Investigating double break (or stacked rotation) options for weed and disease control.

GRDC project code: WMG00003-A

Introduction

Including break crops into rotations with cereals can influence the nitrogen (N) dynamics of cropping systems and assist in the management of weeds and reduce disease incidence in crop rotations. Previous studies into single year break crops where herbicide-resistant annual ryegrass was present found that weeds still had a significant impact on wheat production. Interestingly, these trials demonstrated that clean fallow or break crops can deliver cheaper, more effective ryegrass control compared with in-crop grass management options in wheat.

Two break crops in a row has seen cereal yields double and grassy weeds drop in problem paddocks in low rainfall zones across South Australia. Pastures and break crops - such as pulses, canola, brown manure vetch and oaten hay – have been grown for up to two seasons and some of the results were outstanding. Despite very strong wheat yields in the first two years of the trial, disease and grassy weeds are now starting to reduce performance of continuous wheat. However, wheat following two year breaks are now producing gross margins several hundreds of dollars per hectare better than continuous wheat with no major constraints developing yet. One year breaks have improved the following wheat performance, but weeds and diseases are still present.

The main objective of this project is to demonstrate the rotational benefits of a sequence of broadleaf, legume, and pasture crops for the production of wheat in the Kwinana West and East zones of WA.

Methodology

Table 1. Overview of Crop rotation treatments for the Merredin site for the 2016-2018 seasons.

Rotation treatment no.	2016	2017	2018
1	Vetch	Canola TT	Wheat
2	Lupins	Canola TT	Wheat
3	Balansa clover	Canola TT	Wheat
4	Fallow	Fallow	Wheat
5	Fallow	Chickpea	Wheat
6	Fallow	Lentil	Wheat
7	Fallow	Canola TT	Wheat
8	Sub-clover	Canola TT	Wheat
9	Fallow	Sub-clover	Wheat
10	Fallow	Fieldpea	Wheat
11	Fallow	Oats	Wheat
12	Wheat	Wheat	Wheat

Table 2. Details of sowing and harvest for the 2016 season for all treatments at the Merredin site.

Date:	27/05/2016				
Company:	Kalyx				
Row Spacing (cm):	24				
No. Rows:	6				
Soil Moist. (surface):	Good				
Soil Moist. (depth):	10cm moist				
Seed Bed:	Wheat stubble with capeweed				
Stubble Cover:	10%				
Sowing Method:	Knifepoint & presswheel				
Sowing Speed:	4.5 km/hr				
Crop:	Wheat	Subclover	Clover	Lupins	Vetch
Variety:	Mace	Dalkeith	Balansa	Gunyidi	Morawa
Rate (kg/ha):	100	10	5	100	40
Depth (cm):	2-3	0-1	0-1	2-3	2-3
Seed treatment:	Raxil	Alosca	Alosca	Alosca	Alosca
Annual and Growing season rainfall (mm):	407 mm (253 mm GSR)				
Harvest date:	18/11/2016				

Results

Table 3. Yield of grain crops from the 2016 season at the Merredin site.

2016 Crop type	Tmt No.	Yield (kg/ha)	Protein	Test weight (kg/hectolitre	Screenings
Vetch	1	133	n/a	n/a	6%
Lupins	2	1379	n/a	n/a	n/a
Balansa clover	3	-			
Fallow	4	-			
Fallow	5	-			
Fallow	6	-			
Fallow	7	-			
Sub-clover	8	-			
Fallow	9	-			
Fallow	10	-			
Fallow	11	-			
Wheat	12	1135	8.4%	63.8	7.8%

Discussion

The results presented in this report are from the first year of a three-year study that investigates the effect of break-crop sequences on wheat grain yield. The site was selected due to its high background levels of ryegrass control, and crop rotation treatments have been designed around weed control as the main rotational factor.

Grain yield was relatively low compared to the growing season rainfall of 253 mm. Grain yield was affected by severe frost that occurred during grain fill.

This project will continue with the second crop in rotation for the 2017 season, followed by wheat across all plots in 2018 to assess the benefit of a stacked rotation for subsequent wheat grain yield.