Project title:	AHDB Field Vegetable Centres – Brassicas, Lincolnshire – Collards post-planting herbicides demonstration
Project number:	FV 462
Project leader:	Angela Huckle, ADAS Horticulture
Report:	Annual Report, December 2020
Previous report:	Annual Report, March 2020
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Location of project:	Old Leake, Lincolnshire
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Date project commenced:	1 April 2019

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Peter Seymour

Horticulture Consultant

ADAS Horticulture

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GROWER SUMMARY

Headline

- The residual herbicide AHDB 9987 used alone or in a tank-mix with Gamit 36 CS (clomazone) gave effective weed control for up to twelve weeks when applied soon after planting with good soil moisture.
- The residual/contact herbicides AHDB 9875 and AHDB 9840 0.75 /ha applied a month after planting to weeds at up to 2 true leaf stage, significantly reduced weed levels for up to eight weeks after application.
- These treatments were safe to use over collards at these timings.

Background

The limited range of herbicides currently available for use in brassica crops such as collards (pointed cabbage) leaves gaps in the weed control spectrum, and growers experience problems with a wide range of weeds. Broad leaved weeds remain a key concern for brassica growers, particularly fat-hen, red-shank, charlock and fumitory (AHDB Gap Analysis, 2016). 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. A further challenge for authorisation of products in minor brassica crops such as collards is the availability of crop safety and efficacy data to guide growers with their use, as products are usually only trialled over the major brassica types such as cauliflower and headed cabbage.

In 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 in minor brassica crops are required.

The objectives of this trial are to compare and demonstrate a number of new herbicides from the SceptrePlus project which are close to authorisation at two post-planting application timings for selectivity (crop safety) and efficacy in collards.

Summary

Materials and methods

The trial was situated within a collard crop of a commercially grown variety, cv. Duncan, planted on 7 August 2020. The plots were located at the HL. Hutchinsons brassica trial demonstration site at F. Daubney and Sons in Lincolnshire. The trial was sited in a field with a history of weed problems, and a high level of weeds was established in the untreated control plots by the end of the trial which included the species chickweed (*Stellaria media*), fat hen (*Chenopodium album*), mayweed (*Matricaria spp.*), pale persicaria (*Persicaria lapathifolia*), groundsel (*Senecio vulgaris*) and Shepherds purse (*Capsella-bursa pastoris*).

A randomised block design was used for the trial layout, with three replicates of 12 treatments (Table 3), including one untreated control and two commercial industry standards (Dow Shield and Lentagran). Although, only the first two replicates were assessed for the initial trial measurements until weed levels increased at the third assessment, and then the third replicate was included for the final three assessments from 9th October onwards. There were thirty-two plots in total with the total trial area measuring 12 x 36m. Plots comprised a 6m length of a 2m wide bed. A discard row was planted either side of the trial.

Table 1. Treatment products, rates and timings for the collards herbicide screen at Old Leake, Lincs, 2020

	Timing 1 – Applied within 7 days of planting 10th August 2020		**Timing 2 – Applied at BBCH18 3rd September 2020**	
Trt. No.	**Product**	**Rate (L/ha** or **kg/ha)**	**Product**	**Rate (L/ha** or **kg/ha)**
1	UTC	-		
2*	-	-	Lentagran	2.0 kg/ha
3*	-	-	Dow Shield 400	0.5 L/ha
4	AHDB 9987	2.0 L/ha	-	-
5	AHDB 9987 + Gamit 36 CS	1.0 L/ha 0.25 L/ha	-	-
6	AHDB 9917	0.7 L/ha	-	-
7	-	-	AHDB 9875	3.0 L/ha
8	-	-	AHDB 9840	0.5 L/ha
9	-	-	AHDB 9840	0.75 L/ha
10	-	-	AHDB 9887	0.5 L/ha
11	-	-	AHDB 9887	0.75 L/ha
12	-	-	AHDB 9887	1.0 L/ha

Treatments were applied using a precision knapsack sprayer with a 2-metre boom and 02F110 nozzles at medium quality and 200 litres per hectare water volume (Table 5). All treatments were applied post-planting. Timing 1 applications - Treatments 4, 5 and 6 - were applied on August 10th, within seven days after planting. The Timing 2 applications -

Treatments 2, 3 and 7-12 - were applied on September 3rd, four weeks after planting when the collards reached eight true leaves. Data was collected on weed levels and species, and any effects on the crop were recorded for phytotoxicity (crop damage) assessments. The crop growth stage and any variation within the plots was recorded at each visit. Weed assessments were carried out at the second application, then, four, six, eight, nine, ten and twelve weeks after the 'Timing 1' treatment application. Overall weed levels were recorded at every assessment as percentage cover per plot.

