

Universal Plant Total RNA Rapid Extraction Kit

Cat. No.: U1521342 | Pack size: 50 preps | Storage: Room temperature

Overview

This kit uses an optimized buffer system for the rapid extraction of total RNA from a wide range of plant tissues, including those rich in polysaccharides and polyphenols. The workflow does not require phenol, chloroform, or β -mercaptoethanol, making the procedure safer and faster than traditional methods.

RNA purified with this kit is high-purity, with minimal protein, genomic DNA, or other contaminants. From 100–150 mg of plant tissue, users can typically recover tens of micrograms of RNA suitable for Northern blot, dot blot, mRNA purification, in vitro translation, RNase protection assay, RT-PCR, real-time RT-PCR, and cDNA library construction.

Key Features

- Compatible with diverse plant tissues, including high-polysaccharide / high-polyphenol samples.
- Phenol-, chloroform-, and β -mercaptoethanol-free workflow.
- Yields tens of micrograms of high-purity RNA from 100–150 mg of tissue.
- Built-in genomic DNA removal column; optional on-column DNase I digestion for stricter purity needs.
- Ready for downstream applications: Northern blot, RT-PCR, qPCR, cDNA library construction, and more.

Kit Contents & Storage

Cat. No.	Component	Size	Storage
U1521342A	Buffer RCL	33 mL	RT
U1521342B	Buffer RBE	20 mL	RT
U1521342C	Buffer RW	38 mL	RT
U1521342D	Buffer RCW	28 mL	RT
U1521342E	Buffer RW2	12 mL	RT
U1521342F	RNase-Free ddH ₂ O	15 mL	RT

Cat. No.	Component	Size	Storage
U1521342G	Proteinase K	0.7 mL	RT
U1521342H	Genomic DNA Removal Column DE (with 2 mL Collection Tube)	50 ea	RT
U1521342I	Spin Column RA (with 2 mL Collection Tube)	50 ea	RT
U1521342J	RNase-Free Centrifuge Tube (1.5 mL)	50 ea	RT

Shelf life: All components are stable under dry conditions at room temperature for 15 months.

Note: Buffer RCL may form a precipitate during storage. If this occurs, dissolve by warming at 37 °C and return to room temperature before use.

Materials Required But Not Supplied

Item	Recommended Specification	Purpose
Personal protective equipment	Lab coat, disposable gloves, eye protection, mask	Safe handling and contamination control
Absolute ethanol	Molecular biology grade	Added to Buffer RW2 before first use
Liquid nitrogen	—	Sample freezing and grinding
Mortar and pestle	Pre-chilled, RNase-free	Plant tissue homogenization
Pipettes and tips	RNase-free	Reagent and sample handling
Microcentrifuge	Capable of 14,000 rpm (18,630 × g) and 12,000 rpm (13,680 × g)	Spin-column processing
2 mL centrifuge tubes	RNase-free	Sample lysis
DNase I and DNase I Buffer	Sold separately (optional)	On-column DNase I digestion when high RNA purity is required

Preparation Before Use

1. Add 48 mL of absolute ethanol to Buffer RW2 before first use. Mark the bottle 'Ethanol added' and date.

Protocol

1. Homogenization

Add 600 μ L Buffer RCL to a 2 mL centrifuge tube. Quickly grind plant leaves or fruit flesh into powder in liquid nitrogen. Weigh 50–100 mg of sample and transfer to the centrifuge tube containing Buffer RCL. Close the lid and shake vigorously about 20 times to mix the sample with RCL. Add 10 μ L Proteinase K, immediately vortex for 30 seconds, and centrifuge at 14,000 rpm ($18,630 \times g$) for 2 minutes.

Note:

- If the sample has low RNA content, add 800 μ L Buffer RCL and increase the sample amount to 100–130 mg.
 - For dry seed samples, add RE Reagent (available free of charge) to Buffer RCL before use.
2. Transfer ≤ 700 μ L of the supernatant (the volume varies depending on the sample) to a Genomic DNA Removal Column DE (placed in a collection tube). Centrifuge at 14,000 rpm ($18,630 \times g$) for 30 seconds. Discard the removal column and keep the flow-through in the collection tube.
 3. Measure the volume of the flow-through (the volume may differ between samples; for the same tissue type from the same species, measuring one sample is sufficient). Add 0.7 volumes of Buffer RBE relative to the flow-through volume (precipitation or flocculent material may appear – this is normal). Mix well, then transfer the mixture to a Spin Column RA (placed in a collection tube). Load no more than 700 μ L per spin (if the mixture volume exceeds 700 μ L, load in two separate spins). Centrifuge at 14,000 rpm ($18,630 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube.
 4. If not performing DNase I digestion, add 700 μ L Buffer RW to the column. Centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube. Then proceed to steps 6–9.
 5. DNase I digestion (optional)

If downstream experiments require very high RNA purity, optional DNase I digestion can be performed. If DNase I digestion is chosen, skip step 4 and directly follow steps 5–9.

5.1 Add 350 μ L Buffer RW to the column. Centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube.

5.2 Preparation of DNase I stock solution: Dissolve the DNase I powder (2000 U) in 550 μ L RNase-Free ddH₂O. Mix gently, aliquot, and store at -30 to -15°C (can be stored for 9 months).

