MP Environmental Microbiology

Discover the World of Metagenomics

Find it at **fishersci.com**

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part of Thermo Fisher Scientific

- Soil
- Sediment
- Sludge
- Compost
- Manure
- Waste water
- Feces
- Sand
- Rock
- Water
- Snow
- Clay
- Airborne dust
- Litter
- Rhizosphere
- Volcanic rock
- Glacier
- Permafrost
- Waste oil
- Gypsum

Optimize Your Environmental Workflow With MP Bio's Complete Solution

- Thorough lysis (in seconds) of any bacteria present in environmental samples.
- Ready-to-use DNA & RNA for quantitative and qualitative characterization of microbial soil communities.
- Total removal of humic acids and PCR inhibitors for a successful investigation of microbial diversity.
- Excellent reproducibility for optimum assay-to-assay consistency.

SAMPLE PREPARATION

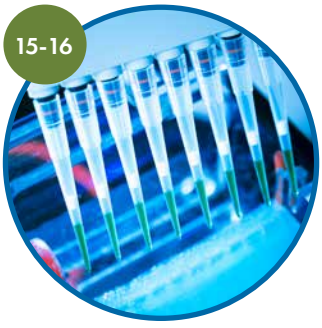
FastPrep® Instruments and Adapters
Lysing Matrix Tubes

DNA/RNA EXTRACTION & PURIFICATION

FastPrep® Extraction Kits

AMPLIFICATION

PCR • RT-PCR
Deoxynucleotides • Reagents



ANALYSIS

Buffers, Reagents for Electrophoresis
Gel Preparation
GENECLEAN® Kits

Unearth the Secrets of Metagenomics

Looking for an optimal grinding solution and an efficient protocol for the isolation of pure DNA from any environmental sample?

FastPrep® Bead Beating Homogenizers and FastDNA™ SPIN Kit for Soil:

A proven Gold Standard Method supported by more than 7,000 references.

"Great results. Easy to use. Reasonable price."

"The protocol is clearly written with useful explanation of procedures. The reagents and supplies in the kit are nicely designed and are proven to be very efficient in extracting DNA from a variety type of samples."

Ran Mei
Department of Civil and Environmental Engineering,
University of Illinois, US

"Whatever environmental samples we deal with, the kit is perfect for unusual samples."

"Although we have "Complicated" samples due to elevated salinity with seemingly low amount of microbiota in subsurface samples, this kit was our success to extract sufficient genomic DNA from the samples."

Johanna Schritter
Institute of Environmental Biotechnology,
University of Vienna, Austria

"Preferred soil extraction product. Very simple to use, excellent results."

"Definitely my preferred soil extraction product. Very simple to use, and it doesn't take a lot of time. It comes with everything you need right in the kit. Excellent results and reproducibility I usually only require one clean-up stage."

Reilly Ische
Faculty of Forestry,
University of British Columbia, Canada

"I can get results that are quick, easy, and contaminant-free."

"I have had excellent experiences with the customer service from the sales staff and technical support staff. Our questions are answered thoroughly and quickly. The kits are never contaminated and the instructions are easy to follow. Our research wouldn't be possible without this."

Brandi Kiel Reese
Department of Life Sciences,
Texas A&M University, US

"Satisfactory results with isolation of DNA and subsequent applications of DNA."

"The kit allows us to isolate DNA from very difficult soil samples as well as water samples. The major problem with soil and water samples is that there are lots of inhibitors in the initial samples. These inhibitors make downstream applications of isolated DNA problematic, such as PCR, qPCR, Illumina sequencing. However, we routinely use the kit to isolate DNA and subsequently, perform PCR, qPCR, and Illumina sequencing with satisfactory results."

Angela Smirnova
Department of Biological Sciences,
University of Calgary, Canada

"Easy to use and efficient for shallow marine sediment DNA extraction."

"I formally tested the efficiency of this product and a competitor to extract chromosomal DNA from Pacific and Arctic deep sea sediments. I am very satisfied with the results and highly recommend this kit particularly for work in shallow marine sediment. The DNA yields and quality are perfectly compatible for subsequent next-generation sequencing."

Gustavo Ramirez
Graduate School of Oceanography,
University of Rhode Island, California, US

Learn more at fishersci.com/mpbiomedicals

Sample Preparation – Instruments and Specialized Adapters

FastPrep® Instruments

Find your optimal solution for lysing, homogenizing or grinding any environmental sample. No matter how tough, tiny or dirty your samples, nothing resists the crushing lysis efficiency of FastPrep instruments.

FastPrep-24™ 5G - The most advanced sample prep system available

Cat. No.
11-600-5500

- **Powerful:** Highest speed available (10 m/s) offering the best performance for the lysis of the most resistant samples.
- **Intuitive:** Interactive user-friendly interface and touchscreen with more than 70 pre-programmed protocols.
- **Flexible:** Easily interchangeable adapters to process any sample size (2 mL, 4.5 mL, 15 mL or 50 mL tubes) at cryogenic or room temperature.

FastPrep-24™ Classic - Time-tested sample prep system

Cat. No.
MP116004500

- **Effective:** Unique optimized figure-8 motion ensuring a thorough grinding of the most resistant samples.
- **Proven:** Backed by 8,500 publications.
- **Flexible:** Easily interchangeable adapters to process any sample size (2 mL, 4.5 mL, 15 mL or 50 mL tubes) at cryogenic or room temperature.

FastPrep-96™ - High throughput sample grinding

Cat. No.
MP116010500

- **High throughput:** Process up to 192 samples simultaneously in 2 x 96 deep well plates.
- **Exceptional versatility:** Easily interchangeable adapters available for 2 x 96 deep well plates, 96 x 2 mL tubes, 48 x 4.5 mL tubes, 20 x 15 mL tubes, 8 x 50 mL tubes and 2 x 250 mL bottles.
- **True linear motion:** Eliminates the need to reorient plates mid-cycle.

Super FastPrep-2™ - Portable field testing

Cat. No.
MP116012500

- **Thorough grinding:** Omnidirectional motion and unique, patent-pending balanced crankshaft-slider mechanism for aggressive bead beating lysis and amazing performance.
- **Time saving:** Complete sample lysis of even the most difficult samples in 5 to 15 seconds, and processing designed for two 2 mL Lysing Matrix tubes.
- **Portable:** Handheld system for lab and field use, with cordless battery power supply.

Typical settings for grinding various environmental samples with the FastPrep-24™ 5G instrument

Below is a table illustrating the typical speed and time settings for grinding 50 mg of various environmental samples with the FastPrep-24 5G instrument and Lysing Matrix E tubes.

Sample Type	FastPrep® Speed (m/s)	FastPrep® Time
Soil/Rock	5.5	2 x 30 sec
Sandy Sample	4.0	4 x 30 sec
Litter	5.5	30 sec
Brunisol Dark Gray Luvisol	5.5	40 sec
Soil from Grassland	5.5	2 x 30 sec
Rhizosphere	6.0	40 sec
Marine Sediment	5.5	2 x 40 sec
Asphalt-permeated Soil	6.0	40 sec

FastPrep® Adapters

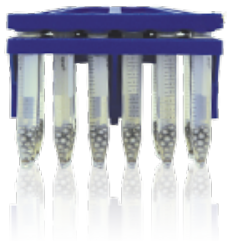
Many interchangeable adapters for various sample sizes and extraction temperatures.

