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CONTRACT REPORT

FV120a

Post emergence control of annual
weeds, volunteer potatoes and
oilseed rape in onions and
leeks - field work
Part II onions - silty loam

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AUTHENTICATION

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

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DISCLAIMER

The products and rates used in this work are not necessarily approved for use on onions or leeks and references to them in this report should in no way be taken as recommendations. Before using a herbicide, the product label should always be consulted and the instructions followed. In the event of doubt, the chemical supplier or local adviser should be consulted.

SUMMARY

Using information gained from previous field trials at ADAS Arthur Rickwood and from screening trials at HRI-Kirton, a range of herbicide combinations for control of volunteer potatoes and oilseed rape was assessed on a spring sown crop of onions at Kirton in 1992.

Three applications were made of the most promising combinations to plots containing known populations of volunteer plants. Weather conditions prevented application until the second true leaf stage of the crop when potato shoots were larger than desirable for a first spray but some treatments were still effective.

The most promising treatments were a combination of Totril, Fortrol and Starane applied at 250 ml, 250 ml and 200 ml per hectare respectively, and Tribunil applied at 2 kg. Both treatments were applied three times. There was evidence of damage to the crop with both of these but it did not appear to be lasting. Any loss of crop due to chemicals was likely to have been small compared to that caused by an uncontrolled volunteer population.

INTRODUCTION

Onions are frequently grown in farm rotations with potatoes, oilseed rape and cereals. Onions are poor competitors against most weeds and need protection from both weeds and volunteer plants from previous crops. Potatoes and oilseed rape with their rapid growth and spreading habit are particular problems.

In some years, late frosts can be useful in controlling early potato shoots and then a normal broadleaved-weed herbicide programme can be effective against them. However, this can be unreliable and after a series of mild winters the problem has intensified.

In response to requests from growers for specific information on systems to control volunteers the HDC sponsored work initially at ADAS Arthur Rickwood on peat soils. This was extended in 1992 to include silt soils at HRI-Kirton and sandy soils at HRI-Wellesbourne.

Work at Kirton included a screening trial carried out in the early spring of 1992 under glass with module raised plants. This tested a range of existing and novel herbicide combinations at various rates enabling unsuitable treatments to be quickly and cheaply eliminated. The information gained together with that from the previous field trials was used to develop field trials for 1992. At Kirton these included drilled onions and late planted leeks. Reports of the leek trial and the glasshouse screening work can be found elsewhere.

MATERIALS AND METHODS

Treatments

| | <u>Chemical</u> | <u>Product and rate</u> |
|-----|---|--|
| 1. | Untreated | - |
| 2. | Hand weeded | - |
| 3. | fluroxypyr | Starane 2 400 ml |
| 4. | sodium monochloroacetate (SMA) + ioxynil | Croptex steel 15 kg + Totril 250 ml |
| 5. | sodium monochloroacetate + cyanazine | Croptex steel 15 kg + Fortrol 250 ml |
| 6. | fluroxypyr + ioxynil | Starane 2 300 ml + Totril 250 ml |
| 7. | fluroxypyr + cyanazine | Starane 2 300 ml + Fortrol 250 ml |
| 8. | fluroxypyr + clopyralid | Starane 2 300 ml + Dow Shield 200 ml |
| 9. | ioxynil + cyanazine + fluroxypyr | Totril 250 ml + Fortrol 250 ml + Starane 2 200 ml |
| 10. | ioxynil + cyanazine | Totril 250 ml + Fortrol 250 ml |
| 11. | bentazone + ioxynil + cyanazine | Basagran 500 ml + Totril 125 ml + Fortrol 125 ml |
| 12. | prometryn | Gesagard 525 g |
| 13. | methabenzthiazuron | Tribunil 2 kg |
| 14. | ioxynil + linuron | Totril 250 ml + PBI liquid linuron 150 ml |
| 15. | cyanazine + linuron | Fortrol 250 ml + PBI liquid linuron 150 ml |

Treatments were applied in 250 l/ha water unless otherwise specified. Applications were made on 20 May and 1 June. On 9 June treatments 3-9

inclusive were repeated a third time and all other treated plots were sprayed with treatment 9 but at 350 ml Totril and Fortrol and 250 ml Starane. Treatment 13 was not given either of the third spray treatments as at the time of spraying effects of the original sprays were becoming visible.

