

## Managing soil erosion

### Managing soil erosion is important to maintain productivity and reduce sediment and nutrient run-off

It can take millions of years to produce 30 cm of topsoil. So basically, the topsoil that you have is all you have got for the life of the farm. A million years of nature's work can be removed in a bad erosion event. Good soil health is an essential element of productive banana farming. Conserving this valuable asset not only helps to maintain productivity but also minimises the amount of sediment and nutrients entering the water systems in the Great Barrier Reef catchment.



**Figure 1. Slashing inter-row spaces maintains ground cover, which limits the potential for soil erosion**

There are two main principles for managing soil erosion: **Maintaining ground cover** and **controlling run-off water**.

### 1. Maintaining ground cover

Ground cover intercepts rainfall, reduces the surface impact of raindrops, slows the velocity of surface water, increases water infiltration and stabilises the soil. Good ground cover is essential for managing soil erosion and is critical on any gradients greater than 3%. Ground cover should be maintained on at least 60% of the inter-row. Living ground covers are ideal as the root system binds soil particles making it more resistant to erosion, builds up soil biodiversity and increases organic matter. Suitable ground covers are shade tolerant, non-invasive, perennial, traffic tolerant, short growing and have a spreading habit. The native vegetation which grows in the inter-row is usually the best suited because of its shade tolerance and response to machinery traffic. However it may be possible to introduce ground cover species that will grow successfully. Maintain vegetation by slashing rather than spraying out. Side throw slashers are best as the clippings are deposited on the mounds. If inter-rows do require spraying out, opt to use a knockdown herbicide to ensure rapid re-establishment.

When it isn't possible to maintain slashed inter-rows and headlands, across the farm all year round, ground cover should be a priority: in plant blocks, during the wet season, on slopes greater than 3% and on lighter soils that are prone to erosion. Specific fallow species (e.g. Canola, Rhodes grass) should be planted in fallow blocks to manage nematode populations, which also avoids leaving a bare block prone to erosion. Maintaining soil cover will reduce the amount of sediment and nutrients entering waterways. Other benefits associated with maintaining soil cover include limiting the spread of pest and diseases such as plant parasitic nematodes and Panama Disease.

## 2. Controlling runoff water

Controlling the speed and direction of runoff water is critical for minimising erosion. Measures and structures should be introduced to slow water where slopes are likely to produce high velocity water flows. Using topographical maps and GPS enabled tractors will assist to design and improve farm layout to provide permanent, all weather access and good drainage. Avoid growing bananas in low-lying flood prone areas.

**Contouring:** As a general rule any land with a gradient greater than 3% (3 m fall in 100 meters) should be contoured. Contouring stops water running off slopes too fast and subsequently eroding soil. GPS controlled tractors can help simplify the contour design process. Unless major modifications are required, maintain these rows as permanent beds. Seek professional advice before developing and establishing contours.



**Figure 2. Contouring paddocks stops water running off slopes too fast and therefore reduces the risk of soil erosion**

**Diversion banks:** These are often used to intercept surface water from above a paddock and divert it away from a block into a suitable waterway.



**Figure 3. Silt traps are the last line of defence and prevent sediment leaving the farm**

**Constructed waterway:** These are wide, flat-bottomed structures designed to collect run-off and slow the water before conveying it at a safe velocity to a drainage line. They differ from constructed wetlands, which are planted with vegetation to capture and hold runoff water (min two days), allowing time for fine sediments and nutrients to be removed from the water.

**Silt traps:** These are the last line of defence against sediment leaving your farm. Silt traps are to be used in conjunction with other practices which minimise soil movement.

**Laser levelling:** On farms with little gradient, blocks should be laser levelled to ensure a constant fall and prevent water from collecting in the paddock and creating wet areas.

An annual maintenance program will ensure the structures and block arrangements that you have invested in will continue to reduce soil losses and prevent sediment and nutrients from entering the waterways that run out to the Great Barrier Reef.

## Monitoring soil erosion

There are simple and effective ways to monitor soil erosion. By monitoring soil erosion you can demonstrate that the implemented practices are effectively reducing soil erosion. Three possible methods for monitoring soil erosion include:

**Turbidity tube:** Make a dark mark (e.g. an 'X') on the bottom of a clear plastic tube that has millimeters marked on the outside. Fill the tube with run-off water until the mark can no longer be seen. The less sediment in the water, the more water the tube will hold. This is a relative measure, since different soil types will have different dispersion properties. Essentially this means that this technique can only be used to compare different practices on the same soil type or at the position at different times of the year.

**Erosion peg:** Hammer a piece of threaded rod into the ground, away from traffic areas. Put a washer at ground level and a nut above this. If there is any erosion, the washer will fall to the new ground level but the nut will remain. The distance between the washer and the nut is a measure of the amount of soil that has been lost. Note - for workplace health and safety reasons make sure the rod is easily visible to staff by painting it or attaching some coloured tape to it.

**Photographs:** This is an easy way to demonstrate a change in practice over time. It is a good idea to include land features for size comparison and to determine the exact location of the photo. Many smart phones and cameras also have GPS functions that allow the exact co-ordinates to be linked to photos.



**Figure 4: Simple ways to monitor soil erosion include: a) Turbidity tube, b) Erosion peg, c) Taking photographs of practice change over time**

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