MORLEY RESEARCH CENTRE

Timing and evaluation of herbicides for winter field beans, 1994

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Summary

A range of established herbicide options were compared on a crop of Punch winter beans established on a sandy loam soil by ploughing-in the seed in early November. Although weed control was poor there did not appear to be sufficient weeds to adversely affect crop development. At harvest several treatments appeared to reduce yields suggesting that some phytotoxicity may have added to the affects of a dry summer. This effect was most noticeable where bentazone was used in early May resulting in a yield loss of 0.72 t/ha.

Object

To evaluate a range of timing, dose and sequence options available for the control of weeds using established products.

Method

The treatments (see Table 1) were applied to a crop of Punch winter beans established by broadcasting the seed on to wheat stubbles in the late autumn before being ploughed under to a depth of between 100 and 250 mm.

Application was by CO_2 pressurised knapsack sprayer using a 4 m hand held boom. All treatments were at 200 l/ha using F110° 03 nozzles.

Details of active ingredients are listed in Table 2.

The treatments were arranged in randomised blocks with four replicates. Plot layout, experiment method and spraying details were according to standard Morley procedures. Assessments of weed populations were made in the late winter (10 February) and spring (13 May). The plots were taken to yield (19 August) using a Claas Dominator combine harvester modified for small plot work. The trial area received normal farm inputs of fertiliser, fungicides and insecticides applied overall.

*Not for publication without the Director's consent. This report deals primarily with only one year's work, so any conclusions given are provisional.

Table 1. *Herbicide treatments*

Herbicide dose (l or kg product/ha) and timing :
Untreated
Pre-emergence (17 November)
Gesatop 500SC (1.7)
Gesatop 500SC (2.3)
Gesatop 500SC + Kerb 50W (1.7 + 1.0)
Gesatop 500SC + Kerb 50W (2.3 + 1.0)
Kerb 50W (2.1)
Carbetamex (3.0)
Pre-emergence (17 November) + post emergence (25 February)
Gesatop 500SC (1.15 + 1.15)
Post-emergence (25 February)
Gesatop 500SC (2.3)
Spring, pre-flower (12 May)
Basagran (3.0)

Table 2. *Details of active ingredients*

Product	Active ingredients (g ai/l or kg)
Basagran	bentazone (480)
Carbetamex	carbetamide (700)
Kerb 50W	propyzamide (500)
Gesatop 500SC	simazine (500)

Results and discussion

Crop establishment and early development appeared satisfactory with no adverse treatment effects. In the winter and early spring the main weeds were field pansy *(Viola arvensis)*, common field speedwell *(Veronica persica)* and annual meadow-grass *(Poa annua)* but these were not present in sufficient numbers to be competitive with the crop.

Weed control

There was no significant difference between treatments during the winter.

Counts of weed numbers on untreated plots made on 13 May showed that field pansy was the dominant broad- leaved species with 38/m², the remainder of broad-leaved weeds totalled 16/m² including black-bindweed *(Fallopia convolvulus)*, common chickweed *(Stellaria media)*, common field speedwell, fat hen *(Chenopodium album)*, mayweed *(Matricaria* spp.*)*, parsley piert *(Aphanes arvensis)* and common poppy *(Papaver rhoeas)*. There were also some annual meadow-grass (55/m²).

Yield

Summer growth was affected by drought after flowering and this adversely affected seed yield (Table 3). Although there was a fairly large degree of variability in the data, yields were differentially affected by herbicide treatment, notably by several simazine treatments and in particular by the late application of Basagran.

The limited weed observations indicated that weed control effects were not responsible for the apparent yield reductions. The numbers and vigour of the weeds present on the untreated plots in mid May suggested that there may have been some competition for moisture between crop and weeds on this sandy loam soil. Under these conditions crop growth may have been adversely affected by some of the treatments. The absence of useful weed observations meant that the inconsistences between the November applications of simazine ±propyzamide are less easy to explain. However, the possibility is acknowledged that some phytotoxicity such as loss of photosynthetic tissue, resulting from the post-winter treatments in particular, may have added to the burden placed on the crop by the dry conditions in the early summer. These results do not provide any clear indications of the value of effective chemical weed control in winter field beans. It is possible that this crop is sufficiently dominant in the early stages of development to overcome the competition of many weed situations and is often relatively unaffected by later weed growth when the crop is reaching maturity. Further studies over a number of seasons would be necessary before any such conclusion could be reached.

