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Project number:	SF 154
Project leader:	Mike Hutchinson, H.L. Hutchinson Ltd
Report:	Final report 2014
Previous report:	None
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(or expected completion date):	

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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.

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## **GROWER SUMMARY**

## Headline

• A range of herbicides have been found to be suitable as potential replacements for Ronstar, to control annual weeds in newly planted blackcurrant cuttings.

## Background and expected deliverables

Blackcurrant cuttings present a particular challenge with respect to weed control. In their first couple of years the cuttings themselves are not very competitive and provide little shading, meaning that growers must pay particular attention to weed control so that establishment and subsequent cropping are not compromised. The residual herbicide Ronstar (oxadiazon) has been widely and successfully used for many years, but successor materials are required now that Ronstar is no longer available. This season long project was instigated to assess the efficacy of alternative herbicides, to include products currently approved for use on blackcurrant and those which may soon become approved or may have potential for approval in future.

## Summary of the project and main conclusions

The approach used was to plant a trial area, and immediately after planting, to treat individual test plots with all of the candidate blackcurrant herbicides. The trial was planted at Sandringham Estate, Kings Lynn, Norfolk; Grid reference TF 715264. The soil was a sandy loam on a site that had been previously used for an orchard, then grass. The cuttings were all hand planted on 13 February 2014 following winter ploughing, pressing and secondary cultivation. Three varieties of blackcurrant (Ben Gairn, Ben Vane and Ben Tirran) were planted. Plots were protected from rabbit damage by an electrified fence. The herbicides were applied to the newly planted cuttings. Crop safety and weed control efficacy provided by these herbicides was assessed during the early growing season. The trial site is displayed in the image below.



#### Treatments

- Trial treatments are shown in Table 1 and the product details listed in Table 2. Of these, MaisTer, Wing-P and Dual Gold currently have no approval for use on blackcurrant cuttings.
- Treatments were applied on 14 February 2014, one day after planting (T1 = early post-planting) to dormant cuttings using a GS air pressurised plot sprayer (Pulvexpur 3m) with 015 F110 Lo Drift nozzles at 3.2 bar pressure and a forward speed of 1.0 m/s.
- Plant surfaces were dry but the soil surface was moist and soil sub-surface was wet.
   The soil condition was loose and the soil tilth was fine.
- There were ideal spraying conditions, with the weather at the time of application being overcast with an air temperature of 3°C, soil temperature of 4°C and wind speed of I kph from the southwest.
- Cloud cover was 100 % and there was rainfall 3-4 hours after application.

	Treatment	Rate / ha	Timing
1	Untreated control		
2	Artist	2.5kg	T1
3	Artist	5.0kg	T1
4	Devrinol	7.01	T1
5	Devrinol	14.0	T1
6	Kerb	4.251	T1
7	Kerb	8.51	T1
8	Shark	0.81	T1
9	Shark	1.61	T1
10	Sumimax	0.11	T1
11	Sumimax	0.21	T1
12	Nirvana	4.51	T1
13	Nirvana	9.01	T1
14	MaisTer	0.075kg	T1
15	MaisTer	0.15kg	T1
16	Wing-P	4.01	T1
17	Wing-P	8.01	T1
18	Dual Gold	1.41	T1
19	Dual Gold	2.81	T1

## Table 1. Treatments - one day after planting at water volume of 200 l/ha

#### Table 2. Product details

Product name	Active(s)	Active formulation	Formulation
Artist	flufenacet + metribuzin	24% + 17.5% w/w	WG
Devrinol	napropamide	450g/l	EC
Dual Gold	metolachlor	960g/l	EC
Kerb	propyzamide	400g/l	EC
MaisTer	foramsulfuron + iodosulfuron + isoxadifen	300g+10g+300g/kg	WG
Nirvana	pendimethalin + imazamox	250g/l+16.7g/l	SC
Shark	carfentrazone-ethyl	60g/l	ME
Sumimax	flumioxazin	300g/l	SC
Wing-P	pendimethalin + dimethenamid	250g/l+212.5g/l	EC

