NUTRIENT MANAGEMENT GUIDELINES FOR SUGARCANE IN THE WET TROPICS

Sugar Research Australia

Ameliorants

Table 1 – Lime guidelines based on exchangeable soil calcium (Ca)

Soil calcium (meq/100g)	Lime application (tonnes/ha)
< 0.20	4
0.20 – 0.40	3.5
0.41– 0.60	3
0.61 – 0.80	2.5
0.81 – 1.20	2
1.21 – 1.60	1.5
1.61 – 2.00	1
> 2.00	0

Table 2 – Magnesium (Mg) guidelines based on exchangeable Mg

Soil Mg (amm-acet) meq/100g	< 0.05	0.06 – 0.10	0.11 – 0.15	0.16 – 0.20	0.21 – 0.25	> 0.25
Mg rate (kg/ha)	150	125	100	75	50	0

Table 3 – Silicate guidelines based on reserves and available soil silicon (Si)

	Si (BSES/sulphuric acid)		Si (CaCl)	Suggested application rate
Si (mg/kg)	< 70	**and**	< 10	Mud/ash at 100-150 wet t/ha

Table 4 – Modifications to ameliorant application rates where mill by-products have been applied

Product	Application rate	Reduce the next lime application by:	Magnesium (Mg)
Mill ash	100 - 150 wet tonnes/ha	2 t/ha	Sufficient Mg for one crop cycle
Mill mud	100 - 150 wet tonnes/ha	2 t/ha	Sufficient Mg for one crop cycle
Mud/ash mixture	100 - 150 wet tonnes/ha	2 t/ha	Sufficient Mg for one crop cycle

Nitrogen (N)

Table 5 – Nitrogen (N) fertiliser guidelines

District Yield Potential	Crop	Organic C (%) range, N mineralisation index and N application rate (kg/ha)						
		< 0.40	0.41 – 0.80	0.81 – 1.20	1.21 – 1.60	1.61 – 2.00	2.01 – 2.40	> 2.40
		VL	L	ML	M	MH	H	VH
120 tc/ha	Plant after bare fallow	140	130	120	110	100	90	80
	Replant and ratoon	160	150	140	130	120	110	100

Table 6 – Calculation of Nitrogen (N) rate discount following a legume crop

Legume crop	N%	Crop dry mass (t/ha)	N discount if cover crop (kg/ha)	N discount if grain harvested (kg/ha)
Soybean	3.5	8	360	120
		6	270	90
		4	180	60
		2	90	30
Peanut	3.0	8	N/A	125
		6		100
		4		65
		2		25
Cowpea	2.8	8	290	100
		6	220	75
		4	145	50
		2	70	25
Lablab	2.3	8	240	80
		6	180	60
		4	120	40
		2	60	20

Table 7 – Modifications to nitrogen (N) rate where mill by-products have been applied

Product	Application rate	To be subtracted from the appropriate N application rate		
		Year 1	Year 2	Year 3
Mill ash	100 - 150 wet tonnes/ha	Nil	Nil	Nil
Mill mud	100 - 150 wet tonnes/ha	80 kg N/ha	40 kg N/ha	20 kg N/ha
Mud/ash mixture	100 - 150 wet tonnes/ha	50 kg N/ha	20 kg N/ha	10 kg N/ha

Notes for determining appropriate N application rate

1. Determine baseline N rate from Table 5 by using the Organic C (%) value to determine N mineralisation index and N requirement for crop.
2. Calculate N rate discount for sugarcane crops that follow a legume crop, using Table 6.
3. If mill by-products were applied prior to planting, use Table 7 to determine N rate discount for the N contribution from mill mud and mud/ash mixture.

Example 1.
The Organic C value is 0.8%, the N mineralisation index is low (L), a crop of soybeans was grown with an estimated 6 t/ha dry mass that was harvested for grain.
The calculation for the N requirement for a plant crop using the **replant** rate to establish baseline N: 150 – 90 = 60 kg N/ha

Example 2.
The Organic C value is 0.8%, the N mineralisation index is low (L) and a mud/ash mixture was applied to the fallow block at 150 wet tonnes/ha.
N requirement for year 1: 130 – 50 = 80 kg N/ha
N requirement for year 2: 150 – 20 = 130 kg N/ha
N requirement for year 3: 150 – 10 = 140 kg N/ha

