Summer weed control options

SUMMARY

Controlling summer weeds improves crop yield. Summer weeds like Heliotrope use large amounts of stored soil water and nitrogen, which is then not available to the following crop.

Heliotrope numbers are generally low in paddocks, which had TT canola (Atrazine used in crop), and cereals treated with a sulphonylurea herbicides. Both of these groups of herbicides have good long-term activity on heliotrope.

Roundup and Spray.Seed have activity on heliotrope (even large heliotrope in flower and 10 to 20 cm high), especially when applied with an oil additive and high water volume. Spraying late in the afternoon or early evening is a good strategy.

Soil moisture and nitrogen conservation, timing, cost and effectiveness are all concerns for summer weed control. It is often difficult to make the right decision. Late spring rains and/or harvest rains combined with the harvest workload make appropriate timing for chemical weed control difficult. Hot temperatures and dust have a large impact on weed control options and effectiveness. Timing of herbicide applications can be critical to the success of summer weed control.

The BCG carried out three trials over the last two summers:

1. Heliotrope effect on wheat yield at Charlton (1998/99 summer)
2. Herbicide options for controlling a range of summer weeds (1999/2000 summer)
3. Spraying conditions for optimum summer weed control (1999/2000 summer)

1. Heliotrope effect on wheat yield at Charlton

METHOD

A demonstration plot was established which had:

(i) cultivated fallow - heliotrope was controlled over summer by cultivation,

(ii) with heliotrope - heliotrope was allowed to grow over summer, on average, 5 pl/m^2 (large)

(iii) raked heliotrope - heliotrope was allowed to grow over summer, on average, 5 pl/m^2 (large). Prior to sowing the heliotrope stubble was raked and removed from the plot. This was to measure if there was any allelopathic (toxic) effect on the crop from the heliotrope residue.

Immediately prior to sowing, soil water and available nitrogen were measured to a soil depth of 60cm.

RESULTS

The cultivated fallow plot at sowing had 70mm more soil water and 33 kg/ha more nitrogen available for the crop than the plots with heliotrope. Both of these positive results translated into a healthier crop throughout the season and at flowering the fallow plot had 100 wheat heads per meter more than the heliotrope plots. The final result was 1.5 t/ha more yield in the fallow plot. In the raked heliotrope plot, the crop did slightly better (0.3 t/ha) than the plot with heliotrope residue (see Table 2.14).

Table 2.14 Soil water, soil available N, wheat head density and yield for fallow versus summer weeds.

	Cultivated fallow	Heliotrope plots	
		With heliotrope	Raked heliotrope
Soil water mm at sowing	210	140	140
Soil available nitrogen kg/ha	78	45	45
Wheat heads per meter at flowering	370	264	286
Wheat yield (t/ha)	**3.68**	**2.17**	**2.46**
WUE (mm/kg/ha)	18.5	16.3	16.3

2. Herbicide options for controlling a range of summer weeds (1999/2000 summer)

METHOD

A wide range of herbicides was tested on summer weeds. Options tested include, pre-emergent (applied to dry, bare ground prior to the first rain), and mid post emergent. The trial was laid out in a nearest neighbour design so that each plot could be scored against an adjacent unsprayed control. Plots were 2.5 m wide by 20 m long. Results of herbicide efficacy were determined on a weed damage score rating. All treatments were applied early morning. Pre-rain treatments were applied on November 19, followed by 27mm rainfall on November 21. Post-emerge (mid-PE) treatments were applied on January 6 when the plants were quite advanced (10 to 20cm high) and conditions were dry (rain on December 26 – 35mm).

RESULTS

Logran, Glean and Ally had excellent control of heliotrope regrowth (Table 2.15). Couch grass was present in the plots. Logran at 20g/ha appeared to have better activity on couch grass than Ally at 5g/ha.

Table 2.15 The effect of pre-emergent herbicide applications on summer weeds.

Herbicide and Rate	Timing	Heliotrope regrowth
Ally 5g/ha	Pre rain	0%
Logran 20g/ha	Pre rain	0%
Glean 10g/ha	Pre rain	1%
Glean 5g/ha	Pre rain	20%
Atrazine 1L/ha	Pre rain	20%

Weeds present at the post emergent application included heliotrope, caltrop, paddy melon, couch grass and portulaca. Heliotrope populations at spraying were 200pl/m^2. The scores are based on activity on heliotrope at 10-20cm in size. Spray.Seed with Estercide 800 and Gramoxone with Hasten combinations severely knocked the advanced heliotrope (Table 2.16). Roundup Extra is slower acting compared to products like Spray.Seed and its effectiveness may still improve.

