



AMIS\_Documents

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Agriculture Certificate

# Agri003

## Certified Reference Material

Sandy Soil, South Africa

*Certificate of Analysis*

## 1. Method of Preparation

The particle size distribution for this material was shown to have a nominal top size of 54µm. The procedure of preparation in brief is as follows: the material was crushed, dry-milled and air-classified to <54µm. It was then blended in a bi-conical mixer, systematically divided. The material is dried at 50°C between 12 to 48 hours.

## 2. Certified Concentrations and Uncertainties

Table 1 gives the certified concentrations and Confidence Interval (95%) for the certified reference material.

**Table 1:**

| Parameter           | Method                      | Certified Value <sup>1</sup> | Confidence Interval (95%) | Unit    |
|---------------------|-----------------------------|------------------------------|---------------------------|---------|
| Boron               | Water                       | 0.2                          | 0.1 - 0.4                 | mg/kg   |
|                     | (Mehlich III)               | 0.6                          | 0.2 - 1.1                 | mg/kg   |
| Copper              | DTPA                        | 0.7                          | 0.1 - 1.2                 | mg/kg   |
|                     | Mehlich III                 | 1.5                          | 0.7 - 2.3                 | mg/kg   |
| Magnesium           | Mehlich III                 | 169.09                       | 19 - 219                  | mg/kg   |
| Manganese           | DTPA                        | 31                           | 18 - 44                   | mg/kg   |
| Nitrogen as nitrate | Potassium chloride extracts | 11                           | 2.1 - 20                  | mg/kg   |
| Organic Matter      | C Walkley Black             | 0.4                          | 0.1 - 0.7                 | %       |
| Soluble salts       | Ca (KCl)                    | 354                          | 319 - 389                 | mg/kg   |
|                     | Mg (KCl)                    | 96                           | 91 - 101                  | mg/kg   |
|                     | KCl                         | 5.8                          | 5.5 - 6.0                 | No unit |
| Phosphorus          | Bray 1                      | 24                           | 9.2 - 39                  | mg/kg   |
|                     | Olsen                       | 23                           | 8.3 - 37                  | mg/kg   |
| pH                  | 1:2 Soil: Water             | 6.2                          | 6.0 - 6.5                 | -       |
|                     | 1:1 Soil: Water             | 6.8                          | 6.3 - 7.2                 | -       |

Notes:

1. These values have been assigned using data derived from a variety of methods – see Section 5.

**Table 2.1: Information purposes**

The following values are provided for information purposes and should be regarded as indicative values only.

| <b>Parameter</b>                  | <b>Value</b> | <b>Unit</b> |
|-----------------------------------|--------------|-------------|
| Calcium -Ammonia Acetate          | 421          | mg/kg       |
| Calcium - Mehlich III             | 549          | mg/kg       |
| Potassium - Mehlich III           | 403          | mg/kg       |
| Magnesium -Ammonia Acetate        | 111          | mg/kg       |
| Magnesium - Mehlich III           | 169          | mg/kg       |
| Manganese - Mehlich III           | 64           | mg/kg       |
| Sodium - Mehlich III              | 28           | mg/kg       |
| Phosphorus -Ammonia Acetate       | 39           | mg/kg       |
| Phosphorus - Mehlich III          | 23           | mg/kg       |
| pH - Saturated Paste <sup>1</sup> | 6.32         | -           |
| Zn - DTPA                         | 2.8          | mg/kg       |
| Zn - Mehlich III                  | 5.9          | mg/kg       |

Note:

1. Saturated Paste – CEC

**Table 2.2: Information purposes – Unmilled Soil**

The following value is provided for information purposes and should be regarded as an indicative value only for unmilled soil.

| <b>Parameter</b> | <b>Method</b>       | <b>Value</b> |
|------------------|---------------------|--------------|
| pH               | pH SMP <sup>1</sup> | 9.8          |

Note:

1. pH SMP – Sand and Slit (Unmilled soil)

### **3. Accepted Assay Data**

38 laboratories submitted data however only data from the 33 laboratories. After removal of outliers, the results were used for certification.

### **4. Participating Laboratories**

The laboratories are in alphabetic order and the laboratory numbers are not assigned below. The following laboratories submitted data and data from 33 laboratories were used:

1. Absolute Science (Pty) Ltd
2. Agri Enviro
3. Agricultural Chemistry and Soils, Zimbabwe Sugar Association Experiment Station
4. Agricultural Research & Extension Trust (ARET)
5. Analytical Laboratory Services
6. ARC - Institute for Industrial Crops
7. ARC - Institute for Soil, Climate & Water
8. ARC - Institute for Tropical & Subtropical crops
9. ARC - Small Grain Institute
10. Bemlab (Pty) Ltd
11. Crop Nutrition Laboratory Services Ltd
12. DARD: KZN Department of Agriculture & Rural Development
13. Department of Plant Production & Soil sciences, University of Pretoria
14. Directorate Research Support Services: Soil, Plant & Water Laboratory
15. Döhne Analytical Services
16. Eco Analitica
17. Glen Soil and Water lab
18. Grond & Omgewings Laboratorium
19. Intertek Agricultural Laboratory
20. Institute for Commercial Forestry Research
21. K L Analytical Services T/A Labserve
22. Madzivhandila College of Agriculture
23. Nvirotek Laboratories
24. Omnia Fertilizer Sasolburg
25. Royal Swaziland Sugar Corporation
26. SA Sugar Research Institute (SASRI)
27. SGS South Africa (Pty) Ltd, Agricultural Services
28. Tobacco Research Board
29. Tompi Seleka College Soil & Water Analytical Lab
30. Trifert (Pty) Ltd
31. University of Venda; Department of Soil Science
32. Van's Lab (Pty) Ltd
33. Wynland Laboratories

