Information Sheet

7.15 Sugarcane leaf sampling

Leaf sampling is an essential part of crop nutrient management. Application of fertiliser does not always result in better uptake of nutrients due to other constraining factors in the soil. The leaf nutrient status thus provides a good indicator of the ability of a crop to access nutrients in the soil under the conditions in which it was grown. Where nutrient imbalances are found, further investigation of causes can be undertaken.

Value of leaf analyses

- Leaf analyses gives an indication of the current nutritional status of the crop.
- It indicates the extent of nutrient uptake by the crop, and whether particular deficiencies or imbalances are limiting crop growth.
- Sampling early in the growth cycle allows for corrective treatment of some nutrients within the current crop.

When should leaf samples be taken?

- When the crop is actively growing.
- The correct sampling period is related to the geographical area and the age of the crop.
- Ideal leaf sampling ages:
  - ◊ Northern Irrigated: 3-5 months
  - ◊ Coastal Lowlands: 4-7 months
  - ◊ Midlands: 4-9 months
- Leaf analysis from samples collected outside of these periods can lead to incorrect interpretation of thresholds.
- At least four weeks must have elapsed since the last fertiliser top-dressing or any chemical spraying.
- The crop must have received enough well-distributed rainfall/ irrigation to ensure that there is no moisture stress in the crop prior to sampling.

How should the samples be collected?

- Select leaves from stalks of average height, but not from young shoots or unusually tall stalks. These samples should represent the average field condition.
- The third fully-expanded leaf should be selected (top visible dewlap leaf). The first is the leaf which is at least half unrolled.
- Collect about 40 such leaves randomly from various spots throughout the field - a zig zag pattern is useful to ensure coverage of the field.
- Do not collect from edges of fields as dust contamination and variable growth affect analysis results.
- If the field consists of areas of good and poor growth, a separate sample should be taken from each portion, even if the field has been fertilised as one unit.
- Holding the leaves in a bundle, chop off the tops and bottoms, leaving a central portion roughly 30 cm long.
- Strip out and discard the midrib from this central portion, using a knife or simply by tearing.
- Spread the leaf sample on a clean sheet and leave to dry in a well-ventilated area.

▲ Third fully-expanded leaf (top visible dewlap leaf).

- Where samples cannot be spread out to dry, store them in brown paper bags (not plastic bags), ideally with the top open.

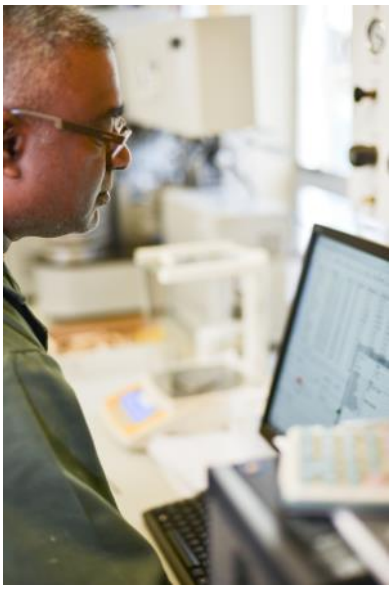
- Bundle the dried-out leaf portions and attach a green leaf sample label. Please provide all the crop details requested on the green label (available from your regional Extension office or FAS).
- The details on the label required are: Grower and Farm name, a contact number, Grower or FAS account number (if available) and your Sample ID (e.g. field number).
- Ensure these details correspond to the information on Leaf Submission Form (available from your regional extension office, FAS or as a download from the FAS website (www.fasagrilab.co.za)).
- A video demonstrating the typical leaf sampling procedure is available in English and isiZulu at www.fasagrilab.co.za.

Precautions

- The midrib must be stripped from the leaf blade as soon as possible after sampling.
- Do not contaminate samples by contact with fertiliser or used fertiliser bags or on the ground/soil.
- Do not collect samples that have noticeable dust contamination or evidence of pest and disease damage on them.
- Do not collect leaves that have had any recent agrochemical treatments applied.

