

Information Sheet

7. NUTRITION

7.1 Recommendations for nitrogen (N)

Nitrogen (N) fertiliser costs the sugar industry some R93 million annually (1998) and the price continues to rise rapidly. This amount represents about 50% of the total spent on fertiliser by the cane grower.

The role of Nitrogen

- one of the main building blocks of proteins
- essential for photosynthesis and sugar production
- associated with vigorous vegetative growth
- too much N can cause lodging, delayed maturity and reduced sucrose levels.

N deficiency symptoms

- growth of entire plant is affected
- light green to yellow leaves from the base of the plant upwards, often with necrosis (death of tissue) on the tips and edges of older leaves
- thin, stunted stalks, reduced stooling.

Soil N supply

Soil type and moisture are important factors affecting yield potential. Optimum levels of N fertiliser for ratoon cane, determined from response curves, are inversely related to soil organic matter content and to soil N release, both for rain grown and irrigated cane, i.e. the probability of a response to applied N decreases with increasing soil organic matter content. The results also indicated that response to applied N was broadly related to the diagnostic topsoil horizons, as shown in the response curves in Figure 1, which were obtained from trials conducted in rain grown and irrigated cane.

Current advisory system for N

N recommendations for rain grown and irrigated plant and ratoon cane are now based on bioclimatic region, soil form and the capacity of the soil to release

N to the plant (see Table 1). For advisory purposes, soils are classified into four categories (low, medium, high and very high) according to their potential to mineralise N from soil organic matter. This is estimated by FAS staff from soil properties such as colour, texture, structure and organic matter content. In view of the close relationship between certain parent materials and diagnostic topsoil horizons the recommendations given in the table, based on soil forms, can also be used for the main soil parent materials, for which a similar set of recommendations has been prepared and is available on request.



Symptoms of N deficiency: light green to yellow leaves.

CURRENT N RECOMMENDATIONS

Plant cane (all areas)

- Plant cane growing on most soils of the industry requires considerably less applied N fertiliser than the succeeding ratoons, because initially much of the crop N requirement can be produced by the soil itself.
- Cane growing on very high N mineralising soils requires only 60 kg N/ha compared with 120 kg N/ha for rain grown cane on low N mineralising soils (see Table 1).
- Apply about one third of the recommended N with P, lightly covered in the furrow and top-dress the balance preferably over the row about 10 weeks later, or, for winter planting, when the cane is more than 30 cm high, but not later than early spring.

Ratoon cane

Spring and summer harvested cane

- In all areas top-dress as soon as the trash has been spread, or the tops scattered/raked, not later than two weeks after harvesting the previous crop.
- Use a 4-6 week split on sandy or waterlogged soils where losses such as urea volatilisation, leaching or denitrification have occurred.

Autumn and winter harvested cane

Northern irrigated areas

- Where conditions are mild, winter harvested cane should be top-dressed within two to three weeks of harvesting the previous crop.
- During very cold winters when regrowth is slow, N uptake will also be slow and splitting of N fertiliser will improve N use efficiency, especially for cane growing on soils with restricted drainage and on other light textured category N1 and N2 soils. Use a 6-8 week split according to the harvesting season:
 - *May-June harvest:* apply one third initial, two thirds top-dressed
 - *July-August harvest:* apply half initial, half top-dressed
 - *September onwards:* all initial.

Coast and coast hinterland

- Top-dress following spring rains, but not later than the end of August.
- Cane cut in the early part of the season (April to May) and grown on category N1 and N2 soils

could benefit from an early split application of N, provided temperature and soil moisture conditions are adequate. Apply one third initial and the balance following spring rains, but not later than the end of August.

Midlands

- Top-dress following spring rains, but not later than the end of September.
- Use a 6-8 week split on sandy or waterlogged soils where losses such as urea volatilisation, leaching or denitrification have occurred.
- During seasons of high rainfall, leaching or denitrification in soils prone to waterlogging may result in the appearance of yellow, chlorotic cane in the second season of growth of a two-year crop. To minimise the risk of N deficiency, an additional 50 kg N/ha should be applied in November of the second summer, when rainfall during early spring is in excess of 150% of the long term mean.

Situations where reduced N rates are recommended

Nitrogen recommendations should be reduced by 20 to 30 kg N/ha where specific growth limiting factors can be identified. This would apply to situations where:

- eldana is known to be a serious problem
- soils are shallow, e.g. Mispah form
- nematodes are a problem when a nematicide is not used, e.g. Fernwood form
- rainfall is comparatively low
- salinity/sodicity problems exist
- cane is to be harvested at a younger age than usual (12 months) and at a naturally low sucrose period
- the price of cane is likely to be lower than usual or a restriction is to be enforced.