The full results from the trial can be found in the 'Science Section' of the report. The results showed that blackcurrant varieties have a variable, though similar, tolerance to a range of herbicides. Several of the candidate herbicide active ingredients were shown to be safe across the three varieties grown in this trial. Several herbicides caused insignificant (P=0.05) reduction in crop vigour – such levels of vigour reduction would not be detected in a commercial crop where a complete field would be treated. Only Nirvana at either 4.5l or 9.0l was clearly unsafe in all three varieties. However, lower rates of Nirvana may be crop-safe, whilst still providing good levels of weed control.

Good levels of black bindweed control were obtained from Kerb, Nirvana and Wing P 75DAT and 109DAT. Good levels of field speedwell control were obtained from Artist, Kerb, Nirvana, Wing P and Dual Gold. Good levels of fat hen control were obtained from Artist, Nirvana and Wing P. Shark is a contact herbicide only and therefore does not provide residual weed control.

Good, long lasting levels of weed control, for a range of commonly occurring weed species were exhibited in the trial. Wing-P provided the best combination of weed control and crop

safety from a single product, although several other herbicides may be useful to extend the range of weeds controlled. It should be noted that Wing-P is not currently approved for use on blackcurrants.

The efficacy data from this trial must be treated with caution as the herbicide treatments were not replicated. The trial has provided basic weed control efficacy data which can be used to design and evaluate future herbicide programmes based on tank mixes of products with complementary weed control spectrums.

## **Financial benefits**

Because this trial has not resulted in the immediate delivery of a new and improved herbicide product to blackcurrant growers, no financial benefits have immediately arisen from this project.

## Action points for growers

• No action points have arisen directly from this herbicide trial.

## **SCIENCE SECTION**

#### Introduction

Blackcurrant cuttings present a particular challenge with respect to weed control. In their first couple of years the cuttings themselves are not very competitive and provide little shading, meaning that growers must pay particular attention to weed control so that establishment and subsequent cropping are not compromised.

The residual herbicide Ronstar (oxadiazon) has been widely and successfully used for many years, but successor materials are required now that Ronstar is no longer available.

The approach used was to plant a trial area, and immediately after planting, to treat individual test plots with all of the currently approved blackcurrant herbicides, and in addition, a small number of materials whose registration on currants is either underway or thought to be possible.

Therefore a range of herbicides was applied to newly planted cuttings of three varieties of blackcurrant (Ben Gairn, Ben Vane and Ben Tirran). The crop safety and weed control efficacy provided by these herbicides was assessed during the early growing season.

## Materials and methods

#### Site:

Sandringham Estate, Kings Lynn, Norfolk; Grid reference TF 715264. The soil type was a sandy loam and the previous crop (2013) grass following a grubbed-out orchard.

#### Crop and cultivars:

Blackcurrant cuttings of the varieties Ben Gairn, Ben Vane and Ben Tirran were all hand planted on 13 February 2014 following winter ploughing and pressing and secondary cultivation. Plots were protected from rabbit damage by an electrified fence.

#### Plot size and design:

3m x 8m, split plot with four replicates of varieties but the herbicide treatments were unreplicated.

#### Treatments

- Trial treatments are shown in Table 1 and the product details listed in Table 2. Of these, MaisTer, Wing-P and Dual Gold currently have no approval for use on blackcurrant cuttings.
- Treatments were applied on 14 February 2014, one day after planting (T1 = early post-planting) to dormant cuttings using a GS air pressurised plot sprayer (Pulvexpur 3m) with 015 F110 Lo Drift nozzles at 3.2 bar pressure and a forward speed of 1.0 m/s.
- Plant surfaces were dry but the soil surface was moist and soil sub-surface was wet.
- The soil condition was loose and the soil tilth was fine.
- There were ideal spraying conditions with the weather at the time of application being overcast with an air temperature of 3°C, soil temperature of 4°C and wind speed of I kph from the southwest.
- Cloud cover was 100 % and there was rainfall 3-4 hours after application.

