

HDC CONTRACT FV/103a

Alternatives to chlorbufam and chloridazon (Alice) for
weed and OSR control in dry bulb onions and leeks.
(YEAR 2)

Part IV Leeks - Sandy loam soil

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HRI - Wellesbourne
December 1992

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ALTERNATIVES TO CHLORBUFAM AND CHLORIDAZON (ALICEP) FOR WEED AND OSR CONTROL IN DRY BULB ONIONS (YEAR 2) AND LEEKS (YEAR 1)

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SUMMARY

In an experiment with drilled leeks on a sandy loam soil, Sovereign applied at 4 l/ha when the crop was at the loop stage and the weeds were at the cotyledon stage was the safest and most effective treatment for controlling weeds that survived the pre-emergence herbicide. Mixtures of Sovereign with Pyramin were also effective at controlling the weeds, as was a tank mix of Kerb + Propachlor. Other treatments killed 50% or fewer of the weeds. None of the commercially available herbicide formulations caused a reduction in crop yield at harvest.

INTRODUCTION

Good, early weed control is necessary to prevent crop losses in slow developing, poorly competitive crops such as drilled onions and leeks. Pre-emergence herbicides are usually effective on most soils but lack activity where the organic matter content is high. There can also be a problem if weather conditions prevent application of pre-emergence sprays, or if the residual herbicides fail to control all of the weeds. An early post-emergence herbicide is therefore an essential part of any weed control programme. Alicep has for many years performed this task in onions and leeks but has now been withdrawn from use. If growers are to maintain consistent supplies of high quality produce, it is imperative to find an alternative treatment that is safe and effective at an early crop stage. The present experiment was made, on a sandy loam soil, to evaluate some promising treatments selected on the basis of screening trials at HRI-Kirton.

METHODS AND MATERIALS

The trial site was Pump Ground West Field at Horticulture Research International, Wellesbourne. The soil was a sandy loam of the Wick series with around 2% organic matter and pH 6.8. The land was prepared in the late winter following a previous cereal crop and allowed to weather before being marked into 1.83 m wide beds and the base fertiliser applied. Shortly before drilling Nitram (120 kg/ha) was applied and a seedbed prepared. Leek cv. Verina (blue coated seed) was drilled on 2/4/92 in rows 0.61 m apart with three rows per bed. Seed was sown at 5 cm intervals along the row. An overall pre-emergence spray of propachlor + chlorthal-dimethyl (Albrass 9 l+ Dacthal 7 kg product/ha) was applied immediately after drilling. Plots were marked out in a randomised block design with three replicates of each spray treatment. There were two untreated plots per replicate block. Plots were 6 m long and 1.83 m (1 bed) wide.

The herbicides used were commercial formulations of chloridazon (Pyramin DF; 65% W/W WG), pendimethalin (Sovereign 330EC; 330 g/l), propachlor (Portman propachlor 50 FL; 500 g/l LI) propyzamide (PBI Kerb; 50% W/W WP), chlorpropham (Triherbide CIPC; 400 g/l EC), methabenzthiazuron (Tribunil; 70% W/W WP), chloridazon + chlorbufam (Alicepe; 20:25% W/W WP), chloridazon + propachlor (Ashlade CP; 86:400 g/l SC), fluazifop-P-butyl (Fusilade 5; 125 g/l EC), together with chloridazon + propachlor (Portman pyramin + propachlor; formulation not specified) and tribenuron-methyl (DPX L5300; 75% wdg) which were experimental materials. The herbicides were applied in 250 l/ha water using a compressed air knapsack sprayer and boom.

The first sprays were applied on 1/5/92 when the crop was at the loop to crook stage. Maximum and minimum temperatures were 12.6 and 6.4 °C respectively. Most weeds were at the cotyledon stage but a few had 1-2 leaves. The soil was moist and the weather was dull and breezy. There was a trace of rain 4-5 hours after spraying. The second sprays were applied on 8/5/92 when the leeks were at the post-crook stage. Maximum and minimum temperatures were 13.9 and 7.4 °C respectively. The soil surface was dry despite some earlier rain, the weather at spraying was dull and breezy but there was no rain for 48 hr after spraying. The experimental herbicide DPX L5300 was applied on 21 May, when the crop was at the full 1-leaf stage.

