

Managing poor drainage and waterlogging to improve sugarcane yields



Marian Davis

Development Officer – Irrigation
Professional Extension and
Communication Unit

Excess water in the form of flooding or waterlogging can have serious impacts on crop growth.

Flooding is generally a short-term problem where water inundates crops for a brief period of time. The amount of crop loss will depend on the period of inundation and the depth of water.

On the other hand, waterlogging can last for several days or weeks and can have a much greater impact. Soils become waterlogged when they are saturated with water. This often occurs when heavy rainfall is unable to drain away or when watertables rise close to the soil surface.

Waterlogging reduces cane yield in three ways: through the loss of nitrogen from denitrification; via increased levels of plant diseases such as red rot; and through toxic responses to anaerobic soil conditions and the secondary breakdown products of soil organic matter.

In addition, prolonged waterlogging causes oxygen starvation in the root zone which retards root growth. This results in stunted root systems and reduced nutrient uptake even when the soil dries out. Waterlogged plants are typically yellow and stunted which reduces the yield potential. **Studies have found that crops can lose 0.5 t/ha/day for every day they remain waterlogged between December and June.**

Improved drainage is the best way to overcome waterlogging. Depending on the cause of the waterlogging, this will either be surface or sub-surface drainage, or a combination of both.

Improving sub-surface drainage

When the waterlogging is caused by high watertables, sub-surface drainage is required. High watertables typically occur in areas that:

- > receive sustained high rainfall for much of the year
- > have little or no outflow of surface drainage water
- > have slopes that flatten out and are often characterised by a soil type change—from a freely draining soil on the slope to a poorly draining soil on the flatter areas.

There are three ways to drain waterlogged areas. The method that is chosen will depend on the area to be drained, the topography, soil type and cost.

1. Interception drains are open drains sited at the bottom of slopes above the waterlogged area. They drain into surface drainage systems.

2. Sub-surface pipes are placed within the waterlogged area to drain water from the root zone. They most commonly consist of slotted ag-pipe which is installed within a layer of permeable material. The intercepted water is then drained to surface drains or to a well that must be pumped out. Subsurface pipe is the most common form of drainage.

3. Mole drains are compacted tunnels drawn through the subsoil. They work best in soils with a reasonable clay content that will hold the tunnel shape. Mole drains need to be renewed at least every crop cycle.

Improving surface drainage

Surface drainage aims to remove surface water from the field within a reasonable period of time. Good surface drainage will:

- > improve field trafficability
- > reduce waterlogging
- > improve productivity
- > not affect downstream neighbours or water quality.

Field levelling and a system of surface drains are the most effective surface drainage methods.

GPS- or laser-guided levelling is used to provide an even slope in fields to help water to run off more effectively. Levelling to remove high and low spots will reduce the risk of water ponding and causes waterlogging. In furrow-irrigated districts, the whole field is likely to be levelled; however, in other districts, levelling just at the end of the field may be sufficient to improve water flow.

On-farm drains should ideally be shallow grassed spoon drains. The shape makes it easier for machinery movement and maintenance (slashing) than deep open drains. The grass cover will help to filter sediment and any associated nutrients or pesticides before the water reaches riparian areas.

Before commencing any on-farm drainage works, you should seek advice on the best options for your farm. In a number of districts, community drainage schemes exist and you should also discuss your plans with scheme members.