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## Modified ZymoBIOMICS™ DNA/RNA Miniprep Kit for parallel extraction of DNA and RNA from peat soil



Forked from [Modified ZymoBIOMICS™ DNA/RNA Miniprep Kit for parallel extraction of DNA and RNA from peat soil](#)

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Rhiannon Mondav<sup>1</sup>

<sup>1</sup>Lund University



Rhiannon Mondav

Lund university

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**Protocol status:** In development

**We are still developing and optimizing this protocol**

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**Keywords:** soil, DNA RNA co-extraction, Zymo miniprep, rna standard zymo dna, rna miniprep kit for parallel extraction, rna miniprep extraction protocol, rna miniprep kit, rna, parallel extraction, dna, clogged filters, filter overload, peat, organic soil, modified zymo dna, rna from peat soil, zymo dna, peat soil, peat, filter with standard protocol reduced sample mass, clogged filter, standard protocol reduced sample mass, organic soil

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## Abstract

Modified ZYMO DNA/RNA miniprep extraction protocol written in a user friendly way to reduce in-process-decisions and process time. Sample type is organic soil, peat, from a degraded rich fen

This protocol includes **two** modifications to tackle clogged filters.

- Samples were centrifuged for 45 seconds instead of 30 seconds in first pass through filters as 100 ul to 200 ul sample remained trapped above filter with standard protocol
- Reduced sample mass to reduce clogging of columns and filters, trialled 200 mg, 150 mg, 100 mg compared to 250 mg

## Guidelines

Follow standard precautions for working with environmental samples and RNA i.e. clean/sterilise with 70% ethanol and 10 to 30 min UV if available, further remove DNA and RNases from work environment and equipment using a cleaner of your choice. Work in a designated RNA/pre-PCR area or cabinet. Wear a face mask if a risk of sneezing or coughing exists and you don't have a cabinet. Wear latex or nitrile gloves and change often.



## Materials

☒ ZymoBIOMICS™ DNA/RNA Miniprep Kit **Zymo Research Catalog #R2002**

### KIT PROVIDED:

#### solutions and buffers:

☒ DNA/RNA Shield **Zymo Research Catalog #R1100-50**

☒ DNA/RNA Lysis Buffer **Zymo Research Catalog #D7001-1-50**

☒ DNA/RNA Prep buffer **Zymo Research Catalog #D7010-2-50**

☒ DNA/RNA Wash Buffer (concentrate) **Zymo Research Catalog #D7010-3-24**

☒ ZymoBIOMICS™ DNase/RNase-Free Water **Zymo Research Catalog #D4302-5-50**

☒ ZymoBIOMICS™ HRC Prep Solution **Zymo Research Catalog #D7010-2-50**

#### enzymes:

☒ DNase I Set **Zymo Research Catalog #E1010** or #E1009-A

both ##SKU have 250U DNase I and come with 4 ml DNA Digestion Buffer

#### tubes, filters, columns:

☒ ZR BashingBead™ Lysis Tubes (0.1 & 0.5 mm) **Zymo Research Catalog #S6012-50**

☒ Spin-Away Filter (yellow) **Zymo Research Catalog #C1006-50-F**

☒ Zymo-Spin™ IIICG Column (green) **Zymo Research Catalog #C1006-50-G**

☒ Zymo-Spin™ III-HRC Filter **Zymo Research Catalog #C1058-50**

☒ Collection Tubes **Zymo Research Catalog #C1001-500**

### USER PROVIDED:

#### consumables:

- pipette tips
- Ethanol 70 % for cleaning
- sharpie
- freezer boxes

☒ Fisherbrand™ Nitrile Indigo Disposable Gloves PPE Cat III **Thermo Fisher Catalog #17182182**

☒ Kimberly-Clark™ Kimtech™ Science Precision Wipes **Thermo Scientific Catalog #10180601**

☒ Thermo Scientific™ Snap Cap Low Retention Microcentrifuge Tubes **Thermo Fisher Catalog #11569914**

Thermo Scientific™ Snap Cap Low Retention Microcentrifuge Tubes **Thermo Scientific Catalog #11579914**

Invitrogen™ Nuclease-Free Water (not DEPC-Treated) **Invitrogen - Thermo Fisher Catalog #AM9932**

Ethanol, Absolute (200 Proof), Molecular Biology Grade, Fisher BioReagents™ **Fisher Scientific Catalog #16606002**

Thermo Scientific™ RNase AWAY™ Surface Decontaminant **Thermo Fisher Scientific Catalog #14-754-34**

