

Erosion control in cropping lands

Since the 1850s, farmers have been cultivating land in Queensland, and this practice expanded rapidly as farming became more mechanised. Early farmers were not aware of erosion and used farming practices developed in regions where erosion by water was not a serious problem. By the 1950s soil erosion was seriously threatening the productivity of fertile cropping areas such as the Darling Downs and the Inland Burnett.

Erosion control programs began in the 1950s and have helped to reduce the erosion problem but farmers need to continue to be vigilant to ensure erosion does not threaten the productivity of their land.

Extent of erosion problems

Around 3 million hectares or 2 per cent of the state are used for growing crops. The principal cropping areas are the Western Downs, Darling Downs, Inland Burnett, Dawson Callide, Central Highlands, Atherton Tableland and the horticultural and sugar cane areas along the east coast of Queensland.

Around 80 per cent of the cultivated area is susceptible to soil erosion, and if no preventative measures are taken, losses can be very high. On the Darling Downs, soil losses from unprotected cultivation in upland cropping areas can average between 20 and 60 tonnes per hectare, per year. Steep, unprotected cropping lands in tropical areas can average soil losses of up to 400 tonnes of soil per hectare, per year.

Contributing factors

Erosion by water is the main concern in Queensland, and susceptibility to water erosion depends on:

Rainfall erosivity—high-intensity rainfall creates a serious risk, as heavy rainfall on bare soil causes the soil surface to seal. Rainfall starts to run off, increasing erosion potential as the runoff begins to concentrate.

Most erosion occurs during the summer, but winter rainfall may also produce erosion.

Soil erodibility—cropping soils are very susceptible to erosion. They include the black, grey and brown cracking clay soils found in most of our inland cropping areas; the deep, red friable clay soils of the Inland Burnett and the Atherton Tableland; and the lighter textured soils (higher proportion of sand) in the coastal areas.

Topography—steeper lands are most susceptible to erosion by water because of the higher rates and speed of runoff. In coastal areas, severe erosion can occur on small pockets of land which have slopes up to 30 per cent. Most cultivated land in Queensland has a slope of less than 5 per cent, but is not exempt from erosion.

Flat floodplains are also susceptible to erosion by concentrated flood flows.

Wind erosion is less of a problem as most cultivated land has a medium to heavy texture (soils with a high clay component). Isolated examples of wind erosion occur when soils that are finely worked with no surface cover are exposed to strong winds.

Impact

The impact of erosion on cropping lands, include:

- reduced ability of the soil to store water and nutrients
- exposure of subsoil, which often has poor physical and chemical properties

- higher rates of runoff, shedding water and nutrients otherwise used for crop growth
- loss of newly planted crops
- deposits of silt in low-lying areas.

Eroded paddocks are more costly to cultivate and seriously eroded paddocks may have to be abandoned, which can lower property values.

Most eroded soil is deposited in lower sloping areas adjacent to the paddock including roads and railway lines. Eventually this sediment may be relocated to streams and dams and could pollute coastal and marine areas.

Control measures

A number of control measures are available to protect land from erosion, including:

Land capability—It may not be possible to reduce erosion to acceptable levels on very steep slopes or highly-erodible soils. The Queensland Government has produced land management field manuals which map and describe the land types that occur in many districts and provide advice on land use and management for each soil type. To access these publications visit <http://www.qld.gov.au/environment/land/soil/>

Erosion control practices involve two essential components—providing cover over the soil surface and controlling runoff.

Surface cover—In the past, farmers commenced the fallow period by burning the stubble from the previous crop and then used cultivation to destroy each new ‘crop’ of weeds that followed rainfall.

Today, farmers are more aware of the need to keep the soil covered through minimum and zero tillage practices (referred to as ‘conservation cropping’ practices). During the fallow period, tillage implements that kill weeds without burying stubble are now used and herbicides are used to minimise the frequency of tillage.

Surface cover controls erosion by reducing rainfall erosivity and by slowing down overland flow. Figure 1 shows the effect that different fallow treatments had on soil loss and runoff in an experiment conducted at Greenmount on the Darling Downs.

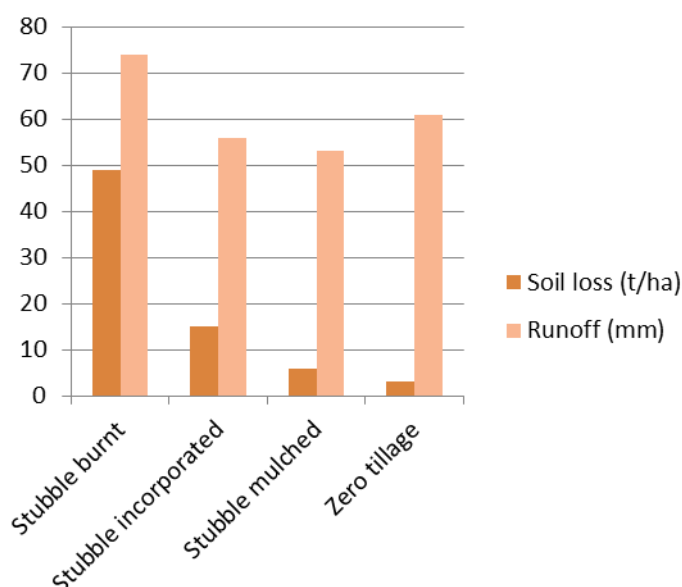


Figure 1. Average annual runoff and soil loss at Greenmount, Darling Downs, 1978-1989

Controlling runoff—Approximately 80 per cent of the soil lost from poor cover can be trapped and retained in the paddock by contour banks (which intercept overland flow and channel runoff). Good surface cover between contour banks will maintain their effectiveness by reducing the amount of silt deposited.

Grass in waterways must be well managed to ensure stability. On flood plains, strip cropping is used to spread flood flows rather than allowing it to concentrate.

The adoption of contour bank and strip cropping systems involves a total change in the way a farm is managed.

Runoff systems must be carefully planned. Flow between properties and across roads and railway lines must be coordinated and suit those affected by the changes.

Should there be the possibility that runoff water may impact neighbouring properties or infrastructure, land owners are encouraged to discuss with their neighbours and seek professional advice.

Soil conservation in action

Queensland farmers have adopted some form of soil conservation measures, and good farmers recognise soil erosion is costly and rapidly reduces soil productivity. Aerial photos from the 1950s of cultivated areas in the Darling Downs show that erosion was rampant. The aerial photos today show a very different story.

Bare fallows are no longer the norm and stubble levels during the fallow period have greatly improved. In cane lands, green cane harvesting techniques have been widely adopted rather than burning the cane prior to harvesting.

Further information

This and other science notes are available from the Queensland Government website www.qld.gov.au – search ‘science notes’. For further information about this science notes series phone **13 QGOV** (13 74 68) – ask for science notes – Land series. Other science notes related to this topic include:

- L35—Run-off control measures for soil conservation
- L202—Maintaining contour banks
- L205—Contour bank specifications

For further information on soil erosion visit <http://www.qld.gov.au/environment/land/soil/erosion/> or email soils@qld.gov.au.