	Treatment	Rate / ha	Timing
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2	Artist	2.5kg	T1
3	Artist	5.0kg	T1
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5	Devrinol	14.01	T1
6	Kerb	4.251	T1
7	Kerb	8.51	T1
8	Shark	0.81	T1
9	Shark	1.61	T1
10	Sumimax	0.11	T1
11	Sumimax	0.21	T1
12	Nirvana	4.51	T1
13	Nirvana	9.01	T1
14	MaisTer	0.075kg	T1
15	MaisTer	0.15kg	T1
16	Wing-P	4.01	T1
17	Wing-P	8.01	T1
18	Dual Gold	1.41	T1
19	Dual Gold	2.81	T1

 Table 3.
 Treatments - one day after planting at water volume of 200 l/ha

#### Table 4. Product details

Product name	Active(s)	Active formulation	Formulation
Artist	flufenacet + metribuzin	24% + 17.5% w/w	WG
Devrinol	napropamide	450g/l	EC
Dual Gold	metolachlor	960g/l	EC
Kerb	propyzamide	400g/l	EC
MaisTer	foramsulfuron + iodosulfuron + isoxadifen	300g+10g+300g/kg	WG
Nirvana	pendimethalin + imazamox	250g/l+16.7g/l	SC
Shark	carfentrazone-ethyl	60g/l	ME
Sumimax	flumioxazin	300g/l	SC
Wing-P	pendimethalin + dimethenamid	250g/l+212.5g/l	EC

#### Assessments

Soil and climatic data were collected at application on 14 February 2014 (T1).

*Crop damage symptoms* including vigour reduction (assessed as % vigour reduction compared to untreated control), chlorosis, necrosis and growth distortion were assessed on the dates/stages shown in Table 3.

Table 3. Dates and crop stages when crop damage was assessed

Days after treatment	Date	Stage
42 DA T1	27.03.2014	Bud break
75 DA T1	29.04.2014	Beginning of rooting
109 DA T1	02.06.2014	New stem growth of 10-28cm

A further crop phytotoxicity assessment was planned but rampant weed growth severely competed with the blackcurrant cuttings, masking any effect of phytotoxicity due to herbicide. *Weed control* was assessed as % weed biomass reduction compared with the untreated control on the dates/stages shown in Table 4. Biomass reduction was recorded for each major weed species present.

Table 4. Dates and crop stages when weed control was assessed

Days after treatment	Date	Stage	
75 DA T1	29.04.2014	Beginning of rooting	
109 DA T1	02.06.2014	New stem growth of 10-28cm	

Weed levels in the untreated control were recorded as % ground cover and number of each weed species per square metre (mean of  $4 \times 0.33$  sq. m quadrats per untreated plot).

Herbicide treatments were not replicated and therefore statistical analysis of herbicide efficacy data was not possible. All herbicide efficacy data should be interpreted with caution.

## Results

#### Crop phytotoxicity

Crop phytotoxicity was assessed on 27 March 2014 (42 DAT) and the results for all three cultivars is shown in Table 5.

Crop vigour reduction (% biomass reduction versus untreated control) was assessed on 29 April 2014 (75 DAT) and 2 June 2014 (109 DAT) and is shown for Ben Gairn in Table 6, for Ben Vane in Table 7 and for Ben Tirran in Table 8. **Table 5** – Crop phytotoxicity (%) on 27 March 2014 (42 DAT) at Crop Stage 10 when the majority of crop first leaves separated

