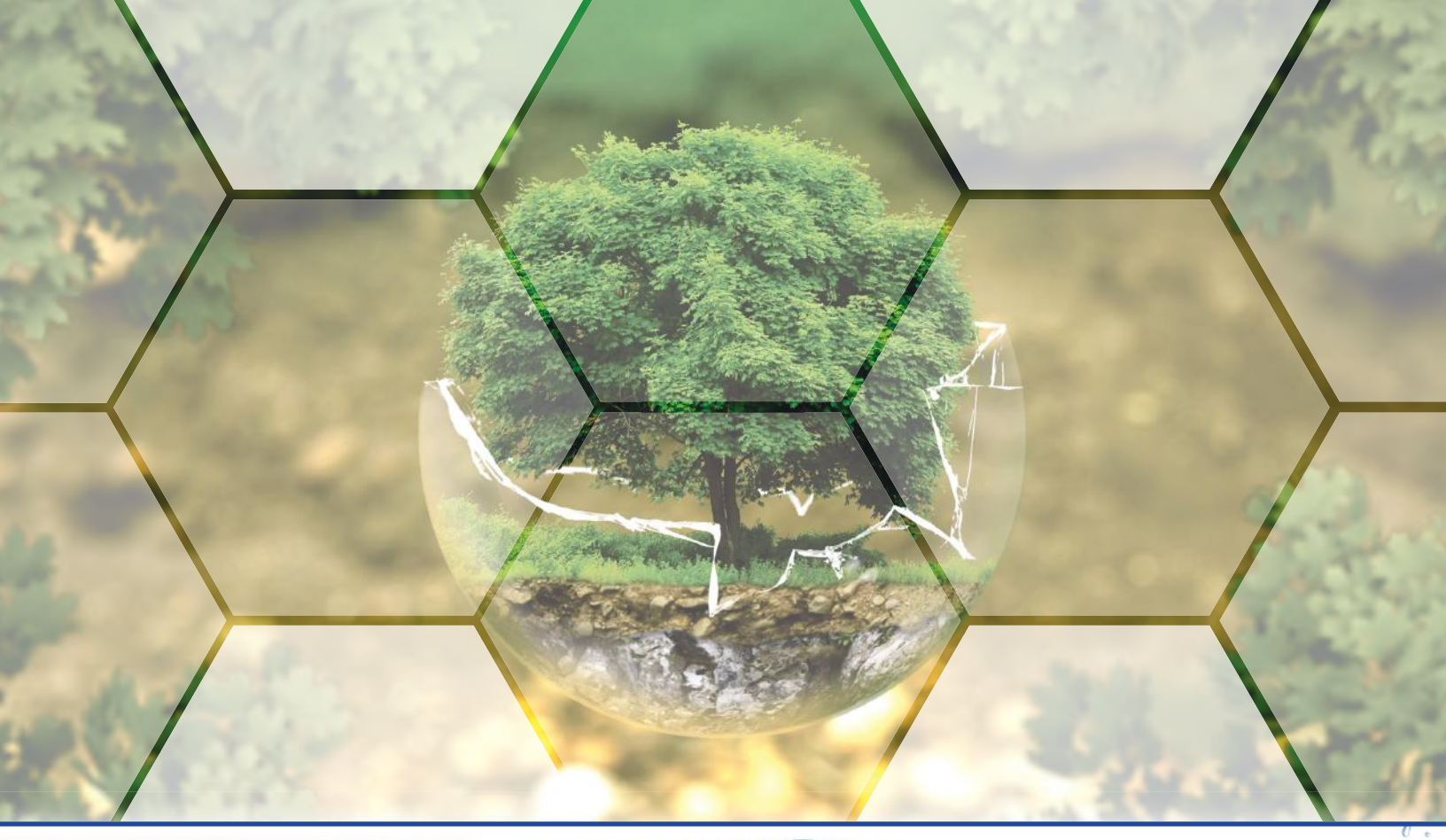

PLANT & ENVIRONMENT

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Purification of inhibitor-free **RNA**, **microRNA** and **genomic DNA** for any application

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Norgen Biotek is dedicated to providing our customers with first class sample preparation kits for RNA, microRNA, DNA, and protein purification, clean-up and concentration for research and diagnostic applications; and to provide dedicated and expert support services to our customers and commercial partners worldwide.

Norgen is an **ISO 9001: 2015, ISO 13485: 2016** and **ISO 15189: 2012** registered company, indicating our commitment to quality.

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PLANT & ENVIRONMENT

SAMPLE PREPARATION KITS

Purification of inhibitor-free **RNA**, **microRNA** and **genomic DNA** for any application

"I am very pleased [...] that Plant/Fungi Total RNA Isolation Kit worked very well for Sorghum sample. In a very short time we were able to isolate good quality and quantity RNA."

- University of Kentucky

Plant/Fungi RNA Purification Kits

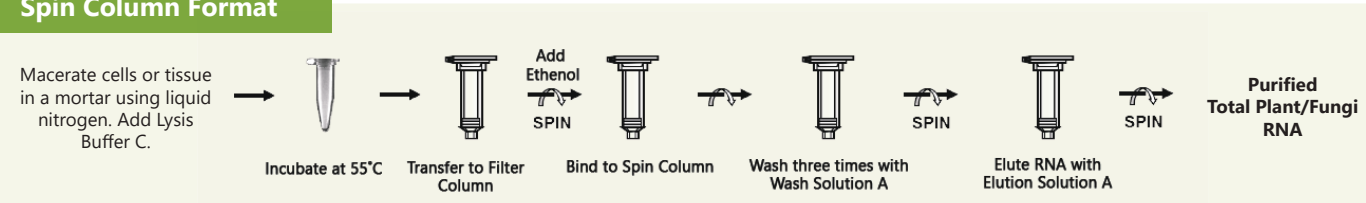
Cat No. 25800, 31300, 31900

- Extract total RNA, including virus & viroid RNA
- Robust lysis buffer is well-suited to even challenging samples such as pine needle, grape leaf, etc
- Isolate total RNA (including microRNA) without phenol
- Isolated RNA is of high quality, integrity and diversity
- Also available in 96-well format for high throughput applications

