



PROGRESS STATEMENT 2013

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mbuckby@adelaideshowground.com.au as a Microsoft Word document

Project No:		Project Title: A new approach to grass weed control for durum wheat.	
Previous Project(s) DGA0109, 2009/10 Research and Extension Project on Durum Agronomy in SA, 16,000			
Organisation: Durum Growers Association of SA Inc			
ACN/ABN:			
Start Date: 1 July 2012		Completion Date: 30 June 2015	
Address:			
Principal Investigator: <i>(Please include name, qualifications, position, organization NB: this person will be responsible for reporting)</i>			% Time
Location:			
Telephone:		Mobile:	
Facsimile:		Email:	
Other Research Staff: <i>(Please include name, qualifications, position, organization)</i>			% Time
Administrative Contact:			
Telephone:		Mobile:	
Facsimile:		Email:	

2. PROGRESS STATEMENT

2.1 Project Aims

This project aims to develop a new and integrated approach to improve grass weed control in durum wheat by developing a set of agronomic management protocols that improve the effectiveness and net benefit of commonly used herbicides, and the herbicide safety of currently grown durum varieties.

2.2 Progress against the Key Performance Indicators of the project

In 2012, field trials were planned and conducted at four locations (Hart, Tarlee, Roseworthy, and Paskeville) in accordance with KPI #1. **All trials were successful, sites were harvested, ryegrass, crop growth measurements taken throughout the season.** The ryegrass seed bank and selected grain quality data is currently being processed. The trial at Hart suffered from severe Crown Rot infection, resulting in reduced yields and increased trial variability; nonetheless the weed competition data was still very useful. Results are currently being summarised and are only in the preliminary stages, however findings will be presented to the DGA committee on the 13th of February, published into relevant farming system magazines, and presented to farmers at the annual durum growers' forums to complete KPI 2.

Key Performance Indicators

No.	KPI	Date to be completed
1 & 2	Plan and conduct trials	30 Dec 2012/2013
1 & 2	Results published in farming system magazines	30 March 2013/2014
3	Plan and conduct best management practice trials	30 Dec 2014
3	Publish and extend results to growers	30 March 2015
3	Submit final report to SAGIT	30 Aug 2015

2.3 Conclusions reached / Discoveries made

2012 was the first year in a series of experiments aimed to help understand the agronomic factors that may improve grass weed control in durum wheat. Outlined below is a brief summary of some of the findings from individual experiments; however, some data is still being analysed. It should be noted that these results only represent data from one site and one year and should therefore be treated with care until more site x year data is available.

Improving Crop Safety

The Paskeville field trial evaluated the potential for crop recovery from herbicide damage using improved plant nutrition (extra applied N, trace elements, and both). At this site there was herbicide damage from all soil applied herbicides in terms of plant establishment, growth, and yield (table 1). The improved nutrition treatments did not offer any enhancement to crop safety or growth recovery compared to the unfertilised treatments. Sakura (which is currently not registered in Durum) was the most damaging herbicide overall, reducing growth and yield. BoxerGold reduced plant density to a similar extent to Sakura but managed to recover yield even when applied at double the recommended rate (5L/ha). The prolonged growth retardation of Sakura throughout the growing season is highlighted by the NDVI results and, translated to yield penalties of up to 37%

Table 1. Plant establishment, crop growth, and grain yield (t/ha) expressed as a percentage of the nil herbicide control averaged across all nutrition treatments (NS) at Paskeville 2012.

	Growth (NDVI GS)		
	Plants/m ²	22)	Yield (t/ha)
<i>Nil Herbicide Control</i>	100 (188)	100	100 (2.54)
Avadex 3 L/ha	92	94	95
BoxerGold 2.5 L/ha	80	88	99
BoxerGold 5L/ha	72	82	95
Sakura 118g/ha	72	67	74
Sakura 236g/ha	71	64	63
Herbicide (LSD 5%)	8%	11%	10%
Nutrition	NS	NS	NS
Herbicide x nutrition	NS	NS	NS

An additional trial at Paskeville showed the potential to improve crop safety by sowing seed below the herbicide band, and using larger seed (figure 1). BoxerGold treated plots yielded similar to the nil herbicide control when combined with larger seed and deeper sowing, whereas shallow sown small seed suffered a yield penalty. Yield penalties were observed in all Sakura treatment plots, however large seed and deeper sowing minimised the penalty. These yield differences can be explained largely by the differences in plant density and growth resulting from herbicide damage at seeding. Shallow sown smaller seed suffered the largest establishment losses from herbicide. As outlined previously, BoxerGold is likely to reduce plant numbers but have minimal impacts on growth, therefore depending on the season plants can often recover yield. In addition to sowing deeper and using larger seed, increasing seeding rates may be another option to negate further yield losses from BoxerGold.

