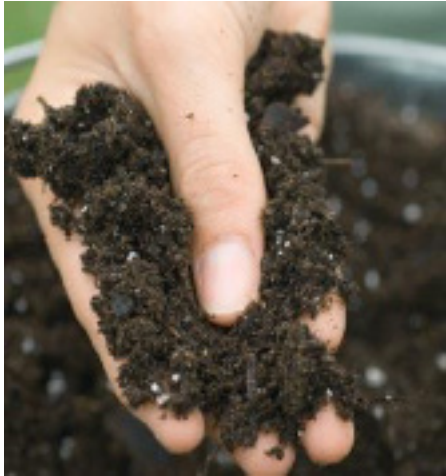




Information Sheet

7.3 Nitrogen management: N-Monitor plots



Nitrogen (N) is one of the most important nutrients to ensure vigorous growth and production potential. However, it is also one of the most difficult nutrients to manage in a cropping system. Nitrogen is subject to several transformations, with unfavourable conditions leading to major N losses (gaseous losses, leaching, run-off), while it can be subject to lock-up and release depending on how organic matter cycles in the soil (see Info Sheet 7.1: Nitrogen Management Guidelines). Crop demand also varies due to the size and health of the crop. While many practices can strongly influence the efficiency of N, many of the site-specific factors that can influence N behaviour are not known at the start of the growing season, making it difficult to get the precise N requirements. One of the simplest on-farm practices a grower can take to help guide their N management and align this best N fertiliser management practices is to establish N-strips or N-monitor plots.

N-Monitor plots

These are strips or plots where the N application rate is varied from the main field and the relative response of the crop monitored. A grower may establish N-monitor plots under several situations:

- At the start of the season, where a grower wishes to test a different rate of N to refine the given recommendations.
- Where N applications are split (as is generally advised). The N-monitor plots have value later in the season when considering whether a crop requires additional N on the split application.
- In situations where the grower suspects that there have been losses of N (e.g. high rainfall events on sandy soils), or that growth has been sub-optimal (e.g. disease or drought); establishing N-monitor plots can guide whether further N applications will improve yield.

In all cases, different rates can be applied to a small section in the main field (the N-monitor plot) and crop performance compared. As crop response to N tends to be quick, benefits manifest soon after application (within a few days during active growth), and can then be used to guide revision of N application rates.

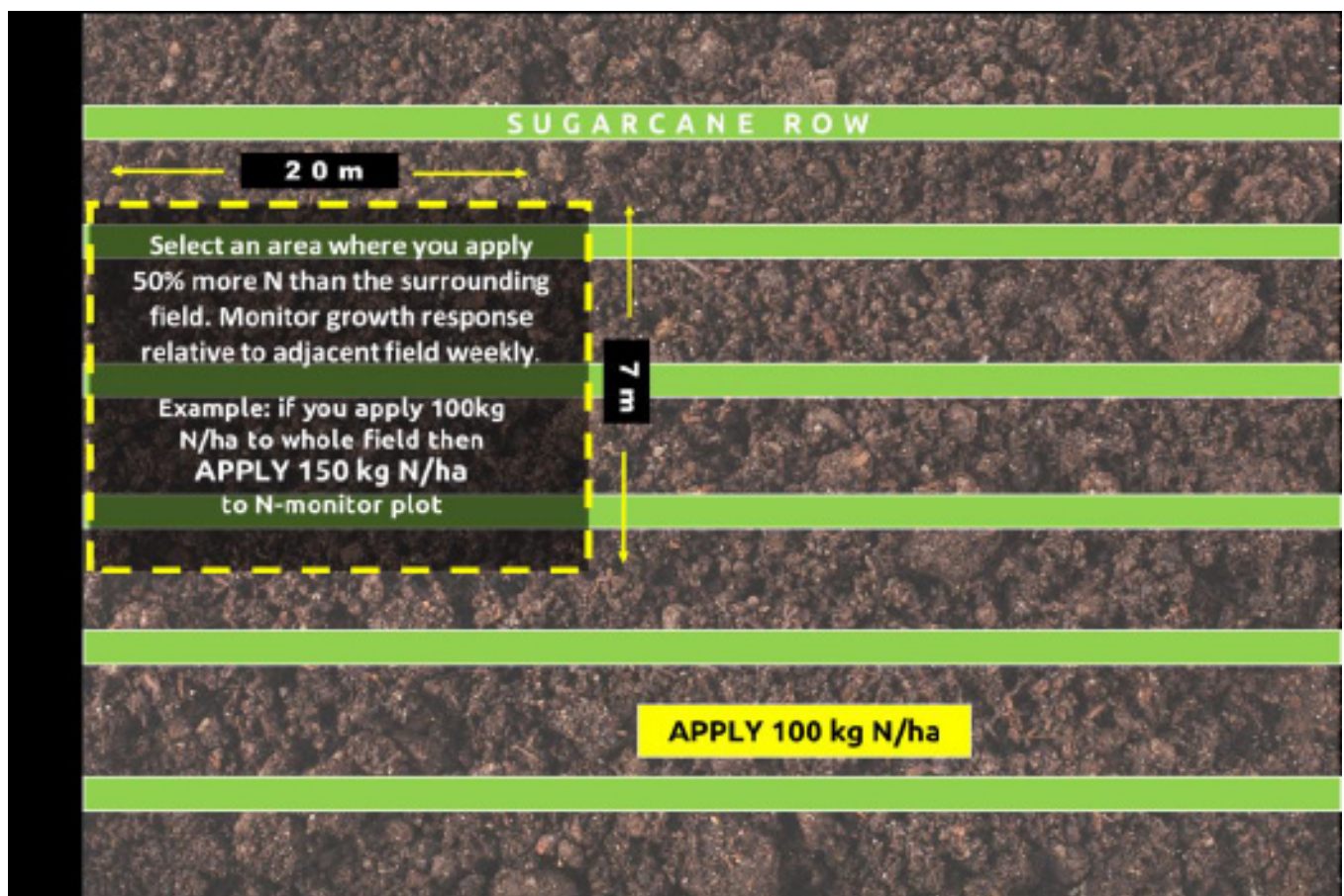


N-Monitor plot design

Below is a simple outline for establishing an N-monitor plot:

- Within a field, select an area roughly 20 m by 7 m (include 5 - 10 lines of sugarcane) – this will be the N-monitor plot.
- Mark this area so it can be easily located later in the season.
- It is advised to locate the plot near a road so that you can readily access the site and observe the differences.
- Apply all the same management practices across the whole field.
- Apply your recommended N-rate across the entire field and alternative N rate in the N-monitor plot.
- After treatment, visit the N-monitor plot every few days and look for visual differences in height, colour and plant vigour.
- It would be useful to take photographs and record what N rates were being compared.
- If growth responses are highly favourable to additional N application, consider treating the whole field with the additional N used in the monitor plot.

Optional: For improved assessment of crop growth, several random height measurements in the N-monitor plot can be compared to several random height measures in the normally treated field.



▲ Example of N-monitor plot design.

Adjusting N-rates for different N-monitor plot situations

1 At start of season:

If you wish to test whether a higher or lower N rate at the first application is better, increase the field recommendation by 30 - 50% in the N-monitor plot. Other rates can also be tested (e.g. quarter rate, double rate). If the crop in the N-monitor plot responds to additional N, then the entire field can be treated.

2 Assessing the need for split application later in season:

If you wish to test whether additional N is required, apply the intended split application to the N-monitor plot and evaluate growth response. If the crop in the N-monitor plot responds to additional N, then the entire field can be treated.

3 Assessing the need for additional N application due to suspected N losses (e.g. high rainfall on sandy soils):

If you wish to test whether additional N is required, apply 30 - 50% of the original N recommendation for the field to the N-monitor plot and evaluate growth response. If the crop in the N-monitor plot responds to additional N, then the entire field can be treated.

4 Assessing the need for additional N application due to suspected under-use by the crop (events that result in decreased crop growth such as drought):

If you wish to test whether to reduce N due to an underperforming crop, apply 30 - 50% of the original N recommendation for the field to the N-monitor plot and evaluate growth response relative to the rest of the untreated field. If the crop in the N-monitor plot responds to the additional N, then the entire field can be treated.



Monitor plots for nutrients other than N



It is feasible to test other nutrients using a similar approach as described for the N-monitor plots. In general, the reason for an alternative nutrient monitor-plot is to evaluate a suspected nutrient deficiency observed in prior seasons. As most other nutrients are less mobile in the soil than N, the approach tends to be limited to start of season applications, though there are some exceptions under certain conditions. It is generally advised that for any nutrient being investigated that only that nutrient be changed so that any responses can be linked to that specific nutrient. Table 1 provides some general guidelines for when it may be suitable to test different nutrients using an adapted monitor plot approach.

General guidelines to establish a monitor plot to test nutrients other than nitrogen for crop response

Consult your Fertiliser Advisor for foliar spray formulations where these are to be tested.

Nutrients	Suggestions as to when to establish and treat the monitor plot		
	Sandy soils (<15%clay)	Clay soils (>15%clay)	Foliar application
Phosphorus (P)	<ul style="list-style-type: none"> At planting use furrow applications. In ratoon crops the benefits of supplementary P are generally limited. However, in severely P deficient situations a response may be observed. 	<ul style="list-style-type: none"> At planting use furrow applications. In ratoon or late season split applications the benefits of supplementary P are very limited and generally not advised. 	No
Potassium (K)	<ul style="list-style-type: none"> At planting using broadcastor band applications. In ratoon or late season split applications use broadcastor band applications. 	<ul style="list-style-type: none"> At planting or ratoon establishment use broadcast or band applications. Late season split applications are not likely to be beneficial in that season. 	No
Calcium (Ca) and Sulphur (S)	Apply gypsum as broadcast or bands in plant, ratoon or late season applications		No
Magnesium (Mg)	Apply soluble Mg source (e.g. magnesium sulphate or nitrate) as broadcast or bands in plant, ratoon or late season applications		No
Zinc (Zn) and Copper (Cu)	<ul style="list-style-type: none"> At planting furrow application is advised. Row top dressing late in season or in the ratoon applied directly on row may show some benefit. 	<ul style="list-style-type: none"> At planting furrow application is advised. Ratoon topdressing on the row may show minor benefit. Late season applications are not likely to be beneficial in that season. 	If leaf testing indicates deficiency, apply when sufficient canopy present.
Iron(Fe) and Manganese (Mn)	Generally limited value but can test at planting using an in-furrow application.		If leaf testing indicates deficiency, apply when sufficient canopy present.
Boron (B)	At planting, ratoon establishment or late season split applications using a banded placement top-dressed on and near the row. Seek guidance on suitable application rate to prevent killing the stools.		If leaf testing indicates deficiency apply when sufficient canopy present.

Louis Titshall (Senior Soil Scientist)

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