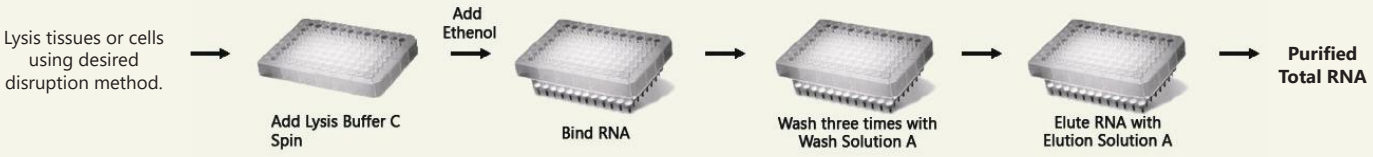
Rapid purification of total RNA (including microRNA) from plants and fungi

Norgen's Plant/Fungi Total RNA Purification Kit provides a rapid method for the isolation and purification of total RNA from a wide range of plant and filamentous fungal species. Total RNA can be purified from fresh or frozen plant tissues, plant cells or filamentous fungi samples using this kit. All sizes of RNA are purified, from large mRNA and ribosomal RNA down to microRNA (miRNA) and small interfering RNA (siRNA). The RNA is preferentially purified from other cellular components, such as proteins, without the use of phenol or chloroform. The purified RNA is of the highest integrity, and can be used in a number of downstream applications including real time PCR, reverse transcription PCR, Northern blotting, RNase protection and primer extension, and expression array assays.

Spin Column Format



96-Well Plate Format



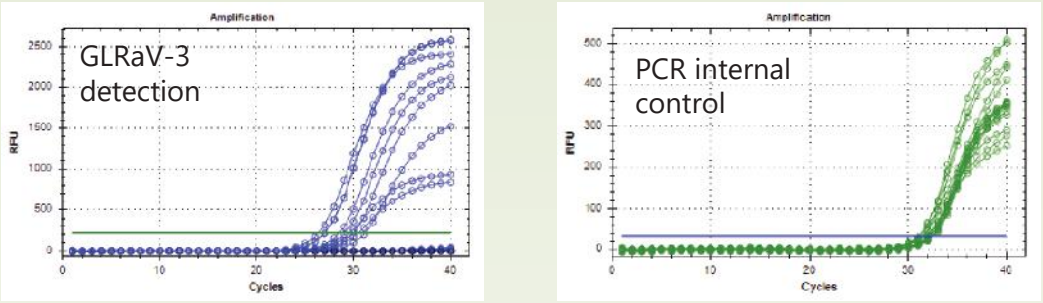


Figure 1. Grape leaf, petiole and cane samples from known Grapevine leafroll associated virus-3 (GLRaV-3) infected vines were processed by Norgen's Plant Total RNA Purification Kit for GLRaV-3 detection. The real-time RT-PCR result (A) indicates a successful GLRaV-3 detection from all different grape sample types and PCR internal control (B) indicates the high quality of RNA isolated that shows no PCR inhibition.

Species	Tissue	Species	Tissue
Tobacco *(Nicotiana tabacum)*	Leaf, stem, root	Eastern white Red Cedar	Leaf
Tomato *(Lycopersicon esculentum)*	Leaf	Strawberry	Leaf, fruit, flower
Pepper *(Capsicum annuum)*	Leaf	Raspberry	Leaf, berry
Soy bean (legume)	Leaf, stem, root	Blackberry	Leaf, berry
Vanilla bean	Bean	Herbs	Leaf
Potato *(Solanum tuberosum)*	Leaf	Persimmon *(Ebenaceae)*	Leaf
Potato tuber *(Solanum)*	Leaf	Citrus	Leaf
Arabidopsis thaliana	Leaf, stem	Cotton *(Gossypium)*	Leaf, cotton
Peach *(Prunus persica)*	Leaf	Mangrove	Leaf
Peach *(fruits and flowers)*	Leaf, fruit	Chrysanthemum	Leaf
Apple *(Malus sp.)*	Leaf, flower, pollen	Corn	Leaf
Pear *(Pyrus sp.)*	Leaf	Kiwi	Leaf
Grape vine *(Vitis sp.)*	Leaf	Cucumber	Leaf
Grape berry	Skin	Coconut	Leaf
Plum *(Prunus sp.)*	Leaf, fruit	Hop	Leaf, seed
Palm *(Arecaceae)*	Leaf	Avocado	Leaf, root
Pine needle *(Pinaceae)*	Needle	and more	

Table 1. List of plant species from which high quality and quantities of RNA have been successfully isolated using Norgen's Plant/Fungi Total RNA Purification Kit.

Ordering Information

Description	Size	Cat. Number
Plant/Fungi Total RNA Purification Kit	50 preps	25800
Plant/Fungi Total RNA Purification Kit	100 preps	31300
Plant/Fungi Total RNA Purification Kit	250 preps	25850
Plant/Fungi Total RNA Purification Kit	2 x 96-well plates	31900

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Non-Organic-Based Isolation of Plant microRNA using Norgen's Plant/Fungi RNA Purification Kit

W.-S. Kim, PhD[1], C. Dobbin, PhD[1], Y. Haj-Ahmad, Ph.D[1,2]
[1] Norgen Biotek Corporation, Thorold, Ontario, Canada
[2] Centre for Biotechnology. Brock University, St. Catharines, Ontario, Canada

INTRODUCTION

Small RNAs, including microRNAs (miRNAs) and short interfering RNAs (siRNAs), are key components of an evolutionarily conserved system of RNA-based gene regulation in eukaryotes. In eukaryotes, regulatory small RNAs are divided into two main classes; (a) small interfering RNAs (siRNAs) are double-stranded RNA of ~20-25 nucleotides that are involved in RNA interference, and (b) microRNAs (miRNAs) are single-stranded RNA of ~21-23 nucleotides in length that contain complementary sequences to the 3' untranslated regions of the target messenger RNAs (mRNA). They are involved in many molecular interactions, including defense against viruses and regulation of gene expression during development. miRNAs interfere with expression of messenger RNAs encoding factors that control developmental timing, stem cell maintenance, and other developmental and physiological processes in plants and animals. miRNAs are negative regulators that function as specificity determinants, or guides, within complexes that inhibitprotein synthesis (animals) or promote degradation (plants) of mRNA targets (1).