The first application was made when potato shoots averaged between 150 and 225 mm in height. The onion crop was almost at second true leaf stage.

On 23 July the whole trial was sprayed with Totril (250 ml) Fortrol (250 ml) and Starane (200 ml) to reduce remaining haulm before harvest.

Establishing volunteers

Potatoes of the variety Maris Piper were planted at a rate of 40 per plot at depths between 25 and 125 mm on 23 March 4 days after the onions were drilled. Two sowings of oilseed rape (OSR) were made in bands of 500 mm across the plots on 1 May and 8 May.

Cultural details

| | |
|--------------------|--|
| Sowing date: | 18 March 1992 |
| Cultivar: | Caribo |
| Soil type: | Alluvial silt |
| Site: | Land at Kirton End known as 'New Land' field 1 |
| Previous cropping: | 1991 grass |
| Soil analysis: | pH 7.3, P ₂ O ₅ index = 4, K ₂ O index = 2, Mg index = 3 |
| Fertiliser: | 13 March base dressing of 90 kg/ha N as compound (15:8:24) |
| Cultivation: | Prepared with 1 pass of 'Lely Roterra' prior to drilling |
| Drilling: | Precision drilled using a Stanhay seed drill equipped with applicator for aldicarb granules as Temik at 51 g per m row |
| Spacing: | Drilled in rows 300 mm apart with five rows per 1.8 metre wide bed |

Soil conditions: Moist at drilling but dry post germination and during potato assessments. Periods of heavy rain from July to harvest

Pre-emergence herbicide: 25 March propachlor as 9 l/ha Ramrod + pendimethalin as 1 l/ha Sovereign + paraquat at 1.5 l/ha

Weeding: Hand weeded plots were cleared on 3 June

Insecticides: 24 June deltamethrin as 300 ml/ha Decis in 600 l/ha water

Fungicides: 27 July chlorothalonil as 2 l/ha Bravo 500 in 400 l/ha water

Irrigation: None

Harvest: 27 August

Grading: 10 November

Harvesting procedure

Onions were harvested taking the middle three rows of a five row bed. They were cured in a store using heat when necessary until grading at the end of September. Grading took place over a normal commercial grading line using normal standards for size and quality.

Experimental design

Three replicates as three randomised blocks. The recorded plot area was 5.49 m².

Records and assessments

Three assessments were made on a single replicate basis of potato, OSR and onion vigour. The effect of treatments was similar on all replicates. These were done on 8, 15 and 30 June. A final assessment was made on 10 August including all plots. This record was statistically analysed. A scoring system of 0-9 was used with 0 being dead and 9 being fully vigorous.

At grading the following were assessed:

Number and wt by grade (40-50 mm, 50-60 mm, 60-70 mm, 70-80 mm, >80 mm diameter)

Number of thick necks and bolters

Number of other waste

A sample was removed from each treatment and assessed visually for skin colour, skin number, shape, uniformity of shape and firmness.

RESULTS

Weather conditions at around the first true leaf stage were persistently windy causing treatment application to be delayed until nearly the second true leaf stage when potato shoots had reached a fairly large size, between 150 and 225 mm. Two applications were made of the listed set of treatments. Some treatments showed no signs of being successful. These were sprayed a third time with the Totril + Fortrol + Starane mixture. Other treatments were given a third application.