Room Temperature Adapters

FastPrep-24™ 5G/Classic

Description	Cat. No.
QuickPrep 3 24 x 2 mL	ICN6002512
HiPrep 48 x 2 mL	ICN6002527
TallPrep 24 x 4.5 mL	MP116002540
TeenPrep 12 x 15 mL	ICN6002526
BigPrep 2 x 50 mL	MP116002525

FastPrep-96™



Description	Cat. No.
QuickFlex 96 x 2 mL	MP116010570
TallFlex 48 x 4.5 mL	MP116010580
TeenFlex 20 x 15 mL	MP116010560
BigFlex 8 x 50 mL	MP116010550
LargeFlex 2 x 250 mL	MP116010590

Metal Adapters

FastPrep-24™ 5G/Classic

Description	Cat. No.
Metal QuickPrep 24 x 2 mL	MP116002545
Metal TeenPrep 12 x 15 mL	11-600-2546
Metal BigPrep 2 x 50 mL	11-600-2547

Cryogenic Adapters

FastPrep-24™ 5G/Classic

Description	Cat. No.
CoolPrep 24 x 2 mL	ICN6002528
CoolTeenPrep 6 x 15 mL	ICN6002530
CoolBigPrep 2 x 50 mL	MP116002531

FastPrep® Lysing Matrix

Tailored to environmental samples

The use of MP Bio's Lysing Matrix E and Y in combination with FastPrep® instruments results in complete and quantitative lysis, resulting in higher yields of DNA and RNA. Lysing Matrix E and Y tubes are designed to lyse all microorganisms present in environmental samples, including difficult sources such as eubacterial spores and endospores, gram positive bacteria and yeast, and plant and animal tissues. Our complete portfolio of Lysing Matrix tubes can be found on our website at www.fishersci.com/mpbiomedicals.

Name/Composition	Pack Size	Cat. No.
Lysing Matrix E Tubes 1.4 mm ceramic beads, 0.1 mm silica beads and 4 mm glass beads	50 x 2 mL	MP116914050
	100 x 2 mL	MP116914100
	500 x 2 mL	MP116914500
	25 x 4.5 mL	MP116974025
	25 x 15 mL	MP116934025
	10 x 50 mL	MP116954010
	1x 96 well plate	MP116984001
Lysing Matrix Y Tubes 0.5 mm Yttria-stabilized Zirconium Oxide Spheres	50 x 2 mL	MP116960050
	100 x 2 mL	MP116960100
	500 x 2 mL	MP116960500
	25 x 4.5 mL	MP116977025
	25 x 15 mL	MP116975025
	10 x 50 mL	MP116976010
	1 x 96 well plate	MP116960001

Metal Lysing Matrix Tubes

- Dry grinding particularly tough or hard samples where heat generation can damage plastic tubes
- Cryogenic dry grinding where severe cold temps (dry ice or LN_2) can damage plastic tubes
- Milling or grinding non-biological samples where plastic contamination is of concern
- Sample processing with solvents or chemicals that are incompatible with plastics

Name/Composition	Pack Size	Cat. No.
Metal Lysing Tube 2 mL, w/ Grinding Ball	2 Each	MP116991002
	3 Each	MP116991003
	6 Each	MP116991006
Metal Lysing Tube 2 mL, w/ Grinding Cylinder	2 Each	MP116992002
	3 Each	MP116992003
	6 Each	MP116992006

DNA/RNA Extraction – FastPrep® Extraction Kits

Ready-to-use protocols for DNA and RNA isolation from any environmental sample

- Rapid and reproducible sample lysis and purification process
- No cross-contamination with closed lysing matrix tubes
- Increased yields of high-quality DNA and RNA
- Integrity and size of DNA and RNA are retained
- Nucleic acids are ready-to-use in downstream applications

RNA Extraction

FastRNA™ Pro Soil-Direct Kit

Isolate total RNA from soil that is immediately ready for RT-PCR

- 50 preps – Cat. No. MP116070050
- Up to 500 mg of soil or other environmental sample
- Lysing Matrix E tubes included for thorough sample lysis with a FastPrep® instrument
- 2 levels of purification to efficiently remove humic acids and other inhibitors
- Cellular RNases are inactivated during homogenization to prevent RNA degradation

FastRNA™ Pro Soil-Indirect Kit

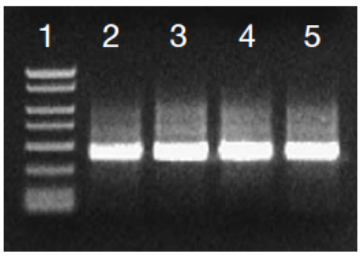
Isolate total RNA from soil supernatant that is immediately ready for RT-PCR

- 50 preps – Cat. No. MP116075050
- Up to 1 g of soil or other environmental sample
- Lysing Matrix E tubes included for thorough sample lysis with a FastPrep® instrument
- Initial separation of microorganisms and other biological specimens from soil
- Efficient removal of PCR inhibitors and inactivation of cellular RNases during the homogenization step

Clean RNA for Uninhibited RT-PCR

Soil types differ in the type and amount of organic materials; the largest and most chemically significant fraction of natural organic matter is composed of humic substances. The amount and type of humic substances in a soil sample are established by a combination of environmental conditions, vegetation and topography. Humic substances and other polyphenolic compounds frequently give soil a yellow/brown color and have been shown to inhibit *Taq* polymerase activity at concentrations as low as 0.1 mg/mL.

FastRNA™ Pro Soil Kits purify RNA in a process that removes humic substances and other inhibitors, and efficiently inactivates cellular RNases during homogenization to prevent RNA degradation. Each kit offers two levels of RNA purification that permits tailoring the protocol to the soil sample and downstream applications.



RT-PCR of Fungal Gene from Total RNA Isolated from Soil Samples with the FastRNA® Pro Soil-Indirect Kit. Approximately 40% of the RT-PCR reaction was loaded on to a 0.8% agarose gel. Lane 1: 150bp – 2kb marker, Lane 2: Soil #1, Lane 3: Soil #2, Lane 4: Soil #7, Lane 5: Soil #10.

FastDNA™ SPIN Kit for Soil

The gold standard for isolation of pure genomic DNA

Cited in over 7,000 scientific publications, the FastDNA™ SPIN Kit for Soil delivers the highest DNA yields from any environmental sample. The sample is processed by a FastPrep instrument and Lysing Matrix E tubes designed to efficiently lyse all soil organisms to isolate bacterial, fungal, plant, and animal genomic DNA. The released DNA is purified by a silica-based spin filter method in a process that removes humic acids and other PCR inhibitors and is suitable for PCR analysis and other downstream applications.

- 50 preps – Cat. No. MP116560200
- Up to 500 mg soil or other environmental sample
- Lysing Matrix E tubes included for thorough sample lysis with a FastPrep® instrument
- DNA purification by a silica-based spin filter method
- Efficient removal of humic acids and other PCR inhibitors

What makes the FastDNA™ SPIN Kit for Soil the Gold Standard in DNA Isolation?