To assess crop damage, any observed effects attributable to phytotoxicity such as chlorosis or scorch were recorded, and photographs were taken. Crop safety was assessed at the same time as the weed assessments. The results of these assessments were analysed using analysis of variance.

Results and discussion

Although soil conditions were moist when the first applications were made, later weather in August was drier and this meant that weeds did not germinate or grow rapidly until two months into the trial. But, the initial moisture at application led to good conditions for the residual herbicides such as AHDB 9987 to work, and then subsequently with weeds emerging and growing slowly in the dry, they remained small, and at cotyledon to two true leaves when the contact herbicides were applied a month later. This was the ideal weed size and timing for the contact herbicides to work effectively, and determine performance.

There were three products which combined crop safety with effective weed control, these were AHDB 9987 applied with or without Gamit 36 CS soon after planting, and AHDB 9875 or AHDB 9840 0.75 L/ha applied at eight true leaves, and a month after planting (Table 2). Both products significantly reduced percentage weed cover by at least 70% compared to the untreated control at the final assessment twelve weeks after the first application ($P < 0.001$, LSD = 32.39) .

Of the treatments applied within five days after planting, AHDB 9987 used alone or in a tank mix with Gamit 36 CS significantly reduced mean percentage weed cover at assessments from eight weeks after application onwards. Although there was no significant difference in the first two assessments, the weed levels in the plots treated with the products were generally low. AHDB 9917 was also applied at this timing, and initially also showed a trend for reduced weed levels, but then didn't manage to keep the same level of control as the other treatments. This is likely due to the product being more targeted at grass weed control with a limited broad leaf weed spectrum, and AHDB 9917 especially struggled to control chickweed with little difference from the untreated control.

AHDB 9987 performed well in this trial as it was applied soon after planting and before weeds had emerged. If applied after the weeds have emerged, it is ineffective.

Table 2: Mean weed cover (%) per plot at the six assessment dates.

Trt no	Treatment	Mean weed % per plot					
		4 WAA 4 Sept	6 WAA 17 Sept	8 WAA 2 Oct	9 WAA 9 Oct	10 WAA 15 Oct	12 WAA 28 Oct
1	Untreated control	22.5	26.5	67	71.67	88.33	93.33
2	Lentagran 2.0 kg/ha	6	8.5	2.5	2.33	3.33	8.33
3	Dow Shield 400 0.5 L/ha	12.5	13.5	25	55.67	85	96.67
4	AHDB 9987 2.0 L/ha	1	1.5	3.5	5	10	13.33
5	AHDB 9987 1.0 L/ha + Gamit 36 CS 0.25 L/ha	0	0	1.5	2.33	2.33	3.67
6	AHDB 9917 0.7 L/ha	3	5.5	17	44	60	70.67
7	AHDB 9875 3.0 L/ha	1	2	7	10.67	16.33	22.67
8	AHDB 9840 0.5 L/ha	15	19.5	8	14.33	28.33	53.33
9	AHDB 9840 0.75 L/ha	3	4.5	5.5	12	21.67	28.33
10	AHDB 9887 0.5 L/ha	30	32.5	49	39	51.67	60.0
11	AHDB 9887 0.75 L/ha	6.5	9	30	31.33	50	58.33
12	AHDB 9887 1.0 L/ha	9	9	21	34	53.33	68.33
	F pr, p-value	>0.05	>0.05	<0.05	<0.05	<0.001	<0.001
	d.f.	11	11	11	22	22	22
	L.S.D.	23.98	26.4	26.56	35.08	31.15	32.39
Significantly different from the untreated control							
Not significantly different from the untreated control							