## 5. Methods of Analysis Requested and Units

The following methods of analysis were requested:

| Parameter           | Method                      | Unit    |
|---------------------|-----------------------------|---------|
| Boron               | Water                       | mg/kg   |
|                     | (Mehlich III)               | mg/kg   |
| Copper              | DTPA                        | mg/kg   |
|                     | Mehlich III                 | mg/kg   |
| Magnesium           | Mehlich III                 | mg/kg   |
| Manganese           | DTPA                        | mg/kg   |
| Nitrogen as nitrate | Potassium chloride extracts | mg/kg   |
| Organic Matter      | C Walkley Black             | %       |
| Soluble salts       | Ca (KCl)                    | mg/kg   |
|                     | Mg (KCl)                    | mg/kg   |
|                     | KCl                         | No unit |
| Phosphorus          | Bray 1                      | mg/kg   |
|                     | Olsen                       | mg/kg   |
| pH                  | 1:2 Soil: Water             | -       |
|                     | 1:1 Soil: Water             | -       |

## 6. Intended Use

Agri003 is a Certified Reference Material, fit for use as a control sample in routine assay laboratory quality control when inserted within runs of test samples and measured in parallel to test samples. This material can also be used for method development, use as independent calibration verification check standard (*i.e.* if not used as a calibration standard in an instrument calibration), or for validation of accuracy in a method validation exercise. The recommend procedure for the use of this CRM as a control standard in laboratory quality control is to develop a Shewhart chart, where a mean value and corresponding 1, 2 and 3 standard deviations are derived from replicate measurements of the CRM. This CRM can also be used to assess inter-laboratory or instrument bias and establish within-laboratory precision and within-laboratory reproducibility. The certified concentrations are property values based on an inter-laboratory measurement campaign and reflect consensus results from the laboratories that participated in the analyses.

## 7. Health and Safety

The material is a fine powder coloured light brown 5YR (5/8). Safety precautions for handling fine particulate matter are recommended, such as the use of safety glasses, breathing protection, gloves and a laboratory coat.

## **8. Handling and Storage Information**

The material is packaged in glass bottles that must be shaken or otherwise agitated before use. The analyte concentrations are quoted on a dry basis; therefore, the user needs to determine the moisture content to convert any obtained assay values to an air-dry basis. The material should be stored in a cool dry place, in such a way that it does not compromise the integrity of the CRM. The material should be stored in conditions which will ensure it does not absorb moisture.

## **9. Metrological Traceability**

Metrological traceability is defined as “the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty”. Measurement of uncertainty of the assigned value is taken into consideration when calculating the Expanded Standard Deviation for Proficiency Assessment, which is used for calculation of the Satisfactory ranges. The values quoted herein are based on the consensus values derived from statistical analysis of the data from an inter-laboratory measurement program. Traceability to SI units is via the standards used by the individual laboratories.

## **10. Period of Validity**

The validity for this product is guaranteed, while still sealed in its original packaging for a specified time, until notification to the contrary. The shelf life for this product is indefinite. The stability of the material will be subject to continuous testing for the duration of the inventory and the duration of the whole shelf-life. Should product stability become an issue, all customers will be notified and notification to that effect will be placed on the [www.amis.co.za](http://www.amis.co.za) website.

## **11. Minimum Sample Size and Availability**

The sample size is 100g for the use of this material. The Explorer Packs contain material in standard envelopes, nitrogen flushed, and vacuum sealed in foil pouches.

## **12. Certification of Mean**

The samples used in this certification process have been selected in such a way as to represent the entire. Initially the data submitted by all the laboratories are subjected to a z-score test, to exclude outliers and the remaining data sets examined for their normality in distribution.

## **13. Two Standard Deviations**

AMIS reports two-standard deviations (2s) with all certified values. Two -standard deviations are calculated using the expression:

$$Two\ standard\ deviations = 2\ (Standard\ Deviation)$$

## 14. Legal Notice

This certificate and the reference material described in it have been prepared with due care and attention. However, AMIS, Melesha Gopi Mungaroo and Chuma Makele; accept no liability for any decisions or actions taken following the use of the reference material.

**Date of Version 000:** 03 February 2021

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**Approving Officers:**

**African Mineral Standards:** \_\_\_\_\_

**Melesha Gopi Mungaroo (Technical Manager)**

**African Mineral Standards:** \_\_\_\_\_

**Chuma Makele (Quality Coordinator)**

**End of certificate**