Department of Primary Industries
Department of Regional NSW

NSW research results

RESEARCH & DEVELOPMENT – INDEPENDENT RESEARCH FOR INDUSTRY

The following paper is from an edition of the Northern or Southern New South Wales research results book.

Published annually since 2012, these books contain a collection of papers that provide an insight into selected research and development activities undertaken by NSW DPI in northern and southern NSW.

Not all papers will be accessible to readers with limited vision.
For help, please contact: Carey Martin at carey.martin@dpi.nsw.gov.au

Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Crop sequencing for irrigated double cropping

Tony Napier and **Daniel Johnston** NSW DPI, Yanco; **Luke Gaynor**, **Cynthia Podmore** and **Rajinder Pal Singh** NSW DPI, Wagga Wagga; **Rob Fisher** Irrigated Cropping Council, Kerang

Key findings

- The single cropping phase of cotton achieved the highest returns for both $/ha and $/ML.
- The double cropping treatment of canola and maize achieved the highest returns for $/ha.
- All double cropping treatments achieved similar returns for $/ML.

Introduction

The project aims to overcome some of the difficulties with double cropping systems (growing a winter and summer crop following one another) and to provide the opportunity for growers to capitalise on their investment in irrigated agriculture. This project considers the issues of herbicide residues; irrigation layouts and management; stubble management; and quantifying achievable crop yield and profitability.

The project has two core sites, one located in Boort (northern Victoria) and the other at the Leeton Field Station (southern NSW). The Victorian site is focusing on herbicide and stubble management. This report is a summary of the first year's results from the southern NSW experiment where the focus is on evaluating the different crop sequences to quantify achievable crop yield and profitability.

Site details

The experimental site was established at the Leeton Field Station in a field with a history of irrigated lucerne. The paddock was formed into 1.83 m-wide beds suitable for furrow irrigated cropping. The crop sequencing started in early 2014 with a winter cropping or fallow phase. The project will run for two years (four cropping seasons) ending in mid-2016 with the harvest of the second summer cropping phase.

Treatments

The experiment includes both single cropping (one crop per year) and double cropping (three or four crops in two years) treatments. The experiment has seven treatments with four replications of each treatment (Table 1). Each plot includes three beds 1.83 m wide by 120 m long, giving a total plot area of 660 m^2 and a treatment area of 0.26 ha. There is a fallow buffer area of one bed between each plot (Figure 1).

Figure 1. Irrigated double cropping experiment located at the Leeton Field Station.

Table 1. Summary of the seven treatments evaluated in the experiment.

Season/Year	Treatment						
	1	2	3	4	5	6	7
Winter 2014	Fallow	Fallow	Fallow	Wheat	Wheat	Barley	Canola
Summer 2014–15	Soybean	Soybean	Cotton	Soybean	Fallow	Soybean	Maize
Winter 2015	Fallow	Fallow	Faba bean	Wheat	Wheat	Barley	Faba bean
Summer 2015–16	Maize	Soybean	Fallow	Soybean	Fallow	Soybean	Fallow

Yield results of first two seasons

Treatments one and two – winter fallow followed by summer soybeans

The first winter phase was left as fallow. The summer crop was pre-irrigated and sown with Djakal soybeans on 20 November 2014. Both treatments were irrigated 14 times, using a total of 8 ML/ha of water for each treatment. Both crops were harvested on 5 May 2015 and achieved an average yield of 3.09 t/ha and 3.36 t/ha respectively. Both treatments were left as fallow during the 2015 winter phase.

Treatment three – winter fallow followed by summer cotton

The first winter phase was left as fallow. Sitcot 71 cotton was sown on 1 October 2014 and irrigated up. The cotton was irrigated 16 times requiring a total of 10 ML/ha of water. The crop was harvested on 29 April 2015 and achieved an average yield of 13.95 bales/ha. The plots were then cultivated and prepared for the faba bean phase to be sown on 22 May 2015.

Treatment four – winter wheat followed by summer soybeans

The first winter crop was sown to Dart$^{\Phi}$ wheat on 23 May 2014, but due to poor establishment, the crop was re-sown on 20 June 2014. The wheat crop was irrigated four times requiring a total of 3.5 ML/ha of water. The wheat crop was harvested on 11 December and achieved an average yield of 5.25 t/ha. The crop stubble was burned and Djakal soybeans were direct seeded on 16 December 2014 (five days after harvesting the wheat). The soybeans were irrigated 12 times requiring a total of 7 ML/ha of water. The crop was harvested on 21 April 2015 and achieved an average yield of 2.79 t/ha. The plots were then prepared for the winter wheat phase to be sown on 16 May 2015.