Huge time savings

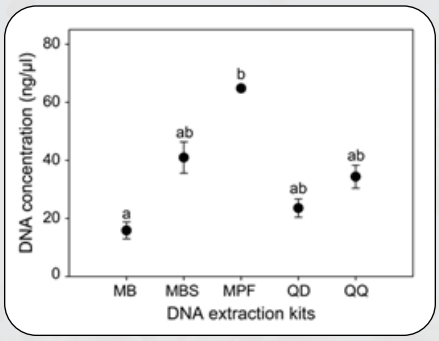
Cell lysis in 40 seconds and complete purification of DNA in less than 30 minutes

Complete lysis of all organisms

Including historically difficult sources such as eubacterial spores and endospores, gram positive bacteria, yeast, algae, nematodes and fungi present in environmental samples

High quality nucleic acids

From environmental samples such as soil, sediments, sludge, compost, manure, rhizosphere or waste water



The FastDNA SPIN Kit for Soil (MPF) outperforms 4 other commercial kits with DNA extraction of plankton communities from a freshwater reservoir.

Liu, M.; Xue, Y.; Yang, J. Rare Plankton Subcommunities Are Far More Affected by DNA Extraction Kits Than Abundant Plankton. *Front. Microbiol.* **2019**, *10*, 454.

References

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Song, Z.-Q.; Cheng, J.-E.; Cheng, F.-X.; Zhang, D.-Y.; Liu, Y. *Plant Pathol J.* **2017**, *33*, 184–192.

Paul, C.; Bayrychenko, Z.; Junier, T.; Filippidou, S.; Beck, K.; Bueche, M.; Greub, G.; Bürgmann, H.; Junier, P. *PeerJ.* **2018**, *6*, e4989.

Tournier, E.; Amenc, L.; Pablo, A. L.; Legname, E.; Blanchart, E.; Plassard, C.; Robin, A.; Bernard, L. *MethodsX.* **2015**, *2*, 182–191.

Eramo, A.; Delos Reyes, H.; Fahrenfeld, N. L. *Front. Microbiol.* **2017**, *8*, DOI 10.3389/fmicb.2017.02024.

DNA Extraction

FastDNA™ 50 mL SPIN Kit for Soil
A gold standard for isolation of pure genomic DNA

- 10 preps – Cat. No. MP116560600
- Up to 10 g soil or other environmental sample
- 50 mL garnet Lysing Matrix tubes included for thorough sample lysis with a FastPrep® instrument
- DNA purification by a silica-based spin filter method (50 mL spin filter tubes)
- Efficient removal of humic acids/polyphenols

FastDNA™-96 Soil Microbe DNA Kit
Rapid, high throughput isolation of PCR-Ready genomic DNA

- 2 x 96 preps – Cat. No. MP119696200
- Up to 130 mg soil or other environmental sample
- 96 deep-well plates with Lysing Matrix Y for sample lysis with the FastPrep-96™ instrument
- Yield is typically 5 µg of total DNA eluted in 50-100 µL of elution solution
- Efficient removal of humic acids/polyphenols

GeneClean for Ancient DNA Kit
Isolation of DNA from bone, preserved tissue, soil organisms, and animal by-products

- 100 preps – Cat. No. MP111002200
- Isolation of up to 20 µg DNA from ancient specimens
- Protocol developed to prevent contamination by contemporary DNA of extraneous sources
- DNA is ready to use in PCR, qPCR and sequencing

FastDNA™ SPIN Kit for Feces
Efficiently isolate PCR-ready genomic DNA from human and animal stool samples

- 50 preps – Cat. No. MP116570200
- Lysing Matrix E tubes included for thorough sample lysis with a FastPrep® instrument
- Typically isolates 10–20 µg of DNA from a maximum 500 mg of stool
- Removes organic contaminates for downstream applications

FastDNA-96™ Fecal DNA Kit
Efficiently isolate PCR-ready genomic DNA from stool samples in approximately 50 minutes

- 2 x 96 preps – Cat. No. MP119696400
- Up to 80 mg wet or dry stool per well
- 96 deep-well plates with Lysing Matrix Y for sample lysis with the FastPrep-96™ instrument
- Yield is typically 5 µg of total DNA eluted in 50-100 µL of elution solution
- Efficient removal of PCR inhibitors

DNA/RNA Extraction from Plant Tissues – FastPrep® Extraction Kits

DNA Extraction

FastDNA™ SPIN Kit
Isolate high quality DNA from difficult-to grind plant specimens

- 100 preps – Cat. No. MP116540600
- Lysing Matrix A tubes included for thorough sample lysis with a FastPrep instrument
- Silica-based spin filter method for the purification process
- DNA is ready to use in any downstream application (PCR, qPCR, sequencing)

FastDNA™ SPIN Kit for Plant and Animal Tissues
Isolate high quality DNA from soft plant specimens

- 100 preps – Cat. No. MP116540800
- Lysing Matrix D tubes included for thorough sample lysis with a FastPrep instrument
- Silica-based spin filter method for the purification process
- DNA is ready to use in any downstream application (PCR, qPCR, sequencing)

RNA Extraction

FastRNA™ Pro Green Kit
Isolate total RNA from plant specimens – phenol/chloroform extraction

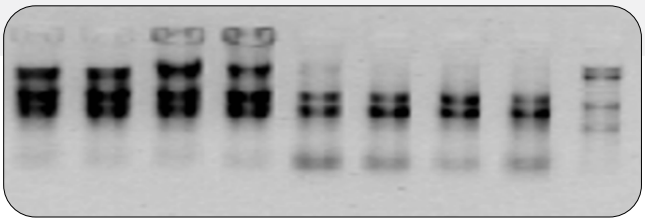
- 50 preps – Cat. No. MP116045050
- Lysing Matrix D tubes included for thorough sample lysis with a FastPrep instrument
- Consistent RNA isolation with the single-reagent RNAPro solution
- Total RNA is isolated via chloroform extraction and ethanol precipitation

FastRNA™ *Win* Kit for Plant
Isolate total RNA from plant specimens – extraction with specialized RNA spin columns

- 50 preps – NEW PRODUCT COMING SOON
- Lysing Matrix Z tubes included for thorough sample lysis with a FastPrep instrument
- Selective removal of DNA by binding to a carrier material during the lysis step
- Spin column purification process

Total RNA isolated with the FastRNA Pro Green Kit and FastRNA Win Kit for Plant is highly pure and ready to use for a broad range of downstream applications:

- Northern Blot
- RNA dot blots
- In vitro translation
- RT-PCR
- ddRT-PCR
- cDNA-libraries
- TaqMan® analysis and array technologies



High-quality total RNA from tomato leaves (lane1-4) and wheat leaves (lane 5-8)

Cellular total RNA was isolated from tomato and wheat leaves using the FastRNA *Win* for Plant Kit. RNA was separated on a denaturating agarose gel.

DNA/RNA Extraction Kits for Automated Nucleid Acid Purification

Process up to 12 samples in a true walk-away system

The MPure-12™ allows rapid purification of nucleic acids from a wide variety of environmental samples (water, soil, air, etc.) using magnetic bead separation technology.

Combined with a uniquely designed magnetic bead processing chamber, the fully integrated and easy-to-use, pre-packaged reagent kits offer superior yields of nucleic acids and high-quality results at an affordable price.

- Fully automated and integrated platform that offers cost and time savings
- Reproducibility, lot-to-lot consistency, scalability, ease-of-use and convenience
- Highest quality and yield of DNA and RNA for downstream applications
- Flexibility and simplicity: 1-12 samples from a wide range of biospecimens processed in a single cycle
- No cross-contamination of samples due to the unique platform design
- Minimized nucleic acid loss and degradation

True Walk-Away Automation

LOAD

Load samples, reagent cartridges and consumables

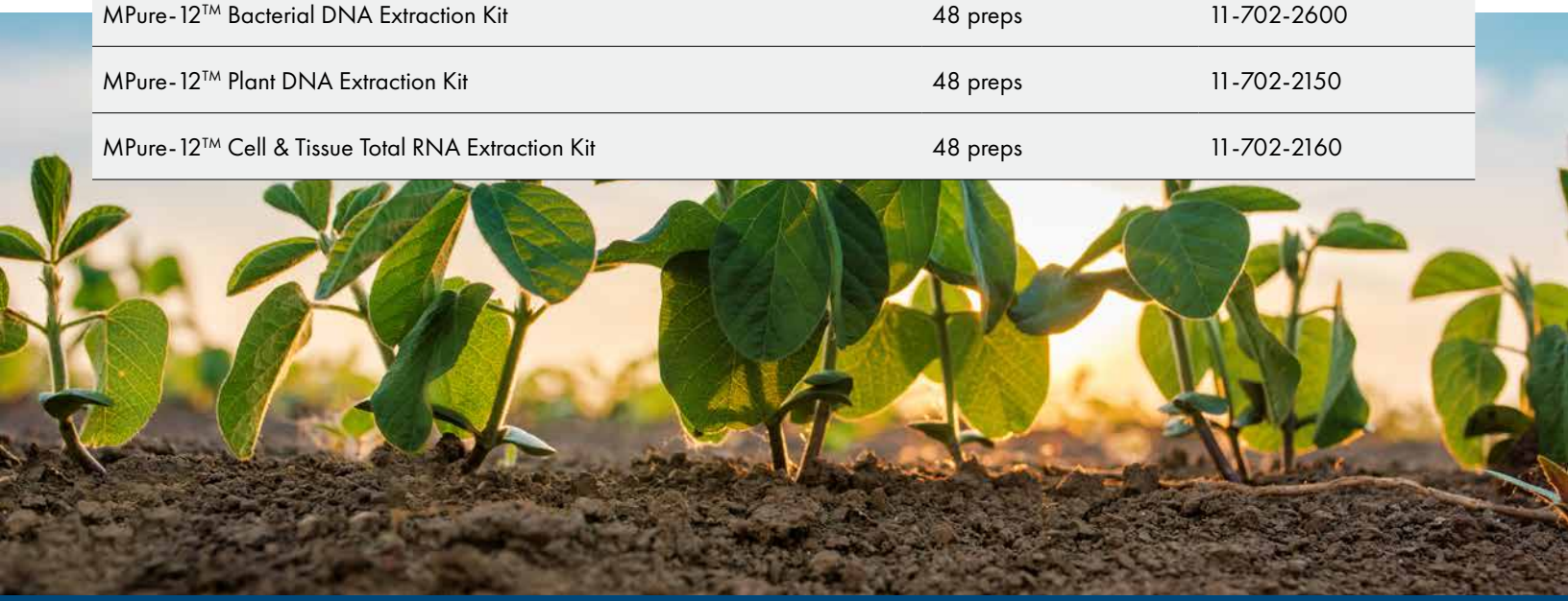
RUN

Select a protocol with a quick barcode scan and let the instrument do the rest

DONE

At the end of the run, purified nucleic acids are auto collected

Product Name	Pack Size	Cat. No.
MPure-12™ Bacterial DNA Extraction Kit	48 preps	11-702-2600
MPure-12™ Plant DNA Extraction Kit	48 preps	11-702-2150
MPure-12™ Cell & Tissue Total RNA Extraction Kit	48 preps	11-702-2160



Amplification

Precious purified nucleic acids need to be handled carefully. Achieve sensitive, reproducible, and consistent PCR results with MP Bio's thermostable polymerases and high-quality PCR reagents. With 30 years of experience in the research and manufacture of recombinant *Taq* DNA polymerase, our enzymes ensure:

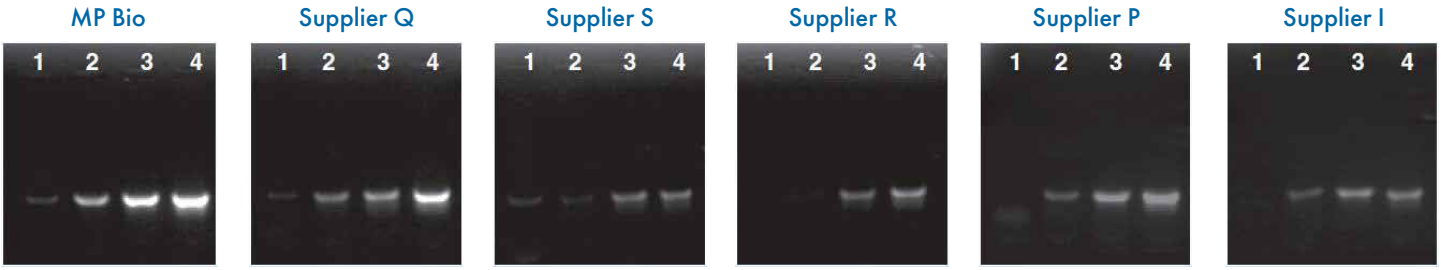
Lot-to-lot reproducibility
Strict quality control procedures guarantee the same enzyme activity for each produced batch. Control of contaminants such as nickases, endo/exonucleases, ribonucleases and bacterial/plasmid DNA.

High purity
Taq DNA Polymerase is highly purified to ensure the lowest possible contamination from *E. coli* DNA or plasmid DNA and thus avoid PCR-false positive results.

Robust PCR performance
Performance comparison with other *Taq* Polymerase sources shows comparable or superior amplification yields.

Optimal flexibility
The unique 10x reaction buffer has been optimized for maximum stability and efficiency in any PCR reaction. Other buffers tailored for specific applications are available as well.

Convenience
A wide selection of pack sizes, buffers and enzyme concentrations meet the needs of every PCR application.



Amplification of a 500 bp fragment from phage DNA with 0.5 U each *Taq* DNA polymerase.
Lane 1: 100 pg; Lane 2: 1 ng; Lane 3: 10 ng; Lane 4: 100 ng

Polymerases

Routine PCR: *Taq* DNA Polymerase

MP Bio's highly-purified, recombinant *Taq* DNA polymerase is supplied with the necessary buffers and reagents in convenient pack sizes to support various applications. *Taq* DNA polymerase comes with a 10x Incubation PCR Buffer with $MgCl_2$ at 1.5 mM final concentration. *Taq*-&GO and *Taq*-&LOAD Mastermixes are 5x concentrated, ready-to-use solutions containing *Taq* DNA polymerase, high purity dNTPs, optimized incubation buffers and $MgCl_2$. Moreover, *Taq*-&LOAD™ contains a densifying agent and a red purple dye for direct loading amplifications.

Product Name	Pack Size	Cat. No.
Taq DNA Polymerase (5 U/µL)	250 U	MP1EPTQA025
Taq-&GO Ready to use PCR mastermix	100 reactions	11EPTAG100
Taq-&LOAD Ready-to-use mastermix for direct loading of PCR products	100 reactions	11EPTAL100

High Fidelity: IZIS Polymerase

Izis DNA polymerase is a proofreading polymerase isolated from *Pyrococcus abyssi*. This DNA polymerase amplifies long DNA fragments with one of the lowest error rates in the market. Moreover, Izis DNA Polymerase exhibits very high thermal stability. Therefore, denaturation temperatures can be increased for reading through difficult secondary structure.

- **40x more accurate than Taq DNA Polymerase**
- **Reads through difficult secondary structure like GC rich domains**
- **Amplifies fragments up to 18 kb**

Amplification of human ß-globin DNA 400 bp (lane 2), 900 bp (lane 3) and mitochondrial human DNA (4.0 kb, lane 4) with Izis DNA polymerase. Reactions: 10 ng of each DNA template, 50 pmoles of each primer, 100 µM of each dNTP and 1.5 mM $MgSO_4$. 0.5 U of Izis DNA polymerase was used for amplifying 400 bp and 1 U for 900 bp and 4.0 kb. Lane 1: Leon™ molecular weight marker.

Amplification programs:

400 bp: 5′ at 93°C (1′ at 91°C, 1′ at 62°C, 1′15″ at 72°C) x 30.
900 bp: 5′ at 93°C (1′ at 91°C, 1′ at 62°C, 1′30″ at 72°C) x 30.
4.0 kb: 5′ at 93°C (30″ at 94°C, 2′ at 62°C, 5′ at 72°C) x 20.

Product Name	Pack Size	Cat. No.
IZIS DNA Polymerase	100 U	MP1EPSIS100

Hot-Start System: SurePRIME Polymerase

SurePRIME DNA Polymerase is an improved "Hot Start" DNA Polymerase used to increase specificity and product yield. SurePRIME DNA Polymerase is heat-activated after a preincubation step at 95°C and is then functionally equivalent to classical *Taq* DNA Polymerase.

Chemically modified *Taq* DNA polymerase	Low background	Highly specific amplification

Product Name	Pack Size	Cat. No.
SurePRIME DNA Polymerase	5 x 250 U	11EPHSP525

Reverse Transcription: cDNA Synthesis & Go Kit

Mastermix for first strand cDNA synthesis

- **Reproducible:** Unique reverse transcriptase and buffer generate consistent first-strand cDNA
- **Sensitive:** Real-time RT-PCR analysis from as little as 1pg of starting total RNA
- **Broad dynamic range:** Ideal for dilute and low-copy samples
- **Unbiased cDNA synthesis:** Complete 5′ to 3′ RNA sequence representation

Product Name	Pack Size	Cat. No.
cDNA Synthesis & Go Kit	50 reactions	MP1EBI00005

qPCR & Go Mastermixes

We also offer an array of high-quality qPCR reagents. Our real-time PCR solutions deliver superior and rapid DNA analysis on all qPCR platforms.

Product Name	Pack Size	Cat. No.
qPCR & Go SYBR® High-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI01050
qPCR & Go SYBR® Low-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI02050
qPCR & Go SYBR® No-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI03050
qPCR & Go Probe High-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI04050
qPCR & Go Probe Low-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI05050
qPCR & Go Probe No-ROX Kit	500 reactions (5 x 1 mL)	MP1EBI06050

Deoxynucleotides

Achieve sensitive and consistent PCR results with ultra-purified deoxynucleotides. Free of polymerase inhibitors, each batch is specifically controlled for RNases, DNases, and nicking contaminant activity. This high-quality standard is assured by stringent PCR functional testing using genomic DNA template. Suitable for use in PCR, RT-PCR, qPCR, cDNA synthesis, DNA sequencing and labeling.

Product Name	Pack Size	Cat. No.
dNTP Set (100 mM each)	4 x 25 µmol	MP1NTACG100
dNTP Mix (5 mM each) ready to use solution	5 µmol	MP1NTPMX050

Reagents

Ensure clean and accurate PCR results by removing potential contaminants on laboratory equipment and surfaces with our RNase Erase and DNA-Erase solutions.

Product Name	Pack Size	Cat. No.
RNase Erase™ (to remove RNase contamination)	250 mL	ICN821682
DNA-Erase™ (to remove DNA contamination)	500 mL	ICN821805

Buffers & Reagents for Electrophoresis

Your source for quick, economical electrophoresis

MP Bio offers a large selection of electrophoresis buffers. TBE buffer, for example, is used for the electrophoresis of nucleic acids and gives an excellent resolution of DNA bands under low voltage. This buffer, filtered through 0.2 µm PTFE, is certified RNase-, DNase-, and protease-free.

Product Name	Pack Size	Cat. No.
Tris, Molecular biology grade	1 kg	MP1TRIS01KG
Tris, Ultra pure	5 kg	ICN819638
TBE 10X Buffer	1 L	MP1TBE10X02
Ethidium Bromide (10 mg/mL)	10 mL	ICN802511

Gel Preparation

High quality agarose for routine and rapid analysis

From basic agarose to low melting point to high resolution agarose, we have a solution for all your applications.

Standard Agarose (low EEO) is recommended for sharp resolution of nucleic acid fragments greater than 1000 bp. Low Melting Point Agarose has finer sieving characteristics than standard agaroses. The low melting temperature permits nucleic acid recovery without denaturation or damage. The agarose will remain in a liquid state at 37°C, allowing gel manipulations without prior DNA purification for applications such as:

Enzyme digestion	Random priming	Sequencing
DNA labelling	PCR	Ligation

Product Name	Pack Size	Cat. No.
Basic Agarose Premier	500 g	MP1AGAF0500
Agarose Standard Low EEO	250 g	MP1AGAH0250
Agarose Low Melting Point	50 g	MP1AGAL0050
Agarose, High Resolution	50 g	MP11AGR0050

Why use MP Bio's agaroses?

- Highest quality and purity
- Certified molecular biology grade
- High resolution gels
- Absence of restriction enzyme inhibitors
- Efficient Southern and Northern transfers

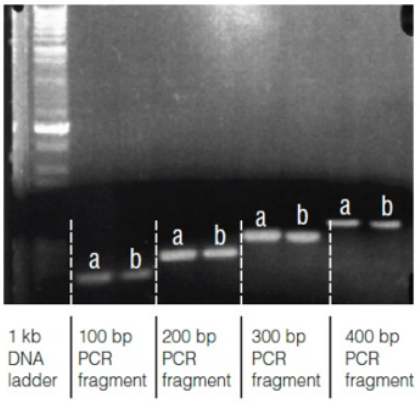
DNA Purification from PCR Reactions and Agarose Gels

GENECLEAN® kits are a proven technology for DNA purification from PCR reactions and agarose gels. Patented GENECLEAN® technology simplifies the process of purifying DNA into three easy steps: BIND, WASH and ELUTE. Ethanol precipitation is never required.

GENECLEAN® Turbo Kits

GENECLEAN® Turbo Kits use a GENECLEAN® Turbo Cartridge system designed to simplify the purification process. This system contains a special silica embedded membrane and buffer system optimized for the purification of DNA. Benefit from the many advantages offered by these kits:

- **High column capacity** – binds up to 10 µg of DNA
- **High yields** – DNA recovery is up to 95%
- **Fast** – 12 samples are processed in 15 minutes
- **Effective** – purified DNA performs well in downstream applications
- **Complete** – kits contain all columns and solutions required



Purification of PCR fragments from solution with the GENECLEAN Turbo Kit

Product Name	Pack Size	Cat. No.
GENECLEAN® Turbo for PCR Kit For purification of PCR products ranging from 100 bp to 10 kb	50 preps	MP111103200
	100 preps	MP111103400
	300 preps	MP111103600
GENECLEAN® Turbo Kit For purification of DNA fragments from 100 bp to 300 kb from TAE or TBE buffered agarose gels or solutions	50 preps	MP111102200
	100 preps	MP111102400
	300 preps	11-110-2600

GENECLEAN® SPIN Kit

The GENECLEAN® SPIN Kit includes a bulk slurry form of the patented silica matrix that allows for customization and flexibility with respect to the scale of purification required and spin filters whose usage prevents silica particle carry-over into cleaned DNA.

Product Name	Pack Size	Cat. No.
GENECLEAN® SPIN Kit For purification of DNA fragments from 200 bp to 300 kb from TAE or TBE buffered gels or solutions.	50 preps	11-110-1200
	100 preps	11-110-1400
	300 preps	11-110-1600

APPLICATION NOTE

Simultaneous Isolation of DNA and RNA from Soil

Tournier, E.; Amenc, L.; Pablo, A. L.; Legname, E.; Blanchart, E.; Plassard, C.; Robin, A.; Bernard, L. *MethodsX*. **2015**, 182.

A comparison of the composition of microbial communities based on co-extraction of both DNA and RNA provides insight into the ecology of populations, provided that DNA and RNA are subjected to the same extraction bias. This study describes the isolation of soil nucleic acids with simultaneous extraction and purification of DNA and RNA following a cascade scheme involving the FastDNA SPIN Kit for Soil, the FastPrep instrument and the RNaid Kit and avoiding the use of harmful solvents.

- **Reproducible:** The coextraction protocol was optimized on a sandy clay loam soil. Yields of 26.7 µg of purified DNA and 4.5 µg of purified RNA per gram of soil were obtained with very good repeatability for both DNA and RNA.
- **Reliable:** The four tropical soils from Madagascar were extractable and gave various DNA and RNA recovery yields sufficiently concentrated to be further analyzed by any other molecular technique.
- **Efficient:** The protocol was efficient on different tropical soils, including Andosol, where their high contents of clays, including poorly crystalline clays, and Fe and Al oxides typically make the nucleic acid extraction more difficult.

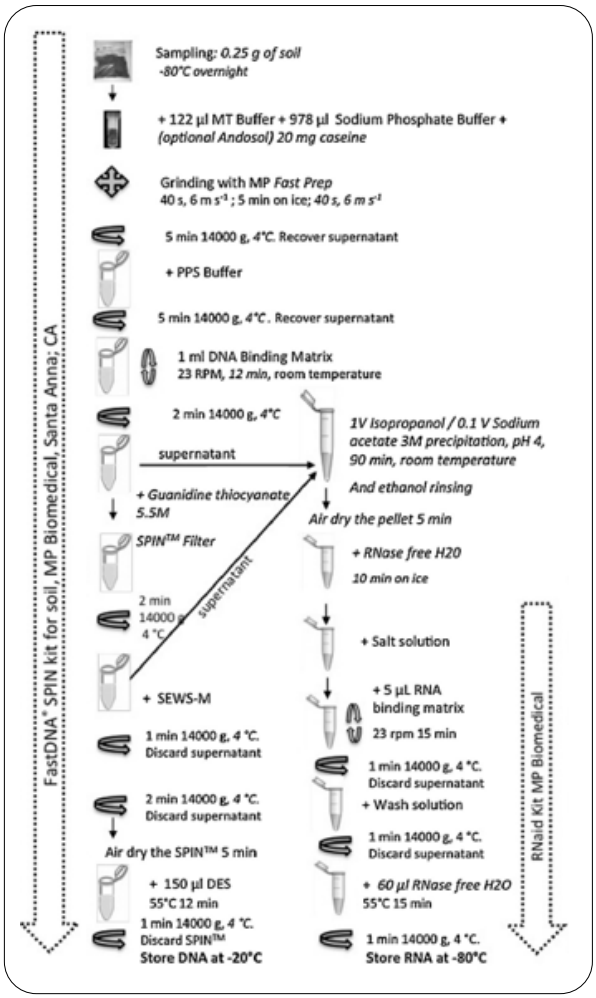
Combined use of:

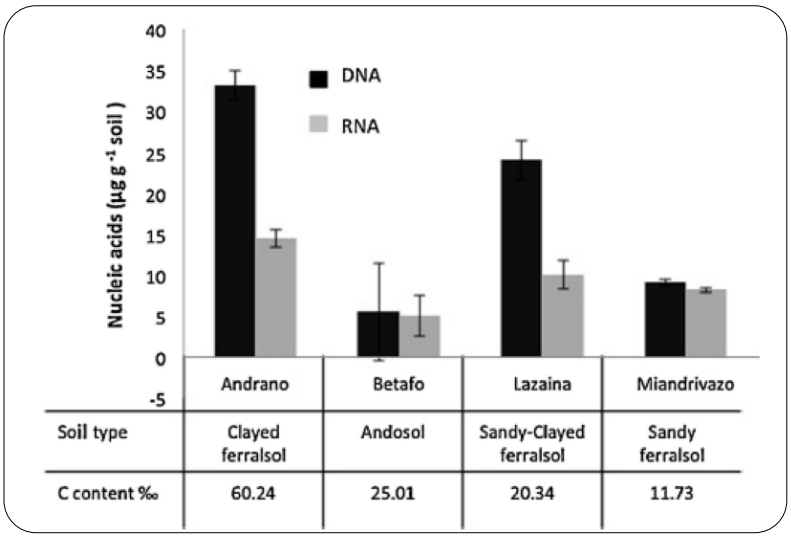
FastPrep-24 instrument
Cat. No. MP116004500

FastDNA SPIN Kit for Soil
Cat. No. MP116560200

RNaid Kit
Cat. No. MP111007200

Schematic diagram of the DNA/RNA co-extraction protocol





Soil type	Clayed ferralsol	Andosol	Sandy-Clayed ferralsol	Sandy ferralsol
C content ‰	60.24	25.01	20.34	11.73

DNA (black) and RNA (light grey) extraction yields and their respective 95% confidence intervals (alpha 0.05, 3 replicates) from 4 tropical soils, sampled in Madagascar and characterized by different textures, mineralogies, metal and carbon contents.