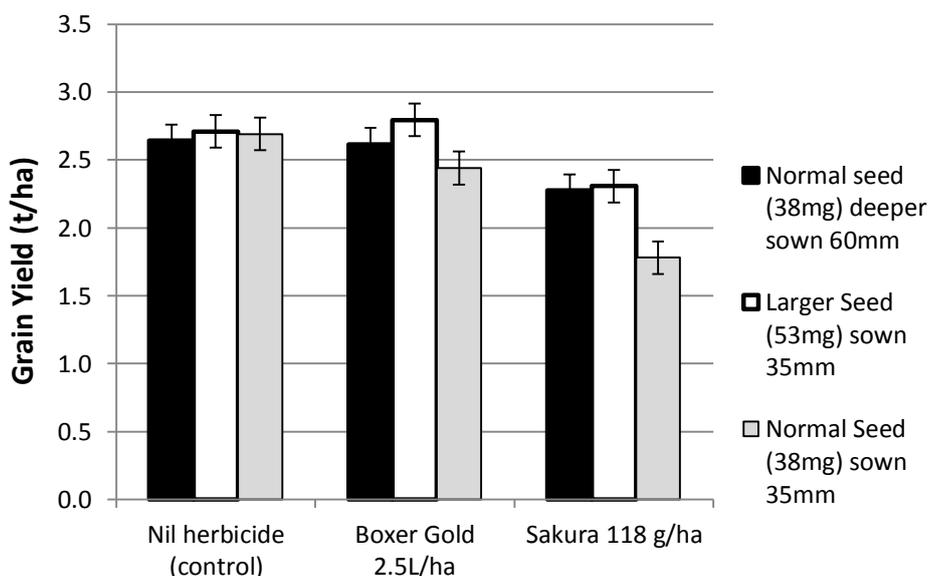


Figure 1. Grain Yield of Tjilkuri Durum at Paskeville, when treated with pre-emergent herbicides and sown in conjunction with different seed sizes and sowing depths.

Varietal herbicide tolerance

A small screening trial evaluated the response of current commercially available durum varieties and advanced lines to BoxerGold and Sakura at recommended and double rates. The key findings are consistent with experiment one, in that Sakura was the most damaging herbicide. Unfortunately, there weren't any notable cultivar differences in tolerance to Sakura or BoxerGold; all of the tested cultivars were either similarly intolerant or worse than traditional variety Tamaroi. The current yield penalty associated with Tamaroi is unacceptable, therefore it seems unlikely that Sakura will be registered in any other variety at the current time.

Improving the net benefit of current herbicides:

Given Sakura is unlikely to be registered; growers should focus on improving the net benefit of current herbicide options through robust agronomic systems. The trial at Tarlee focused on agronomic management to reduce weed seed set using competitive varieties and seeding rates. Whilst a full analysis using ryegrass data (suppression) is not yet available, the preliminary results suggest there are significant differences in varietal competitiveness (tolerance). Figure 2, below, shows the yield of two selected varieties, Tamaroi and Saintly, in the presence of ryegrass. Of current varieties, Tamaroi was identified as a poor weed competitor and Saintly, a better competitor. The application of BoxerGold offered good ryegrass control and subsequently improved yields across the site. Importantly, the yield penalty from withholding herbicide depended upon the seeding rate. In both Tamaroi and Saintly, similar yields were achieved compared to current practice (i.e. BoxerGold at 200 seeds/m²) when seeding rates were high at 300 seeds/m² without any herbicide. However, when seeding rates were lower Tamaroi suffered a significant yield penalty whereas the more competitive variety Saintly did not. These results are encouraging for growers as optimal combinations of variety and seeding rate can be used to alleviate the pressure of pre-emergent herbicides and be a useful IWM strategy.