Unlike larger DNA or RNA molecules, small RNAs are subjected to significant loss in traditional isolation methods that involve alcohol precipitation. Moreover, some available commercial products for small RNA isolation involve the use of organic extraction, which is hazardous and time consuming. Norgen's Plant/Fungi RNA Purification Kit provides an innovative and rapid method for the isolation and purification of total RNA, including small RNA, from both plant and fungal cells that does not require organic extraction. The procedure is based on spin col-umn chromatography using Norgen's proprietary resin as the separation matrix. The procedure is rapid and convenient, as it does not rely on the use of liquid nitrogen in order to homogenize the samples. The purified RNA is of the highest quality and can be used in a number of downstream applications including real time PCR, re-verse transcription PCR, Northern blotting, and expression array analysis.

In this application note, Norgen's Plant/Fungi RNA Purification Kit is used to isolate total RNA from a variety of different plant cells. The yield and integrity of the purified RNA is then analyzed by gel electrophoresis, as well as by using an Agilent BioAnalyzer. Furthermore, the down-stream application of RT-PCR is performed, indicating the purity and biological activity of the purified RNA.

METHODS AND MATERIALS

Plant RNA Isolation

Plant RNA was isolated from 50 mg of plant leaf tissue (equivalent to ~ 5 x 10^6 plant cells) using Norgen's Plant/Fungi RNA Purification kit as per the provided protocol (Figure 1). Briefly, the plant cells were ground in a mortar containing 600 µL of Lysis Solution with a pestle until the tissue was completely macerated. The lysate was then transferred into an RNAse-free microcentrifuge tube and centrifuged for 2 minutes to re-move cellular debris. The supernatant was then transferred to a new RNAse-free microcentrifuge tube and an equal volume of 70% ethanol was added and mixed by vortexing. Next, 600 µL of the clarified lysate was then loaded onto an assembled column and centrifuged for 1 minute at 14,000 x g (~14,000 rpm). The flow-through was discarded and the column reassembled. The remaining lysate was then loaded onto the same column by centrifugation for 1 minute at 14,000 x g. The column was then washed a total of three times by applying 400 µL of Wash Solution to the column, centrifuging for 1 minute and then discarding the flowthrough. The columns were centrifuged for 2 minutes to thoroughly dry the resin. For RNA elution the column was placed into a fresh 1.7 mL elution tube and 50 µL of the Elution Buffer was applied to the column. Columns were then centrifuged for 2 minutes at 200 x g (~2000 rpm), followed by a 1 minute spin at 14,000 x g. Purified RNA was then stored at -20° Ct for several days or at -70°C for long term storage. For comparison of microRNA isolation, total RNA was also isolated from the same plant samples using a leading market competitor's plant RNA purification kit according to the manufacturer's protocol and used in comparative experiments.

RNA Gel Electrophoresis

The purified total plant RNA (Norgen's and competitor's) was run on 1X MOPS, 1.0% formaldehyde-agarose gels for visual inspection and comparison. Generally, 5 µL of each 50 µL elution was run on the gel. The purified RNAs (Norgen's and competitor's) were also resolved on an 8% Urea-PAGE gel for visual comparison.

Capillary Electrophoresis

Purified RNAs from grape, tomato, tobacco and peach leaf tissue were loaded onto an Agilent® RNA Nano 6000 chip and resolved on an Agilent® 2100 BioAnalyzer according to the manufacturer's instructions. RT-qPCR Assay Plant RNA purified from peach leaves was used as template for one step RT-qPCR, and miRNA was detected by employing primers spe-cific to miR398b.

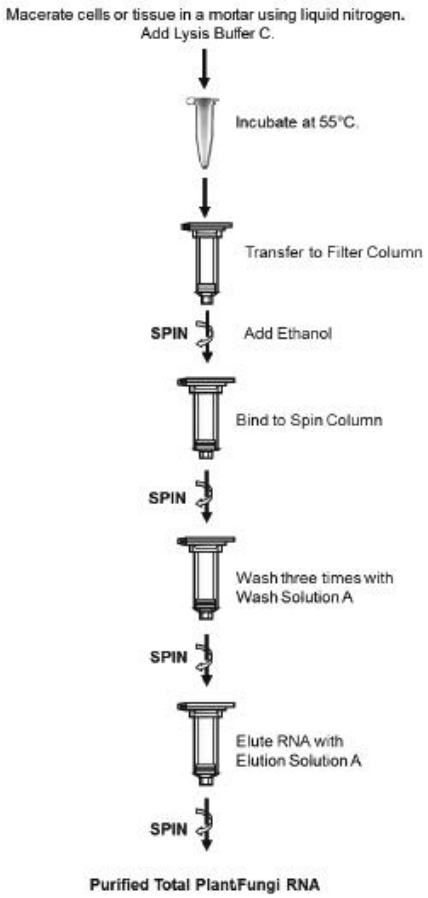


Figure 1. Procedure flowchart for the purification of Plant RNA using Norgen's Plant/Fungi RNA Purification kit.

RESULTS AND DISCUSSION

Total RNA was isolated from 5 x 10^6 plant cells using Norgen's Plant/Fungi RNA Purification Kit according to the provided protocol as described in Figure 1. The entire protocol was completed in 30 minutes. At the same time, a commercially available competitor's plant total RNA kit was used for comparison. Once total RNA was isolated from the leaf tissues of apple, peach, grape, strawberry and pine needles, they were run on a 1X MOPS, 1.0% formaldehyde-agarose gel for visual inspection (Figure 2).