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Detection of *Kudoa septempunctata* 18S Ribosomal DNA in Patient Fecal Samples from Novel Food-Borne Outbreaks Caused by Consumption of Raw Olive Flounder

Feces

CASE STUDY

Harada, T.; Kawai, T.; Jinnai, M.; Ohnishi, T.; Sugita-Konishi, Y.; Kumeda, Y. Detection of *Kudoa septempunctata* 18S Feces Ribosomal DNA in Patient Fecal Samples from Novel Food-Borne Outbreaks Caused by Consumption of Raw Olive Flounder (*Paralichthys olivaceus*) *Journal of Clinical Microbiology*. **2012**, *50*, 2964–2968.

Introduction

A method to detect *K. septempunctata* 18S ribosomal DNA in fecal samples of outbreak patients using real-time PCR. A spiking experiment was performed to assess whether a previously developed real-time PCR assay was applicable to detect *K. septempunctata* in feces. Simultaneously, three commercially available kits were compared to determine relative extraction efficacy of *K. septempunctata* DNA.

Overview

- Keywords: Food-borne disease, Parasite identification, Human feces, qPCR, *K. septempunctata*
- Aim of the study: Identification of a standard method for DNA extraction from fecal parasites
- Application: Quantitative PCR
- Sample name: Human fecal sample
- Sample type: Feces
- Material: FastDNA™ SPIN Kit for Soil containing Lysing Matrix E, QIAamp® DNA Stool Mini Kit, UltraClean™ Fecal DNA Kit
- Buffer: Provided with each of the three commercial DNA extraction kits

Protocol and Parameters

To compare the amount of *K. septempunctata* (parasites) DNA extracted using the three kits.

1. 200 mg of each sample and 200 µL of DNA elution buffer were used during the extraction procedure for each kit.
2. Extracted DNA was stored at -20°C until use.

CASE STUDY

Results

Real-time PCR was performed to compare parasite DNA extraction from human fecal samples using three commercial DNA extraction Kits: QIAamp® DNA Stool Mini Kit (Qiagen); FastDNA™ SPIN Kit for Soil (MP Biomedicals); UltraClean™ Fecal DNA Kit (MOBIO Laboratories). Superscript letters A to C indicate the DNA extraction efficiency in each experiment, from high (A) to low (C), as determined using the Turkey-Kramer test with a significance level (P) of 0.05.

Mean C_T ± SD$^{\alpha}$ at low and high concentrations of spiked *K. septempunctata* spores in fecal samples. The FastDNA™ SPIN Kit for Soil resulted in the lowest average C_T values compared to other kits for the majority of the samples tested.

	Low (1.6 x 10^4 spores/g)			High (1.6 x 10^6 spores/g)		
Sample	QIAamp	FastDNA	UltraClean	QIAamp	FastDNA	UltraClean
A	37.65 ± 0.747^{C}	27.55 ± 0.286^{A}	35.54 ± 0.751^{B}	30.70 ± 0.125^{C}	24.25 ± 0.547^{A}	29.48 ± 0.596^{B}
B	37.15 ± 0.435^{C}	29.40 ± 2.264^{A}	32.94 ± 0.330^{B}	31.83 ± 0.366^{C}	27.03 ± 0.323^{B}	25.31 ± 0.212^{A}
C	36.96 ± 0.422^{C}	27.75 ± 0.108^{A}	32.85 ± 0.193^{B}	29.52 ± 0.166^{C}	20.64 ± 0.215^{A}	25.65 ± 0.853^{B}

Conclusion

The FastDNA™ SPIN Kit for Soil proved to be the best DNA extraction method providing the highest PCR amplification.

FastPrep technology gives higher yields and increases detection limit threshold of PCR. FastDNA SPIN Kit for Soil is the most efficient method for extracting parasite DNA from fecal samples.

Skim Milk Drastically Improves the Efficacy of DNA Extraction from Andisol, a Volcanic Ash Soil

Soil

CASE STUDY

Takada-Hoshino, Y. ; Matsumoto, N. Skim milk drastically improves the efficacy of DNA extraction from Andisol, a volcanic ash soil. *Japan Agricultural Research Quarterly*. **2005**, *39*, 247- 252.

Introduction

The challenge with extractions from soil is isolating DNA or RNA without contamination by humic acids or other PCR inhibitors. Effective, efficient sample preparation is critical for succcessful downstream results. DNA extraction from Andisol, a volcanic ash soil, is known to be very difficult because this soil has a complex matrix, including allophane as a clay mineral. Soil properties such as high clay content contribute to high adsorption of DNA to soil particles.

Overview

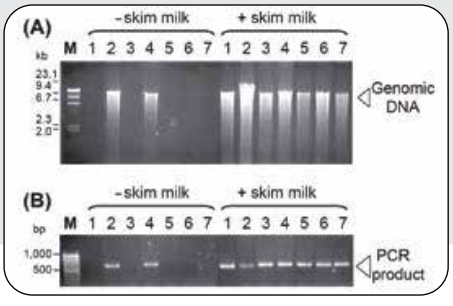
- **Keywords:** Environmental DNA, microbial community analysis, molecular methods, unculturable microorganisms.
- **Aim of the study:** Improvement of DNA extraction from volcanic ash soil
- **Application:** PCR
- **Sample name:** Andisol
- **Sample type:** Volcanic ash soil
- **Material:** FastPrep-24™ instrument, FastDNA™ SPIN Kit for Soil, skim milk (carrier minimizing adsorption of nucleic acids to soil)

Protocol and Parameters

1. Add the soil sample together with or without 40 mg skim milk per gram of soil to a Lysing Matrix E tube.
2. Add 978 µL sodium phosphate buffer to the sample in the Lysing Matrix E tube.
3. Add 122 µL MT Buffer.
4. Homogenize in a FastPrep instrument for 40 seconds at a speed setting of 6.0.
5. Centrifuge at 14,000 x g for 5-10 minutes to pellet debris.
6. Follow the FastDNA™ SPIN Kit for Soil protocol for DNA purification from the homogenate.

Conclusion

DNA could successfully be extracted from Andisol soil samples with the FastDNA SPIN Kit for Soil and the addition of 40 mg of skim milk per gram of soil sample. PCR products of the expected size were amplified from all extracts with skim milk. Resultant extracts were suitable for PCR and no other purification procedures were needed.



Microbes on building materials - Evaluation of DNA extraction protocols as common basis for molecular analysis

Building Material

CASE STUDY

Ettenauer, J. D.; Piñar, G.; Lopandic, K.; Spangl, B.; Ellersdorfer, G.; Voitl, C.; Sterflinger, K. *Science of the Total Environment.* **2012**, *439*.