Treatment	1	1 2			3		
No Name	Ben (	Gairn	Ben Vane		Ben T	Ben Tirran	
1 Untreated control	0.0	а	0.0	а	0.0	а	
2 Artist 2.5kg	0.0	а	0.0	а	0.0	а	
3 Artist 5.0kg	0.0	а	0.0	а	0.0	а	
4 Devrinol 7.0l	0.0	а	0.0	а	0.0	а	
5 Devrinol 14I	0.0	а	0.0	а	0.0	а	
6 Kerb 4.25l	0.0	а	0.0	а	0.0	а	
7 Kerb 8.5l	0.0	а	0.0	а	0.0	а	
8 Shark 0.8l	0.0	а	0.0	а	0.0	а	
9 Shark 1.6l	0.0	а	0.0	а	0.0	а	
10 Sumimax 0.11	0.0	а	0.0	а	0.0	а	
11 Sumimax 0.2l	0.0	а	0.0	а	0.0	а	
12 Nirvana 4.5l	0.0	а	0.0	а	0.0	а	
13 Nirvana 9.0l	0.0	а	0.0	а	0.0	а	
14 MaisTer 0.075kg	0.0	а	0.0	а	0.0	а	
15 MaisTer 0.15kg	0.0	а	0.0	а	0.0	а	
16 Wing-P 4.0I	0.0	а	0.0	а	0.0	а	
17 Wing-P 8.0I	0.0	а	0.0	а	0.0	а	
18 Dual Gold 1.4I	0.0	а	0.0	а	0.0	а	
19 Dual Gold 2.8l	0.0	а	0.0	а	0.0	а	
LSD (P=.05)	0.0	00	0.0	0	0.0	00	
Standard Deviation	0.0	00	0.0	0	0.0	00	
CV	0.0	00	0.0	0	0.	0	
Replicate F	0.0	000	0.0	00	0.0	00	
Replicate Prob(F)	1.0	000	1.00	00	1.00	000	
Treatment F	0.0	000	0.0	00	0.0	00	
Treatment Prob(F)	1.0	000	1.00	00	1.00	000	

NB: Means followed by the same letter (e.g. a) do not significantly differ (P= 0.05, LSD)

**Table 6** – Ben Gairn - Crop vigour reduction (% biomass reduction versus untreated<br/>control) – 29 April 2014 (75 DAT) and 2 June 2014 (109 DAT)

Treatment		75 DAT		109 DAT	
No	Name	Ben Gairn Ben G		Bairn	
1	Untreated control	0.0	С	0.0	С
2	Artist 2.5kg	0.0	С	0.0	С
3	Artist 5.0kg	2.5	С	0.0	С
4	Devrinol 7.01	5.0	С	0.0	С
5	Devrinol 14l	5.0	С	0.0	С
6	Kerb 4.25l	2.8	С	0.0	С
7	Kerb 8.5l	4.5	С	0.0	С
8	Shark 0.8I	0.0	С	0.0	С
9	Shark 1.6l	0.0	С	0.0	С
10	Sumimax 0.11	3.5	С	0.0	С
11	Sumimax 0.2I	0.0	С	0.0	С
12	Nirvana 4.5l	76.3	b	38.8	b
13	Nirvana 9.0I	96.3	а	78.3	а
14	MaisTer 0.075kg	0.0	С	0.0	С
15	MaisTer 0.15kg	0.0	С	0.0	С
16	Wing-P 4.0I	0.0	С	0.0	С
17	Wing-P 8.0I	0.0	С	0.0	С
18	Dual Gold 1.4I	0.5	С	0.0	С
19	Dual Gold 2.8I	3.0	С	0.0	С
LS	D (P=.05)	10.4	40	14.0	07
Sta	andard Deviation	7.3	35	9.9	95
C۷	,	70.	11	161.	.53
Re	plicate F	1.5	86	1.72	21
Re	plicate Prob(F)	0.20	)34	0.17	'36
Tre	eatment F	53.8	329	15.5	507
Tre	eatment Prob(F)	0.00	001	0.00	01

