

Herbicide carry-over effects on the following crop

The aim of this demonstration was to raise the awareness of the carry-over or residual effect in alkaline soils of some herbicides on the following crop and show the visual phyto-toxic effects of these herbicides.

Summary: Care has to be taken with many residual herbicides to avoid potential damage to the following crop. On alkaline soils the residual effects of Glean and Ally used for summer fallowing will be severe on pulses and conventional and TT canola. Atrazine used for summer fallowing in dry seasons slows the growth of conventional canola and wheat. Diuron used as an over summer herbicide in this demonstration had a negative effect on conventional and TT canola.

Background

Group B herbicides, especially those in the Sulphonylurea subgroup (Glean - chlorsulfuron, Logran - triasulfuron, Ally - metsulfuron-methyl), have very long residual periods in alkaline soils, and even minute traces of the chemical can affect growth of susceptible crops. These herbicides are very effective weed control agents but care needs to be taken with using them either in-crop (in relation to the following crop) or as weed control options in fallow. Other Group B herbicides not in the Sulphonylurea subgroup, such as Eclipse - Metosulam, can also have a carry over effect and care needs to be taken when using this chemical for summer fallowing depending on the crop which will be sown after the fallow. Group C herbicides such as Atrazine are also known to have residual effects on alkaline soils. Another Group C herbicide, which is used prior to the crop being sown, is Diuron. In WA there have been reports where Diuron is used over summer and there is some evidence that it actually stimulates the growth of canola in the year of application. (This last sentence is a bit awkward)

Methods

Atrazine 1L/ha, Eclipse 5g/ha, Spinnaker 0.15L/ha, Ally 5g/ha, On Duty 30g/ha and Glean 15g/ha were applied in a nearest neighbour design so that every treatment plot was located adjacent to an unsprayed control. These herbicides were applied in October 2000 (7 months prior to sowing). Diuron at 1L was applied as a summer application in March 2001 (2 months prior to sowing). In mid-May 2001 faba beans, lentils, wheat, TT canola, IT canola and conventional canola were sown with Mallee Mix 1 at 80kg/ha. Crop phyto-toxic assessments were made several times during the season. The scores reported refer to the pre-flowering stage observations. (No in-crop weed control was made)

Results

The visual effects of herbicide carry-over on the following crop are explained in Table 1.

Interpretation

The period between herbicide application and sowing the crop was very dry (55mm = Nov/Dec 2000mm of rain between spray application and sowing). Due to the length of the dry period the effect of some of these herbicides may have been more pronounced than expected. Many of these herbicides are broken down either by hydrolysis (breaking of the chemical structure by the pH effect of the soil) or by microbial activity. Both of these processes require a moist soil so breakdown of the chemical will be slow during dry periods.

The Group B, sulphonylurea herbicides: Glean and Ally when used as a late fallow herbicide will cause significant damage to lentils, beans, regular canola, TT canola.

The Group B, imidazilinone herbicides: On Duty and Spinnaker will cause damage to lentils, regular canola, TT canola and wheat. The wheat appeared to suffer more from YLS (Yellow Leaf Spot) comment on multiplication affect of stressed plants

The Group B, sulfonamide herbicide: Eclipse had some effect on lentils, beans and regular canola. Surprisingly the effect on wheat was visible only early during the cropping season with a higher level of YLS in the crop compared to the controls.

The group C herbicide: Atrazine had a low level effect on conventional canola. Diuron applied in March had a severe effect on conventional and TT canola. This effect was different to the reports from WA where Diuron seems to promote growth of conventional canola.

Table 1. Visual damage score[#] and observations of chemical effect on crop

	Applied: October 2000						March 2001
	Atrazine	Eclipse	Spinnaker	Ally	On-Duty	Glean	Diuron
Lentils	1	4 purple leaf edges, stunted plants	5 purple leaves, stunted plants	5 purple leaves, stunted plants	5 purple leaves, stunted plants	8 purple bunched leaves, short and stunted plants	2 very slight stunting
Beans	1	3 some stunted plants	2 few stunted plants	1	3 some stunted plants	6 purple bunched leaves, short and stunted plants	1
Regular canola	3 some stunted plants	3 some purple leaves, stunted plants	8 severe stunting	5 some purple leaves, stunted plants	8 some purple leaves, severe stunting	7 some purple leaves, severe stunting	5 stunted plants no purpling
IT canola	1	1	1	1	1	1	2 small reduction in growth
TT canola	1	2 small reduction in growth	7 some purple leaves, severe stunting	2 small reduction in growth	7 some purple leaves, severe stunting	6 some purple leaves, severe stunting	4 some plants stunted, other plants unaffected
Wheat	3 thin crop	4 reduction in growth, thin crop more YLS	5 reduction in growth some yellow youngleaves more YLS	2 slight stunting colour good	4 stunted plants more YLS	3 reduction in growth, thin crop	1

[#] Scores for weed control and crop effect: 1- no symptoms evident; 3 – slight symptoms; 5- severe symptoms; 7 – heavy damage; 9 – complete loss of plants

Commercial Practice

When using residual herbicides it is important to follow the label to ensure that crop damage is minimal.

Watch out when summer fallow spraying:

- Glean and Ally will severely damage lentils, beans, conventional and TT canola
- Atrazine can cause a reduction in early growth in conventional canola and wheat if the period between application and sowing is dry.
- Diuron appears safe except on conventional and TT canola.