Weed numbers and species were recorded on 18/6/92 and percent crop injury was also assessed then. The plots were hand-weeded on 10/7/92 and weed fresh weight and the species present recorded. The leeks were harvested on 5/10/92. The centre row only of each plot was lifted and the leeks counted, trimmed and weighed.

Weather data for the period of the trial were recorded at the HRI - Wellesbourne weather station within 1 km of the trial site and are included at the end of this report.

RESULTS

The treatments are listed in Table 1; the rates of application are expressed as litres or kg of product per hectare. The pre-emergence herbicides worked well and controlled most weeds but unfortunately those that remained were very patchy in distribution, and although the weed counts and weed weights (Tables 2, 3 and 4) demonstrate differences in the effectiveness of the post-emergence treatments the results were very variable. The best weed control was

achieved with treatments 2, 3, 7 and 11 (Pyramin + Sovereign at 2 or 4 l/ha, Sovereign alone, and Kerb + Propachlor) (Table 2). Weed control with Alicep was acceptable, the split 2x 1 kg rate (treatment 1) giving the same level of control as the single 3 kg dose (treatment 13). CIPC (treatment 12) and DPX L5300 (treatment 14) also gave adequate levels of weed control. Tribunil (treatment 10) killed around 50% of the weeds but Kerb, Ashlade CP, Portman Pyramin + Propachlor, Fusilade and Pyramin alone (treatments 4, 5, 6, 8 and 9) controlled 40% or fewer.

The main weed species that survived the pre-emergence spray were field pansy (*Viola arvensis*, VIOARV), common fumitory (*Fumaria officinalis*, FUMOFF), scentless mayweed (*Tripleurospermum inodorum*, TRIINO), knotgrass (*Polygonum aviculare*, POLAVI), black bindweed (*Fallopia convolvulus*, FALCON), fool's parsley (*Aethusa cynapium*, AETCYN), common chickweed (*Stellaria media*, STEMED) and pennycress (*Thlaspi arvensis*, THLARV). The total counts of these weeds following the post-emergence treatments are shown in Table 3. Few treatments controlled field pansy the commonest weed. Only the treatments containing Sovereign (2, 3 and 11) appeared to control this species adequately and many of the other weeds too. Treatment 7 (Kerb + Propachlor) although generally effective left some field pansy and mayweed. Most treatments appeared to control knotgrass and black bindweed but not treatments 9 (Pyramin) or 10 (Tribunil). CIPC (treatment 12) and Kerb (treatment 4), as would be expected, did not control the mayweed. Any differences in the numbers of survivors of the various weed species between the two Alicep treatments (1 & 13), and between the two chloridazon + propachlor formulations (treatments 5 & 6) were probably due to patchy weed distribution. Fusilade (treatment 8) is a graminicide and would not be expected to control the broad-leaved weeds. Weed fresh weight from each plot recorded at weeding on 10 July (Table 4) confirmed the effectiveness of treatments 2, 3, 7 and 11 in controlling weeds that had escaped the pre-emergence spray.

There was very little crop injury from any of the treatments when damage was assessed on 18 June (Table 5). Before analysis, angular transformation of the data was used to normalise its distribution. The untransformed data is presented in full but only the means of the transformed data. Slight tip scorch (5% injury) was seen on many plots but may not have been treatment related. In addition some plants exhibited leaf yellowing or the crop stand appeared thin. Treatment 2 (Pyramin + Sovereign), 7 (Kerb + propachlor), 10 (Tribunil), 13 (Alicep) and 14 (DPX L5300) had somewhat higher injury levels than the other treatments but none was particularly damaging. On plots with scores of 30% or higher there was some distortion of the leek plants but no leaf trapping was observed at any time.

At harvest on 5 October only the experimental herbicide DPX L5300 (treatment 14) caused a significant reduction in crop yield (Table 6). The herbicide was applied at a relatively high rate to determine crop tolerance, and damage might be avoided with a lower dose. There may have been some weed competition on the weedier plots but the weeds were not dense and were removed and the crop top dressed with Nitram (80 kg/ha N) to maintain good growth. Plant number at harvest was reduced by treatment 14 (DPX L5300), and by treatments 2 (Pyramin + Sovereign), 7 (Kerb + Propachlor) and 10 (Tribunil) (Table 7). A few leeks had a twisted appearance at harvest but this was not treatment related. There was no leaf trapping and no bolting on any plots.

