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**Soil quality — Assessment of  
genotoxic effects on higher plants —  
*Vicia faba* micronucleus test**

*Qualité du sol — Évaluation des effets génotoxiques sur les végétaux  
supérieurs — Essai des micronoyaux sur Vicia faba*



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

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The committee responsible for this document is ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological methods*.

## Introduction

In the field of assessment of the quality of soils and soil materials, it appears necessary to determine *in vivo* their genotoxic potential which may be induced by pollution or by a decontamination process. Indeed, genotoxic agents have the ability to damage the genome of living organisms or to interfere with its functioning, but they are not always detected by chemical analysis or classical ecotoxicological tests. Actually, genotoxic effects are often observed at sublethal concentrations, where no toxic effect (e.g. survival or growth) can be observed in the short term but some long term effects may be feared in living organisms. Moreover, higher plants, like *Vicia faba* (broad bean) are ecologically relevant to assess soils and soil materials quality.



# Soil quality — Assessment of genotoxic effects on higher plants — *Vicia faba* micronucleus test

## 1 Scope

The purpose of this International Standard is to describe a method for assessing genotoxic effects (chromosome breakage or dysfunction of the mitotic spindle) of soils or soil materials on the secondary roots of a higher plant: *Vicia faba* (broad bean). This method allows the assessment of genotoxicity (toxicity for genetic material) of soils and soil materials like compost, sludge, waste, fertilizing matters, etc. Two ways of exposure can be considered: a direct exposure of plants to the soil (or soil material) which is relevant for the real genotoxic potential and an exposure of plants to the water extract of the soil (or soil material). This last way of exposure to a leachate or an eluate allows the detection of the mutagens which are not adsorbed to soils and which may be transferred to aquatic compartments. Moreover, this test may be used to evaluate genotoxic effects of chemical substances and to waters, effluents, etc.

## 2 Normative reference

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10381-6, *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 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 11260, *Soil quality — Determination of effective cation exchange capacity and base saturation level using barium chloride solution*

ISO 11269-2:2012, *Soil quality — Determination of the effects of pollutants on soil flora — Part 2: Effects of contaminated soil on the emergence and early growth of higher plants*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO/TS 21268-1, *Soil quality — Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil materials — Part 1: Batch test using a liquid to solid ratio of 2 l/kg dry matter*

ISO/TS 21268-2, *Soil quality — Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil materials — Part 2: Batch test using a liquid to solid ratio of 10 l/kg dry matter*

EN 14735, *Characterization of waste — Preparation of waste samples for ecotoxicity tests*

## 3 Terms and definitions

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

### 3.1

#### control soil

uncontaminated substrate used as control and dilution medium for preparing dilution series with test soils or test materials

EXAMPLE      compost, sludge, waste, chemicals