As it can be seen in Figure 2, RNA samples prepared using Norgen's Plant/Fungi RNA Purification Kit were of a high quality. In addition, Norgen's kit allowed for the isolation of RNA from all sample types, whereas the competitor's kit was not successful at isolating RNA from some of the more difficult sample types including grape and strawberry leaves and pine needles. Importantly, microRNA and small RNAs could be observed in the total RNA isolated using Norgen's kit. In contrast, the competitor's total RNA kit did not isolate small RNAs. Thus Norgen's Plant/Fungi RNA Purification Kit truly isolates total RNA with a wider size diversity and quality than its competitor's, including RNA from difficult samples.

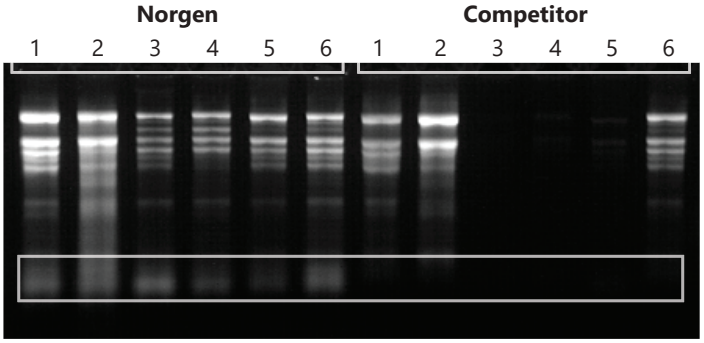


Figure 2. Isolation of True Total RNA, Including Small RNA Species, Using Norgen's Kit. Total RNA was isolated from 50 mg (~5.0 x 10^6 cells) of Apple (1), Peach (2), Grape (3), Pine needle (4), Strawberry (5) or Pear (6) leaf tissue using Norgen's Plant/Fungi RNA Purification Kit and a leading com-petitor's kit. Samples of the purified RNA (5 µL of each 50 µL elution) were loaded onto a 1X MOPS, 1.0% formaldehyde-agarose gel and visualized via ethidium bromide staining. Norgen's kit allowed for the isolation of high quality RNA from all of the samples, including the difficult samples, while the competitor failed to isolate RNA in some cases. Furthermore, only Norgen's kit was able to isolate the small RNA species (white box).

The quality of small RNAs isolated by Norgen's purification kit was further demonstrated by resolution on an 8% Urea-PAGE gel (Fig. 3) and capillary gel electro-phoresis (Fig. 4). Total RNA was isolated in duplicate from apple and peach leaf tissue using Norgen's purification kit and the competitor's kit. Fig. 3 demonstrates that unlike its competitor, Norgen's kit is able to isolate small RNA species which are < 200 nucleotides in length.

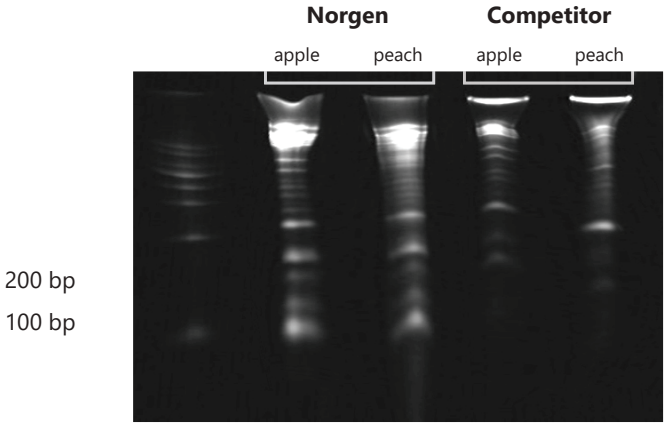


Figure 3. Resolution of Small RNA on an 8% Urea-PAGE Gel. Following purification of total RNA from apple and peach leaf tissue using Norgen's Plant/Fungi RNA Purification Kit and a competitor's kit, the RNA was separated on an 8% urea-PAGE gel (7 µL loaded from the 50 µL elutions). Norgen's kit was able to isolate true total RNA with a wide size diversity, including small RNA species (white box). In contrast, the competitor's total kit was unable to purify RNA species which were below 200 nucleotides in size.

