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Markundersökningar – Provtagning – Del 6: Vägledning för insamling, hantering och förvaring av jordprover under aeroba förhållanden för bedömning av mikrobiologiska processer, biomassa och diversitet på laboratorium (ISO 10381-6:2009, IDT)

Soil quality – Sampling – Part 6: Guidance on the collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory (ISO 10381-6:2009, IDT)

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Den internationella standarden ISO 10381-6:2009 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 10381-6:2009.

The International Standard ISO 10381-6:2009 has the status of a Swedish Standard. This document contains the official English version of ISO 10381-6:2009.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00.
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SIS Förlag AB, SE 118 80 Stockholm, Sweden. Tel: +46 8 555 523 10. Fax: +46 8 555 523 11.
E-mail: sis.sales@sis.se Internet: www.sis.se

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10381-6 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological methods*.

This second edition cancels and replaces the first edition (ISO 10381-6:1993), Subclauses 3.6, 3.7, 3.8 and Clause 4 of which have been technically revised. Table 1 has been added.

ISO 10381 consists of the following parts, under the general title *Soil quality — Sampling*:

— *Part 1: Guidance on the design of sampling programmes*

— *Part 2: Guidance on sampling techniques*

— *Part 3: Guidance on safety*

— *Part 4: Guidance on the procedure for investigation of natural, near-natural and cultivated sites*

— *Part 5: Guidance on the procedure for the investigation of urban and industrial sites with regard to soil contamination*

— *Part 6: Guidance on the collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory*

— *Part 7: Guidance on sampling of soil gas*

— *Part 8: Guidance on sampling of stockpiles*

Introduction

Soils are both complex and heterogeneous because they consist of both living and non-living components occurring in different combinations. Therefore, the condition of the soil, from collection to completion of an experiment, should be considered in relation to effects on the soil microflora. Temperature, water content, availability of oxygen and duration of storage are all known to affect the soil microflora, and thus the processes they mediate.

Soils can however be used effectively in laboratory systems to investigate microbially-mediated processes, provided that the dynamics of the living microflora are appreciated. This part of ISO 10381 provides guidance on the collection, handling and storage of soil for laboratory use where aerobic microbial activity is the main component of the study. It describes how to minimize the effects of differences in temperature, water content and availability of oxygen on aerobic processes to facilitate reproducible laboratory determinations [10], [11].

Soil quality — Sampling —

Part 6:
Guidance on the collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory

1 Scope

This part of ISO 10381 provides guidance on the collection, handling and storage of soil for subsequent testing under aerobic conditions in the laboratory. The recommendations in this document are not applicable to the handling of soil where anaerobic conditions are to be maintained throughout.

This part of ISO 10381 is mainly applicable to temperate soils. Soils collected from extreme climates (e.g. permafrost, tropical soils) may require special handling.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
aerobic
descriptive of a condition in which molecular oxygen is freely available

2.2
anaerobic
descriptive of a condition in which molecular oxygen is not available

2.3
water content on a dry mass basis
mass of water evaporating from the soil when dried to constant mass at 105 °C divided by the dry mass of the soil and multiplied by 100

[ISO 11465:1993, 3.2]

3 Procedure

3.1 Selection of sampling locations

The locations of the sites from which samples are taken should be selected according to the purpose of the study.

These locations should be identified and recorded, e.g. on a map by reference to easily recognizable static objects or by using a detailed map reference or by GIS. If practicable, the locations should be marked so that they may be used for comparative tests or for obtaining replicate samples.

3.2 Description of field site

Selection of a soil sampling site depends on the purpose of a particular study, and knowledge of the field site history is always desirable. The site should be accurately described and its history given. Details of vegetation cover, the morphology of the sampling area (e.g. flat area, slopes, steepness), and of chemical and biological additions or accidental contamination, should be recorded and reported.

3.3 Sampling conditions

Soil required for studies conducted under laboratory conditions should, if practicable, be sampled in the field with a soil water content which facilitates sieving. Sampling should, unless the purpose of the study requires otherwise, be avoided during or immediately following long periods (e.g. 1 month) of drought, freezing or flooding. If laboratory tests are to be used for field monitoring, conditions existing in the field should be accepted. Soil samples may be frozen before investigations of, for example, ammonium oxidations.

3.4 Sampling methods

The sampling technique depends on the purpose of the study. If aerobic agricultural soil is required, sampling is usually conducted to the actual ploughing depth. Any surface vegetation cover, moss-covered litter layer, visible roots, large pieces of plant or woody plant litter and visible soil fauna should be removed to minimize the addition of fresh organic carbon to the soil. Organic constituents introduced from roots or other sources can cause unpredictable changes in the activities and composition of the soil microflora. If natural soils show distinct horizons, samples should be taken from these horizons.

3.5 Sample marking

Sample containers should be clearly and unambiguously marked and identified so that each sample can be related to the location from which it was taken. Use of containers which either absorb water from the soil or release materials, e.g. solvents or plasticizers, into the soil should be avoided.

3.6 Transportation conditions

Samples should be transported in a manner which minimizes changes in the soil water content, and should be kept in the dark with free access of air; a loosely-tied polyethylene bag is generally adequate for this purpose. Extreme environmental conditions should be avoided: the soil should be kept as cool as possible but it is essential that it is not allowed to dry out or become water-logged. Exposure to light for extended periods should be avoided as this encourages the growth of algae on the surface of the soil. Physical compaction should be avoided as far as is practicable.

Samples for DNA or RNA analysis shall be frozen quickly in the field using dry ice. During transportation to the laboratory, dry ice shall be used to maintain the temperature of those for RNA analysis. Samples for DNA analysis may be transported in a cooling box unless the circumstances are such that dry ice is needed for these as well.

3.7 Soil processing

The soil should be processed as soon as possible after sampling. Vegetation, larger soil fauna and stones should be removed prior to passing the soil through a 2 mm sieve. Sieving soil through a 2 mm sieve facilitates gaseous exchange between particles and is therefore recommended for maintaining the aerobic nature of the soil. It also removes small stones, fauna and plant debris. Some organic materials such as moor layers or peat do not pass easily through a 2 mm sieve and should be sieved in the moist condition through a 5 mm sieve. This necessitates manual operation and the quality of the material passing the sieve depends on the operator. If the soil is too wet to sieve, it should be spread out, in a gentle air stream where possible, to facilitate uniform drying. The soil should be finger crumbled and turned over frequently to avoid excessive surface drying. Usually, this should be performed at ambient temperature. If drying is required, the soil should not be dried more than necessary to facilitate sieving. Generally, drying of soils is not recommended although air-drying and rewetting is a common physiological stress for the microbial communities in surface soils. It has been shown that drying-rewetting events can induce significant changes in microbial C and N dynamics which