FITZROY BASIN ASSOCIATION

Fact Sheet

Series: Land

Assessing ground cover in grazing lands of the Fitzroy Basin

Keeping soil on the paddock (and out of the river) means, in part, maintaining good ground cover.

What is ground cover?

Ground cover consists of any material covering the ground, up to 50cm above the ground, that will break the fall of rain, including:

- plants
- litter
- bark/leaves
- dung
- ash
- rock.

Trees are not considered ground cover and don't have the same benefit in reducing erosion as grasses do, as they do not protect the soil surface. Why not? A matter of gravity — droplets from trees are larger and hit the ground with similar power as raindrops.

Ground cover helps maximise pasture production and reduce land degradation

Ground cover plays a number of important roles in grazing lands. It protects the soil from sun, wind and rain — maximising infiltration, minimising erosion and evaporation and promoting efficient cycling of nutrients.

Photo by Andrew Whyte

Fitzroy River at Rockhampton, November 2005.

Apart from having substantial production benefits, reducing erosion and runoff also has significant effects over an entire catchment, by reducing the amount of soil and chemicals washed into creeks and rivers.

Ground cover can be either *attached* (pasture plants) or *detached* (litter).

▲ Attached cover

Photos by Felicity Anderson, FBA

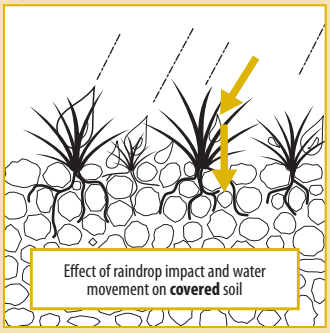
▲ Detached cover

Both attached and detached ground cover has an important role to play in protecting the soil surface from raindrop impact (see Figure 1, next page).

Ground cover protects soil from raindrop impact

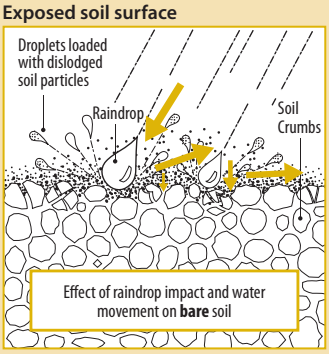
Figure 1:

Protected soil surface
High infiltration



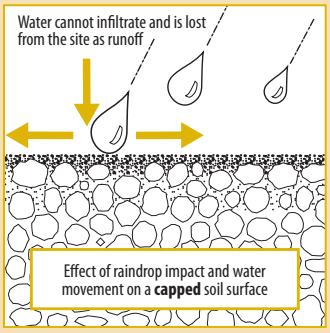
Plants protect soil from the impact of the raindrops water is able to infiltrate the soil.

Exposed soil surface



Bare ground is exposed to the full force of raindrops. The impact shatters soil crumbs and the fine particles seal the soil surface.

Capped soil surface
Low infiltration



Dislodged soil particles have blocked soil pores to form a cap, leaving no holes for water to enter the soil. The water is forced to run off.

Arrow indicates water movement

Bare ground exposes soil to raindrop impact, which destroys soil crumbs, breaking them into individual soil particles, as shown in Figure 1. These small particles clog pores between remaining soil crumbs, causing soil capping (crusting) and decreasing infiltration rate. Soil capping causes water to flow across the surface, carrying soil with it. Instead of rainfall being used for pasture growth, it flows off to neighbouring areas downstream, taking soil and nutrients with it.

Although any type of ground cover benefits the paddock, attached, organic ground cover is more effective than detached ground cover in decreasing erosion as its roots prevent it being washed away. Attached cover will also persist through a number of seasons, as will logs and rocks, providing long lasting cover to the soil surface.

Grass tussocks slow water flow across the soil surface, reducing erosion and trapping sediment, thus preventing soil loss. The more robust the tussocks, and the closer together they are spaced, the more water will be trapped and slowed. Plant roots also promote biological activity in the soil and form channels through the soil which aid infiltration.

Roles of ground cover

Ground cover performs a number of roles in a grazing system, including:

- reducing raindrop impact at soil surface
- increasing infiltration, thus increasing the amount of rainfall entering the soil for plant growth
- decreasing runoff and soil loss, thus retaining soil and nutrients on farm
- slowing water flow across the landscape
- providing organic matter onto the soil surface, which is important in nutrient cycling
- protecting topsoil against temperature extremes at the soil surface (high temperatures restrict microbial growth and establishment of plants)
- improving habitat for soil biota
- reducing wind speed at the soil surface through attached ground cover, thus reducing wind erosion.