Of the contact treatments applied at four weeks after planting, and after weeds had emerged, Lentagran performed well, reducing weed levels by 91.1% to below 9% overall weed cover across all of the assessments. Dow Shield 400 did not reduce overall weed levels as much as the other treatments as it is more targeted to control of composite weeds. Therefore Dow Shield 400 only significantly reduced weed cover for a month after application, but it did significantly control groundsel up to eight weeks after application as expected. AHDB 9875 and AHDB 9840 both significantly reduced weed cover with AHDB 9875 performing better than AHDB 9840 and reducing overall weed cover by 91.4% and giving an equivalent level of control to the commercial standard, Lentagran . AHDB 9840 performed better when applied at 0.75 L/ha rate compared to 0.5 L/ha rate giving a reduction in overall weed levels of 69.7% and 42.9 % respectively.

Although AHDB 9887 did not reduce weed levels as much as other products in the experiment, it could still be a useful addition for authorisation for control of fat hen and chickweed, but has a weakness in control of mayweed and groundsel.

Financial Benefits

This is difficult to quantify as weed levels vary within crops, but where weed infestation is severe, yields can be reduced by 30% due to competition, which is a substantial loss to the grower. These products would bring effective weed control, and therefore increase crop yields and profitability.

Conclusions

Overall, AHDB 9987 applied alone or in a tank-mix with Gamit 36 CS or AHDB 9875 were the most effective of the experimental products, with evidence that these treatments significantly minimise weeds, reducing weed levels to below 13% mean plot cover by the final assessment in this trial. AHDB 9887 and AHDB 9840, although not as effective at reducing overall weed cover, did significantly reduce fat hen in the final weed cover assessment, and could be useful for control of selected weed species. AHDB 9887 also significantly controlled chickweed at rates above 0.75 L/ha, and AHDB 9840 was more effective at the higher rate of 0.75 L/ha and controlled groundsel.

If authorised, AHDB 9987 would be a useful alternative to use in place of metazochlor at an application timing soon after planting, while AHDB 9875 or AHDB 9840 0.75 L/ha would improve weed control at a later post-planting application timing once weeds have emerged

SCIENCE SECTION

Introduction

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5	AHDB 9987 + Gamit 36 CS	1.0 L/ha 0.25 L/ha	-	-
6	AHDB 9917	0.7 L/ha	-	-
7	-	-	AHDB 9875	3.0 L/ha
8	-	-	AHDB 9840	0.5 L/ha
9	-	-	AHDB 9840	0.75 L/ha
10	-	-	AHDB 9887	0.5 L/ha
11	-	-	AHDB 9887	0.75 L/ha
12	-	-	AHDB 9887	1.0 L/ha

Table 4. Pesticide status of products used in the herbicide screen at Old Leake, Lincs, 2020

Herbicide	**Active ingredient(s)**	**MAPP No.**	**EAMU number (if applicable)**	**Experimental approval needed**
Lentagran WP	45% w/w pyridate	14162	0786/09	No
Dow Shield	clopyralid 400 g/L	14984	N/A	No
Gamit 36 CS	clomazone 360 g/L	18718	0799/19	No
AHDB 9987	-	not yet UK approved	N/A	✓
AHDB 9875	-	not yet UK approved	N/A	✓
AHDB 9917	-	not yet UK approved	N/A	✓
AHDB 9887	-	not yet UK approved	N/A	✓
AHDB 9840	-	-	N/A	✓

Treatments were applied using a precision knapsack sprayer with a 2-metre boom and 02F110 nozzles at medium quality and 200 litres per hectare water volume (Table 5). All treatments were applied post-planting. Timing 1 applications - Treatments 4, 5 and 6 - were applied on August 10th, within seven days after planting. The Timing 2 applications - Treatments 2, 3 and 7-12 - were applied on September 3rd, four weeks after planting when the collards reached eight true leaves. Data was collected on weed levels and species, and any effects on the crop were recorded for phytotoxicity (crop damage) assessments. The crop growth stage and any variation within the plots was recorded at each visit. Weed assessments were carried out at the second application, then, four, six, eight, nine, ten and twelve weeks after the 'Timing 1' treatment application. Overall weed levels were recorded at every assessment as percentage cover per plot.

Table 5. Details of the two applications.