Stripping of leaf midrib. ▶

Interpretation of leaf analysis data



FAS leaf analysis reports include interpretive information for each nutrient. It is important that samples are collected during the ideal crop age (see section "When should leaf samples be taken?") for appropriate interpretation. Nitrogen thresholds are dependent on month of sampling (see table below) while ranges for other nutrients are given on page 4.

Guidelines for the correction of deficiencies where leaf samples show that N is limiting are presented in the second table on page 4. Normally, fertiliser N applications are recommended only if the current crop is young enough to benefit from top-dressed fertiliser (application of N too close to harvest time can lead to reduced sucrose yield). However, numerous factors need to be considered in decisions relating to N topdressings, and growers are advised to consult their Extension Specialists.

Due largely to the immobility of P and K in the soil, where deficiencies of these nutrients are detected through leaf analysis, it is usually not possible to effectively correct them by topdressing of the current crop. Instead, corrective applications of these nutrients are to be carried out at harvest to ensure that subsequent ratoons do not suffer deficiencies.

For micronutrients, there may be benefit of foliar sprays where deficiency is detected. This will not remedy any soil-related problem leading to the deficiency, but will improve the health of the crop in that growing season. Consult your Extension Specialist or Fertiliser Advisor for guidance.

Importantly, research shows that, to a large extent, N governs the uptake of P, K and S, and possibly other nutrients as well. Consequently, reliable interpretation of sufficiency levels of the latter nutrients is possible only where N concentrations are non-limiting.

It should be kept in mind, therefore, that when leaf N levels are below threshold, P, K and S leaf values may not reliably reflect plant-available reserves of these nutrients in the soil.

Leaf nitrogen (N) threshold (lower threshold for sufficiency)

Area	Crop age (months)	Month of sampling	N %	
			Plant	Ratoon
Northern Irrigated	3 to 5	Oct-Dec	1.9	1.8
		Jan-Feb	1.8	1.7
		Mar-Apr	1.7	1.6
Coastal Lowlands	4 to 7	Nov-Dec	1.9	1.8
		Jan-Feb	1.8	1.7
		March	1.7	1.6
Midlands	4 to 9	Nov-Dec	1.9	1.8
		Jan-Feb	1.8	1.7

Interpretive criteria used for leaf nutrient content (expressed on a dry matter basis)

Nutrient	Unit	Category			
		Low	Sufficient	High	Excess
Nitrogen (N)	%	Dependent on season and area – see nitrogen threshold table			
Phosphorus (P) (All varieties except N12)	%	<0.19	0.19 – 0.24	0.25 – 0.40	>0.40
Phosphorus (P) (N12 only)	%	<0.16	0.16 – 0.24	0.25 – 0.40	>0.40
Potassium (K)	%	<1.00	1.00 – 1.59	1.60 – 1.79	>1.79
Calcium (Ca)	%	<0.2	0.2 – 0.39	0.40 – 0.59	>0.59
Magnesium (Mg)	%	<0.13	0.13 – 0.29	0.30 – 0.39	>0.39
Sulphur (S)	%	<0.14	0.14 – 0.24	0.25 – 0.34	>0.34
Silicon (Si)	%	<0.60	0.60 – 1.99	2.00 –2.99	>2.99
Zinc (Zn)	ppm	<15.0	15.0 – 29.9	30.0 - 75	>75.0
Manganese (Mn)	ppm	<15.0	15.0 – 99.9	100 - 250	>250
Copper (Cu)	ppm	<3.00	3.00 – 7.99	8.00 – 12.0	>12.0
Iron (Fe)	ppm	<50.0	50 – 99.9	100 - 250	>250
Boron (B)	ppm	<10.0	10 – 20.9	21.0 – 35.0	>35.0
Molybdenum (Mo)	ppm	<0.08	0.08 – 1.00	>1.00	-

Approximate amounts of fertiliser N to correct deficiencies detected using leaf analysis

	N % in leaf			
	0.4% or more	0.3 - 0.4 %	0.2 % below	Greater than TV
N required# (kg/ha)	100	75	50	0

* TV = Threshold Value from table on page 3.
# Appropriate N rates are dependent on a number of factors, including stage of the crop, time to harvest and soil moisture status.

Written by Neil Miles and Louis Titshall

(Senior Soil Scientists)

Updated: February 2021