NB: Means followed by same letter do not significantly differ (P= 0.05, LSD)

No	Treatment Name		Ben Vane 75 DAT		Ben Vane 11099 DDAATT	109 DAT
1	Untreated control	0.0	i	0.0	С	_
2	Artist 2.5kg	2.8	fgh	0.0	С	
3	Artist 5.0kg	6.3	de	0.0	С	
4	Devrinol 7.01	5.0	ef	0.0	С	
5	Devrinol 14I	10.0	С	0.0	С	
6	Kerb 4.25l	4.0	efg	0.0	С	
7	Kerb 8.5l	1.8	ghi	0.0	С	
8	Shark 0.8l	0.0	i	0.0	С	
9	Shark 1.6l	0.0	i	0.0	С	
10	Sumimax 0.11	5.3	ef	0.0	С	
11	Sumimax 0.2I	7.8	d	0.0	С	
12	Nirvana 4.5l	68.8	b	40.0	b	
13	Nirvana 9.01	83.8	а	62.5	а	
14	MaisTer 0.075kg	1.3	hi	0.0	С	
15	MaisTer 0.15kg	0.0	i	0.0	С	
16	Wing-P 4.0I	3.8	e-h	0.0	С	
17	Wing-P 8.0I	3.0	fgh	0.0	С	
18	Dual Gold 1.4	2.8	fgh	0.0	С	
19	Dual Gold 2.8	4.3	efg	0.0	С	
LSD (P=.05)			2.23		8.04	
Standard Deviation			1.57		5.68	
CV			14.22		105.37	
Replicate F			0.615		1.344	
Rep	licate Prob(F)		0.6084		0.2698	
Trea	atment F		874.533		34.068	
Treatment Prob(F)			0.0001		0.0001	

**Table 7** – Ben Vane - Crop vigour reduction (% biomass reduction versus untreated control) – 29 April 2014 (75DAT1) and 2 June 2014 (109DAT)

Means followed by same letter do not significantly differ (P= 0.05, LSD)

Treatment		Ben <sup>-</sup>	Tirran	Ben Tirran	
No Name		75 DAT		109 DAT	
1	Untreated control	0.0	е	0.0	С
2	Artist 2.5kg	0.0	е	0.0	С
3	Artist 5.0kg	0.0	е	0.0	С
4	Devrinol 7.01	0.0	е	0.0	С
5	Devrinol 14l	0.0	е	0.0	С
6	Kerb 4.25l	0.0	е	0.0	С
7	Kerb 8.5l	0.0	е	0.0	С
8	Shark 0.8I	0.0	е	0.0	С
9	Shark 1.6l	0.0	е	0.0	С
10	Sumimax 0.11	0.0	е	0.0	С
11	Sumimax 0.2l	2.5	d	0.0	С
12	Nirvana 4.5l	58.5	b	16.3	b
13	Nirvana 9.01	82.1	а	27.5	а
14	Maister 0.075kg	0.0	е	0.0	С
15	Maister 0.15kg	0.0	е	0.0	С
16	Wing-P 4.0I	3.4	С	0.0	С
17	Wing-P 8.0I	2.7	cd	0.0	С
18	Dual Gold 1.4I	2.7	cd	0.0	С
19	Dual Gold 2.8I	2.9	cd	0.0	С
LSD (P=.05)		0.07t		10.33	
Standard Deviation		0.05t		7.31	
CV		14.2		317.28	
Replicate F		2.808		1.945	
Replicate Prob(F)		0.0481		0.1332	
Treatment F		568.916		3.829	
Treatment Prob(F)		0.0001		0.0001	

**Table 8** – Ben Tirran - Crop vigour reduction (% biomass reduction versus untreated<br/>control) – 29 April 2014 (75DAT1) and 2 June 2014 (109DAT)

Means followed by same letter do not significantly differ (P= 0.05, LSD)

#### Weed control

Stellaria media (common chickweed)

Weed control was assessed on 29 April 2014 (75 DAT) and levels in the untreated control are shown in Table 9.

