

Standard Operating Procedure - Sample Preparation and Shipment

SOP 04

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1. Scope

This standard operating procedure (SOP) is a compilation of simple steps and procedures needed to be taken immediately after the completion of the field survey. That is, after the soil samples have been collected from the field. It is intended as a quick reference guide for all country supervisors and their associates. This SOP is developed within the framework of the implementation of the EU funded project, Soils4Africa. The SOP should be followed to ensure that samples reach their destination without damage or loss. The shipping agency must be selected carefully and all necessary documents should be attached to prevent confiscation at the point of entry to South Africa.

Related Forms

- Sample shipment Form for Country Supervisors (see your ODK-Collect under 'Get Bank Form')
- Coarse fragment form (see your ODK-Collect under 'Get Bank Form')

Requirements and documentation

- Khaki or jute Bags / Crates or boxes
- Labels
- Permanent marker pens

Equipment

- Weighing balance

2. Exporting of Samples

- Documentation
 - a. Phytosanitary certificate from the exporting country¹
 - b. An import permit from the Republic of South Africa. See Appendix 1 or ask from your regional hub coordinator
 - c. Sample inventory/ Sample list. Do not write out the QR codes

3. Labelling

- Ensure all samples are clearly labelled with a QR code attached.
- Make sure that all the khaki or jute bags for triple packing/ plastic containers/ cartons are labeled
- Indicate the details of the samples
- Print the details of the sample and stick the label on the container
- Use a permanent marker pen to label the outside of the container. Preferably get the label printed and stick to the outside of the container and keep a copy inside the container
- Indicate the name and address and institution of the recipient on the cartons/transporting boxes. See section 5

4. Packaging

- a. Ensure that the sample is placed into a well-labelled bag
- b. Triple pack the samples in khaki or jute bags
- c. Ensure that the sample is completely sealed to avoid any leakages

¹ Obtain a phytosanitary certificate from your country's plant inspectorate authorities. If this is not possible, a letter from the relevant government authority indicating that the soils are specifically meant for research purposes only and have no commercial value

- d. If using plastic containers, ensure that they are durable and there are two layers between the soil and the outer box.
- e. A hard copy of the sample list should accompany the samples
- f. Attach a copy of the permits on the sample cartons/ boxes bearing the names of the recipient.
- g. Ensure to pay DHL all the required fees including custom duties where possible or required

5. Shipping Requirements and Process

- a. Original copy of the permit/phytosanitary certificate in an envelope should accompany the samples
- b. Complete and submit the ODK S4A Sample shipment form
- c. Send a soft copy of the sample inventory to the recipient by email and copy s.mesele@cgiar.org.

Recipient in Republic of South Africa

Dr Nondumiso Zanele Sosibo
 Researcher: Soil Science
 ARC-Soil, Climate and Water
 600, Belvedere Street,
 Arcadia 0083, Pretoria
 South Africa
 012 310 2694
sosibon@arc.agric.za

6. Quality Control

- Ensure that you have the correct documents, which include sample list, Permits and phytosanitary certificate.
- Check the packing either triple pack in khaki bags or use durable plastic containers with durable and two layers between the soil and outer box.
- Check for any leakages or broken packages.
- Confirm recipient details.
- Complete and upload the sample shipment form on the ODK server

7. Air Drying of Soil Samples

The tasks carried out in sample processing include; air drying of soil samples, soil crushing and sieving, soil sub-sampling, and coarse fragment (gravel) determination.

For quantitative work, it is often necessary to dry samples to constant weight. Soil samples for laboratory analyses are typically dried and milled to provide a stable homogeneous mixture.

Equipment and supplies

- a. Soil drying room
- b. Trolley or wheelbarrow
- c. Weighing balance
- d. Writing pad and pens,
- e. Marker pen
- Move the samples into the drying room; open the sample bags and arrange them on the drying shelves in an orderly manner to allow good circulation of air.

- Transfer the sample label tag into the paper bags and write sample details from the plastic bag onto the paper bag. The paper bag containing the label (QR code) could be placed underneath the plastic bag or the container where the sample is placed.
- It is important to ensure that no material from a sample is lost or discarded, as weights of soil fractions are to be recorded on processing.
- Great care should be taken at all stages to ensure sample labels remain with the samples.
- Break up clods as far as possible to aid drying. Take care to avoid crushing gravel-sized particles.
- Drying time will depend on the status of the samples and ambient conditions, but the samples should be thoroughly dry (i.e. until constant weight is achieved).
- Once a constant dry weight has been achieved, the samples are removed from the drying room and weighed.

8. Soil Crushing and Sieving

After the drying process, soil samples are crushed by hand and sieved through 2mm sieve. Make sure that all soil materials are crushed, but do not attempt to crush gravel and rocks. This process is also a homogenizing process. Sieving process removes stones and extraneous substances, yielding a uniform sample which can be easily handled in the laboratory. Remember to clean the bench with a damp cloth to remove soil dust, to prevent contamination from one sample to another. The samples (soil fines less than 2 mm diameter) can then be packaged and made ready for shipment. Care should be taken to ensure the sample labels are not misplaced.

8.1 Coarse fragments (>2mm diameter) determination

1. Weigh and record the sample after drying but before sieving
2. Pass the sample through the 2 mm sieve.
3. Weigh the sample less than 2 mm diameter and record
4. Take 450 g of sample from the <2 mm diameter and package for shipment
5. Weigh the remaining coarse fragments (fraction greater than 2 mm diameter) and record
6. Complete the coarse fragment ODK form and submit
7. Discard the coarse fragment samples safely
8. Selection of samples for wet chemistry and spectral analysis
 - **Wet chemistry (400g):**
 - 1 topsoil sample per PSU (first SSU of each PSU; all reference sites (RS) included)
 - subsoil samples for every 6th PSU (first SSU of the PSU; all RSs included)
 - **Multispectral analysis (50g)**
 - 1 topsoil sample/SSU (all topsoil samples collected)
 - 1 subsoil sample/SSU (all subsoil samples collected)
 - **Pesticide residue analysis (100g):** Samples shipped for pesticide residue should not be prepared. Only package 100g and labeled properly for each of the samples.

1. Bulk density determination

Bulk density is the mass of soil present in a given volume, expressed in g/cm^3 . Bulk density is determined by sampling a known volume of soil and weighing it after drying.

Bulk density is determined **only on samples which were collected on the Minimalistic Reference Sites from the surface and walls of the mini profiles**. The samples in each plastic bag consist of three subsamples taken by a unit-volume (100 cm^3) metallic cylinder, thus representing 300 cm^3 soil material.

1. The procedure of analysis

- 1.1. Empty the plastic bags into a labelled sampling bag or tray with known weight (or use the “Tare” function on the scale)
- 1.2. Obtain the dry mass of the sample. Oven drying at 105 °C is necessary for complete moisture removal. The entire sample may be placed in the oven for minimum of 48h.
- 1.3. After weighting sieve the soil to 2 mm
- 1.4. Weight the remaining fraction less than 2 mm diameter
- 1.5. Weight the remaining coarse fragments (fraction larger than 2 mm diameter) and record.
- 1.6. Calculate bulk density.

2. Calculations

Bulk density is simply calculated according to the formula below. The result is referred as gross bulk density as it includes the whole soil (fine earths and coarse fragments).

$$BD_g = M_{\text{dry soil}}/V_{\text{core}}$$

where

BD_g : gross bulk density (g/cm³)

$M_{\text{dry soil}}$: mass of oven-dried soil

V_{core} : volume of the soil (300 cm³)

For soils containing abundant coarse fragments (gravels), it is useful to calculate the fine earth BD (the bulk density of the fine earth fraction, ‘removing’ the coarse fragments). The fine earth BD allows for direct comparison of samples with differing coarse fragments content.

For calculating the fine earth bulk density, the volume of the coarse fragments ($V_{\text{coarse fragments}}$) should be calculated (by dividing their mass by the particle density of quartz (2.65 g/cm³)):

$$V_{\text{coarse fragments}} = M_{\text{coarse fragments}}/2.65$$

The fine earth bulk density ($BD_{\text{fine earth}}$) should be calculated according to the equation below:

$$BD_{\text{fine earth}} = M_{\text{dry fine earth}}/V_{\text{fine earth}} = M_{\text{dry fine earth}}/(300 \text{ cm}^3 - V_{\text{coarse fragments}})$$

where

$M_{\text{dry fine earth}}$: mass of < 2mm oven dried soil

Note: the above example shows how the bulk density is calculated by the ODK form. When the dry weight (in grams) of the 1.) sample 2.) fraction less than 2 mm and 3.) coarse fragments is entered in the ODK the gross bulk density and fine earth bulk density will be automatically calculated.

DO NOT SHIP THE BULK DENSITY SAMPLES TO SOUTH AFRICA!

9. Guideline for sample storage and retrieval

The leftover samples should be stored securely until the end of the project. The leftover samples provide essential backups in case of loss of samples in transit or need for re-analysis of samples. The samples should be stored with the QR code attached or included and the sampling point ID written on the bag or container.

10. Health and Safety

Occupational health and safety (OHS) policies require that all operations must comply with enterprise safety stipulations imposed by Health and Safety policy of your country and that these requirements must not be compromised at any time. All operations require and have standard precautions to be applied and users should access and apply them. Safety glasses and protective gloves are recommended whenever samples are handled.

REFERENCES

- Ateku, D. and Chacha, R. 2021. SOP 001 - Samples reception, processing, log-in, shipping, archiving and disposal. CFIRO World Agroforestry

Appendix 1 : Import permit: South Africa



agriculture, land reform & rural development

Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

Directorate: Food Import & Export Standards, Department of Agriculture, Land Reform and Rural Development
P.O. Box 40024, Arcadia, 0007

Tel: 012 319 6102. Fax: 012 319 6370 E-mail: PlantHealthPermits@Dalrdd.gov.za

28 February 2022

Dear Client

NEW TARIFFS AS FROM 1 APRIL 2022:

IMPORT PERMITS ISSUED IN TERMS OF THE AGRICULTURAL PESTS ACT, 1983 (ACT NO. 36 OF 1983)

