



Information Sheet

7. NUTRITION

7.3 Recommendations for Potassium (K)

Compared with many crops, sugarcane has a very high demand for potassium, with amounts of up to 200 and 500 kg K per ha respectively being removed by rain grown and irrigated cane crops. Potassium is essential for plant growth and photosynthesis, helps the plant use water more efficiently and controls the movement of sugars in the plant. In potassium deficient cane the older leaves are orange-brown in colour, with scorching of the outer edges of the leaves (firing). See Figures 1 and 2.

Fertiliser use

The sugar industry uses $\pm 40\,000$ tons K annually, costing more than R80 million, which is about a third of the total spent on fertiliser by cane growers. As

South Africa is dependent on imported supplies for its potash requirement, these costs will continue to increase. It is therefore important to ensure that cane is using K fertiliser as efficiently as possible.

For economic reasons the K fertiliser used almost exclusively by the sugar industry is potassium chloride (KCl – 50% K), also known as muriate of potash. It is often applied as the straight fertiliser or in a range of NK or NPK mixtures such as 1.0.1, 2.0.3, 2.3.4, 3.1.5, 5.1.5 or 4.1.6, or prescription blends.

Advances in K fertiliser recommendations

For many years Experiment Station recommendations for potassium fertiliser application were based on a single threshold value of 112 ppm K for all soils.



Figure 1. Potassium deficient cane. The older leaves are orange-brown in colour with marginal firing.



Figure 2. Dead areas along leaf margins give the cane a 'fired' appearance.

During the past two decades various inadequacies in this simplified interpretation of soil analyses became apparent and further research (from more than 100 trials) has led to substantial improvements. Potassium fertiliser recommendations for whole cycle advice are now based on different threshold values for three categories of soil, defined by clay content and location. These are as follows:

- All soils with a clay content of 30% or less (112 ppm or 250 kg K/ha)
- All soils with more than 30% clay (150 ppm or 340 kg K/ha)
- All soils with more than 40% clay in the northern irrigated cane areas, i.e. Pongola, Eastern Transvaal and Swaziland (225 ppm or 500 kg K/ha).

Recent studies have shown that even a threshold value of 225 ppm K is inadequate for irrigated cane grown on a winter cycle in the Eastern Transvaal and Swaziland on heavy textured, strongly potassium fixing black and red soils which have a high ratio of Ca + Mg to K. High Ca and Mg saturation can limit the amounts of K that enter the cane plant during the winter months, so K fertiliser recommendations for the period April to August have been increased for soils with a high base status (i.e. Ca + Mg more than 4 000 ppm).

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WHOLE CYCLE K FERTILISER RECOMMENDATIONS

All soils with a clay content of 30% or less											
Soil K level	K (ppm)	> 267	267	222	178	133	112	100	89	78	< 67
	K (kg/ha)	> 600	600	500	400	300	250	225	200	175	< 150
Fertiliser requirement (kg/ha)	Plant	Nil	Nil	Nil	Nil	Nil	75	100	125	150	175
	1R	Nil	Nil	Nil	Nil	125				175	
	2R	Nil	Nil	Nil							
	3R	Nil	Nil								
	4R	Nil									

All soils with more than 30% clay											
Soil K level	K (ppm)	> 310	310	266	222	178	150	122	100	< 75	
	K (kg/ha)	> 700	700	600	500	400	340	275	225	< 175	
Fertiliser requirement (kg/ha)	Plant	Nil	Nil	Nil	Nil	Nil	100	150	175	200	
	1R	Nil	Nil	Nil	Nil	150				200	
	2R	Nil	Nil	Nil							
	3R	Nil	Nil								
	4R	Nil									

*All soils with more than 40% clay in the Northern irrigated areas											
Soil K level	K (ppm)	> 400	400	355	310	266	225	200	175	< 150	
	K (kg/ha)	> 900	900	800	700	600	500	450	390	< 340	
Fertiliser requirement (kg/ha)	Plant	Nil	Nil	Nil	Nil	Nil	100	150	175	200	
	1R	Nil	Nil	Nil	Nil	150				200	
	2R	Nil	Nil	Nil							
	3R	Nil	Nil								
	4R	Nil									

* i) medium base status (Ca + Mg < 4 000 ppm), summer and winter cycle

ii) high base status (Ca + Mg > 4 000 ppm) summer cycle only (September to March)

**All soils with more than 40% clay in the Northern irrigated areas											
Soil K level	K (ppm)	> 450	450	400	380	355	330	310	288	< 266	
	K (kg/ha)	> 1000	1000	900	850	800	750	700	650	< 600	
Fertiliser requirement (kg/ha)	Plant	Nil	Nil	Nil	Nil	Nil	100	150	200	250	
	1R	Nil	Nil	Nil	Nil	200				300	
	2R	Nil	Nil	Nil							
	3R	Nil	Nil								
	4R	Nil									

** iii) high base status (Ca + Mg > 4 000 ppm), winter cycle only (April to August)

NB. Single crop ratoon cane recommendations based on soil analysis are as for plant cane whole cycle recommendation.