Weed species	Weeds / sq. m	Weed size
Veronica hederifolia (field speedwell)	36	2tl-early flowering
Polygonum convulvulus (black bindweed)	252	1-3tl
Chenopodium album (fat hen)	72	cotyledon-6tl
Galium aparine (cleavers)	<1	12cm across
Polygonum persicaria (redshank)	72	1-2tl
<i>Poa annua</i> (annual meadow grass)	<1	3 tillers

<1

14cm across

#### Table 9. Weed levels in untreated controls at – 29 April 2014 (75DAT)

Although high levels of Redshank were observed, only black bindweed, field speedwell and fat hen were sufficiently uniform across the whole trial area, to allow weed control assessment. Weed control (as % weed biomass reduction versus untreated control for three key weeds) assessed on 29 April 2014 (75 DAT) is shown in Table 10 and assessed on 2 June 2014 (109 DAT) is shown in in Table 11.

**Table 10.** Assessment of weed control as % weed biomass reduction versus untreated control – 29 April 2014 (75DAT)

No	Treatment	Black bindweed	Field speedwell	Fat hen
INO.	Name			
1	Untreated control	0	0	0
2	Artist 2.5kg	70	95	95
3	Artist 5.0kg	70	98	100
4	Devrinol 7.01	55	40	65
5	Devrinol 14I	75	70	97
6	Kerb 4.25l	93	100	75
7	Kerb 8.5l	100	100	80
8	Shark 0.8I	5	5	5
9	Shark 1.6l	5	5	5
10	Sumimax 0.11	30	25	20
11	Sumimax 0.2I	50	45	25
12	Nirvana 4.5l	100	100	98
13	Nirvana 9.01	100	100	100
14	Maister 0.075kg	20	70	25
15	Maister 0.15kg	25	80	30
16	Wing-P 4.0I	90	100	85
17	Wing-P 8.0I	98	100	98
18	Dual Gold 1.4I	40	100	45
19	Dual Gold 2.8l	60	100	60

**Table 11.** Assessment of weed control as % weed biomass reduction versus untreated control – 2 June 2014 (109DAT)

	Treatment	Black bindweed	Field speedwell	Fat hen
Na	Nama			
INO	Name			
1	Untreated control	0	0	0
2	Artist 2.5kg	10	100	95
3	Artist 5.0kg	25	100	100
4	Devrinol 7.01	0	90	85
5	Devrinol 14I	10	100	100
6	Kerb 4.25l	90	100	10
7	Kerb 8.5I	100	100	50
8	Shark 0.8l	0	0	20
9	Shark 1.6l	0	0	25
10	Sumimax 0.11	0	80	70
11	Sumimax 0.2I	0	90	90
12	Nirvana 4.5l	100	100	92
13	Nirvana 9.01	100	100	100
14	Maister 0.075kg	0	0	0
15	Maister 0.15kg	0	0	0
16	Wing-P 4.01	80	100	90
17	Wing-P 8.0I	95	100	100
18	Dual Gold 1.4l	0	10	0
19	Dual Gold 2.8I	0	20	0

#### Discussion

No phytotoxicity was observed on newly opened buds for any herbicide treatment, 42DAT for all three blackcurrant varieties in the trial. However, crop effects were observed 75DAT in all varieties for some of the herbicide treatments.

By far the most damaging treatment, across all three varieties, was Nirvana at both 4.5 and 9.0l/ha. Damage levels were significantly (P=0.05) higher than the untreated control and would be clearly unacceptable in a commercial situation.

Ben Gairn generally showed low levels of vigour reduction 75DAT. Although several herbicides showed small, insignificant (P=0.05) levels of vigour reduction, only Nirvana (4.5I and 9.0I) resulted in a significant (P=0.05) vigour reduction in the blackcurrant cuttings. By the next crop safety assessment (109DAT), the Ben Gairn cuttings had out-grown all herbicidal effects seen earlier, with the notable exception of Nirvana, at both rates trialled.