Overview

Keywords: Building materials, DNA extraction, DNA purity, PCR

Aim of the study: Analyzing microbial communities in building materials

Sample name: Plaster, red brick and gypsum

Material: FastPrep-24™ instrument, FastDNA™ SPIN Kit for Soil containing Lysing Matrix E

Buffer: Sodium Phosphate Buffer & MT Buffer (provided with the Kit)

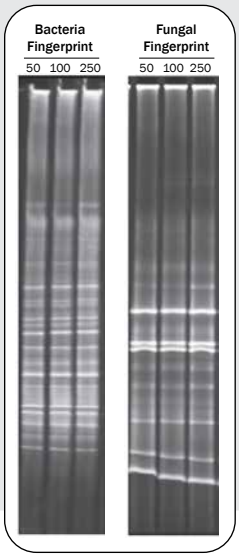
Protocol and Parameters

1. Sampling was done using a sterile scalpel or an ethanol flamed hammer and chisel to remove the material from the walls and was collected in sterile plastic bags.
2. The transport and storage of the sampling material were done at room temperature.
3. In the laboratory, samples were ground for 2 min in liquid nitrogen using a sterile mortar and pestle, collected in a sterile 50 mL falcon tube and homogenized by manual shaking.
4. Three different sample amounts of each material, 50 mg, 100 mg and 250 mg (each in triplicate), were weighed using a Sartorius precision scale for each extraction method.
5. Tubes were either immediately processed or stored at -20 °C. The resulting nine samples for each method were further subjected to the different DNA extraction methods.
6. When using the FastDNA™ SPIN Kit for Soil method, samples were processed two times in a FastPrep® instrument for 40 s at a speed of 6 m/s.

Results

A Proven Gold Standard Method

Representative examples of bacteria and fungal fingerprints obtained from the plaster material. The banding patterns of the three tested sample amounts (50, 100, 250 mg) from the FastDNA™ SPIN Kit for Soil.



Of the thirteen methods evaluated, the FastDNA™ SPIN Kit for Soil proved to be the best DNA extraction method and could provide positive results for all tests with all tested samples.

This study shows that the FastPrep® extraction method is a gold standard for quantification of indoor fungi and bacteria in building materials.

Comparison of seven methods for extraction of bacterial DNA from fecal and cecal samples of mice.

Feces

CASE STUDY

Ferrand, J.; Patron, K.; Legrand-Frossi, C.; Frippiat, J.; Merlin, C.; Alauzet, C.; Lozniewski, A. *Journal of Microbiological Methods.* **2014**, *105*.

Overview

Keywords: DNA extraction, mice feces, mice cecal content, 16S rDNA, qPCR

Aim of the study: Selection of an optimal DNA extraction method for molecular assays

Application: Quantitative PCR

Sample type: Mice feces and intestinal contents

Material: FastDNA™ SPIN Kit for Soil, FastDNA™ SPIN Kit for Feces, QIAamp™ DNA Stool Mini Kit, MasterPure™ Gram Positive DNA Purification Kit, NucliSENS™ easyMAG, ZR Fecal DNA MiniPrep™, FastPrep-24™ instrument

Buffer: Buffers provided with each DNA extraction kit

Protocol and Parameters

1. Feces were pooled and frozen at -20°C immediately after collection.
2. Cecal samples were obtained shortly after dissection and immediately frozen in liquid nitrogen and stored at -80°C before use.
3. With each extraction method tested, DNA was extracted from 50 mg of starting material (wet weight) in five duplicates.
4. For three bead beating methods (FastDNA™ SPIN Kit for Soil, FastDNA™ SPIN Kit for Feces and ZR Fecal DNA MiniPrep™), DNA extraction was performed with the FastPrep-24™ homogenizer at speed 6 m/s for 40s.

Conclusion

Among seven DNA extraction methods, the FastDNA™ SPIN Kit for Soil was shown to be the most efficient extraction method for both feces and intestinal contents, providing the highest DNA yields and 16S rDNA. DNA fragments recovered were larger than 1.6 kb and suitable for PCR-analysis of microbiomes. This study reveals how FastPrep® technology (FastPrep® homogenizer and FastDNA™ SPIN Kit for Soil) can be adapted for detecting genes of various Gram-positive bacteria present in fecal and cecal matrices.

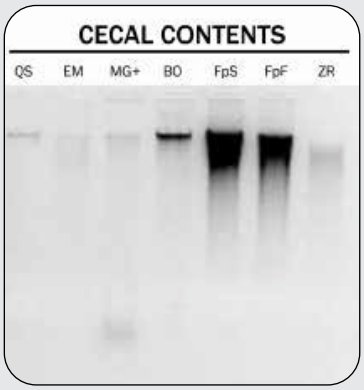


Figure 1

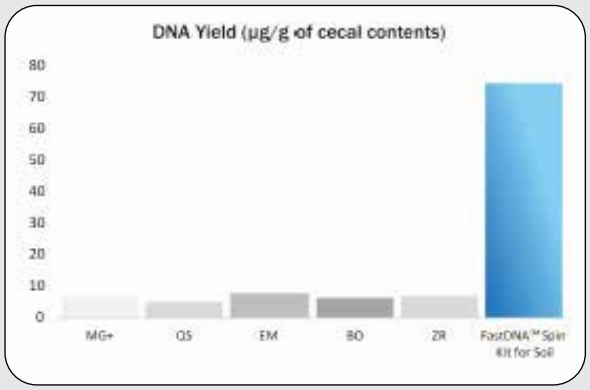


Figure 2

Fig. 1: Electrophoresis profiles of DNA extracted from cecal contents using the seven methods tested. MG+: MasterPure™ Gram Positive; QS: QIAamp™ DNA Stool; EM: NucliSENS™ easyMAG; BO: method from Bonot et al (2010); ZR: ZR Fecal DNA MiniPrep™; FpF: FastDNA™ SPIN Kit for Feces; FpS: FastDNA™ SPIN Kit for Soil.

Fig. 2: DNA yields from a 50 mg sample. MG+: MasterPure™ Gram Positive; QS: QIAamp™ DNA Stool; EM: NucliSENS™ easyMAG; BO: method from Bonot et al (2010); ZR: ZR Fecal DNA MiniPrep™; FpS: FastDNA™ SPIN Kit for Soil.

Quantitative PCR for Genetic Markers of Human Fecal Pollution.

Wastewater

CASE STUDY

Shanks, O. C.; Kelty, C. A.; Sivaganesan, M.; Varma, M.; Haugland, R. A. *Appl and Envir. Microbiol.* **2009**, *75*.

Overview

Keywords: Waterborne disease, environmental waters, microbial community, DNA extraction

Aim of the study: Development of a method to assess microbial community present in waste water samples

Application: Quantitative PCR

Sample name: Wastewater

Material: FastPrep-24™ instrument, FastDNA™ SPIN Kit for Soil containing Lysing Matrix E

Buffer: Sodium Phosphate Buffer and MT Buffer supplied with the FastDNA™ SPIN Kit for Soil

Protocol and Parameters

500 mL of primary effluent was collected and immediately stored on ice. 25 mL of each sample was filtered through a 0.2 µm-pore size supor-200 filters and each filter was placed in a sterile 1.5 mL microtube and stored at -80°C for DNA extraction.

1. Cut the frozen filters with a sterile cutter.
2. Add the cut filters to a Lysing Matrix E tube.
3. Add 978 µL of Sodium Phosphate Buffer and 122 µL of MT buffer, provided with the FastDNA™ SPIN Kit for Soil.
4. Homogenize in the FastPrep-24™ instrument for 120 seconds at a speed setting of 6.0
5. Centrifuge at 14,000 x g for 5-10 minutes to pellet debris.
6. Proceed with the FastDNA™ SPIN Kit for Soil extraction protocol.

Conclusion

The FastPrep-24™ and associated matrices have demonstrated successful lysis and DNA extraction from 20 samples of wastewater in only 120 seconds.

This method saves hours of work during sample preparation and ensures highly purified DNA for effective PCR amplification.

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