



ARE GREEN MANURE COVER CROPS A VIABLE OPTION TO REDUCE THE USE OF AGROCHEMICALS IN THE LOW RAINFALL MALLEE?



PROGRESS REPORT 2016

BACKGROUND

Cover crops can be used to achieve 100% weed seed set control by terminating the crop with glyphosate prior to the development of viable seeds of the target weed. Using herbicides to kill both the cover crop and weeds is termed “Brown Manure”. However, this management practice still relies on appreciable herbicide inputs which can be a significant input cost and there is a long term threat of the development of resistance to glyphosate.

A management alternative is to use cultivation to terminate both the cover crop and weeds which is termed green manure. This practice potentially has some benefits over brown manure, such as:

- an alternative to herbicide inputs to control weeds,
- increased decomposition of cover crop residues which may influence soil nutrient supply,
- increased soil water storage as crop growth is terminated more quickly, and
- improved seeding and crop establishment of the following crop.

However, in low rainfall farming systems such as the Mallee, the threat of reducing ground cover levels below critical levels and increasing the risk of erosion is ever present. Therefore if green manure cover crops are to become viable management option, the change in ground cover and agronomic benefits such as increased nitrogen supply, soil water changes and subsequent crop yield need to be quantified.

TRIAL DESIGN

The aim of this trial is not to measure how effective cover crop termination is at controlling weed seed set, but rather is a green manure a viable management option (in terms of maintenance of ground cover and other agronomic benefits) as we know that terminating cover crops will result in 100% seed set control providing that the crop is effectively killed at an appropriate time.

A factorial trial design with the factors of cover crop choice x termination methods:

- Cover crop choice: Vetch (legume) and Oats (non legume)
- Termination methods:
 1. Herbicide (brown manure),
 2. Herbicide + Hay cut,
 3. High disturbance cultivation (Offset Disc),
 4. Moderate disturbance cultivation (Chopper chain),
 5. Low disturbance cultivation (Blade Plough).

The site will be sown to a cereal (wheat or barley) to quantify the impact of the previous management techniques on grain production in the second year, 2016.

PROGRESS AGAINST 2015 ACTIVITIES

ACTIVITY	TIMING	
Pre sowing soil nitrogen and water content measurements	April 2015	Completed See attached graphs
Sowing Oats and Vetch plots	May 2015	Completed
Cover crop establishment plant counts	June 2015	Completed
Cover crop termination treatments 1. Herbicide (brown manure), 2. Herbicide + Hay cut, 3. High disturbance cultivation (Offset Disc), 4. Moderate disturbance cultivation (Chopper chain), 5. Low disturbance cultivation (Blade Plough).	September 2015	Completed See attached Photos
Ground Cover assessment	Immediately after termination	Completed
Live plant counts (1 square mtr quadrants)	1 week post treatment	Completed No live plant
Live plant counts (1 square mtr quadrants)	1 month post treatment	Completed No live plants
Ground Cover assessment. Using ground cover assessment guide photos in "Stubble Management – A guide for Mallee farmers"	December 2015	Completed See attached graphs

INTERIM RESULTS

All of the treatments were implemented as described in the trial design (see figure1).



Figure 1: Treatments at site (Oats top and Vetch below)

The nitrogen status of the sites was captured prior to the treatments being implemented as a baseline for the nitrogen impact of the treatments in the second year crop (see figure 2).