What ground cover means on farm

Ground cover is a key component of a grazing system as it aids water infiltration and nutrient cycling and helps keep these functions working effectively in the system.

Ground cover acts as an indicator for erosion risk and can be monitored to gauge this:

- Low ground cover levels lead to increased runoff. Runoff is simply rainfall that does not enter the soil. Below the 50% ground cover threshold runoff can become a significant proportion of the rain that falls. Losing a large proportion of rainfall as runoff is the same as if that rain had never fallen. This can lead to increased drought susceptibility, as rain that runs off effectively decreases the total amount of rainfall available for plant growth.
- High ground cover levels ensure the soil is able to maximise infiltration, thus retaining water on site where it is available for plant growth. Water is also retained for longer, therefore making the most efficient use of rainfall.

The more bare ground, the more impact heavy rains will have, and the more sediment, nutrients and water will be lost from the pasture system, resulting in less grass production.

Ground cover is particularly critical at the end of the dry season when levels are normally at their lowest and high intensity storms occur leading into the wet. During high intensity rain events, low levels of cover result in large losses of soil by erosion.

Between thirty and ninety percent of sediment lost from the land is captured by floodplains, wetlands, creeks and rivers. High ground cover levels near creeks and streams can trap sediment and nutrients before entering the stream (for more information about improving riparian zones, refer to the FBA Property Planning fact sheet series, listed in References and Resources at the end of this fact sheet). Monitoring cover levels in these areas is particularly important so management across the property can be adjusted accordingly.

The bottom line: consider ground cover when making management decisions, as managing ground cover is the most important tool you have to protect against erosion and ensure you maintain your soil: one of the most important grazing assets. Grazing strongly influences ground cover, thus managing grazing is the key to managing ground cover.

Ground cover affects land condition

The condition of the soil is an important component of the condition of the land. Ground cover acts to protect surface soil and maintain good surface soil condition. Persistent cover also helps to maintain land condition over time. Loss of ground cover creates a gap in the system by which nutrients, soil and water can be lost instead of being utilised by the grazing land.

Levels of ground cover act as a signal: persistent low ground cover is often a precursor to a decline in land condition. Ground cover is therefore an indicator of future land condition and erosion risk.

What is an adequate level of ground cover?

Changes in ground cover are a basic measure of how well the land surface is protected from erosion. There are critical levels of cover below which the land surface is not effectively protected (Figures 2 and 3).

Figure 2: Soil loss vs ground cover graph

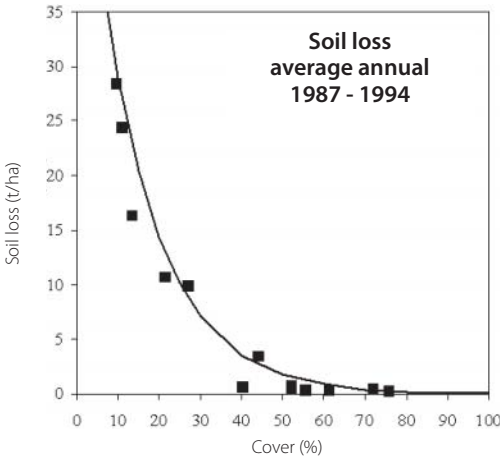
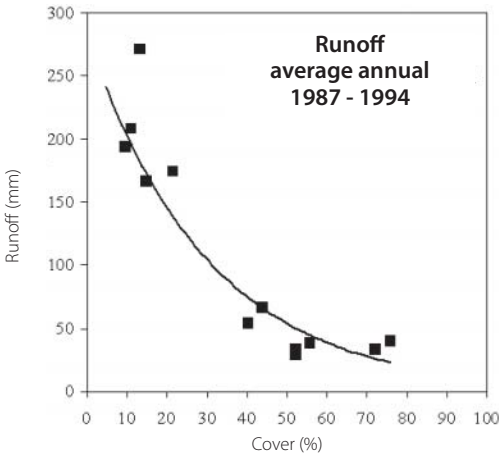


Figure 3: Runoff vs groundcover graph



Study results from native pastures under silver-leaf ironbark woodland, *Springvale*, 75km west of Emerald, in the Nogoa River catchment, showing the relationship between ground cover, runoff and resulting soil loss (erosion). (1987-1994).

Adapted from graphs courtesy of QLD Department of Natural Resources, Mines and Water

At the end of the dry season

Above 50% ground cover = High

High ground cover (over 50%) means less runoff and better land condition.

Ground cover shown in this photo = 88.5%.

