

Improving nutrient application improves water quality and farm profitability



David Calcino

Development Officer – Nutrition
Professional Extension and
Communication Unit

The maintenance of good quality water, whether drinking water, river water or ocean water, is in everyone's interest. Over the last couple of decades, the sugar industry has played a significant part in attempting to address water quality concerns. So how can recommended sugar industry fertiliser practices contribute to the improvement of both water quality and farm profitability?

The environmentally sensitive nutrients

Two of the nutrients required for cane growth are under the spotlight. Both nitrogen (N) and phosphorus (P) can have detrimental impacts on water quality.

This article focuses on N as it is very mobile – moving easily from the point of application – while P losses have been greatly reduced with the adoption of green cane trash blanketing in most regions – because P is usually lost when soil particles move off-site.

Why nitrogen can be a problem

Nitrate, which is a particular form of N, can be harmful to human health in drinking water. It exists in nature, but levels may increase due to a range of human activities, including the use of nitrogen-based fertiliser.

One of the greatest water quality risks to the Great Barrier Reef is from N discharge. Excessive nitrogen runoff to the ocean can result in more frequent outbreaks of infestations of crown-of-thorns starfish that feed on coral. Although these are naturally occurring organisms, their increased numbers cause heavy damage to corals and the whole reef ecosystem.

While cane is far from the only contributor to N runoff, there are some well-established, recommended practices growers can continue to do that will benefit both farm profitability and the environment.

Ways nitrogen is lost from cane blocks

Runoff

The movement of water or soil across the surface of a block. The water may contain nutrients and sediment that are lost to the crop.

Leaching

The movement of water down through the soil profile and away from the main root zone. The water may contain nutrients, especially nitrate-N.

Volatilisation

The conversion of surface-applied, urea-based products to gases whereby N is lost to the atmosphere.

Denitrification

The conversion of all N fertilisers to gases where waterlogged conditions and a ready source of organic matter occur. In such circumstances, substantial amounts of N may be lost to the atmosphere.

What can be done to reduce environmental impacts of nitrogen while maintaining yields?

The overarching guiding principle is to stick to the SIX EASY STEPS nutrient guidelines. Fertiliser recommendations that have been developed and updated over many years of research are based on yield, profitability and sustainability over a full crop cycle.

The simple, one-page SIX EASY STEPS guide for your region can be obtained from your local productivity services officer or from the SRA website: www.sugarresearch.com.au

While there are no recipes for farm management practices and there are isolated exceptions to the rule, the principles below apply to the entire industry.

Sometimes it cannot be avoided but fertiliser applied just before the wet season is at much higher risk of loss as the crop will not have had enough time to take up the fertiliser.

Above: Denitrification and leaching of nitrogen fertilisers will occur under waterlogged conditions.



Runoff

Apply fertiliser below the ground, not on the surface. A green cane trash blanket provides excellent added protection to the soil and fertiliser.

Leaching

Sandy soils are extremely prone to leaching. Do not over-irrigate. Consider splitting the fertiliser applications or using a controlled-release product. You should discuss these strategies with your advisor as timing and cost issues need to be considered.

Volatilisation

Subsurface-apply fertiliser into the middle or sides of the row. However, surface application may be

acceptable when the canopy is about 50 cm high, which provides some protection to the fertiliser from the weather. Also, the leaves are able to absorb some of the volatilising ammonia-N.

Because volatilisation occurs only with urea-based products, an alternative strategy is to consider using a different N product such as sulphate of ammonia, just to be safe. Irrigating cane straight after surface application of fertiliser will ensure the fertiliser enters the soil and is not volatilised.

Denitrification

Subsurface-apply fertiliser into the middle or sides of the row where it is in the driest part of the profile. In areas that are regularly waterlogged,

consider planting into pre-formed raised mounds or splitting the N application on early-harvested blocks. Good surface drainage is particularly important.

Nitrification-inhibiting products that slow the breakdown of N fertilisers in waterlogged conditions are showing some promise. They cost more than regular products so discuss their use with your advisor.

Simply adhering to basic, sound management practices will ensure that crops have the best chance of high productivity while at the same time minimising the impacts on water quality.



Above: Following the Six Easy Steps nutrient management guidelines will maximise profitability and minimise impacts on water quality.



Above: Under waterlogged conditions, nitrogen can be lost to leaching, denitrification and weeds.

Local industries to drive the improvement of harvesting practices

Each year the Australian sugar industry incurs avoidable cane losses during the harvesting process.

Two new Regional Applied Research (RAR) projects, funded by SRA and led by productivity services groups with their local industry, are looking at ways to tackle this long-standing issue.

Reducing harvesting losses in the Burdekin region

Data collected from shed meetings in late 2013 in the Burdekin region showed that harvesting loss is either the top or second-most important issue that growers feel is limiting the local production system.

A three-year project led by Burdekin Productivity Services – *Understanding the impact of harvester speed on subsequent ratoon performance in the Burdekin* – will measure the effect of various harvester speeds on ratoonability and subsequent yield.

This activity will produce information on the cost benefit or penalty of a range of harvester speeds of 6–12 km/h.

This information will then help growers, harvesting operators and advisors understand the effect that harvester speed has on productivity, profitability and subsequent crop performance, and whether a change in harvester speed can be justified.

All trial blocks have been harvested with shoot, stool and gap counts completed.