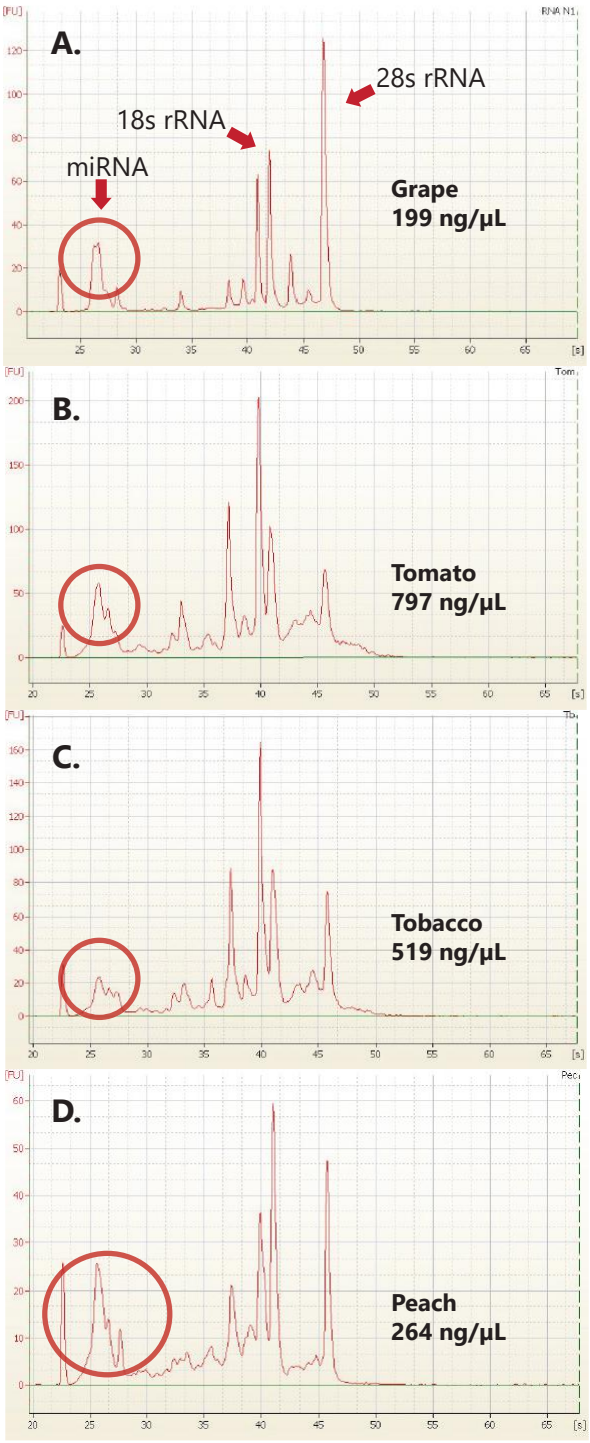


Figure 4. Resolution of Total RNA Isolated Using Norgen's Kit on the Agilent BioAnalyzer. Total RNA was isolated from grape (Panel A), tomato (Panel B), tobacco (Panel C) and peach (Panel D) leaf tissue using Norgen's kit. Purified DNA was then resolved on an Agilent Lab-on-a-Chip and electropherograms were generated. All RNA species, including small RNA species, can be detected in all 4 cases.

The ability of Norgen's Plant/Fungi RNA Purification Kit to isolate true total RNA, including small RNA, was further demonstrated when total RNA samples purified from grape, peach, tomato and tobacco were resolved on an Agilent Lab-on-a-Chip (Figure 4). Panel A in Figure 4 is an electropherogram of total RNA isolated from grape leaf tissue using Norgen's purification kit. All the RNA species, including microRNA, 18s rRNA and 28s rRNA can be observed. Similar results were obtained when total RNA was purified from tomato (Panel B), tobacco (Panel C) or peach (Panel D). It is evident that RNA species of a wide size diversity can be purified using Norgen's Plant/Fungi RNA Purification Kit, including plant microRNAs.

In order to analyze the biological activity of the purified RNAs, RT-qPCR was performed. Unlike regular RT-PCR, the amplification and detection of small RNA molecules, such as microRNA, requires the addition of an adaptor. One of the commonly-used protocols involves the addition of a poly(A) tail to the microRNA by Poly(A) Polymerase (2). This method was employed here, and Figure 5 shows the amplification of the miR398b transcript from total plant RNA isolated from peach leaves using Norgen's Plant/Fungi RNA Purification Kit. The PCR product was successfully detected from the total RNA purified from peach leaf tissue.

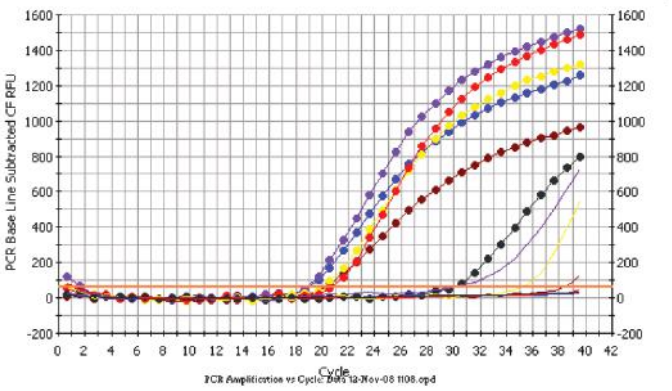


Figure 5. One-step RT-qPCR for the Detection of Plant miRNA. Total RNA was extracted from peach leaf tissues using Norgen's Plant/Fungi RNA Purification Kit, and miRNA was detected using primers specific for miR398b. miRNA was detected for all stem loop primer concentra-tions tested: 5nM (red); 10nM (yellow); 25nM (purple); 50nM (blue) and; 100nM (burgundy).

CONCLUSION

Through the analysis of the performance of Norgen's Plant/Fungi RNA Purification Kit for isolating total RNA from plant cells, a number of conclusions regarding Norgen's kit can be made:

1. Norgen's kit allows for the isolation of high quality total RNA, including small RNA, within 30 minutes and without the use of any organic solvents. Unlike other commercial kits, Norgen's kit does not require the use of organics for extraction, or the use of liquid nitrogen for homogenization of samples, making the RNA purification rapid and convenient.

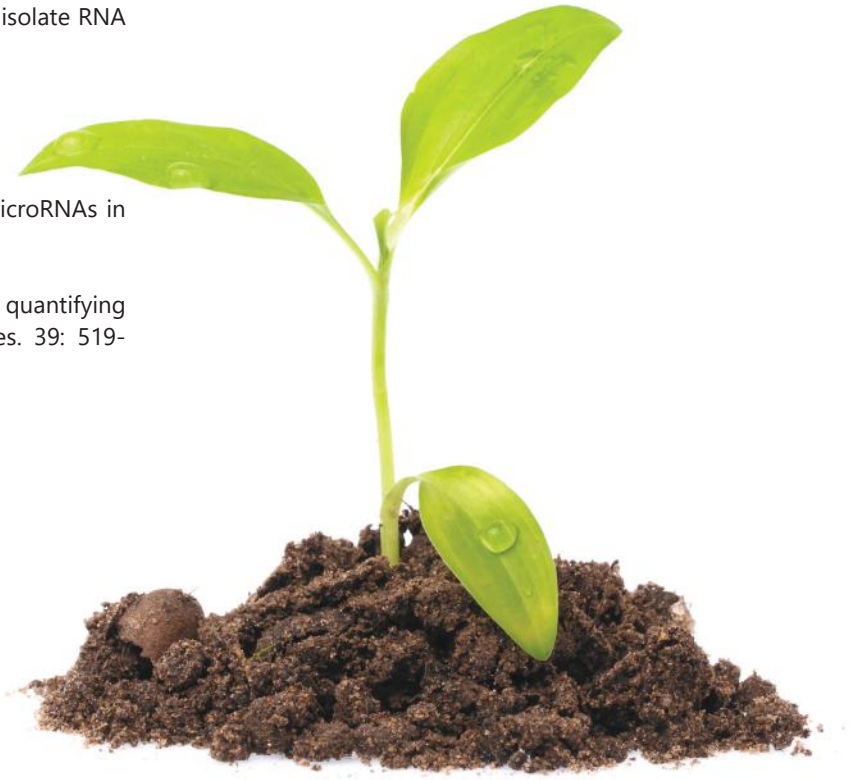
2. Norgen's kit isolates RNAs of high yield, purity and integrity from a wide range of plant and fungal samples. The purity and integrity of the total RNA isolated using Norgen's kit could be seen in the various gel photos. In addition, the RNA was of a high quality, as it could be used in downstream applications including RT-qPCR.