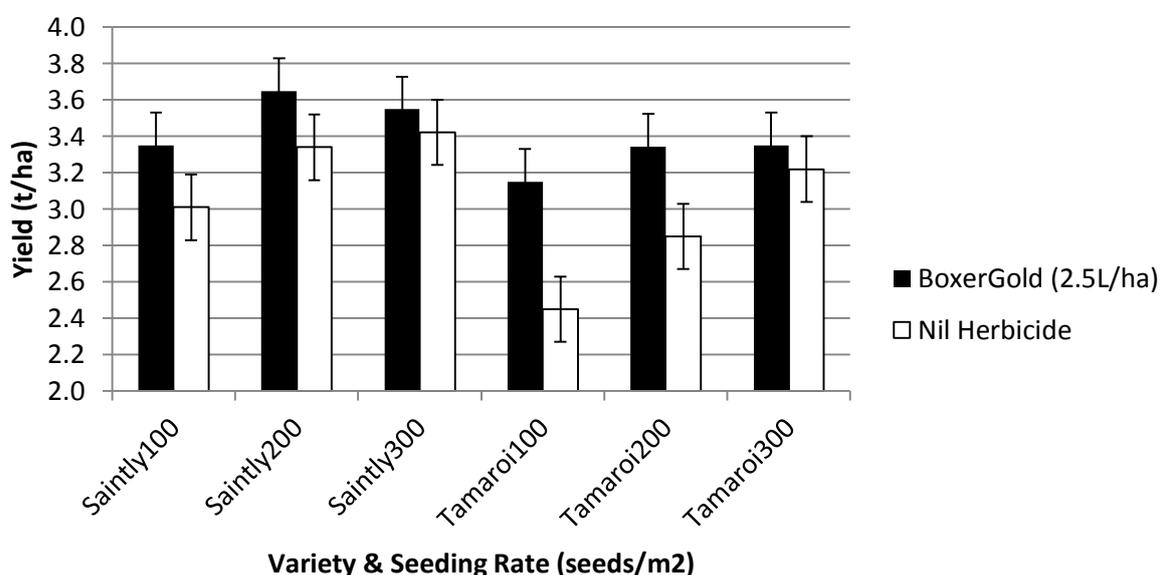


Figure 2 Grain yield of selected durum varieties Saintly and Tamaroi sown at three seeding rates, with BoxerGold and without in the presence of annual ryegrass at Tarlee, 2012

The trial at Roseworthy investigated a number of herbicide options in durum, primarily herbicide dose rates and time of application in conjunction with crop density. The results found that of the currently available herbicides, the combination of BoxerGold at 2.5L/ha and 2L Avadex was the safest and most effective option in Durum. Other application combinations, including lower dose rates of Sakura and split applications of BoxerGold, offered excellent efficacy but resulted in significant crop damage. In almost all of the herbicide combinations, increasing seeding rates from 200seeds/m² to 300seeds/m² improved ryegrass control and had no adverse affects on grain yield.

Based on the preliminary data from 2012 the following **key messages** for growers can begin to be established:

- New durum cultivars are equally susceptible to crop damage from Sakura compared to older durum varieties; therefore Sakura is not likely to be registered in Durum in the near future.
- The foliar application of trace elements did not improve crop safety or recovery from herbicide damage in 2012.

- Sowing seed deeper below the herbicide band and using larger seed improved the safety of current pre emergent herbicide options
- Durum varieties differed in their ability to compete with ryegrass both in terms of tolerance (yield in presence of weeds) and suppression (weed set)
- The combination of a competitive cultivar and increased seeding rates improved weed control both in the presence and absence of current herbicides
- The combination of BoxerGold at 2.5L/ha and 2L Avadex was the safest and effective herbicide option for control of ryegrass in Durum in 2012

2.4 Communication of results to farmers/industry

In the first year of the project, extensive communication of the research and preliminary findings have already been delivered to farmers and industry. Background information on the project was published in the HART and Mid North High Rainfall Zone (MNHRZ) field day guides. Crop walks were conducted at Paskeville in conjunction with the Landmark crop walk, Rob Wheeler presented the research to growers at the MNHRZ winter walk along with the release of new durum variety Yawa. The Durum weed management trials also featured in two sessions at the annual field days at HART and the MNHRZ, and the DGA crop walk in the South East. This work will continue to be widely promoted at crop walks and field days amongst the durum industry along with annual updates at the SA durum growers annual pre-seeding forums held at Blyth (Mid North), and in the South East. Results will be accessible to agronomists and growers through crop science society publications and annual farming system publications with a view to further extension in the years ahead, and will be available online at the DGA website (URL: www.durumgrowerssa.org.au).

2.5 Plans for the coming year

The plans for the coming year will continue as outlined in the research proposal with a focus on adding more data to the first year experiments but to also use the data from year one to continue to develop a package of best management protocols for a successful integrated weed management program. This year will see the introduction of a trial in the emerging durum district of the South East Bordertown district to showcase the research, highlighting the most effective weed control options for integrated grass control in durum. Given there was little varietal differences identified in tolerance to both BoxerGold and Sakura in the current commercial varieties, a more extensive screening process will be conducted instead of the current field based approach. A lab based screening trial will be conducted on a wider range of germplasm from the Adelaide Uni Breeding program to identify if there is any other genetic variation.

3. AUTHORISATION OF THE PROJECT REPORT

Signature:

Date: