
SOIL SAMPLING GUIDELINES

1. Purpose

The primary objective when collecting a soil sample for laboratory analysis is that its composition is representative of the conditions that exist in the field. The general procedure involves the **random** collection of several individual soil cores over the designated area and combining them to form a composite sample for analysis. If soil samples are carefully collected and processed the test result will be very useful.

The nutrient of interest, the soils present, and the crop rotation can influence the specific sampling practice and importance of each of these factors. Proper consideration of each factor for each specific field or region is needed to best estimate the nutrient availability in the soil and to develop reliable nutrient application recommendations.

2. Scope and application

2.1. This procedure applies to all soil samples which are received by Analytical Laboratory Services (Pty) Ltd, Windhoek.

3. Equipment and consumables

- 3.1. Plastic sample bucket
- 3.2. Clean shovel or Spide
- 3.3. Sample bags
- 3.4. Permanent marker

Tools should be clean, free of rust, and stored away from fertilizer materials. **DO NOT USE** galvanized or brass equipment of any kind as it will contaminate the samples with micronutrients.

4. Procedure

4.1. Soil Sampling Strategies

Five main factors generally should be considered when taking soil samples:

- 1. Sampling depth.
- 2. Time of year when samples are collected.
- 3. Number of soil cores per composite sample.
- 4. Number and distribution of samples across a field.
- 5. Sampling frequency.

For most purposes, soil sampling is done to a depth of about 15 to 20 cm. Laboratory tests are calibrated to specific depths. It is vital to collect samples from appropriate depths

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because a core taken deeper or shallower will generate erroneous results. Sampling depth for most soils is typically the tillage depth in 15 cm intervals. The top 15cm of soil has the most root activity and fertilizer applications are generally restricted to this depth. These surface soil samples (zero to 15 cm) are typically used for conventional tests of organic matter, phosphorus, potassium, pH, and salt levels. Deep-rooted crops such as wheat and barley need deeper samples if nitrogen fertilizer recommendations are desired. Be sure to separate and discard surface litter.

Subsoil samples from the 15 cm to 60 cm (sometimes 100 cm) depth are needed to estimate available nitrogen and in some cases sulphur. Nitrate-nitrogen and sulphate-sulphur are mobile in the soil and will move below the 15cm tillage layer. If leaching has not moved these nutrients below the rooting depth, they will be available for plant uptake. Both surface and subsurface soil samples are needed to test for available nutrients in the root zone.

Collect soil samples from fields used for crop production after harvest and before planting the subsequent crop. To obtain the most accurate estimates of nitrogen availability, take samples as close to planting time as possible. Sampling fields near the same time each year is recommended for more consistent results. Nitrate-nitrogen concentrations should be determined annually for non-legume crops. Phosphorus and potassium determinations should be made every three to four years. Sampling and testing for both phosphorus and nitrate-nitrogen is required prior to manure application. Beware of situations that may cause soil values to change between sampling and planting, e.g. heavy rainfall or pre-irrigation on sandy soils could leach nitrate-nitrogen from the root zone.

Soil cores collected for each sampling depth must be thoroughly mixed. Individual soil cores from a minimum of 20 locations (sub-samples) should be mixed thoroughly in a clean plastic container. Approximately one kilogram of the soil mixture (called the composite sample) is then placed in a soil sample bag which is often lined with plastic. There are two important requirements: a) a uniform slice should be taken from the surface to the depth of insertion of the tool and b) the same volume of soil should be obtained in each sub-sample.

A composite soil sample should represent a uniform field area. Each area should have a similar crop and fertility history. Soil characteristics (colour, slope, texture, drainage) should be similar.

Exclude small areas within a field that are obviously different. These can be sampled separately if they are large enough to warrant treatment. The field area represented by a single composite sample (taken from a minimum of 20 sub-samples) should represent no more than 15 irrigated hectares or 40 dryland hectares. Fewer hectares is better.

How frequently should soil samples be collected? The frequency with which soil samples should be collected depends on the specific soil test, environmental conditions, and value of the crop. Status of some soil nutrients can change quickly, whereas others do not. For example, phosphorus levels in soil are unlikely to change rapidly and annual testing may be unnecessary. Nitrogen levels, on the other hand, change very quickly and frequent tests are required to obtain accurate determinations of plant-available levels. A new soil analysis might be necessary after heavy rains or after a prolonged period of waterlogging if one needs an accurate measure of soil nitrogen.

When making substantial changes to soil fertility levels, it is a good idea to make the change over a period of two to three years, retesting the soil annually. If a crop does not have a high economic value, then occasional soil testing (once every 3 to 4 years) may be

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adequate in the absence of any noticeable nutritional problems. In contrast, commercial production of high value crops may warrant annual testing to ensure maximum yields.

4.2. Field Sampling Procedure

Remove the soil surface vegetation and debris. Using a clean spade, auger, or sampling tube, obtain soil from the surface through the primary rooting zone of the crop using the following practice:

- Obtain thin vertical slices or cores of soil from the surface to the required depth.
- If using a trowel or spade, insert the blade into the soil to the specific depth, remove soil and throw aside.
- Reinsert the blade to take a thin slice of soil and lift the slice from the ground.
- Using a knife, cut a 50mm wide core from the centre of this slice from top to bottom. Place the core (sub-sample) in a clean bucket or other container.

Note:

- It is essential that the soil is not contaminated by carefully collecting samples using clean equipment.
- Do not leave the sample moist for more than 24 hours after sampling.
- If the sample cannot be taken to the lab within 24 hours after sampling, they should be dried/refrigerated.
- Sampling depth is important.

5. Transportation and delivery of samples to the laboratory

- 5.1. Handle all samples with care to prevent any possible contamination and avoid conditions that can compromise the quality of the sample.
- 5.2. Ensure that the sample submittal form is completed and that the description of the sample(s) align with those on the sampling bag.
- 5.3. Moist sample should be delivered within 24 hours of sampling or keep cool to prevent additional mineralization, if not they should be dried/refrigerated.

6. Sample Identification

Along with each soil sample, sampling information sheets should be filled out that describe the sample and proposed crops along with a list of tests requested.

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