Treatment five – winter wheat followed by summer fallow

The first winter crop was sown to Dart$^{\Phi}$ wheat on 23 May 2014, but due to poor establishment, the crop was re-sown on 20 June 2014. The wheat crop was irrigated four times requiring a total of 3.5 ML/ha of water. The wheat crop was harvested on 12 December and achieved an average yield of 5.17 t/ha. The 2014–15 summer phase was left fallow.

Treatment six – winter barley followed by summer soybeans

The first winter crop was sown to Scope CL$^{\Phi}$ barley on 23 May 2014. The barley crop was irrigated four times requiring a total of 3.5 ML/ha of water. The barley crop was harvested on 29 November and achieved an average yield of 4.19 t/ha. The crop stubble was burnt and Djakal soybeans were direct seeded on 2 December 2014 (three days after harvesting the barley). The soybeans were irrigated 13 times requiring a total of 7.5 ML/ha of water. The crop was harvested on 21 April 2015 and achieved an average yield of 2.79 t/ha. The plots were then prepared for the winter barley phase to be sown on 18 May 2015.

Treatment seven – winter canola followed by summer maize

The first winter crop was sown to Hyola® 50 canola on 16 May 2014. The canola crop was irrigated four times requiring a total of 3 ML/ha of water. The canola crop was harvested on 13 November and achieved an average yield of 3.44 t/ha. The crop stubble was mulched and Pioneer P0012 maize was direct seeded on 21 November 2014 (eight days after harvesting the canola). The maize was irrigated 14 times requiring a total of 9 ML/ha of water. The maize crop was harvested on 21 April 2015 and achieved an average yield of 9.75 t/ha. The plots were then prepared for the winter faba bean phase to be sown on 22 May 2015.

Profitability results of first two seasons

Treatment three demonstrated the highest profit per hectare with a gross margin return of $4766/ha, which was significantly higher than all other treatments. Treatment seven had the second highest profit per hectare with $1840/ha, which was significantly higher than the remaining five treatments. Treatment five had the lowest profit per hectare with a gross margin of $461/ha, which was significantly lower than all other treatments (Figure 2).