Table 2.16 The effect of early post emergent chemical applications on heliotrope.

Chemical and rate	Score *
Roundup Xtra 1.5L/ha	5
Roundup Xtra 1L/ha	4
Roundup Xtra 650ml/ha + Invader 80ml/ha + 0.5% Uptake	3

Roundup Xtra 650ml/ha + Ally 5g/ha + 0.5% Uptake	3
Spray.Seed 1L/ha + Estercide800 800ml/ha + BS 1000	8
Gramoxone 1.25L/ha + Hasten 1%	8
Amicide500 2L/ha + Hasten 1%	6
Invader 125ml/ha + 0.5% Uptake	2
Broadstrike 25g/ha + 0.5% Uptake	1
Atrazine 1L/ha + 1% Uptake	4
Tordon 73D 300ml/ha + 0.5% Uptake	2

*visual assessment completed 18 days after spraying
scale: 1= no effect, 5=severe symptoms, and 9= complete loss of plants

3. Spraying conditions for optimum summer weed control (1999/2000 summer)

METHOD

Roundup Xtra and Spray.Seed were applied at:

(i) 1.5 L/ha each
(ii) with and without oil (Uptake 1%)
(iii) water rate 60 and 100 L/ha
(iv) early in the morning and early evening

Table 2.17 Spray conditions for summer weed control demonstration

Application date	Early evening of 12 Jan	Early morning 13 Jan
Time	6:30pm	6:30am
Max / min temperature	38° / 19°	33° / 20°
Temperature at time of spraying	30°	20°
Wind	Gusting easterly	Light easterly
Level of plant stress	Mod-high	Mod
Weather conditions prior to spraying	Strong hot easterly winds	Overnight wind died down
Dust	Present	Present
Weed present and density	Heliotrope, 200pl/m^2	Heliotrope, 200pl/m^2
Growth stage	10-20cm	10-20cm
Temperature prior to spraying	4 days above 30°C	4 days above 30°C

RESULTS

Plots were 6m wide by 100m long. Results of herbicide efficacy were determined on a weed damage score rating. Early-evening applications of Roundup Xtra or Spray.Seed, with oil and applied with 100L/ha of water gave the best results (Table 2.18).

Table 2.18 The effect of Roundup Xtra and Spray.Seed on heliotrope.

	Roundup Xtra		Spray.Seed	
Treatments	Early evening	Early morning	Early evening	Early morning
100L + oil	9	7	9	8
100L – oil	6	6	n/a	7
60L + oil	7	7	8	7
60L – oil	5	5	7	7

*visual assessment completed 11 days after spraying
scale: 1= no effect, 5=sever symptoms, and 9= complete loss of plants

There was evidence of new growth on the heliotrope on the Spray.Seed without oil application. The plants had been burned off but small new leaves were appearing in the lower parts of the plant. The Roundup Xtra without oil treated plants still had a green appearance.

Evening spraying appeared to be better compared to early morning application. The evening application may have been more effective compared to the morning application of herbicide because in the evening the herbicide has had more time to translocate into and through the plant. If plants are sprayed in full sunlight, herbicide movement into and translocation throughout the plant is hampered by the rapid kill of actively photosynthesising plant tissue (this is especially the case with Spray.Seed).

INTERPRETATION

Not controlling summer weeds such as heliotrope has an enormous effect on soil water (at the Charlton site there was 70mm less water available where the heliotrope was not controlled) and available nitrogen (30 kg less N available). This translated directly to a reduction in yield by 1.5t/ha (from 3.7 to 2.2t/ha) and this can be directly attributed to the loss of water. 70mm of stored soil water translates to 1.4 t/ha in grain yield at a water use efficiency of 20 kg/mm/ha.

Summer weed such as heliotrope are effectively controlled by:

- sulphonylurea herbicides (Glean, Logran or Ally) prior to emergence (watch plant back for pulses, canola, barley and oats on alkaline soils)
- atrazine either before or after emergence (use oil for post emergent control) (watch plant back for cereals and normal canola)

Roundup Xtra or Spray.Seed, plus oil, applied late in the afternoon / early evening with as much water as can be put out (100L was more effective than 60L)