

Soil erosion solutions

Helping North Coast landholders reduce soil erosion

Fact sheet 4: Groundcover

Groundcover is vital for soil. Without cover to protect it, soil is vulnerable to raindrop impact, surface runoff and wind. Unprotected soil can lose up to 100t/ha a year (1mm depth of soil over one hectare weighs around 10t).

What is groundcover?

Groundcover is any material on or near the soil surface that protects the soil against the erosive action of raindrops, surface water flow and wind. It can be living or dead plant material, compost, mulch, dung, stones, and even snow. On large land areas the most efficient groundcovers are living plants as they are not carried away by runoff and their roots help hold the soil.

How do plants protect soil?

Plants protect the soil by providing **canopy cover** (more than 5cm above the soil surface) and **contact cover** (up to 5cm above the soil surface). Canopy and contact cover both protect the soil against raindrop impact. Contact cover slows runoff so that water infiltrates the soil and deposits any sediment around the plants. Without groundcover up to 85% of rainfall from storms can run off into creeks and streams rather than soak into the soil and be available for plant growth. When groundcover is thin, patches of bare soil connect and provide a path for runoff to build up speed and erode the unprotected soil. This is why good contact cover is crucial on sloping country. Plants provide food sources and habitat for soil organisms whose activities then improve soil structure and make the soil less erodible.

How much groundcover do I need?

Generally your groundcover is adequate when you have minimal runoff and are not losing any soil. If you do have runoff and erosion it is a sign that you need to improve your groundcover levels. The amount of groundcover you need depends on

- the amount of rainfall you receive
- intensity and seasonality of the rainfall
- soil moisture

- slope gradient and length
- soil characteristics.

Groundcover is measured as the percentage of plant material covering the ground, including crops, stubble, pasture plants and their residues, leaf litter, bark and twigs. Research by the Department of Natural Resources in the Hunter Valley found that at least 70% groundcover is needed to prevent excessive runoff and erosion on red clay soil with a gentle slope of 10 per cent and average rainfall of 625 mm.

On the north coast with its easily erodible soils, sloping country, and intense rainfall events, 90-100% groundcover is recommended (see table overleaf).

In drainage lines where water runs with considerable force, 100% groundcover is required to prevent erosion and formation of gullies. This may require drainage lines to be fenced, with regular slashing or selective grazing of the cover to maintain plant growth.

DNR research has found that 90% of soil loss occurs from only 10% of storms, so aim to keep groundcover at or above the estimated minimum cover for your soil type and slope during the north coast storm risk period from October to May.

How much groundcover do I have?

There are many ways to assess groundcover. Here are three simple methods.

Quadrat measurement

Place a square frame (quadrat) on the ground and estimate the percentage groundcover in it. Do this ten times across the paddock and average the results.

Standing measurement

Stand with your feet 50cm apart. Visualise a 50cm square in front of your feet and estimate the percentage of groundcover in it. Do this ten times in the paddock and average the results.

Walking measurement

Take 10 paces and check how often your foot strikes bare soil or mud.

- 1-2 times means there is enough ground cover to protect the soil from erosion.
- 2-6 times means there is not enough groundcover to protect the soil.
- 7-10 times means the soil is likely to leave the paddock as dust or suspended in runoff water.

How can I get more groundcover?

The best way to have good groundcover is to select plants well adapted to your climate, soil and farming system, so that they persist without a lot of attention.

Grasses

Grasses with fibrous roots systems are preferable to tap-rooted plants because they are more effective at increasing soil organic matter, encouraging microorganisms, improving soil structure and maintaining infiltration. Perennial grasses are preferred because of their greater potential to provide year round cover and production of herbage. Species with above ground runners or stolons such as kikuyu and couch are good for drainage lines because of their ability to spread and provide good contact cover. In orchards, smothergrass is proving a useful low-light groundcover in macadamia orchards where under-tree soil erosion is a major problem.

Native shrubs and trees

Species that provide good erosion control due to their strong root systems include:

- river bottlebrush (*Callistemon salignus*)
- weeping bottlebrush (*Callistemon seeberi*)
- tufted sedge (*Carex gaudichaudiana*)
- thin-fruited tea tree (*Leptospermum brachyandrum*)
- creek tea tree (*Leptospermum polygalifolium*)
- spiny mat rush (*Lomandra hystrix* and *L. longifolia*)
- river grass (*Potamoiphila parviflora*)
- water gum (*Tristanopsis laurina*)
- weeping myrtle (*Waterhousea floribunda*)

Table 1: Estimates of minimum groundcover (%) required to reduce excessive runoff and erosion and sustain productivity for a range of slope gradients and soil erodibility classes.

Grafton		Paddock slope			
Erodibility	Typical soil types	Flat	Gentle	Moderate	Steep
Low	deep sands	60	80	90	100
Low to moderate	sandy loams, light clays, uniform clays, kraznozems and euchrozems (ferrosols)	60	85	95	100
Moderate to high	loams self-mulching black earths (vertosols)	65	90	100	100
High	silts, fine sandy loams, red-brown earths (chromosols) red and yellow earths (kandosols), solodics (sodosols)	70	90	100	100
Low to high	drainage lines (all soil types)	100	100	100	100

Source: Agfact P2.1.14 Maintaining groundcover to reduce erosion and sustain production

Mulch

Biodegradeable organic mulches such as woodchips, straw or compost provide quick short term protection from raindrop impact, assist the soil to hold moisture and enrich the soil with organic matter. This can help a degraded soil recover to better support plant growth if you have been having trouble establishing plants on a bare site. Mulch can also be a good 'band-aid' for small bare patches within pastures, to allow time for grass to recolonise before weeds invade. Unless you have suitable materials on site, mulching can be expensive so is usually only used to protect new plantings and suppress weeds on rehabilitated erosion areas.

More information

Much of the information in this leaflet has been drawn from NSW DPI Agfact P2.1.14 *Maintaining groundcover to reduce erosion and sustain production..*

NSW DPI's website has information on soil erosion at:

<http://www.dpi.nsw.gov.au/agriculture/resources/oils/erosion>

To discuss your specific soil erosion issues, contact NSW DPI soils advisory officer Abigail Jenkins, Wollongbar, on 6626 1357 or abigail.jenkins@dpi.nsw.gov.au.



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