	Application 1	Application 2
Application date	10/08/20	03/09/20
Time of day	8:30-9:15	12:30 – 13:45
Crop growth stage (Max, min average BBCH)	16	18
Crop coverage (%)	25	40
Application Method	Spray	Spray
Application Placement	Foliar	Foliar
Application equipment	Oxford precision sprayer	Oxford precision sprayer
Nozzle pressure	2.5	2.5
Nozzle type	Flat fan	Flat fan
Nozzle size	02F110	02F110
Application water volume/ha	200	200
Temperature of air - shade (°C)	20	19
Relative humidity (%)	94	73
Wind speed range (kph)	8	22
Wind direction	NNE	WSW
Dew presence (Y/N)	N	N
Temperature of soil - 2-5 cm (°C)	17	17
Wetness of soil - 2-5 cm	Normal	Moist
Cloud cover (%)	15	10

To assess crop damage, any observed effects attributable to phytotoxicity such as chlorosis or scorch were recorded, and photographs were taken. Crop safety was assessed at the same time as the weed assessments. The results of these assessments were analysed using analysis of variance. Statistical analysis was carried out by the ADAS statistician, Chris Dyer.

Phytotoxicity was assessed at each assessment using Table 6 as a scale.

Table 6. Crop tolerance scores from 0-10, where 0 = no damage, to 10 = complete crop loss with an associated percentage score for each tolerance score conveying the phytotoxic damage. * ≤ 2 = acceptable damage, i.e. damage unlikely to reduce yield and acceptable to the farmer.

Crop tolerance score	Equivalent to crop damage (% phytotoxicity)
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%

Results

Crop damage/safety

No phytotoxicity or crop damage was observed during the trial in any of the plots at any of the assessments.

Efficacy

Six treatments significantly reduced the percentage mean overall weed cover by at least 35% at the final assessment (Table 7), twelve weeks after the first treatment application (T1), and eight weeks after the second treatment application (T2). Those products were AHDB 9987 applied alone or in a tank-mix with Gamit 36 CS just after planting at T1, and AHDB 9875, AHDB 9840, and AHDB 9887, as well as the standard Lentagran 2.0 kg/ha (Table 6). The latter four products applied at a month after planting at T2. The most effective products – AHDB 9987, AHDB 9875 and the standard Lentagran reduced percentage weed cover by at least 75% at the final assessment.

Mean percentage weed cover was moderate initially due to drier conditions through August restricting germination and growth, but after further showers in September, weed levels increased to high levels in the untreated plots for the remainder of the trial duration allowing differentiation of the performance of the products in these final assessments. Due to these conditions and lower weed levels, significant differences compared to the untreated control were only observed at assessments from 2 October but not in the prior assessments. At 2 October assessment, all treatments significantly reduced weed levels with the exception of AHDB 9887 at the lowest rate.

At the assessment on 9 October three treatments no longer gave a significant reduction in weed levels indicating less persistence than the other experimental products. These were AHDB 9887 at the lowest rate, AHDB 9917 and Dow Shield 400. Dow Shield 400 and AHDB 9917 failed to significantly reduce weed levels for the latter part of the trials duration. In addition, both of these products have more targeted weed spectrums, and would not be expected to control all the weeds present in the trial when used alone. Overall Lentagran 2.0 kg/ha, AHDB 9875, AHDB 9987 used alone or in a tank-mix with Gamit 36 CS performed the best keeping weed levels low throughout the trial (<20% cover at any assessment date). AHDB 9840 0.5 L/ha and 9840 0.75 L/ha were significantly different from the untreated but percentage weed cover was still relatively high (between 20 and 50% at the final assessment).

Table 6: Mean weed cover (%) per plot at the six assessment dates.

Trt no	Treatment	Mean weed % per plot					
		4 WAA 4 Sept	6 WAA 17 Sept	8 WAA 2 Oct	9 WAA 9 Oct	10 WAA 15 Oct	12 WAA 28 Oct
1	Untreated control	22.5	26.5	67	71.67	88.33	93.33
2	Lentagran 2.0 kg/ha	6	8.5	2.5	2.33	3.33	8.33
3	Dow Shield 400 0.5 L/ha	12.5	13.5	25	55.67	85	96.67
4	AHDB 9987 2.0 L/ha	1	1.5	3.5	5	10	13.33
5	AHDB 9987 1.0 L/ha + Gamit 36 CS 0.25 L/ha	0	0	1.5	2.33	2.33	3.67
6	AHDB 9917 0.7 L/ha	3	5.5	17	44	60	70.67
7	AHDB 9875 3.0 L/ha	1	2	7	10.67	16.33	22.67
8	AHDB 9840 0.5 L/ha	15	19.5	8	14.33	28.33	53.33
9	AHDB 9840 0.75 L/ha	3	4.5	5.5	12	21.67	28.33
10	AHDB 9887 0.5 L/ha	30	32.5	49	39	51.67	60.0
11	AHDB 9887 0.75 L/ha	6.5	9	30	31.33	50	58.33
12	AHDB 9887 1.0 L/ha	9	9	21	34	53.33	68.33
	F pr, p-value	>0.05	>0.05	<0.05	<0.05	<0.001	<0.001
	d.f.	11	11	11	22	22	22
	L.S.D.	23.98	26.4	26.56	35.08	31.15	32.39
Significantly different from the untreated control							
Not significantly different from the untreated control							

Table 7: Percentage reduction of weed cover by the treatments compared to the untreated control. Negative percentages indicate an increase in weed cover.

Trt no	Treatment	% weed reduction compared to the untreated control.					
		4 WAA	6 WAA	8 WAA	9 WAA	10 WAA	12 WAA
		4 Sept	17 Sept	2 Oct	9 Oct	15 Oct	28 Oct
1	Untreated control						
2	Lentagran 2.0 kg/ha	73.3	67.9	96.3	96.8	96.2	91.1
3	Dow Shield 400 0.5 L/ha	44.4	49.1	62.7	22.3	3.8	-3.6
4	AHDB 9987 2.0 L/ha	95.6	94.3	94.8	93.0	88.7	85.7
5	AHDB 9987 1.0 L/ha + Gamit 36 CS 0.25 L/ha	100.0	100.0	97.8	96.8	97.4	96.1
6	AHDB 9917 0.7 L/ha	86.7	79.3	74.6	38.6	32.1	24.3
7	AHDB 9875 3.0 L/ha	95.6	92.5	89.6	85.1	81.5	75.7
8	AHDB 9840 0.5 L/ha	33.3	26.4	88.1	80.0	67.9	42.9
9	AHDB 9840 0.75 L/ha	86.7	83.0	91.8	83.3	75.5	69.7
10	AHDB 9887 0.5 L/ha	-33.3	-22.6	26.9	45.6	41.5	35.7
11	AHDB 9887 0.75 L/ha	71.1	66.0	55.2	56.3	43.4	37.5
12	AHDB 9887 1.0 L/ha	60.0	66.0	68.7	52.6	39.6	26.8

Six species of weeds were observed in the trial area (Table 8), these were chickweed, mayweed, pale persicaria, fat hen, shepherds purse and groundsel. In the untreated control at the final assessment chickweed was the most abundant, followed by groundsel and mayweed. Shepherds purse and pale persicaria were not as common in the trial as the other weed species.

At the final assessment (28 October) three products – AHDB 9987, AHDB 9875 and the standard Lentagran - significantly reduced the percentage cover of four species of weed (chickweed, mayweed, fat hen and groundsel) compared to the untreated control (Table 8 and Figure 1). These were the products which have performed best overall throughout the trial.

Chickweed was the main weed species, and varied in occurrence across the replicates, but a significant reduction was gained by Lentagran, AHDB 9987 alone or in a tank mix with Gamit 36 CS, AHDB 9875 and AHDB 9887 at the two higher rates, reducing the mean percentage cover to 7% or below compared to 38.3% in the untreated control.

Mayweed had lower percent mean cover than chickweed but was still present at a reasonable level at 17.3 % mean cover pre plot, and only three treatments significantly reduced mayweed. These were the Lentagran and the AHDB 9987 alone or in a tank mix with Gamit 36 CS.

Fat hen was significantly reduced by all treatments with the exception of Dow Shield 400. But, this is not unexpected for Dow Shield as the product mainly targets composite weeds. Groundsel was reduced significantly by most treatments, with the exception of AHDB 9917 and AHDB 9887. No significant effects were observed on pale persicaria or shepherds purse but the levels of these weeds were low.