3. Norgen's kit isolates true total RNA, including small RNA, from various plant samples. As can be seen in the various figures, Norgen's kit was able to consistently isolate total RNA, including microRNA. The competitor's kit failed to isolate the small RNA species. Furthermore, Norgen's kit was able to isolate RNA from all the samples tested, while the competitor failed to isolate RNA from some of the more difficult samples.

REFERENCES

1. Carrington, J. C. and V. Ambros. 2003. Role of microRNAs in Plant and Animal Development. Science. 301: 336.

2. Shi, R. and V. L. Chang. 2005. Facile means for quantifying microRNA expression by real-time PCR. BioTech-niques. 39: 519-24.



Plant microRNA Purification Kit

Cat No. 54700

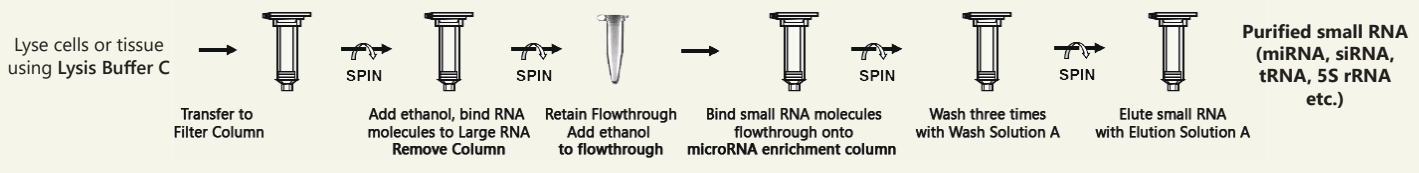
- Fast and easy processing using a rapid spin-column format
- No phenol or chloroform extractions
- Isolate all small RNA molecules (<200 nt)
- Minimal contamination from large RNA molecules and genomic DNA
- High quality small RNA can be used in various downstream applications

Rapid purification of microRNA from small input amounts

Norgen's Plant microRNA Purification Kit provides a rapid method for the isolation and purification of small RNA molecules (< 200 nt) from cultured plant cells or plant tissues. These small RNAs include regulatory RNA molecules such as microRNA (miRNA) and short interfering RNA (siRNA), as well as tRNA and 5S rRNA. Small RNA molecules are often studied due to their ability to regulate gene expression. miRNAs and siRNAs are typically 20-25 nucleotides long, and regulate gene expression by binding to mRNA molecules and affecting their stability or translation. The small RNA molecules isolated using Norgen's Plant microRNA Purification Kit can be used in various downstream applications relating to gene regulation and functional analysis, including RT-PCR, miRNA sequencing, northern blotting and microarray analysis.

Purification is based on spin column chromatography using Norgen's proprietary resin as the separation matrix. Norgen's resin binds RNA in a manner that depends on ionic concentrations. The small RNA molecules are preferentially purified from other cellular components such as ribosomal RNA without the use of phenol or chloroform.

Spin Column Procedure



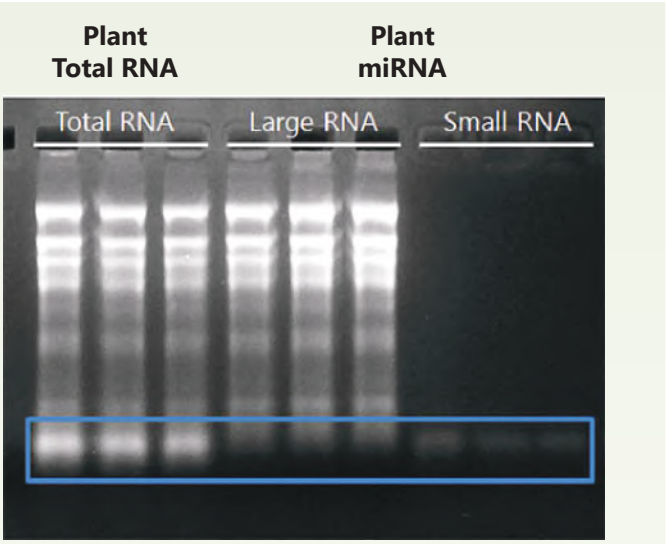


Figure 1. Fractionation of Large and Small RNA. Large RNA and small RNA were sequentially purified using Norgen's Plant miRNA Purification Kit from 50 mg of raspberry leaf tissue and the RNA profile was compared with the RNA isolated using Norgen's Plant/Fungi Total RNA Purification Kit (Cat. #25800). For visualization, 10 µL of RNA from 50 µL of RNA elution was loaded on 2% 1x MOPS agarose gel. Norgen's kit was able to isolate both the large and small RNA fractions, and the small RNA fraction does not contain any of the large RNA species.