DISCUSSION

The safest and most effective treatment on this sandy loam soil was Sovereign applied at 4 l/ha (treatment 11) when the leeks were at the loop stage and the weeds were at the cotyledon stage. On 18 June, when weed numbers and crop injury were assessed, the plots of treatment 11 were noted as being virtually weed free and having healthy looking crop plants. Mixtures of Sovereign with Pyramin (treatments 2 & 3) were also very effective at controlling weeds as was Kerb + Propachlor (treatment 7), however, there was some reduction in plant stand but not crop weight at harvest. Alicep, applied post-emergence at the standard rate, has been found to cause a slight reduction in crop stand at times on this sandy loam soil. The other treatments were poorer in terms of overall weed control but with a different weed flora they might prove more effective than the treatments that worked well in this experiment. None of the commercial herbicide formulations reduced crop weight at harvest.

The only treatment to cause a significant reduction in crop yield was DPX L5300. In previous evaluation trials, not taken to yield, onions and leeks showed some tolerance to post-emergence applications of this short persistence sulfonylurea (Bond & Burch, 1988). However in the present experiment, at the rate tested, there was a 19% yield loss. In a small observation plot, DPX L5300 applied at 25 g a.i./ha to volunteer potato plants growing in drilled leeks caused a severe check to the growth of the potatoes. Although the potatoes showed some recovery after a few weeks, further evaluation of repeated low doses of the chemical in leeks may be merited.

REFERENCES

- BOND, W & BURCH, P.J. (1988) Weed control in drilled vegetable crops with DPX L5300. *Tests of Agrochemicals and Cultivars* No. 9 (*Annals of Applied Biology* 112 Supplement), pp. 54-55.

Table 1.

TREATMENTS
(product/ha)

1	Alicep 1 kg loop + 1 kg post-crook
2	Pyramin 1.4 kg + Sovereign 2 l loop
3	Pyramin 1.4 kg + Sovereign 4 l loop
4	Kerb 1.25 kg loop
5	Ashlade CP 5 l loop
6	Portman Pyramin + propachlor 15 l loop
7	Kerb 1.25 kg + propachlor 4.5 l loop
8	Fusilade 0.5 l loop
9	Pyramin 1.4 kg loop
10	Tribunil 2 kg post-crook
11	Sovereign 4 l loop
12	CIPC 1 l loop
13	Alicep 3 kg post-crook
14	DPX L5300 25 g 1-leaf (applied 21/5/92)
15	Untreated
16	Untreated

Table 2.

WEED NUMBER
(seedlings / plot)

Treatment	A	B	C	Mean	% of control	
1	18	8	4	10.0	29.9	
2	3	4	1	2.7	8.0	
3	11	3	1	5.0	14.9	
4	7	15	43	21.7	64.7	
5	2	17	51	23.3	69.7	
6	12	41	7	20.0	59.7	
7	2	3	14	6.3	18.9	
8	6	33	24	21.0	62.7	
9	16	35	36	29.0	86.6	
10	35	7	7	16.3	48.8	
11	2	6	3	3.7	11.0	
12	7	12	13	10.7	31.8	
13	1	14	15	10.0	29.9	
14	5	3	26	11.3	33.8	
15	33	19	23	33.5	100.0	
16	25	62	39			
LSDs for comparison with control				5%	18.8	56.0
				1%	25.2	75.4
LSDs for comparison with other means				5%	21.7	64.7
				1%	29.2	87.0

CV for variate 80.7

Table 3.

WEED SPECIES COUNTS
(total seedlings from three replicates)

T'M ENT	POL AVI	BIL CON	AET CYN	MAT INO	FUM OFF	VIO ARV	THL ARV	STE MED	OTH ERS
1	3	1	5	1	2	7	6	0	5
2	0	1	2	2	1	0	2	0	0
3	1	2	6	1	4	1	0	0	0
4	3	1	0	9	11	30	2	3	6
5	0	7	2	4	4	36	7	4	6
6	4	6	7	3	25	11	3	0	1
7	0	0	1	4	0	12	2	0	0
8	2	5	4	5	12	30	1	3	1
9	17	9	9	5	7	28	3	4	4
10	17	16	2	4	2	4	2	0	2
11	0	3	6	1	0	0	0	0	1
12	2	0	2	11	5	8	3	0	1
13	1	2	0	6	2	13	5	0	1
14	0	1	0	2	3	25	0	0	3
15	11	9	10	7	8	22	5	2	1
16	15	8	6	5	30	41	13	2	6

Table 4.

