



NucleoMag® DNA Microbiome

Automated purification of microbial DNA from soil, stool and biofilms on the MagnetaPure 32+

Application benefits

The integration of the well-established NucleoMag® DNA Microbiome technology and the MagnetaPure 32+ provide a streamlined and efficient workflow for isolating high-quality microbial DNA from diverse samples, enabling comprehensive analysis of microbiome composition and function:

- Verified automation method for isolating DNA in microbiomic studies
- Patented inhibitor removal technology
- Simultaneous processing of up to 32 samples in parallel
- Consistent and reliable results
- No programming required: Verified and pre-installed methods available

Keywords

Microbiomics, metagenomics, bacteria, microorganisms, microbial DNA, inhibitor removal, soil, stool, feces, biofilm, bead tubes, homogenization, NucleoMag®, magnetic beads, magnetic rod system, MagnetaPure



Introduction

Microorganisms, which colonize various surfaces and organisms as complex communities, have a profound impact on our ecosystem and overall health. Microbiome studies aim to systematically comprehend their roles, functions, communities, and interactions with their environment and hosts. A crucial aspect of microbiome research involves extracting high-quality DNA that accurately represents all species within a sample.

The NucleoMag® DNA Microbiome kit, provided by MACHEREY-NAGEL, offers a verified method for isolating DNA from stool, soil, and biofilms. This kit enables high-throughput and automation-friendly extraction of microbial DNA commonly used in microbiome studies. With its combination of mechanical lysis using bead beating technology and patented inhibitor removal technology, the NucleoMag® DNA Microbiome kit ensures the extraction of superior-quality DNA, making it an ideal choice for microbiome analysis.

This application note showcases the automated extraction of DNA using the NucleoMag® DNA Microbiome kit on the MagnetaPure 32+ system, which is a compact nucleic acid extraction platform based on magnetic bead technology. With the capacity to process up to 32 samples simultaneously, this user-friendly instrument offers pre-installed verified scripts and detailed protocol information, streamlining the mixing, magnetic bead transfer, washing, and elution steps and saving valuable hands-on time. For more information on the MagnetaPure 32+ and additional application notes, please visit www.mn-net.com/MagnetaPure32.

NucleoMag® DNA Microbiome

Technology	Magnetic beads
Sample material	20–200 mg soil, stool, biofilm (including swabs)
Elution volume	50 – 200 µL
Fragment size	300 bp – approx- 50 kbp
Max. sample number on the MagnetaPure 32+	32 samples

MagnetaPure 32+

Technology	Automated magnetic rod system
Display	7 inch-color touch screen
Capacity / volume per well	1 – 32 samples / 50 µL to 1000 µL
Dimensions	417 x 410 x 426 mm
Weight	20 kg
Contamination control	UV lamp, internal filter system
Website	www.mn-net.com/MagnetaPure32

Material and Methods

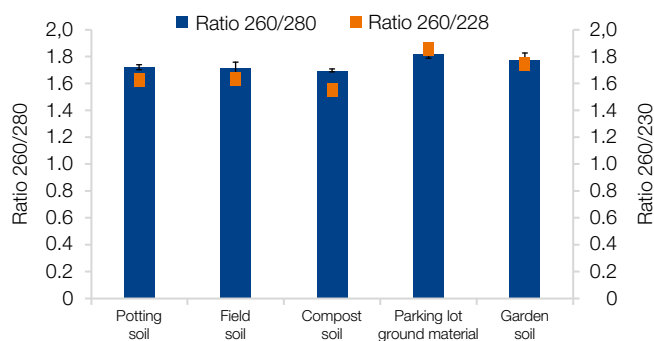
The isolation procedure of the NucleoMag® DNA Microbiome kit is based on reversible adsorption of nucleic acids to paramagnetic NucleoMag® B-beads under appropriate binding conditions. To prepare the samples, 200 mg of soil or feces samples were homogenized using MN Bead Types Type A. Contaminants were then precipitated using Buffer Mlc, and reversible binding of nucleic acids is enabled by adding Binding Buffer MI2 to the paramagnetic beads. Subsequent to

magnetic separation, the NucleoMag® B-Beads were washed to remove contaminants and salts using wash buffers MI3, MI4, and 70 % ethanol respectively. After air drying, highly pure nucleic acids were eluted in 100 µL elution buffer MI5.