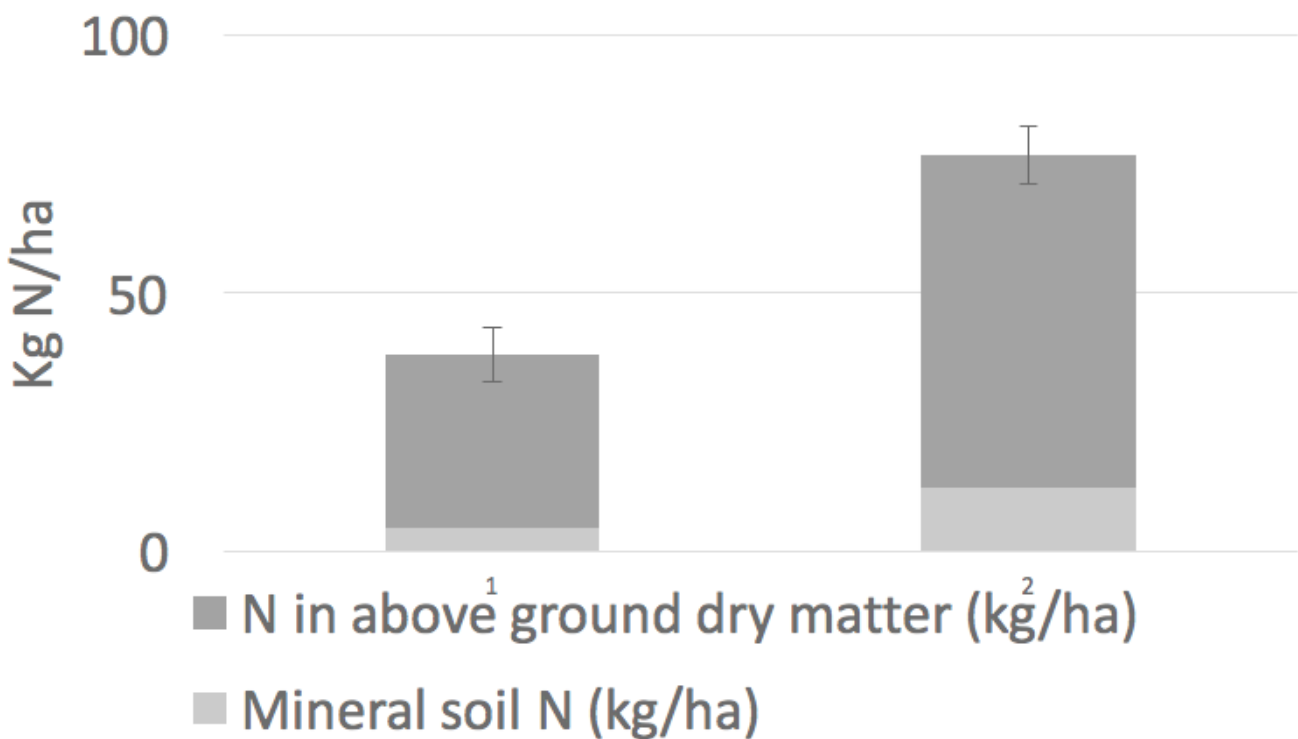


Figure 2: Soil and Plant nitrogen status for the cereal (1) and legume (2) sites prior to treatment.

The groundcover impact of each of the treatments has been assessed in December 2015 and February 2016 (See figure 3). The data already indicates that a number of the treatment will not be viable as they resulted in a less than 50 % groundcover which will increase the risk of erosion of Mallee sand to an unacceptable level. At this stage the only viable options that reduce chemical usage are the cutting for hay and the use of a blade plough to terminate the crop and associated weeds.

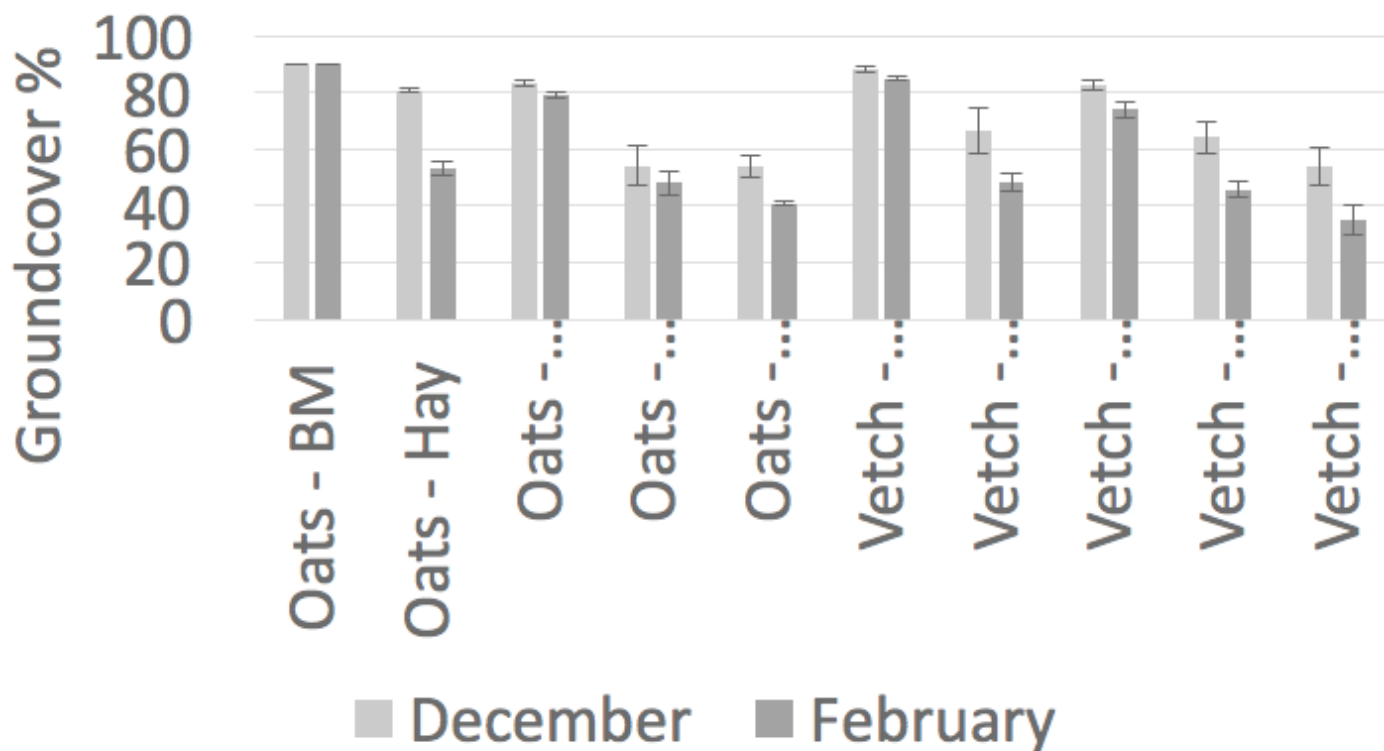


Figure 3: Groundcover status of treatments

2016 ACTIVITIES

Activity	Timing
Ground Cover assessment	February 2016 - completed
Ground Cover assessment	April 2016
Pre sowing soil nitrogen and water content measurements	April 2016
Sowing barley or wheat in line with farmers preference	May 2016
Early crop vigour: NDVI and biomass cuts (Z22, Z30)	June and July 2016
Biomass cuts at flowering	September 2016
Grain yield and quality measurements	November 2016

EXTENSION ACTIVITIES

There was a Field Day held on the 7th of October with 68 people attending the site. However with the trial at an early stage participants were only shown the trial and introduced to its purpose. Subsequent field days will involve communication of the results.