WEED FRESH WEIGHT
(kg / plot)

Treatment	A	B	C	Mean	% of control	
1	4.60	2.56	1.40	2.85	38.6	
2	0.51	1.78	1.10	1.13	15.3	
3	1.31	0.12	1.80	1.08	14.6	
4	3.54	3.94	13.11	6.86	92.7	
5	1.44	3.37	12.87	5.89	79.6	
6	4.92	11.39	1.36	5.89	79.5	
7	0.88	3.18	5.55	3.20	43.2	
8	1.22	10.70	5.56	5.83	78.7	
9	6.44	10.26	6.88	7.86	106.2	
10	13.18	4.50	11.09	9.59	129.6	
11	0.17	0.90	2.22	1.10	14.8	
12	3.78	5.36	7.25	5.46	73.8	
13	0.51	4.49	6.65	3.88	52.4	
14	4.37	1.78	6.42	4.19	56.6	
15	10.44	3.10	9.50	7.40	100.0	
16	5.78	10.79	4.80			
LSDs for comparison with control				5%	4.9	65.7
				1%	6.5	88.4
LSDs for comparison with other means				5%	5.6	75.9
				1%	7.6	102.1

CV for variate 67.8

Table 5.

PERCENT CROP INJURY
(assessed 18.6.92)

Treatment	A	B	C	Mean	Mean ang. trans data
1	5	5	5	5.0	12.92
2	15	25	10	16.7	23.74
3	10	5	5	6.7	14.76
4	10	5	5	6.7	14.76
5	5	0	0	1.7	4.31
6	5	0	10	5.0	10.45
7	10	20	10	13.3	21.14
8	0	10	20	10.0	15.00
9	0	0	0	0.0	0.00
10	0	15	30	15.0	18.67
11	0	0	5	1.7	4.31
12	5	10	0	5.0	10.45
13	5	10	25	13.3	20.45
14	5	35	10	16.7	22.54
15	0	0	0	0.8	2.15
16	0	5	0		
LSDs for comparison with control				5%	11.87
				1%	15.98
LSDs for comparison with other means				5%	13.71
				1%	18.45

CV for variate 66.6

Table 6.

YIELD OF TRIMMED LEEKS
(kg / 6 m row)

Treatment	A	B	C	Mean	% of control	
1	17.40	19.20	13.80	16.80	102.7	
2	19.70	12.25	13.35	15.10	92.3	
3	20.40	18.65	18.85	19.30	117.9	
4	18.10	15.95	12.00	15.35	93.8	
5	18.20	20.00	15.40	17.87	109.2	
6	19.15	13.30	16.20	16.22	99.1	
7	17.10	16.65	15.50	16.42	100.3	
8	16.15	14.80	15.25	15.40	94.1	
9	15.85	16.45	14.30	15.53	94.9	
10	16.24	18.15	10.50	14.96	91.4	
11	21.50	19.05	16.65	19.07	116.5	
12	17.45	13.55	17.85	16.28	99.5	
13	13.90	17.00	14.20	15.03	91.9	
14	14.70	11.90	13.10	13.23	80.9	
15	17.75	18.75	17.50	16.37	100.0	
16	15.35	15.95	12.90			
LSDs for comparison with control				5%	3.00	18.3
				1%	4.00	24.6
LSDs for comparison with other means				5%	3.45	21.1
				1%	4.64	28.4

CV for variate 12.8

Table 7.

LEEK NUMBER AT HARVEST
(plants / 6 m row)

Treatment	A	B	C	Mean	% of control	
1	57	58	49	54.7	88.2	
2	52	41	52	48.3	78.0	
3	63	48	68	59.7	96.2	
4	59	58	49	55.3	89.3	
5	51	64	56	57.0	91.9	
6	63	59	48	56.7	91.4	
7	55	52	44	50.3	81.2	
8	58	56	55	56.3	90.9	
9	49	57	54	53.3	86.0	
10	57	44	33	44.7	72.0	
11	63	69	64	65.3	105.4	
12	58	57	58	57.7	93.0	
13	56	56	52	54.7	88.2	
14	42	45	47	44.7	72.0	
15	66	63	65	62.0	100.0	
16	63	61	54			
LSDs for comparison with control				5%	8.2	13.3
				1%	11.1	17.9
LSDs for comparison with other means				5%	9.5	15.3
				1%	12.8	20.6

CV for variate 10.3