Note: Where fertigation is practised, there is scope for reducing the N recommendation by up to 20% due to improved N use efficiency. Specific advice may be obtained on request.

Situations where additional N is recommended

- Where rainfall has been excessive following fertiliser application, leaf samples should be taken to establish whether additional N is needed.
- Use an additional 20 kg N/ha on ratoon cane older than fourth ratoon.

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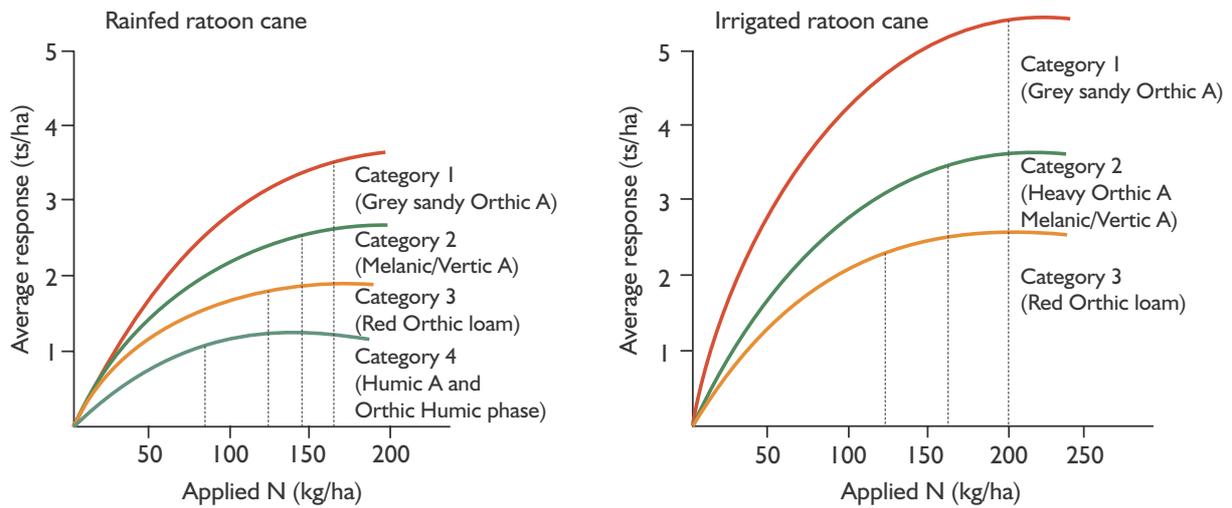


Figure 1. N response curves for rainfed and irrigated ratoon cane.

Table 1. Nitrogen recommendations.

CATEGORY		LOW I	MODERATE II	HIGH III	VERY HIGH IV
Soil forms		Fernwood Cartref (light) Longlands Westleigh Kroonstad Katspruit Glenrosa (light) Estcourt Sterkspruit Dundee Shepstone Mispah (grey) Oakleaf (light)	Cartref (mod) Glenrosa (heavy) Clovelly (light) Hutton (light) Oakleaf (grey) Swartland Bonheim (non-red) Valsrivier Tambankulu Willowbrook Rensburg Arcadia Milkwood Mayo Inhoek Mispah (brown) Longlands (med)	Hutton (heavy) Hutton (mod) Shortlands Bonheim (red) Oakleaf (red) Glenrosa Clovelly (mod) Griffin (mod)	Champagne Inanda Nomanci Kranskop Magwa Hutton (humic) Clovelly (humic) Griffin (humic)
Organic matter		<2%	2 to 4%	2 to 4%	4%
Plant crop	All soil systems				
	Rainfed	120	100	80	60
	Irrigated	140	120	80	60
Ratoons	Coastal (Berea, Umzinto coast lowlands)	Rooting depth			
		<400 mm	>400 mm		
	Rainfed	140	160	140	#100
	Irrigated	160	180	160	#100
Midlands (Umzinto midlands/river valley and Nottingham)	Rainfed	140	160	120	100
	Irrigated	140	160	140	100
Lowveld (Komatipoort, Nelspruit)	Irrigated	160	200	160	*120 / 140**
# = peat soils * = 1st to 4th ratoon ** = older than 4th ratoon					