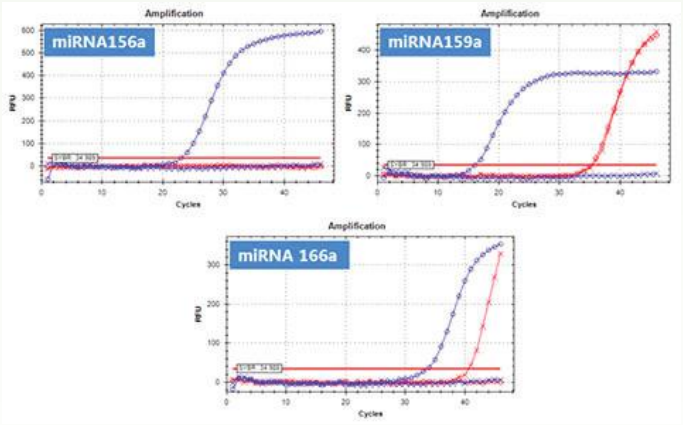


Figure 2. Efficiency of the concentration of miRNA using Norgen's Plant miRNA Purification Kit to detect three plant miRNAs. Small RNA was concentrated from 50 mg raspberry using Norgen's Plant miRNA Purification Kit. Three µL of the elution was directly used for cDNA generation and 3 µL of cDNA was used for the CFX96 Touch™ Real-Time PCR Detection System (Bio-Rad). Blue: concentrated small RNA from Norgen's Plant miRNA Purification Kit, Red: Total RNA from Plant Total RNA Purification Kit (Cat. 25800), Circle: +RT, Cross: - RT.

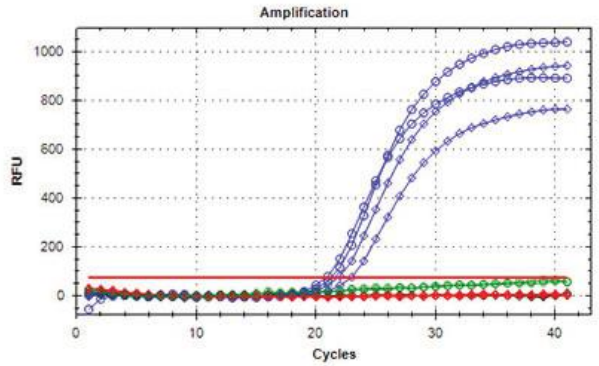


Figure 3. Isolation of Concentrated RNA that can be used in Sensitive Downstream Applications. Three different miRNA purification methods were compared for their ability to isolate and detect plant miRNA. miRNA was purified from grape using three miRNA purification kits according to the manufacture's manual. Next, 3 µL of the elution was directly used for cDNA generation and 3 µL of cDNA was used for the CFX96 Touch™ Real-Time PCR Detection System (Bio-Rad) to detect the miRNA 159a. As it can be seen, only the miRNA purified using Norgen's kit (blue lines) was amplified, while the miRNA isolated using the other 2 kits failed to amplify (red and green lines). Both of the competitor's kits rely on phenol to isolate the miRNA, and therefore residual phenol is likely interfering with the amplification. Norgen's kit isolates high yields of good quality miRNA without the use of phenol. Blue: Norgen Plant miRNA, Red: Competitor Q, Trizol: Green.

	Norgen Plant miRNA	Competitor Q	Trizol
Phenol	No	Yes	Yes
Processing time	15 min	35 min	70 min
Elution volume	20 µL	30 µL	50 µL

Ordering Information

Description	Size	Cat. No
Plant microRNA Purification Kit	25 preps	54700

For more detailed information on this product please scan the **QR code** with your mobile device.

For more information
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Plant RNA/DNA Purification Kit

Cat No. 24400

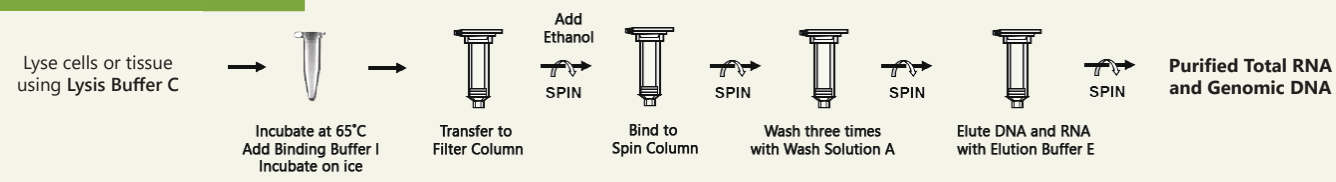
- Robust Lysis Solution processes even the most challenging plant species such as pine needle and grape
- No phenol extractions
- DNA and all sizes of RNA are recovered, including microRNA
- High quality DNA and RNA are purified simultaneously using the same spin column
- No need to split the lysate

Simultaneous isolation of total RNA and DNA from the same plant sample

Norgen's Plant RNA/DNA Purification Kit provides a rapid method for the isolation and purification of total RNA and DNA simultaneously from a single sample of plants. The total RNA and DNA (including genomic DNA) and are both column purified in under 30 minutes using a single column. It is often necessary to isolate total RNA and genomic DNA from a single plant sample, such as for studies of gene expression, mutant or transgenic plant characterization, and host plant-pathogen characterization. Traditionally the RNA and DNA would be isolated from different aliquots of the same sample, however this novel technology will allow for their simultaneous isolation from the same sample. This will not only save time, but will also be of a great benefit when isolating RNA and DNA from precious, difficult to obtain or very small samples. Furthermore, gene expression analysis will be more reliable since the RNA and DNA are derived from the same sample, therefore eliminating inconsistent results.

With Norgen's Plant RNA/DNA Purification Kit, the purification is based on spin column chromatography using Norgen's proprietary resin as the separation matrix. Norgen's resin binds nucleic acids in a manner that depends on ionic concentrations, thus the RNA and DNA will bind to the column while the proteins are removed in the flowthrough. At this point, optional on-column DNase or RNase digestions may be carried out in order to isolate pure RNA or DNA. Norgen's kit purifies all sizes of RNA, from large mRNA and ribosomal RNA down to microRNA (miRNA) and small interfering RNA (siRNA). The purified RNA and DNA are of the highest integrity and can be used in a number of downstream applications.

