
**Soil quality — Test for measuring the
inhibition of reproduction in oribatid
mites (*Oppia nitens*) exposed to
contaminants in soil**

*Qualité du sol — Essai de détermination de l'inhibition de la
reproduction chez les acariens oribates (*Oppia nitens*) exposés aux
contaminants dans le sol*

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological characterization*.

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Introduction

Ecotoxicological test systems are applied to obtain information about the effects of contaminants in soil and are proposed to complement conventional chemical analysis (see ISO 15799^[1] and ISO 17616^[2]). ISO 15799 includes a list and short characterization of recommended and standardized test systems and ISO 17616 gives guidance on the choice and evaluation of the bioassays. Aquatic test systems with soil eluate are applied to obtain information about the fraction of contaminants potentially reaching the groundwater by the water path (retention function of soils), whereas terrestrial test systems are used to assess the habitat function of soils with regards to supporting soil biota and interactions within.

Mites (Acari) are a world-wide and diverse group of arthropods belonging to a sub-class of Arachnida with over 40 000 species recorded, divided into two super-orders (Acariformes and Parasitiformes). Due to their relative small size (a few μm to a few cm), they occupy specific ecological niches on plants as well as in soils^[5].

In recent years, there has been an increase in the development of biological test methods for assessing contaminated soil, which has historically lagged behind that for other media (e.g., water and sediment). Ecotoxicology tests for soil are challenged, among other things, by the complexity of soil systems (e.g., lack of homogeneity) and the variety of exposure routes (e.g., via alimentary uptake, exposure to pore water or soil vapours, or direct contact with soil particles). A recently developed method (ISO 21285^[3]) assesses the effects of contaminated soil on the reproduction of the predatory mite (*Hypoaspis aculeifer*), mainly through alimentary uptake. Oribatid mites represent a different but essential ecological niche than *H. aculeifer* within soil, contributing to carbon mineralization and soil formation, as well as nitrogen and phosphorous release through grazing activities. Oribatid mites are among the most diverse and abundant micro-arthropod species within soil, however, their slower metabolism and development, coupled with low fecundity, long life span, and limited dispersal capacity increase the potential for susceptibility and sensitivity to short- and long-term disturbances^[6]. The use of oribatid mites in the context of soil ecotoxicology testing has been thoroughly reviewed^{[7][8][9][10][11]}. Recent research using *Oppia nitens* for soil testing has demonstrated applicability and relative sensitivity of the species for the assessment of contaminated soils from both agronomic regions, and those from the boreal and taiga ecozones^{[6][12][13][14][15]}. Research has also demonstrated its sensitivity to metals^{[16][17][18][19]}, pesticides^{[20][21]}, and organic compounds^{[16][17][22]}. *Oppia nitens* is an oribatid mite, inhabiting the upper organic layer of soil, and is a member of the largest oribatid family (Oppiidae) with approximately 1 000 species in 129 genera widely distributed throughout Holarctic and Antarctic regions^[23]. They are sexually reproducing, polyphagous fungivores that can be easily reared in the laboratory in soil or on plaster of Paris, and on a diet of Baker's yeast^[10].

This method outlines procedures for conducting 28-day tests for determining the effects of contaminated soils on the survival and reproduction of the oribatid mite, *Oppia nitens*. Optionally, the method can be used for testing chemicals added to standard soils (e.g., artificial soil) for their lethal and sublethal hazard potential to oribatid mites. The performance of this method has been assessed in an international inter-laboratory investigation^[15], as summarized in [Annex E](#). Mites represent communities that cannot be omitted from environmental hazard assessment. This species is considered to be representative of non-predatory soil mites.