Ben Vane showed the highest levels of vigour reduction to a range of herbicides; many of the vigour reductions were significant (P=0.05) when compared to the untreated control. The more damaging treatments included Artist (5.0kg) and Devrinol (14.0l). However, by

the next crop safety assessment (109DAT), the Ben Vane cuttings had out-grown all herbicidal effects seen earlier, with the notable exception of Nirvana, at both rates trialled.

Ben Tirran exhibited the least crop effects to the range of herbicides. Although several herbicides showed small, insignificant (P=0.05) levels of vigour reduction 75DAT, only Nirvana (4.5I and 9.0I) resulted in a significant (P=0.05) vigour reduction in the blackcurrant cuttings. By the next crop safety assessment (109DAT), the Ben Tirran cuttings had out-grown all herbicidal effects seen earlier, with the notable exception of Nirvana, at both rates trialled.

This trial has shown that blackcurrant varieties have a variable, though similar, tolerance to a range of herbicides. Several herbicide active ingredients were shown to be safe across the three varieties grown in this trial. Several herbicides showed insignificant (P=0.05) reduction in crop vigour – such levels of vigour reduction would not be detected in a commercial crop where a complete field was treated. Only Nirvana at either 4.5I or 9.0I should not be progressed in future trials. However, lower rates of Nirvana may be crop-safe, whilst still providing good levels of weed control.

Good levels of Black bindweed control were obtained from Kerb, Nirvana and Wing P 75DAT and 109DAT.

Good levels of Field speedwell control were obtained from Artist, Kerb, Nirvana, Wing P and Dual Gold.

Good levels of fat hen control were obtained from Artist, Nirvana and Wing P.

Shark is a contact herbicide only and therefore does not provide residual weed control.

#### Conclusions

The trial has shown the potential for future testing of many tank mix options for the control of a range of weeds in newly planted blackcurrant cuttings.

### Knowledge and Technology Transfer

None to date.

# Appendix – Photographic plates



PLATE 1. TRIAL PLANTING NEARING COMPLETION – 13<sup>TH</sup> FEBRUARY 2014



PLATE 2. TRIAL PLANTED WITH RABBIT PROTECTION –  $13^{\text{TH}}$  February 2014



PLATE 3. CROP PHYTOTOXICITY ASSESSMENT –  $27^{TH}$  March 2014



Plate 4. Herbicide efficacy differences  $-5^{TH}$  May 2014



Plate 5. Untreated control –  $5^{TH}$  May 2014



PLATE 6. ARTIST (5.0 KG) – 5<sup>™</sup> MAY 2014



PLATE 7. DEVRINOL (14.0L) –  $5^{TH}$  May 2014



Plate 8. Kerb (8.5l) – 5<sup>th</sup> May 2014



PLATE 9. SHARK (1.6L) –  $5^{TH}$  May 2014



PLATE 10. SUMIMAX (0.2L) – 5<sup>™</sup> MAY 2014



PLATE 11. NIRVANA (9.0 L) – 5<sup>th</sup> May 2014



PLATE 12. MAISTER (0.15 KG) – 5<sup>™</sup> MAY 2014



PLATE 13. WING P  $(8.0 \text{ L}) - 5^{\text{TH}}$  May 2014



PLATE 14. DUAL GOLD (2.8L) – 5<sup>™</sup> MAY 2014



PLATE 15. ARTIST (5.0 KG) BEYOND CONTROL – 2ND JUNE 2014



PLATE 16. NIRVANA (4.5 AND 9.0L) SHOWING CROP EFFECTS – 2ND JUNE 2014



PLATE 17. WING P (4.0 AND 8.0L) GOOD CONTROL AND CROP SAFETY – 2ND JUNE 2014