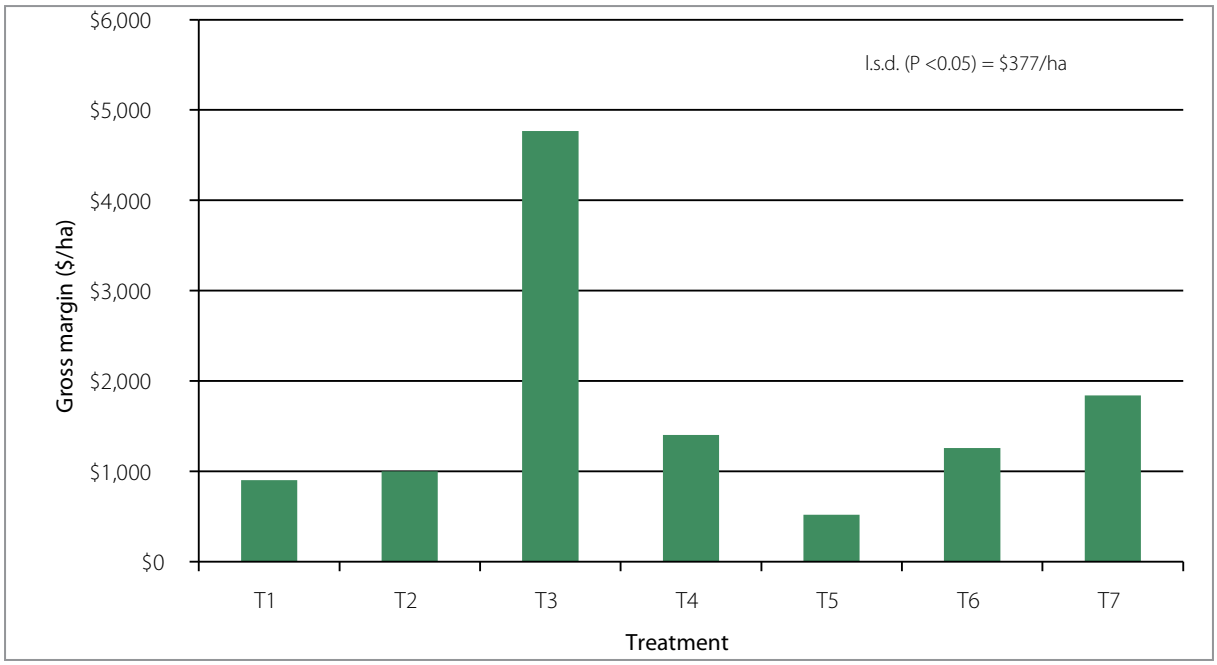

Figure 2. Gross margin ($/ha) return for the irrigated double cropping experiment at Leeton from April 2014 to April 2015.

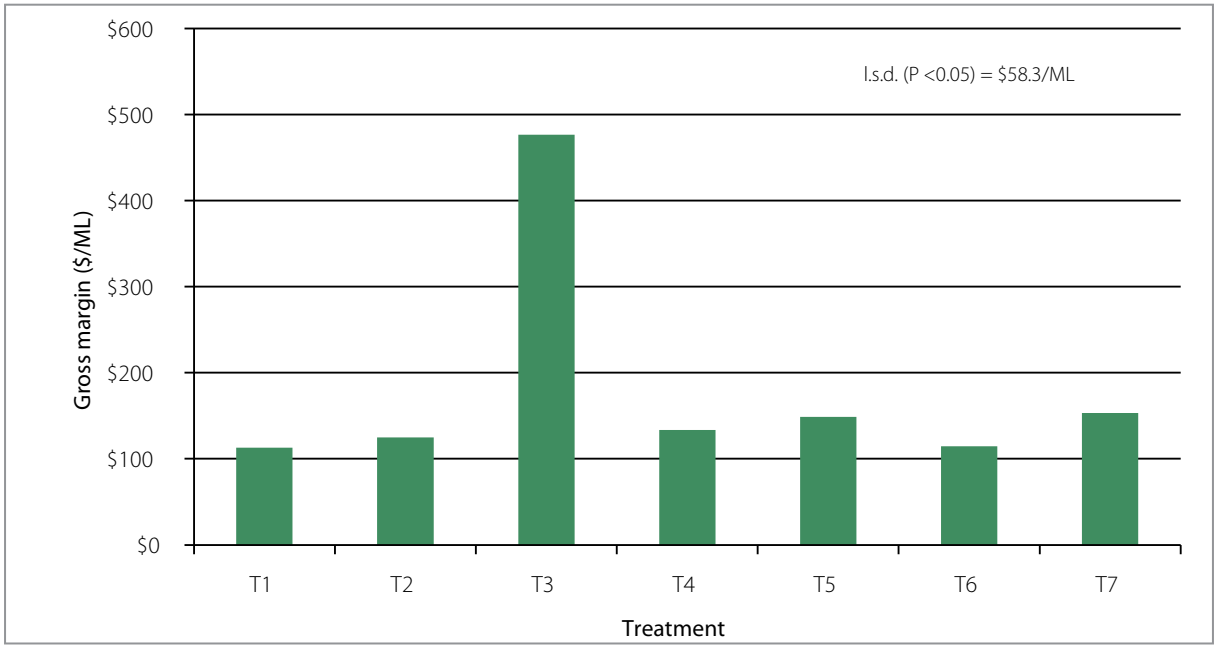

Figure 3. Gross margin ($/ML) return for the irrigated double cropping experiment at Leeton from April 2014 to April 2015.

Treatment three achieved the highest profit per megalitre with a gross margin return of $477/ML, which was significantly higher than all other treatments. Treatment seven had the second highest profit per megalitre with $153/ML, which was statistically similar to the remaining five treatments (Figure 3).

Summary

The first two season's results clearly demonstrate that the single cropping phase of cotton produced a significantly higher return for both $/ha and $/ML than any other single or double cropping treatment. Treatment seven achieved the highest return per hectare for the treatments with a cropping phase over both winter and summer. All double cropping treatments achieved statistically similar returns for $/ML.

Acknowledgements

The research is part of the 'Correct crop sequencing for irrigated double cropping project', VIC00010, 2014–16, jointly funded by NSW DPI and GRDC, and ICC are the Project Leaders. The support of Alan Boulton, Glenn Morris and Paul Morris is gratefully acknowledged.