Very little evidence of damage to onions or OSR was seen until about the time the third spray was applied. It is not altogether certain whether affects which started to be seen at that time were a result of the original treatments or of the blanket treatment but as variations were recorded on 8 June it seems likely that much was due to the original treatments. The weather after the first two sprays was also fairly damp and cool, not conducive to desiccation of plant material. A further problem encountered was with OSR sown together with potatoes. As the potato canopy grew the OSR growth was noticeably retarded. In subsequent trials potato and OSR should be established in separate areas of the plot.

A summary of field assessments is shown in Table 1. In general terms, Basagran and Gesagard were not very effective even with Basagran mixed with low rates of Totril and Fortrol. SMA with Totril or Fortrol showed some initial scorching and stunting of potatoes but re-growth occurred towards the end of the trial. Linuron had little effect when combined with Totril or Fortrol.

The most effective treatment overall for potato control was the three-way Totril + Fortrol + Starane mixture. This also had some effect on OSR. There was re-growth of OSR from a number of the other treatments probably due to late germinating seedlings. The most effective treatment against OSR was Tribunil which was also effective at suppressing potato growth. Unfortunately, this chemical did the most damage to the onion seedlings causing them to fall over for some time after the application although they

recovered later on. Starane also had a visible effect causing twisting of both potatoes and onions although the onions did recover with no apparent long term problems.

The yield figures in Table 2 relate more to the potato cover than to any possible phytotoxicity. The highest yield coming from the hand weeded and Tribunil plots which had the most effective control of potatoes. The worst yield was from the untreated control where it was difficult to find any onions at all. These plots were omitted from the analysis. The Gesagard also gave a very low yield due partly to potato growth and partly to loss of plant stand. There were differences in size of onions represented by the 40-50 mm and 60-70 mm grades. There were no significant differences in the 50-60 mm grade. The hand pulled control also gave a low yield due to a delay in the removal of the potatoes.

CONCLUSION

The yields of onions were drastically reduced where control of potatoes was inadequate, illustrating the nature of the problem. It is also difficult to make comments about phytotoxicity as yields are related directly to the vigour of the potatoes rather than to any possible direct chemical effect. This was illustrated by Tribunil which did the most immediate damage after spraying but still gave one of the highest yields. Separate areas would be required to assess the affects of chemicals grown without potatoes. Although there may have been some phytotoxicity any small yield loss is likely to be acceptable compared to the total crop loss sustained if no control is practiced.

The effect of potato canopies also made it difficult to assess the effect of sprays on OSR seedlings and once again separate areas should be used in future for potatoes and OSR assessments.

Two treatments emerged as clear winners, the Totril + Fortrol + Starane and Tribunil at 2 kg although the rate of the latter may be a little high. A further factor was the size of the potatoes when spraying took place. This was delayed due to adverse weather conditions and most treatments would have performed better on smaller shoots.

RECOMMENDATIONS FOR FURTHER WORK

Treatments using various combinations of Totril, Fortrol, Starane and Tribunil should be used in further trials with any other untried possibilities. All future trials on volunteer potatoes should segregate potato and OSR areas within plots and a further area of plot should be left completely without volunteers to assess accurately any affect on the crop yield as distinct from the crop losses caused by uncontrolled weed canopy.

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Table 1. Field assessments of vigour

