



OCTOBER 2019

FACT SHEET

Cover Cropping to Improve Productivity and Sustainability

Two years of drought have left many cropping paddocks with very low levels of groundcover. Exposed topsoil can lead to wind and water erosion, a reduction in soil water storage and poor water infiltration. A significant proportion of plant nutrients are found in the topsoil which can then be lost through erosion.

Groundcover slows runoff and evaporation which increases water infiltration and soil water storage. Groundcover also protects surface soil from raindrop impact preventing the breakdown of soil aggregates which in turn increases infiltration.

At best approximately 25% of fallow rain is stored in the soil profile and while the percentage stored is highly variable a lack of groundcover will reduce storage efficiency significantly. At 10% groundcover an average fallow efficiency of 15% can be expected and at 50% groundcover approximately 20% fallow efficiency. Groundcover levels of 70% are needed to obtain 25% fallow efficiency.

The organic matter that makes up groundcover also supports a diversity of microflora that can have both positive and negative impacts on following crops and pastures.

Low levels of groundcover will significantly reduce productivity when the drought breaks as water storage will be reduced and this will be reflected in crop and pasture productivity. Where groundcover levels have fallen below 30% and stored soil water is insufficient to plant a cash crop managers may consider the sowing of cover crops if a planting opportunity arises.



Figure 1: Groundcover below 30% will result in poor infiltration and moisture storage



**Local Land
Services**

Cover Cropping to Improve Productivity and Sustainability

Cover crops

A cover crop is a crop sown to establish groundcover, the crop is then usually sprayed out before seed set. The increased groundcover protects soil and increases soil water storage. Cover crops can suppress weeds both during the growth of the cover crop and after it has been killed. Cover crops can also make short term contributions to soil carbon compared to bare fallows and increase soil microbial biomass. These benefits need to be weighed against the costs of planting a cover crop and the risk of reducing soil moisture for the following crop.

Cover crops and soil water

In the best case scenario stored soil water at the end of the fallow will be equal to or greater than that under a bare fallow i.e. the additional water captured is greater than what is used by the cover crop. This however, will not always be the case and in some cases cover crops have a negative impact on starting soil water for the next crop.



Figure 2: Very low groundcover on a grazed fallow, initial infiltration will be high until the soil swells closing cracks and reducing infiltration.

In circumstances where there is a longer period between spraying out the cover crop and planting the following crop there is more likely to be a positive influence on soil water. For this reason it is recommended to plant cover crops as early as possible in the cropping cycle and terminate the cover crop once sufficient biomass has been achieved.

When initial levels of groundcover are very low (15% or less) cover crops are more likely to have a positive impact on soil water as the increase in groundcover will be greater. Paddocks with very low levels of cover represent the best case for using cover crops.

It should be remembered that the positive effect of the cover crop will continue after planting the following crop as greater cover improves infiltration and slows evaporation of early in-crop rain.

Crop Choice

For cover crops over summer millet is the most commonly grown although the small seed can make planting more difficult particularly in loose “fluffy” soils. Retained sorghum seed can be used as a low cost seed source. Hybrid Sorghum, forage sorghum, sudan grass and summer legumes (cowpeas, lab lab) have also been grown. Crop choice may be influenced by the following crop and the possibility of cover crops harbouring disease for following crops cannot be excluded. Limited information indicates that millet is not a good host of crown rot (*Fusarium pseudograminearum*) and is unlikely to significantly add to crown rot infection in a following wheat crop.

Legumes will not produce biomass as quickly and may well produce less total biomass compared to grass and cereal crops. Legume residues will breakdown faster due to the higher Nitrogen (N) content in the residues. Both these factors can result in less groundcover.

Legumes cover crops have been used to increase soil N but as with soil water this does not always occur. If legumes are to fix N for following crops initial soil N should be low and/or legumes must be retained until soil nitrogen is depleted sufficiently forcing them to fix atmospheric N.

Cover Cropping to Improve Productivity and Sustainability

Following crops

A number of studies have shown improvements to the yield of grain and cotton crops following cover crops. These improvements may be due in part to an improvement in water storage during fallow and in-crop but may also be due to greater crop emergence as a result of better surface moisture under groundcover. Other benefits may include higher populations of beneficial arbuscular mycorrhizal fungi (AMF) and greater breakdown of disease carrying crop residues due to higher moisture retention under groundcover.

Grazing and harvesting cover crops

In some cases when favourable seasonal conditions occur after planting a decision to utilise the cover crop for grain or grazing may occur. When grazing sufficient biomass should be left behind (more than 50%) to provide adequate groundcover otherwise the original purpose of the cover crop is compromised. Before deciding to retain a cover crop for grain thought needs to be given to adequacy of nutrition and stored water to achieve an economic yield.

References

Lawrence Price, *Cover crops, soil water and following crop impacts*. <<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2009/09/cover-crops-soil-water-and-following-crop-impacts>>

Lawrence Price, *Update on cover crop research*, GRDC Dalby Summer Crop Grains Research Update, 19th & 20th August 2008.

Lawrence Price, *Cover cropping in low stubble situations*, GRDC Goondiwindi Grains Research Update, 28th February & 1st March 2007.

David Lawrence, *Cover crops can boost soil water and protect the soil for higher crop yields*. GRDC Grains Research Update, Driving Profit through Research, Quirindi, New South Wales Tuesday 8th August 2008.

E M Wunsch, L W Bell, M J Bell, *Can legumes provide greater benefits than millet as a spring cover crop in southern Queensland farming systems?*, Crop & Pasture Science, Volume: 68 Issue: 8, Pages: 746-759 Published: 2017

Xiaoqi Zhou, Hanwen Wu, Guangdi Li, *Short-term contributions of cover crop surface residue return to soil carbon and nitrogen contents in temperate Australia*. Environmental Science and Pollution Research, 23. 23175-23183.

Hanwen Wu, Eric Koetz, Deirdrie Lemerle, *Cover cropping multiple benefits and limitations*. GRDC 2009 update, 10th and 11th February 2009, Charles Sturt University, Wagga Wagga

This publication prepared by Bill Manning and George Truman
North West Local Land Services

©State of New South Wales through Local Land Services 2019. The information contained in this publication is based on knowledge and understanding at the time of writing (October 2019). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of Local Land Services or the user's independent adviser.

More information

Visit our website: www.lls.nsw.gov.au
or call 1300 795 299