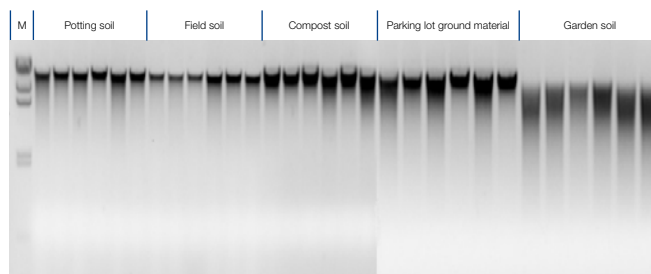
All binding, washing, and magnetic bead separation steps were carried out by the MagnetaPure 32+ magnetic rod device.

Application Data

A

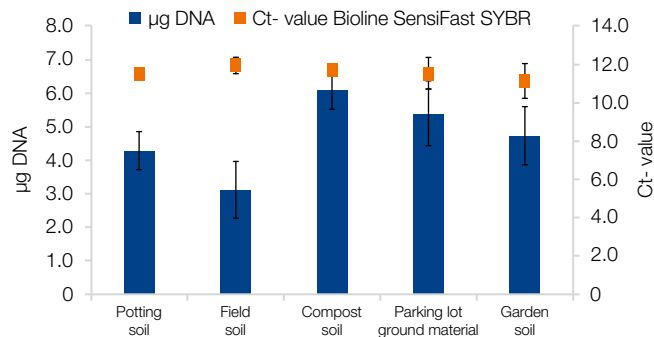


B



High quality DNA obtained from different soil sample types

Different types of soil were subjected to a mechanical lysis procedure with MN Bead Tubes Type A (n=6 per soil type). DNA was purified from the homogenates using the NucleoMag® DNA Microbiome kit (MN) on the MagnetaPure 32+. Purities of nucleic acids were determined by UV spectroscopy (A) and integrity (B) of genomic DNA was visualized via agarose gel electrophoresis (10 µL per lane; 1 % TAE gel).



Reliable qPCR performance of purified DNA from soil samples

DNA eluates were photometrically quantified (blue bars) and used in a qPCR for the bacterial 16S rRNA gene detecting both gram + and gram - bacteria using the SensiFAST™ SYBR Lo-ROX qPCR assay from Bioline on a Applied Biosystem® 7500 Real-Time PCR System. The corresponding Ct-values (orange squares) demonstrate a reliable qPCR-performance of DNA eluates.

Options for sample homogenization

For optimal DNA yields, a complete disruption of sample material is necessary and can be performed with e.g. MN Bead Tubes Type A or MN 96 Bead Plates Type A. These accessories contain ceramic beads, resulting in the efficient disruption of microbial cells in soil, stool, and other materials used for microbiome studies. The tubes and plates are compatible with common bead-beating devices or plate disruption devices.

Ordering information

Product	Specifications	Quantity	REF
NucleoMag® DNA Microbiome	Magnetic bead-based kit for the isolation of genomic DNA from microorganisms in soil, stool and biofilm (swab) samples; including NucleoMag® B-Beads and buffers	1 x 96 preps 4 x 96 preps	744330.1 744330.4
MagnetaPure 32+	Magnetic rod system for automated nucleic acid extraction using MACHERY-NAGEL NucleoMag® kits, parallel processing of up to 32 samples	1	747010
MN Bead Tubes Type A	2 mL screw cap micro tubes prefilled with 0.6 – 0.8 mm ceramic beads; recommended for soil, stool and biofilm samples	50	740786.50
MN 96 Bead Plate Type A	Rack of prefilled tube strips (12 strips with 8 tubes each) containing 0.6 – 0.8 mm ceramic beads; suitable in conjunction with mixer mill; recommended for soil, stool and biofilm samples	4 x 96 preps 24 x 96 preps	740850.4 740850.24
96 Deep-well plates	96 deep-well plates for MagnetaPure 32+	25	744955
Tip combs	8-place magnetic tip combs for MagnetaPure 32+	50	744960

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