30 – 50% ground cover = Moderate

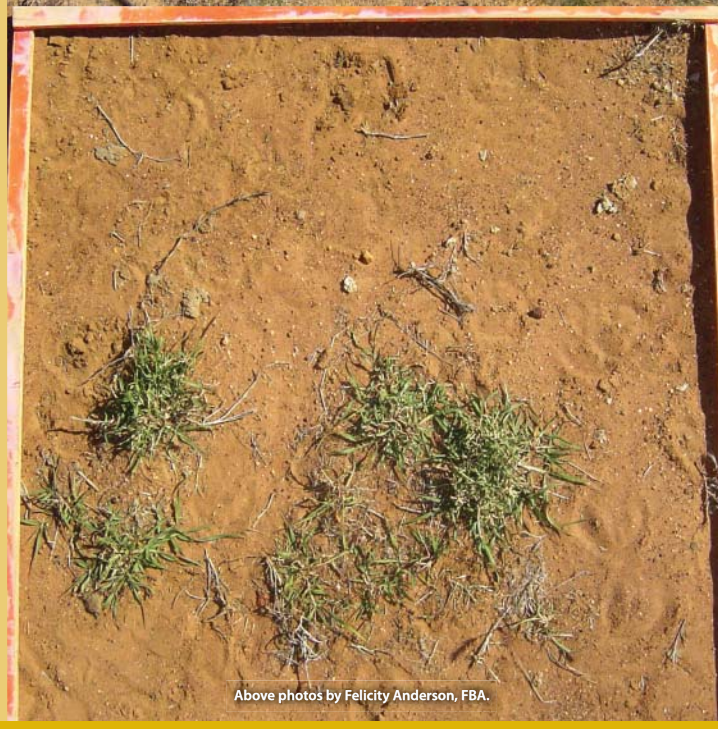
Moderate levels of ground cover mean there is a moderate erosion risk

Ground cover shown in this photo = 44%.

Below 30% ground cover = Low

Below 30% ground cover, soil loss more than doubles (see figures 2 and 3). 30% is a critical level of ground cover, as below this threshold bare ground patches start to link up which create flow patterns through the paddock and landscape, significantly increasing soil loss.

Ground cover shown in this photo = 15%.



Above photos by Felicity Anderson, FBA.

Keep track of ground cover using FBA photo standards for grazing

Once you know how much ground cover you *need*, the key is knowing how much you *have*. To this end, FBA has developed photo standards for use as a monitoring tool.

Photo standards can be used in the paddock for rapid assessment of the pasture and soil resources by comparing paddock ground cover levels with the photos. They can also be used to track changes over time in cover levels by comparing photos taken for monitoring purposes with the standards.

The standards are available as a set of A5-sized photos taken using a 1m x 1m square, and marked as to what level of ground cover is shown in the photo.

Important factors to take into consideration when using photo standards to assess ground cover are:

- ensure a reasonable distance from watering points
- monitor different land types separately
- measure representative areas of the paddock if you are aiming for an average ground cover measure

If taking photos to monitor changes in ground cover over time, include a tape measure in the photo, or something 1m long to be able to compare to the metre square photo standards.

For more information or to request a free copy of FBA's ground cover photo standards for grazing land management (available in early 2007), please contact FBA on (07) 4999 2800.

References and resources

Visit the FBA web site (www.fba.org.au) for the following resources:

- Fact Sheet: *Fitzroy Basin Association's Satellite Imagery Project: Mapping for the CQ Community* (publication number FBA-05-023) (or contact our GIS team on (07) 4999 2800)
- Fact Sheet: *Neighbourhood Catchments* (publication number FBA-05-002)
- Field book: *Ground cover photo standards for grazing land management* (available in early 2007)
- Fact Sheet: *Property planning: Fencing to landtype — Riparian lands* (publication number FBA-06-024)
- Fact Sheet: *Property planning: Using off-stream watering points* (publication number FBA-06-013)
- Fact Sheet: *Property planning: Sustainable grazing on riparian lands — why and how to do it* (publication number FBA-06-012)

Questions? Contact the Regional Coordinator for the Sustainable Landscapes program on (07) 4999 2800.

References:

Tongway, D. and Hindley, N., 1995. *Assessment of soil condition of tropical grasslands*.

Aisthorpe, J. and Paton, C., *Stocktake: Balancing supply and demand*. 2004. Queensland Department of Primary Industries and Fisheries.

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Photo by Gavin Peck, FBA

Thanks

Production of FBA's ground cover photo standards for grazing land management has been a joint effort between Fitzroy Basin Association and Queensland Department of Primary Industries and Fisheries.

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Department of Primary Industries and Fisheries

Further information

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