

# SSWM – local research experience

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## Ryegrass mapping

The commercially available crop sensors (CropCircle™, GreenSeeker® and Yara N-Sensor®) measure light reflectance in the red and near infra-red (NIR) wavebands. Red light reflectance is sensitive to changes in plant chlorophyll content and NIR light reflectance is sensitive to changes in plant biomass.

In cropping situations, variation in plant biomass is a result of two variables, the crop and weeds. At early crop growth stages crop biomass tends to be relatively uniform with little expression of underlying soil or landscape variability.

Weed biomass at early growth stages varies according to weed density. Therefore, variability in plant biomass mapped with these sensors at early crop growth stages can often be associated with variable weed densities.

In South Australia, these three sensors have been used successfully to map ryegrass patches in lentil and canola crops at early growth stages, before crop growth and variability starts to mask differences in weed density.

It is important to check by ground truthing how weed species vary across the paddock, as all weeds can contribute to plant biomass variability.

The plan for future research is to determine the threshold density of

ryegrass that can be detected by each sensor in different crops at different growth stages. From work done so far, these sensors can readily detect dense patches of young ryegrass at early growth stages of lentils and canola.

## Herbicide treatment decisions in ryegrass patches

To assess how information on weed distribution may be used in practice, herbicide treatment decisions for high and low density ryegrass patches have been used in two treatment opportunities; pre-emergent herbicide application in cereals and post-emergent grass selective herbicide application in legumes and canola.

This work is being funded as part of a GRDC Science and Innovation Award and as part of a GRDC project (through SANTFA) on direct injection of herbicides in a boom spray.

## Pre-emergent herbicides

The addition of Avadex Xtra® (500g/L triallate) and/or Dual® (720g/L metolachlor) to trifluralin, as well as different rates of trifluralin were compared in two areas, a high ryegrass density and a low ryegrass density. These areas were sown with wheat and the ryegrass populations were assessed at six weeks after sowing.

The choice of herbicides is based on research carried out over four years at two sites in SA (including Hart), which showed that the use of these

combinations of herbicides resulted in an improved kill of ryegrass.

Ryegrass patches were mapped in a paddock of lentils in 2006 and this map was used to locate pre-emergent herbicide trial sites in areas with high and low-density ryegrass populations in 2007.

Results show that the addition of Avadex Xtra® or Dual® to a base rate of trifluralin has led to a significant improvement in control at the high density ryegrass site (Figure 1). However, at the low density ryegrass site in the same paddock a base rate of trifluralin provided adequate control. There was no additional benefit gained by increasing trifluralin rate or the addition of another herbicide at this low ryegrass site. Therefore, the area treated with the higher cost herbicide mix could confidently be restricted to the areas where the ryegrass density was highest.

These results also indicate that there may be a higher level of trifluralin resistance at the high ryegrass site compared with the low ryegrass site. This is being assessed. If herbicide resistance in ryegrass is found to have a greater prevalence in higher density patches, then this will provide added incentive for using more effective herbicide mixes in those areas.

The usefulness of maps in subsequent years will be dependent on patch stability; patch stability will be influenced by movement of seed

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by natural dispersal, or by machinery, in particular harvesters. It may also be influenced by soil conditions affecting germination and seed set of the ryegrass. Adding a larger treatment area around the patches would account for these factors in most cases.