Table 3. *Crop yield and thousand grain weight*

Herbicide dose (l or kg product/ha) and timing	Yield (t/ha @ 85% dm)	Thousand grain weight (g @ 85% dm)
Untreated	3.58	658.3
Pre-emergence (17 November)		
Gesatop 500SC (1.7)	3.15	669.5
Gesatop 500SC (2.3)	3.16	666.1
Gesatop 500SC + Kerb 50W (1.7 + 1.0)	3.37	667.7
Gesatop 500SC + Kerb 50W (2.3 + 1.0)	3.67	664.1
Kerb 50W (2.1)	3.73	658.8
Carbetamex (3.0)	3.35	643.5
Pre-emergence (17 November) + post emergence (25 February)		
Gesatop 500SC (1.15 + 1.15)	3.01	656.3
Post-emergence (25 February)		
Gesatop 500SC (2.3)	3.20	665.8
Spring pre-flower (12 May)		
Basagran (3.0)	2.86	648.2
LSD	0.398	NS
SE per plot (27 df)	±0.275	±14.14
CV (%)	8.3	2.1

LSD = least significant difference at 95% probability level
NS = no significant difference

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Appendix

The following information is presented as an Appendix and is available on request:-

Field details
Method
Experiment diary
Additional tables

Table A1. Weed assessment, 10 February

Field details

Crop winter beans **Variety** Punch

Field reference OS TM063988

Site Broom Close, Manor Farm, Morley

Previous crop 1993 winter barley
1992 sugar beet
1991 winter barley

Soil type and series sandy loam over chalky boulder clay (Ashley series)

Soil analysis

	pH	P	K	Mg
(Sept 1991)	8.1	2.7	1.5	2.2

Seed Commercial **Seedrate** 200 kg/ha (Approx. 30 seeds/m^2)

Date sown 9 November 1993

Nutrients applied 105 kg/ha P_2O_5
162 kg/ha K_2O

Cultivations 9 November 1993 - plough and press

Applications to crop

Date	GS	Item (ai, g/l or kg)	Rate/ha
20 March	102	Cyperkill (cypermethrin, 100)	0.25 l
19 May	204	Ronilan (vinclozolin, 500)	0.75 l
		Bravo (chlorothalonil, 500)	2.0 l
		Bavistin DF (carbendazim, 500)	0.5 kg
		Manflo (maneb, 800)	1.0 l
20 June	207	Bravo	1.0 l
		Hinge (carbendazim, 500)	1.0 l
		Pirimicarb (pirimicarb, 500)	0.26 kg
		Mantec (manganese foliar feed)	1.75 kg

Method

Plot layout

The beans were sown at approximately 200 kg/ha with an Amazone fertilizer distributor set to broadcast seed on the soil surface. Subsequently the seed were ploughed in to a depth of up to 28 cm. The herbicide treatments were applied to plots 12 m long and 4 m wide and within these treated areas harvest areas were clearly marked by rotovating strips to give an effective plot width of 2.35 m and a length of 10 m, which was used for harvest yield assessments.

Common treatments such as fertiliser, insecticides or fungicides were applied across all plots with farm machinery using wheelings, 12 m apart.

Treatments were applied using a CO_2 powered backpack sprayer, utilising 'Cornelius' vessels and a 4 m boom (eight nozzles at 0.5 m spacings) with Lurmark F110° 03 nozzles at 2 bar pressure, to give 200 l/ha spray volume at 1.6 m/s forward speed.

Agronomic factors

Weed observation assessments in February were made by integrating subjective scores for plant vigour and density (maximum = 100).

The weed population in May was determined by making six counts of a 50 cm x 50 cm square quadrat per plot on untreated plots.

Harvest details

Plots were harvested using a Claas Dominator combine which was modified for plot work and used electronic weighing. The trial was harvested by replicate.

Post-harvest determinations

Moisture content was determined by taking a 500 g subsample, oven drying for 48 hours at 100 -102°C and weighing at ambient temperature.

1000 seed weight was determined by counting 200 seeds from a well mixed sample and weighing on an electronic balance. A minimum of two samples were counted from each plot with a tolerance of 0.2 g required between samples.

Experiment diary

Date	Treatments applied or action
9 November 1993	Seed broadcast and site ploughed
17 November	Pre-emergence treatments applied
10 February 1994	Weed scores
25 February	Post-emergence treatments applied
12 May	Pre- flower Basagran applied
13 May	Weed counts
19 August	Trial harvested

Results

Table A1. *Weed control score on 10 February (%)*

Herbicide dose (l or kg product/ha) and timing	Field pansy - score (0-100 max)	Common field speedwell - score (0-100 max)
Untreated	21.4	26.0
Pre-emergence (17 November)		
Gesatop 500SC (1.7)	30.5	36.7
Gesatop 500SC (2.3)	28.5	34.2
Gesatop 500SC + Kerb 50W (1.7 + 1.0)	25.3	25.3
Gesatop 500SC + Kerb 50W (2.3 + 1.0)	31.8	28.5
Kerb 50W (2.1)	25.5	28.3
Carbetamex (3.0)	21.6	23.7
Pre-emergence (17 November) + post emergence (25 February)		
Gesatop 500SC (1.15 + 1.15)	35.4*	28.4*
LSD	NS	NS
SE per plot	±7.47 (21 df)	±8.90 (23 df)

*First part of treatment applied only at this stage