#### equipment:

- mass balance for weighing tubes/samples
- Vortex
- Micro-centrifuge
- Freezers -80 °C
- Freezer -20° C
- optional choice between Nanodrop, gel electrophoresis, Qubit, TapeStation, and/or BioAnalyzer to characterise quantity, purity, and quality of extracted nucleic acids

#### Equipment

**NanoDrop™ 2000**

NAME

Microvolume Spectrophotometer

TYPE

Thermo Scientific

BRAND

ND-2000

SKU

<https://www.thermofisher.com/order/catalog/product/ND-2000><sup>LINK</sup>

| Equipment                                                                                                                                                                                                                                                                                           |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 2100 Bioanalyzer                                                                                                                                                                                                                                                                                    | NAME     |
| Fragment Analysis system                                                                                                                                                                                                                                                                            | TYPE     |
| Agilent                                                                                                                                                                                                                                                                                             | BRAND    |
| G2939BA                                                                                                                                                                                                                                                                                             | SKU      |
| <a href="https://www.agilent.com/en/product/automated-electrophoresis/bioanalyzer-systems/bioanalyzer-instrument/2100-bioanalyzer-instrument-228250">https://www.agilent.com/en/product/automated-electrophoresis/bioanalyzer-systems/bioanalyzer-instrument/2100-bioanalyzer-instrument-228250</a> | LIN<br>K |

| Equipment        |       |
|------------------|-------|
| FinnPipette      | NAME  |
| F2               | TYPE  |
| ThermoScientific | BRAND |

## Equipment

MP Bio FastPrep 24

NAME

bead beating grinder

TYPE

MP Bio

BRAND

116004500

SKU

<https://www.mpbio.com/us/fastprep-24-classic-instrument-1-each> <sup>LINK</sup>



## Before start

- Before starting you will need to clean and de-contaminate work space and equipment where possible
- Add ethanol to **DNA/RNA Wash Buffer** (step 1.2) (once per kit)
- Reconstitute DNase and aliquot (step 1.3), freeze unused aliquots at - 20°C (once per kit)
- Aliquot provided water into 1.5 ml or 2 ml tubes
- Cut pipette tip ends off from one box of 1000 ul tips to transfer slurry (step 2)
- Perform all steps at room temperature unless specified

## Pre-prep

46m

1

20m

Note: if you have a micro-centrifuge with 24 places, you can process maximum 12 samples per batch because steps 10 to 16 process DNA and RNA simultaneously, ie 12 samples x 2 (DNA + RNA) = 24

- 1.1
- If samples are frozen at -80°C in DNA/RNA Shield, retrieve now and place on ice to thaw during preparation (see step 2). Remember to check and vortex periodically during set-up.
  - Retrieve DNase from freezer if already reconstituted and place on ice to thaw



- 1.2 (If not already done) Add 96 ml 100% ethanol (104 ml 95% ethanol) to the 24 ml DNA/RNA Wash Buffer concentrate
- this only needs to be done once per kit

3m

- 1.3 (If not already done) Reconstitute lyophilized DNase I with DNase/RNase-Free Water, mix by gentle inversion and store frozen aliquots @ -20°C
- this only needs to be done once per kit

2m

- 1.4 Prepare DNase Master Mix and store on ice until needed:

5m

|                         | A  | B   | C   | D   | E    | F |
|-------------------------|----|-----|-----|-----|------|---|
| sample no.              | 1  | 6   | 8   | 12  | 24   |   |
| DNase I (ul)            | 5  | 30  | 40  | 60  | 120  |   |
| DNase dgstn buffer (ul) | 75 | 450 | 600 | 900 | 1800 |   |



- 1.5 Pipette 400 µl of DNA/RNA Lysis Buffer into one nuclease-free tube (not provided) for each sample to be processed (see step 4). Label with sample ID

3m

- 1.6 Pipette 800 µl of 95-100% ethanol into one nuclease-free tube (not provided) for each sample to be processed (see step 7). Make sure cap is tightly closed. Label with sample ID and 'RNA'

3m

- 1.7 for each sample:
- Prepare and label a further 4 tubes with sample ID including 2 with 'RNA' and 2 with 'DNA'.
  - Set up and label 5 collection tubes with sample ID including 2 with 'DNA', and 2 with 'RNA'

10m



- Place a yellow filter in one collection tube labelled DNA
- Place a green column in one collection tube labelled RNA
- Place HRC filters in two collection tubes with one each labelled DNA and RNA