### Post emergent herbicides

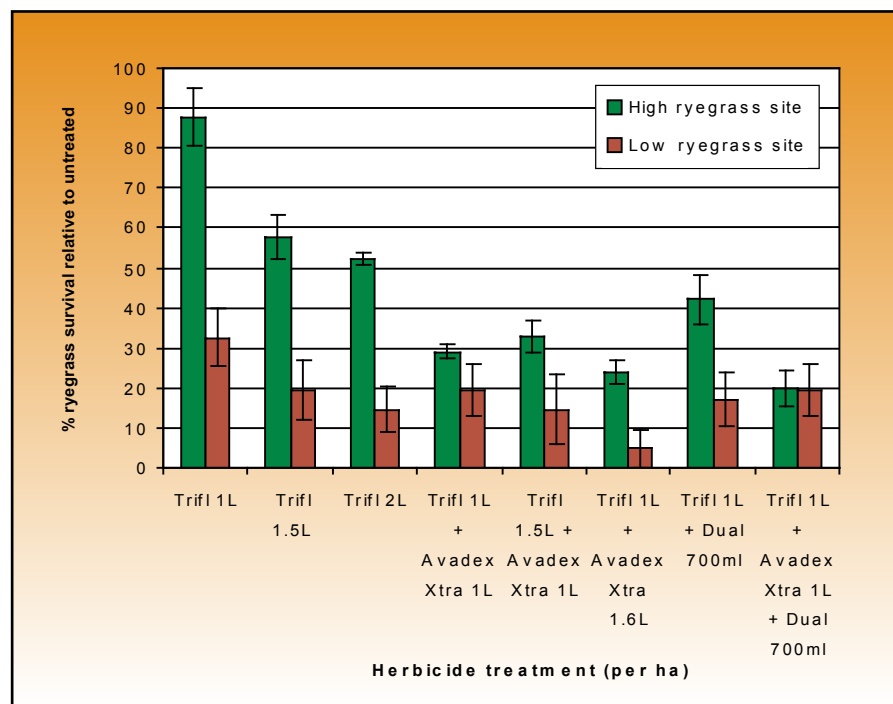
Reasons for using higher rates of post emergent grass selective herbicides in thicker patches of ryegrass are:

- Dense ryegrass patches where plants overlap and shade each other increases the risk that an individual plant will not receive a lethal dose.
- Patches of ryegrass resistant to Select® (Group A) may vary across a paddock.
- Achieving acceptable level of control. In a low density population 95% control may be acceptable, but leave an unacceptably high level of survivors in a high-density population.

This was tested in a separate trial in which different rates of Select® (240g/L clethodim) were applied to high and low density patches of ryegrass in a lentil crop.

Ryegrass counts (Table 1) show that at the high ryegrass site 350 and 500ml/ha of Select® provided significantly greater control than 250ml/ha. At the low ryegrass site there was no significant difference

**Figure 1. Pre-emergent herbicide effects on ryegrass survival relative to nil treatment at two sites in one paddock with differing ryegrass populations (High ryegrass site: nil = 574 plants/m<sup>2</sup>, LSD (5%) = 13.2; Low ryegrass site: nil = 11 plants/m<sup>2</sup>, differences not significant. Error bars show standard errors.**



between these three rates, and these rates provided significantly greater control than 150ml/ha.

Higher rates provided greater control at the high ryegrass site indicating that plants may have been overlapping, thereby limiting herbicide contact to all plants or may indicate an increased level of Select® resistance in the high ryegrass patch. This trend is not evident at the time of ryegrass head counts though, the highest Select® rate provided the best control at both sites. The decision to vary rates based on the

ryegrass head count results would be related to what is an acceptable level of control.

**Rates used were purely for experimental purposes and only label rates are recommend for commercial use.**

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**Table 1. Effect of Select (240g/L clethodim) rate on ryegrass (RG) numbers and ryegrass head production at two sites in one paddock with differing ryegrass populations (different letters denote treatments that are significantly different at 5% level).**

	RG plant counts (plants/m <sup>2</sup> )		RG head counts (heads/m <sup>2</sup> )	
	High RG site	Low RG site	High RG site	Low RG site
Nil	935.5 a	70.7 a	1558.0 a	557.0 a
Select 150 ml/ha	49.7 b	6.8 b	249.3 b	59.1 b
Select 250 ml/ha	11.5 c	2.3 c	83.3 c	32.9 b
Select 350 ml/ha	5.5 d	0.4 c	42.6 c	17.4 c
Select 500 ml/ha	3.3 d	0.6 c	15.0 d	3.3 d