Note: Thawed DNase I stock solution can be stored at 2–8°C for up to 6 weeks. Do not refreeze.

5.3 Preparation of DNase I working solution: Transfer 10 μ L of DNase I stock solution to a new RNase-Free centrifuge tube, add 70 μ L DNase I Buffer, and mix gently.

- 5.4 Add 80 μL of the DNase I working solution to the center of the column. Let stand at room temperature for 15 minutes.
- 5.5 Add 350 μL Buffer RW to the column. Centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube.
6. Add 500 μL Buffer RCW to the column. Centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube.
7. Add 700 μL Buffer RW2 (ensure absolute ethanol has been added before use) to the column. Centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. Discard the flow-through and return the column to the collection tube.
8. Centrifuge at 12,000 rpm ($13,680 \times g$) for 2 minutes.
9. Transfer the column to a new 1.5 mL RNase-Free centrifuge tube. Open the lid and let stand at room temperature for 1 minute to completely air-dry any residual ethanol. Add 30–100 μL RNase-Free ddH₂O to the center of the membrane without touching it. Let stand at room temperature for 1 minute, then centrifuge at 12,000 rpm ($13,680 \times g$) for 30 seconds. The obtained RNA can be used directly in downstream experiments or stored below -80°C .

Note: The volume of RNase-Free ddH₂O should not be less than 30 μL ; smaller volumes will reduce recovery. To increase RNA yield, reload the first eluate onto the column, let stand at room temperature for 1 minute, and centrifuge again at 12,000 rpm ($13,680 \times g$) for 30 seconds (second elution), or preheat the RNase-Free ddH₂O to 65°C .

Sample Handling

Fresh plant samples are recommended. If extraction cannot be performed immediately, freeze samples in liquid nitrogen and store below -70°C . Avoid repeated freeze-thaw cycles, which reduce RNA yield and quality.

Yield and purity vary across plant species, tissue types, and developmental stages. For new sample types, run a small pilot at 50, 100, and 130 mg input and select the input that gives the best A_{260}/A_{280} , A_{260}/A_{230} , and downstream RT-PCR performance.

Precautions

1. Operators should wear disposable masks and gloves, change gloves frequently during the experiment, and use RNase-free plasticware and tips to avoid RNase contamination.
2. This kit removes most genomic DNA contamination, allowing the RNA to be used directly in downstream experiments without DNase I digestion. However, nucleic acid content varies significantly among different samples or different input amounts. If downstream experiments require very high RNA purity, optional DNase I digestion can be performed (see step 5). DNase I can be purchased separately.

- Fresh plant samples are recommended for RNA extraction. If extraction cannot be performed immediately, samples should be frozen in liquid nitrogen and stored below -70°C. Avoid repeated freeze-thaw cycles, as this will affect RNA yield and quality.

Quality Control

QC Item	Method	Acceptable Range
Component completeness	Visual inspection on receipt	All components and counts match the kit contents table; lot number and expiry date legible
Nucleic acid integrity	Agarose gel or Bioanalyzer	Per downstream application requirements; intact bands or RIN > 7 for sensitive applications
Nucleic acid purity	Spectrophotometry (A_{260}/A_{280} , A_{260}/A_{230})	Per downstream application requirements; A_{260}/A_{280} typically 1.8-2.1 for RNA

Troubleshooting

Issue	Possible Causes	Corrective Action
Low nucleic acid yield	- Sample quantity below recommended range - Inefficient sample homogenization or lysis - Elution volume too small	- Increase sample input within the recommended range and adjust lysis buffer accordingly - Ensure complete homogenization (e.g. liquid nitrogen grinding for plant tissue) - Use the recommended elution volume; perform a second elution to recover residual nucleic acid
Nucleic acid degradation	- Nuclease contamination - Delayed sample processing or repeated freeze-thaw	- Use only nuclease-free plasticware, tips, and water - Process fresh samples or store at < -70 °C; avoid repeated freeze-thaw - Change gloves frequently during the workflow

Issue	Possible Causes	Corrective Action
Low A_{260}/A_{280} ratio	- Protein contamination - Insufficient washing	- Repeat the wash steps - Reduce sample input if A_{260}/A_{280} remains low

Recommended Applications

Northern blot · dot blot · mRNA purification · in vitro translation · RNase protection assay · RT-PCR · real-time RT-PCR · cDNA library construction

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- For Research Use Only (RUO). Not for use in human or animal diagnostics, therapeutics, or in vivo applications. Not for food, cosmetic, or household use.
- This product is not a CE-marked in vitro diagnostic device under IVDR (EU) 2017/746 and is not an FDA-cleared device under 21 CFR. Use is restricted to verified businesses, institutions, and qualified professionals for research and development purposes.
- Where any kit component is classified as hazardous under CLP (EC) 1272/2008 or OSHA HCS (29 CFR 1910.1200), the product Safety Data Sheet (SDS) takes precedence over this document for handling, storage, and disposal information.
- Performance depends on sample type, sample condition, handling, and operator technique. Users are responsible for validating the kit for their specific application.



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