## SAMPLE LYSIS

55m

- 2 Sample thaw and transfer protocol:
- For liquid nitrogen flash frozen samples transfer 0.20, 0.15, 0.10 g sample to a ZR BashingBead Lysis Tube and add 750  $\mu$ l DNA/RNA Shield to lysis tube, cap tightly and vortex briefly, also vortex briefly during thaw 2 or 3 more times. (measure and record mass of sample)
- OR
- For samples collected in DNA/RNA Shield, vortex briefly every five minutes while thawing on ice (may take 30 minutes or longer). Set pipette to 50  $\mu$ l more than chosen volume, vortex sample briefly or invert to mix, and transfer 900  $\mu$ l, 800  $\mu$ l, or 750  $\mu$ l of slurry (using a pre-cut pipette tip) to a ZR BashingBead Lysis Tube and cap tightly.
- 3
1. Label side of BB Lysis Tube with sample ID as lid labels wear off during bead beating
  2. Bead beat on MP Bio FastPrep for 60 seconds at 6.5 m/s, then
  3. rest for 5 minutes.
  4. Repeat four more times for a total of 5 minutes bead beating
- 4
1. Centrifuge samples 16 000 x g for 30 seconds and
  2. transfer 400  $\mu$ l of the supernatant to pre-prepared tube with lysis buffer (see step 1.5), and
  3. mix well by inversion. (sample volume is now 800  $\mu$ l)

10m



40m



5m



## DNA

8m

- 5
1. Pour or pipette the sample into a Spin-Away™ Filter (yellow) in a collection tube and
  2. centrifuge 16 000 x g for **45** seconds.
- 6
- Transfer the Spin-Away™ Filter (yellow) containing DNA into a new Collection Tube and store until ready to proceed with step 10. **\*\*SAVE the flow through for step 7!**

5m



3m

## RNA

35m

- 7
1. Transfer flow-through (800  $\mu$ l) from step 6 to pre-prepared tube with same volume of ethanol, close cap tightly and mix well by inversion. This contains RNA, sample volume is now 1600  $\mu$ l.
- 8
1. Transfer 700  $\mu$ l of the RNA mixture into a prepared Zymo-Spin™ IIICG Column (green) in a Collection Tube

5m



10m





2. centrifuge 16 000 x g for **45** seconds.
3. Discard flow through.
4. Repeat steps 8.1 to 8.3 until all RNA solution has passed through the green column.

9

1. Add 400 µl DNA/RNA Wash Buffer to each green column
2. centrifuge 16 000 x g for **45** seconds
3. discard the flow-through
4. Add 80 ul DNase I Master Mix (step 1.4) to green column
5. incubate @ room temp for 15 minutes

20m



## Parallel DNA and RNA processing

43m

- 10
  1. Add 400 µl **DNA/RNA Prep Buffer** to the yellow filter / green column
  2. centrifuge 16 000 x g for 30 seconds
  3. Discard the flow-through.
- 11
  1. Add 700 µl DNA/RNA Wash Buffer to the yellow filter / green column
  2. centrifuge 16 000 x g for 30 seconds
  3. Discard the flow-through.
- 12
  1. Add 400 µl DNA/RNA Wash Buffer to the yellow filter / green column
  2. centrifuge for **2 minutes** 16 000 x g to ensure complete removal of the wash buffer
  3. Carefully transfer the column into a tube (not provided)
  4. discard tube and flow-through
- 13
  1. Add 100 µl ZymoBIOMICS™ DNase/RNase-Free Water directly to the yellow filter / green column matrix
  2. incubate for 5 minutes
  3. centrifuge 16 000 x g for 30 seconds to elute DNA and RNA from the respective yellow filter / green column
  4. You can pause here (store in fridge, on ice, or freeze), but make sure sample is thawed and RT before proceeding
- 14
  1. add 600 µl ZymoBIOMICS™ HRC Prep Solution to a Zymo-Spin™ III-HRC Filter in a Collection Tube
  2. Centrifuge at **8,000 x g for 3 minutes**, discard collection tube and flow through
  3. Transfer prepared III-HRC Filter to a new tube (not provided)
- 15
  1. Transfer the eluted DNA and RNA (step 13) into a prepared Zymo-Spin™ III-HRC Filter
  2. centrifuge at exactly **16,000 x g for 3 minutes**
- 16
  1. Discard filter, close tube lid, place on ice
  2. Pipette 3 to 10 ul of each sample to new tubes for purity, quantity, and quality testing
  3. Place actual samples in -20°C or -80°C freezers for storage.

5m



5m



5m



8m



5m



5m



10m



4. Optionally make 5 ul and 10 ul aliquots for downstream testing and processing to reduce contamination and degradation risk.