Table 8: Mean weed cover (%) per plot of the different weed species at the final assessment.

Trt no	Treatment	Mean% cover per plot at the final assessment (28 October)					
		Chick weed	Mayweed	Pale Persicaria	Fat hen	Shepherds purse	Groundsel
1	Untreated control	38.3	17.3	6.0	10.67	0.0	20.0
2	Lentagran 2.0 kg/ha	**4.0**	**0.7**	2.3	**0.0**	0.0	**1.3**
3	Dow Shield 400 0.5 L/ha	56.7	7.3	19.3	7.3	1.7	**0.3**
4	AHDB 9987 2.0 L/ha	**3.3**	**0.0**	5.7	**3.0**	0.0	**0.3**
5	AHDB 9987 1.0 L/ha + Gamit 36 CS 0.25 L/ha	**1.3**	**0.0**	0.3	**1.3**	0.0	**0.3**
6	AHDB 9917 0.7 L/ha	36.7	7.3	8.3	**5.0**	0.3	8.7
7	AHDB 9875 3.0 L/ha	**7.0**	5.0	3.7	**1.0**	1.7	**3.3**
8	AHDB 9840 0.5 L/ha	24.0	13.7	10.0	**2.0**	1.7	**0.0**
9	AHDB 9840 0.75 L/ha	14.3	6.0	6.7	**0.7**	2.7	**1.0**
10	AHDB 9887 0.5 L/ha	18.3	16.0	13.3	**0.7**	0.0	9.3
11	AHDB 9887 0.75 L/ha	**2.7**	24.0	0.0	**3.0**	1.7	26.0
12	AHDB 9887 1.0 L/ha	**4.7**	28.3	1.7	**0.7**	3.3	28.3
	F pr. p-value	<.001	<.001	> 0.05	<.001	> 0.05	<.001
	d.f.	22	22	22	22	22	22
	L.S.D.	24.25	12.47	12.7	4.359	2.977	12.66
Significantly different from the untreated control							
Not significantly different from the untreated control							