As from 1 April 2022, import permits issued for controlled goods (any live or dead part of a plant or derivation thereof, pathogen, insect, exotic animal, growth medium, infectious thing, honey, beeswax, or used apiary equipment) in terms of the above Act, will be issued at a tariff of **R210-00 per permit.**

1. One Import Permit for plants or plant products is allowed to include a maximum 10 Genera or **10** specific kinds/types of plant material per commodity e.g.
Application for Rose (Rosa SPP)-
Tissue culture in vitro (this counts as item 1)
Rooted Plants or cuttings (this counts as item 2)
Unrooted cuttings (this counts as item 3)
Cut flowers (this counts as item 4) Etc...
therefore on one application form, a total of only **10 items shall be allowed.**
2. Where there are different permit conditions for different species, each species will count as 1 kind/type – for example, *Prunus persica* plus *Prunus avium* will count as 2 Genera/kinds/types, and can be included in 1 permit.

3. One Import Permit will be issued for each of the following:
 - 3.1 **Seeds:** 1 Species of each of 10 Genera / 2 Species of each of 5 Genera etc, or
 - 3.2 **Rooted plants:** 1 Species of each of 10 Genera etc, or
 - 3.3 **Various other planting material:** 8 types = e.g. 1 Species of 2 Genera each of rooted plants +unrooted cuttings + tissue culture plants + budwood, or
 - 3.4 10 Genera = e.g. *Pyrus, Malus, Vitis, Rosa, Dianthus, Chrysanthemum, Quercus, Betula, Lycopersicon, Brassica etc.*;
 - 3.5 Fruits and vegetables: 10 types - per Genus or e.g. per Prunus type (apricots, plums, peaches, nectarines), see point 2, above;
 - 3.6 Cut flowers: 10 types = 10 Genera e.g. *Rosa, Dianthus, Chrysanthemum, Protea, Leucadendron, Anthurium, Gypsophila, Gerbera, Liatris, Lillium etc.*;
 - 3.7 Timber: 10 types = 10 Genera, but only those Genera not published in R1013.
4. For other types of controlled goods / regulated articles, 1 Import Permit will be issued for the following commodities:
 - 4.1 Biocontrol agents / research organisms: 10 species per permit / 10 host species per permit (as appropriate)
 - 4.2 Growing media: one type of growing medium will count as 1 Genus/kind/type, e.g. peat plus compost = 2 types.

Please take note of the following:

1. As from 1 April 2022, a tariff of **R350 will be charged for each amendment letter** requested and a tariff of **R210 will be charged for each copy** of a permit requested.
2. The deposit slip or receipt must clearly indicate the company's name or in case of an individual, the surname and initial.
3. An import permit will be valid for one year.
4. Original permits that were faxed or e-mailed to the client will be posted as well.
5. Procedure to apply and pay for an import permit:
 - Application form to be completed legibly and in full and a clear indication to be made whether the permit is to be posted, faxed, e-mailed or will be collected.

- All application forms to be accompanied by proof of payment (bank deposit slip or cashier receipt)
- Application form together with the proof of payment, can be posted, faxed or delivered by hand

Payment to be made as follows:

**Payment to Department of
Agriculture's bank account**
Bank: Standard Bank
Branch: Arcadia
Branch No: 01-08-45
Account No: 011251735
Account Name: DAFF:
Import of Controlled Goods

OR Payment in cash:
**Department of
Agriculture's cashier**
Pretoria:
Agricultural Place, 20 Beatrix
Street, Arcadia, Pretoria.
Block P: Room GF 15

Stellenbosch:
Quarantine Station,
Polkadraai Road,
Stellenbosch
Room 110

Permit offices: Contact details

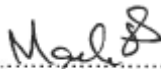
Pretoria:
Tel: 012 319 6102 / 6207/ 6130 / 6396
Fax: 012 319 6370
E-mail:
PlantHealthPermits@dalrrd.gov.za

****Stellenbosch:**
Tel: 021 809 1608 / 1617
Fax: 021 883 2570
E-mail: HaroonA@dalrrd.gov.za

***ONLY PERMITS FOR PLANT PROPAGATION MATERIAL OF SPECIFIC CROPS NEEDING INTENSIVE POST ENTRY QUARANTINE EVALUATION WILL BE HANDLED BY THE STELLENBOSCH OFFICE.**

No services will be rendered if the correct tariff is not paid in full. Clients are encouraged to ensure correct payment is made in order to avoid delays in processing of applications.

Kind Regards,



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DIRECTOR: FOOD IMPORT & EXPORT STANDARDS



**agriculture, land reform
& rural development**

Department
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

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ACT, 1983 (ACT No. 36 OF 1983)

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The tariffs applicable from 1 April 2022 are as follows:-

- | | |
|--|-------------|
| • Issuance of an import permit | R210 |
| • Issuance of each amendment letter | R350 |
| • Issuance of a copy of an import permit | R210 |

No services will be rendered if the correct tariff is not paid in full. Clients are encouraged to ensure correct payment is made in order to avoid delays in processing of applications.

Kind Regards,

.....
DIRECTOR: FOOD IMPORT & EXPORT STANDARDS