| Treatment | 8 June | | 15 June | | 30 June | | 10 Aug | | | | |
|-----------------------------------|--------|-------|---------|----|---------|-------|--------|-----|-------------|------|------|
| | pot | OSR 1 | OSR 2 | on | pot | OSR 1 | OSR 2 | pot | OSR | | |
| untreated | 9 | 7 | 7 | 9 | 9 | 2 | 2 | 9 | 6.7 | 5.3 | |
| Hand pulled | - | - | - | - | - | - | - | - | 0.0 | 0.0 | |
| S(400 ml) | 3 | 8 | 8 | 8 | 8 | 6 | 5 | 5 | 2.0 | 7.3 | |
| SMA + T(250 ml) | 6 | 0 | 1 | 8 | 5 | 1 | 3 | 7 | 5.3 | 6.7 | |
| SMA + F(250 ml) | 5 | 7 | 7 | 9 | 4 | 6 | 2 | 5 | 5.7 | 7.7 | |
| S(300 ml) + T(250 ml) | 5 | 5 | 5 | 9 | 4 | 4 | 4 | 6 | 1.3 | 7.3 | |
| S(300 ml) + F(250 ml) | 3 | 6 | 0 | 7 | 2 | 5 | 0 | 1 | 1.3 | 8.0 | |
| S(300 ml) + Sh(250 ml) | 3 | 9 | 7 | 9 | 3 | 9 | 6 | 4 | 2.3 | 7.3 | |
| T(250 ml) + F(250 ml) + S(200 ml) | 4 | 3 | 3 | 8 | 2 | 1 | 2 | 4 | 2.0 | 6.0 | |
| T(250 ml) + F(250 ml) | 7 | 2 | 2 | 9 | 4 | 2 | 1 | 4 | 2.3 | 5.0 | |
| B(500 ml) + T(125 ml) + F(125 ml) | 7 | 0 | 1 | 8 | 5 | 1 | 1 | 3 | 4.0 | 5.3 | |
| Gesagard 575 ml | 8 | 8 | 7 | 7 | 6 | 6 | 2 | 5 | 3.7 | 7.3 | |
| Tribunil 2 kg | 6 | 0 | 0 | 4 | 1 | 1 | 0 | 4 | 2.5 | 0.0 | |
| T(250 ml) + L(150 ml) | 8 | 3 | 3 | 9 | 5 | 3 | 0 | 6 | 5.0 | 6.0 | |
| F(250 ml) + L(150 ml) | 8 | 4 | 4 | 9 | 6 | 2 | 2 | 5 | 3.3 | 7.7 | |
| | | | | | | | | | SED (29 df) | 0.74 | 1.02 |
| | | | | | | | | | LSD (5%) | 1.51 | 2.84 |

Key

S = Starane SMA = Croptex Steel/sodium monochloroacetate T = Totril F = Fortrol Sh = Shield B = Basagran L = Linuron
 OSR1 sown 1 May OSR2 sown 8 May

Table 2 Yield and size

| Treatment | t/ha total mktble | % by wt of marketable | | |
|-----------------------------------|-------------------------|-----------------------|----------|--------------------|
| | | 40-50 mm | 60-70 mm | per m ² |
| untreated | - | - | - | - |
| hand pulled | 19.76 | 27 | 17 | 49 |
| S(400 ml) | 5.95 | 55 | 10 | 37 |
| SMA + T(250 ml) | 3.81 | 55 | 3 | 40 |
| SMA + F(250 ml) | 11.20 | 36 | 12 | 43 |
| S(300 ml) + T(250 ml) | 5.75 | 54 | 9 | 37 |
| S(300 ml) + F(250 ml) | 18.97 | 26 | 20 | 44 |
| S(300 ml) + Sh(200 ml) | 5.22 | 55 | 5 | 39 |
| T(250 ml) + F(250 ml) + S(200 ml) | 22.51 | 24 | 16 | 47 |
| T(250 ml) + F(250 ml) | 10.47 | 35 | 10 | 42 |
| B(500 ml) + T(125 ml) + F(125 ml) | 4.65 | 44 | 11 | 32 |
| Gesagard 575 g | 1.86 | 50 | 7 | 26 |
| Tribunil 2 kg | 20.86 | 16 | 20 | 39 |
| T(250 ml) + L(150 ml) | 3.05 | 42 | 5 | 31 |
| F(250 ml) + L(150 ml) | 5.45 | 33 | 8 | 36 |
| SED (29 df) | 2.689 | 8.3 | 4.6 | 3.8 |
| LSD (5%) | 5.500 | 17.0 | 9.4 | 7.8 |

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