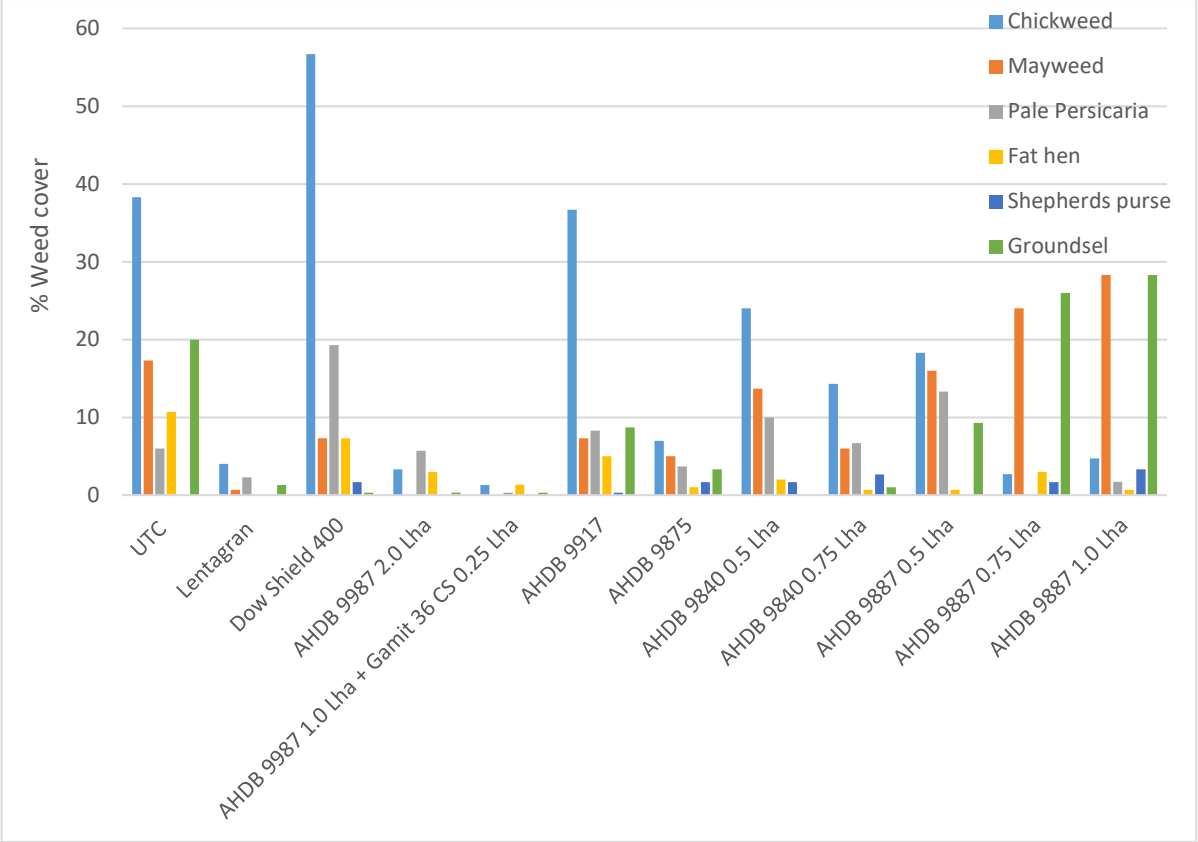


Figure 1: Mean percentage weed cover of the six species at the final assessment (28 October) in the different treatments.

Discussion

Although soil conditions were moist when the first applications were made, later weather in August was drier and this meant that weeds did not germinate or grow rapidly until two months into the trial. But, the initial moisture at application led to good conditions for the residual herbicides such as AHDB 9987 to work, and then subsequently with weeds emerging and growing slowly in the dry, they remained small, and at cotyledon to two true leaves when the contact herbicides were applied a month later. Which was the ideal weed size and timing for the contact herbicides to work effectively, and determine performance.

There were three products which combined crop safety with effective weed control, these were AHDB 9987 applied with or without Gamit 36 CS soon after planting, and AHDB 9875 or AHDB 9840 0.75 L/ha rate applied at eight true leaves, and a month after planting. Both products significantly reduced percentage weed cover by at least 70% compared to the untreated control at the final assessment twelve weeks after the first application ($P < 0.001$, LSD = 32.39) .

Of the treatments applied within five days after planting, AHDB 9987 used alone or in a tank mix with Gamit 36 CS significantly reduced mean percentage weed cover at assessments from eight weeks after application onwards. Although there were no significant differences in the first two assessments, the weed levels in the plots treated with the products were generally low. AHDB 9917 was also applied at this timing, and initially also showed a trend for reduced weed levels, but then did not manage to keep the same level of control as the other treatments. This is likely due to the product being more targeted at grass weed control with a limited broad leaf weed spectrum, and AHDB 9917 especially struggled to control chickweed with little difference from the untreated control.

AHDB 9987 performed well in this trial as it was applied soon after planting and before weeds had emerged. If applied after the weeds have emerged, it is ineffective.

Of the contact treatments applied at four weeks after planting, and after weeds had emerged, Lentagran performed well, reducing weed levels by 91.1% to below 9% overall weed cover across all of the assessments. Dow Shield 400 did not reduce overall weed levels as much as the other treatments as it is more targeted to control of composite weeds. Therefore Dow Shield 400 only significantly reduced weed cover for a month after application, but it did significantly control groundsel up to eight weeks after application as expected. AHDB 9875 and AHDB 9840 both significantly reduced weed cover with AHDB 9875 performing better than AHDB 9840 and reducing overall weed cover by 91.4% and giving an equivalent level of control to the commercial standard, Lentagran . AHDB 9840 performed better when applied at 0.75 L/ha rate compared to 0.5 L/ha rate giving a reduction in overall weed levels of 69.7% and 42.9 % respectively.

Although AHDB 9887 did not reduce weed levels as much as other products in the experiment, it could still be a useful addition for authorisation for control of fat hen and chickweed, but it has a weakness in control of mayweed and groundsel.