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Phosphorus (P)

Table 8 – Phosphorus (P) fertiliser guidelines

PBI	P sorption class	Crop	BSES P (mg/kg) range and P application rate kg/ha								
			< 5	5 - 10	10 - 20	20 - 30	30 – 40	40 - 50	50 - 60	60 - 120	> 120
> 420	Very high	Plant and replant	80	50	40	30	30	30	30	30	0
		Ratoon	40	40	30	25	20	20	20	20	0
281 - 420	High	Plant and replant	80	50	40	30	20	20	0	0	0
		Ratoon	40	40	30	25	20	10	0	0	0
140 - 280	Moderate	Plant and replant	60	40	30	20	20	20	0	0	0
		Ratoon	30	30	20	20	15	5	0	0	0
< 140	Low	Plant and replant	40	30	30	20	20	20	0	0	0
		Ratoon	20	20	15	10	10	0	0	0	0

Table 9 – Modifications to phosphorus (P) application rate where mill by-products have been applied

Product	Application rate	P contribution
Mill ash	100 - 150 wet tonnes/ha	Sufficient P for a plant crop and one ratoon
Mill mud	100 - 150 wet tonnes/ha	Sufficient P for two crop cycles
Mud/ash mixture	100 - 150 wet tonnes/ha	Sufficient P for two crop cycles

Potassium (K)

Table 10 – Potassium (K) fertiliser guidelines

Nitric K (meq/100g)	Texture	Crop	Exchangeable K (meq/100g)						
			< 0.20	0.20 – 0.25	0.26 – 0.30	0.31 – 0.35	0.36 – 0.40	0.41 – 0.45.	> 0.45
< 0.70	Sand	Plant	100	80	50	50	0	0	0
		Replant and ratoon	120	120	100	80	50	0	0
	Loam	Plant	120	100	80	50	0	0	0
		Replant and ratoon	120	120	100	100	80	50	0
	Clay	Plant	120	120	100	80	50	0	0
		Replant and ratoon	120	120	100	100	100	80	0
> 0.70	Sand	Plant	80	50	0	0	0	0	0
		Replant and ratoon	100	100	80	50	0	0	0
	Loam	Plant	100	80	50	0	0	0	0
		Replant and ratoon	100	100	100	80	50	0	0
	Clay	Plant	100	100	80	50	0	0	0
		Replant and ratoon	100	100	100	100	80	50	0

Table 11 – Modifications to potassium (K) application rate where mill by-products have been applied

Product	Application rate	To be subtracted from the appropriate K application rate		
		Year 1	Year 2	Year 3
Mill ash	100 - 150 wet tonnes/ha	120kg K/ha	120kg K/ha	0
Mill mud	100 - 150 wet tonnes/ha	40 kg K/ha	0	0
Mud/ash mixture	100 - 150 wet tonnes/ha	120kg K/ha	0	0

Sulphur (S)

Table 12 – Sulphur fertiliser guidelines (kg/ha) for plant and ratoon crops

Sulphate S (mg/kg)	N mineralisation index VL - L	N mineralisation index ML - M	N mineralisation index MH - VH
< 5	25	20	15
5 – 10	15	10	5
11 – 15	10	5	0
> 15	0	0	0

Table 13 – Modifications to sulphur (S) application rate where mill by-products have been applied

Product	Application rate	To be subtracted from the appropriate S application rate		
		Year 1	Year 2	Year 3
Mill ash	100 - 150 wet tonnes/ha	0	0	0
Mill mud	100 - 150 wet tonnes/ha	10kg S/ha	10kg S/ha	10kg S/ha
Mud/ash mixture	100 - 150 wet tonnes/ha	10kg S/ha	10kg S/ha	0

Micronutrients

Table 14 – Copper (Cu) fertiliser guidelines

Copper (DTPA)	Application rate
< 0.2 mg Cu/kg	10 kg Cu/ha once per crop cycle

Table 15 – Zinc (Zn) fertiliser guidelines

Zinc (HCL)	**Application rate**
< 0.6 mg Zn/kg	10 kg Zn/ha once per crop cycle
Zinc (DTPA)	**Application rate**
< 0.3 mg Zn/kg	10 kg Zn/ha once per crop cycle

These guidelines summarise information contained in the SIX EASY STEPS® district specific Nutrient Management program.
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