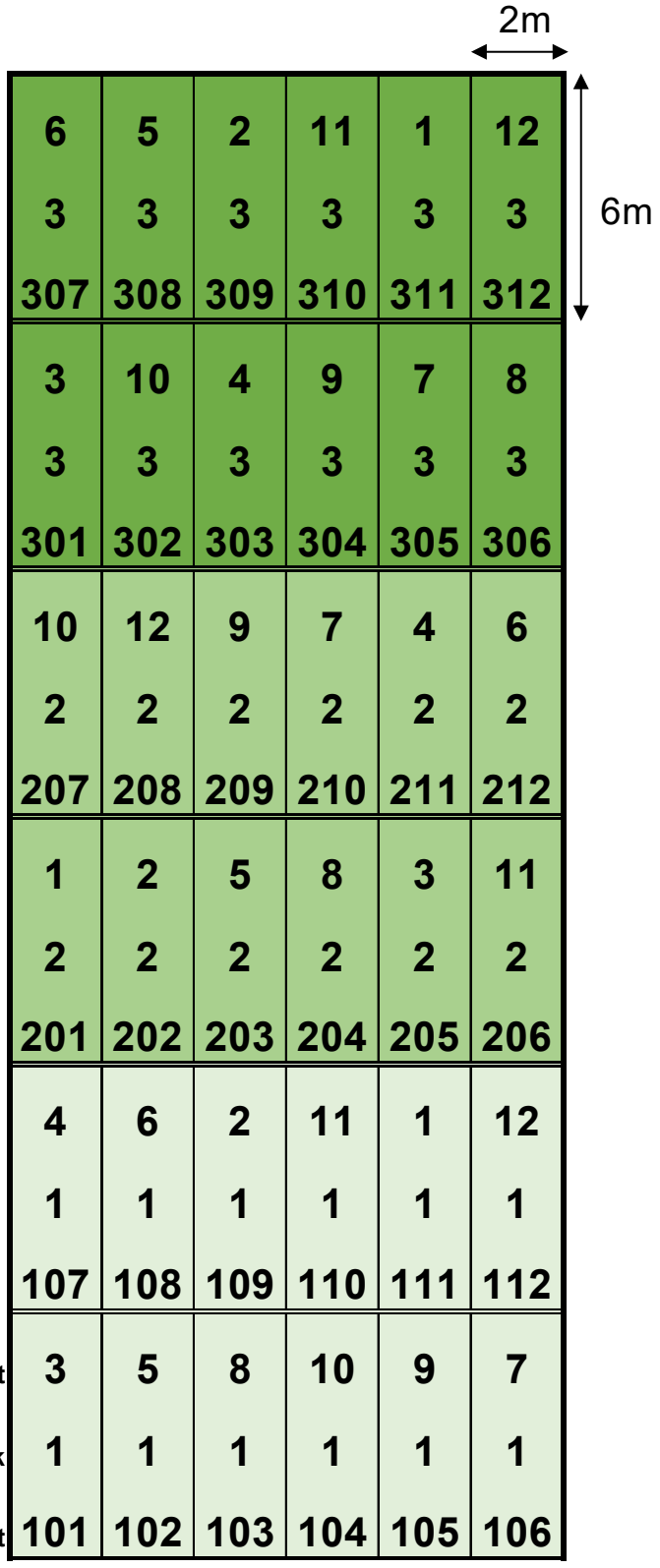
Date	Event
01/08/2019	Crop planted.
02/09/2019	Application A spray.
13/09/2019	Application B spray.
17/09/2019	Assessment, two weeks after treatment (phyto/weeds).
30/09/2019	Assessment, four weeks after treatment (phyto/weeds).
28/10/2019	Assessment, eight weeks after treatment (phyto/weeds).
27/11/2019	Assessment, twelve weeks after treatment (phyto/weeds).

c. Climatological data during study period from each site.

Date	Min. temp. (°C)	Max. temp. (°C)	Precip. (mm)
02/09/19	8	19	0
03/09/19	12	24	0
04/09/19	13	19	2
05/09/19	8	19	0
06/09/19	8	19	0
07/09/19	8	17	0
08/09/19	8	18	0
09/09/19	8	14	2
10/09/19	8	18	0
11/09/19	8	22	1
12/09/19	8	24	0
13/09/19	8	20	0
14/09/19	8	22	0
15/09/19	8	20	3
16/09/19	8	17	7
17/09/19	8	17	0
18/09/19	8	18	0
19/09/19	8	22	0
20/09/19	8	20	0
21/09/19	8	24	0
22/09/19	8	23	3
23/09/19	8	20	1
24/09/19	8	18	16
25/09/19	8	18	35
26/09/19	8	20	5
27/09/19	8	16	9
28/09/19	8	18	16
29/09/19	8	19	26
30/09/19	8	16	14
01/10/19	8	14	48
02/10/19	8	13	0
03/10/19	8	12	7
04/10/19	8	15	8
05/10/19	8	16	0
06/10/19	8	14	15
07/10/19	8	13	1
08/10/19	8	16	0
09/10/19	8	16	0
10/10/19	8	16	0
11/10/19	8	16	6
12/10/19	8	15	0
13/10/19	8	14	22
14/10/19	8	13	20
15/10/19	8	13	11

Date	Min. temp. (°C)	Max. temp. (°C)	Precip. (mm)
16/10/19	8	15	1
17/10/19	8	13	1
18/10/19	8	14	1
19/10/19	8	14	1
20/10/19	8	12	1
21/10/19	8	13	1
22/10/19	3	14	0
23/10/19	4	14	1
24/10/19	7	12	10
25/10/19	6	15	2
26/10/19	5	9	28
27/10/19	3	12	0
28/10/19	2	11	0
29/10/19	2	12	2
30/10/19	4	12	1
31/10/19	3	11	0
01/11/19	6	14	6
02/11/19	8	14	10
03/11/19	6	12	0
04/11/19	7	12	2
05/11/19	5	12	12
06/11/19	3	8	1
07/11/19	6	9	28
08/11/19	3	8	6
09/11/19	1	7	0
10/11/19	4	10	0
11/11/19	5	9	12
12/11/19	4	8	1
13/11/19	1	9	0
14/11/19	4	8	39
15/11/19	3	9	4
16/11/19	6	9	1
17/11/19	5	9	0
18/11/19	1	8	0
19/11/19	-3	5	0
20/11/19	0	7	0
21/11/19	2	7	0
22/11/19	6	9	2
23/11/19	7	10	10
24/11/19	8	9	0
25/11/19	7	11	6
26/11/19	8	12	5
27/11/19	7	10	26

d. Trial design



	6	5	2	11	1	12
	3	3	3	3	3	3
	307	308	309	310	311	312
	3	10	4	9	7	8
	3	3	3	3	3	3
	301	302	303	304	305	306
	10	12	9	7	4	6
	2	2	2	2	2	2
	207	208	209	210	211	212
	1	2	5	8	3	11
	2	2	2	2	2	2
	201	202	203	204	205	206
	4	6	2	11	1	12
	1	1	1	1	1	1
	107	108	109	110	111	112
Treatment	3	5	8	10	9	7
Block	1	1	1	1	1	1
Plot	101	102	103	104	105	106

e. 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