Conclusions

Overall, AHDB 9987 applied alone or in a tank-mix with Gamit 36 CS or AHDB 9875 were the most effective of the experimental products, with evidence that these treatments significantly minimise weeds, reducing weed levels to below 13% mean plot cover by the final assessment in this trial. AHDB 9887 and AHDB 9840, although not as effective at reducing overall weed cover, did significantly reduce fat hen in the final weed cover assessment, and could be useful for control of selected weed species. AHDB 9887 also significantly controlled chickweed at rates above 0.75 L/ha, and AHDB 9840 was more effective at the higher rate of 0.75 L/ha and controlled groundsel.

If authorised, AHDB 9987 would be a useful alternative to use in place of metazochlor at an application timing soon after planting, while AHDB 9875 or AHDB 9840 0.75 L/ha would improve weed control at a later post-planting application timing once weeds have emerged

Knowledge and Technology Transfer

Presentation to the Brassica Grower Association – 14 October 2020

Acknowledgements

AHDB for funding the work, and also the crop protection companies for providing samples for the trials. Thanks should also be given to Richard Daubney of F. Daubney and Sons for hosting the trial. Particular thanks should be given to Carl Sharp and Andy Richardson of Allium and Brassica Centre for spray applications and technical input.

Appendices

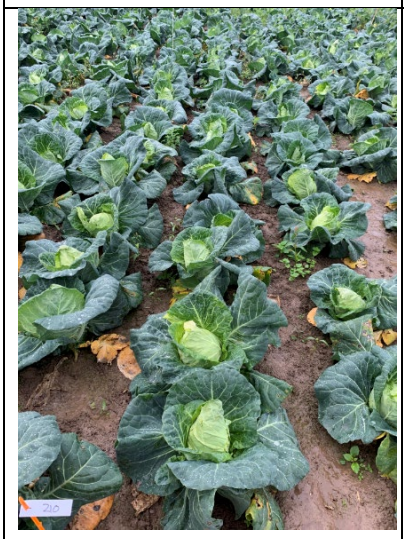
Raw data (plot means of overall weed cover)

Row Labels	Treatment	04/09/2020	17/09/2020	02/10/2020	09/10/2020	15/10/2020	28/10/2020
101	***3***	10	12	20	35	85	100
102	***5***	0	0	2	2	2	3
103	***8***	20	25	11	15	40	85
104	***10***	10	10	31	35	50	70
105	***9***	5	5	8	15	30	40
106	***7***	2	4	9	10	15	30
107	***4***	2	3	5	7	10	17
108	***6***	2	3	12	15	30	32
109	***2***	2	2	2	2	3	5
110	***11***	5	8	10	12	25	55
111	***1***	5	8	50	55	70	85
112	***12***	10	10	17	17	50	80
201	***1***	40	45	84	90	100	100
202	***2***	10	15	3	3	5	10
203	***5***	0	0	1	2	2	3
204	***8***	10	14	5	8	15	30
205	***3***	15	15	30	32	70	90
206	***11***	8	10	50	52	75	75
207	***10***	50	55	67	70	85	90
208	***12***	8	8	25	25	40	55
209	***9***	1	4	3	4	15	25
210	***7***	0	0	5	6	8	10
211	***4***	0	0	2	3	5	8
212	***6***	4	8	22	22	50	80
301	***3***	**Extra replicate not assessed initially.**			100	100	100
302	***10***				12	20	20
303	***4***				5	15	15
304	***9***				17	20	20
305	***7***				16	26	28
306	***8***				20	30	45
307	***6***				95	100	100
308	***5***				3	3	5

309	***2***		2	2	10
310	***11***		30	50	45
311	***1***		70	95	95
312	***12***		60	70	70

Trial photographs

		
Plot 201 Untreated	Plot 202 Lentagran 2.0 kg/ha	Plot 203 AHDB 9987 1.0 L/ha + Gamit 36 CS
		
Plot 204 AHDB 9840 – 0.75 L/ha	Plot 205 Dow Shield 400 0.5 L/ha	Plot 206 AHDB 9887 0.75 L/ha

		
Plot 207 AHDB 9887 0.5 L/ha	Plot 208 AHDB 9887 1.0 L/ha	Plot 209 AHDB 9840 0.5 L/ha
		
Plot 210 AHDB 9875	Plot 211 AHDB 9987 2.0 L/ha	Plot 212 AHDB 9917