Spin Column Procedure



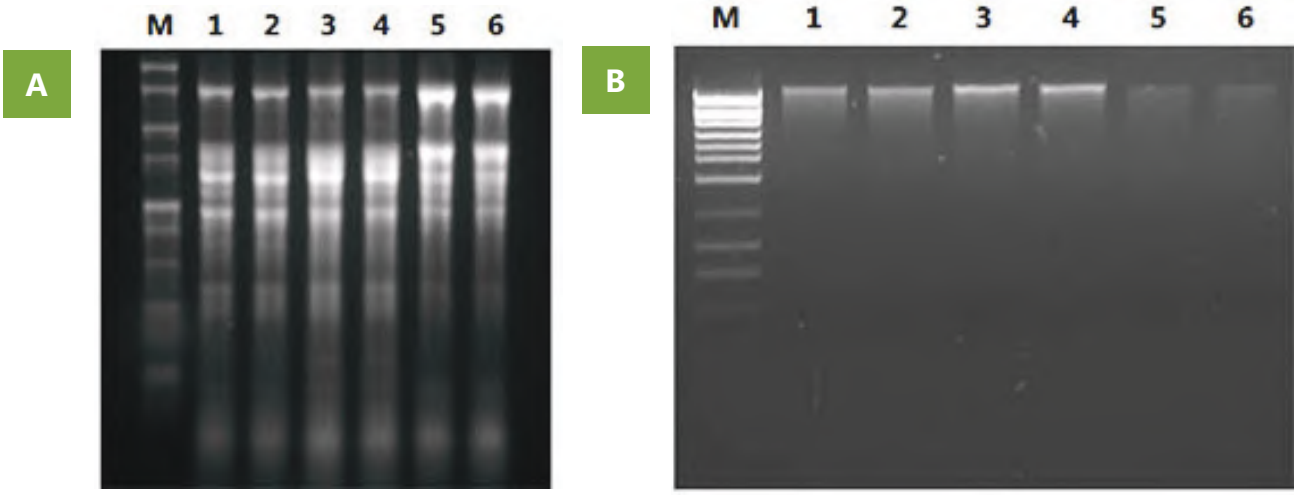


Figure 1. Isolation of Total RNA and Genomic DNA from Tobacco, Tomato and Peach Leaf Tissue. Total RNA and genomic DNA were isolated from 50 mg of tobacco leaf, 50 mg of tomato leaf and 50 mg of peach leaf using Norgen's Plant RNA/DNA Purification Kit. Panel A is a 1X MOPS 1.5% agarose gel showing the total RNA that was isolated after the optional on-column DNase digestion. Five µL of total RNA from each 75 elution was mixed with 2x RNA loading dye and denatured at 70°C for 10 minutes and loaded onto the gel. Lane M is Norgen's 1 kb RNA Ladder, Lanes 1 and 2 contain RNA isolated from tobacco cells, Lanes 3 and 4 contain RNA isolated from tomato cells, and Lanes 5 and 6 contain RNA isolated from peach cells. Panel B is a 1.5% agarose gel containing the genomic DNA that was isolated after the optional on-column RNase digestion, and in each case 10 µL of the 75 µL elution was loaded. Lane M is Norgen's HighRanger 1kb DNA Ladder, Lanes 1 and 2 contain the tobacco DNA, Lanes 3 and 4 contain the tomato DNA, and Lanes 5 and 6 contain the peach DNA. The RNA and DNA are intact and of the highest quality, and can be used in a number of different downstream applications.

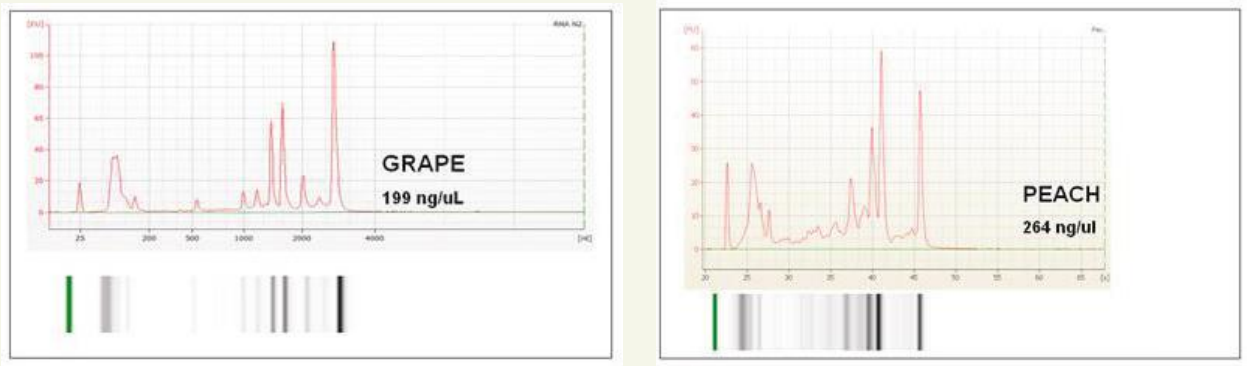


Figure 2. Isolate High Quality Total RNA from Challenging Samples. Total RNA was purified from 50 mg of grape and peach leaves using Norgen's Plant RNA/DNA Purification Kit, with the optional on-column DNase treatment. Next, 1 µL of 75 µL eluted RNA was resolved on an Agilent 2100 bioanalyzer using an RNA Nano 6000 chip. High quality total RNA was isolated from both samples, even from the challenging grape leaf sample.

Ordering Information

Description	Size	Cat. No
Plant RNA/DNA Purification Kit	50 preps	24400

For more detailed information on this product please scan the **QR code** with your mobile device.

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Water RNA/DNA Purification Kit

Cat No. 26480, 26450, 26400

- Isolate total DNA and RNA from all microorganisms found in water, including bacteria, fungi and algae
- RNA and DNA are both column purified simultaneously using the same column
- Elution contains concentrated DNA and RNA without the need for further precipitation
- Complete RNA (including microRNA) without phenol
- Isolated RNA and DNA are of high quality and integrity for all downstream applications

Convenient purification of RNA and DNA from microorganisms in water samples

Norgen's Water RNA/DNA Purification Kit provides a convenient and rapid method for the detection of microorganisms from environmental water samples. The kit allows for the rapid isolation and purification of total RNA and DNA simultaneously from the microorganisms found in small and large samples of water. The total RNA and DNA (including genomic DNA) are isolated from all the microorganisms found in the water, including bacteria, fungi and algae without the use of any inhibitory organic substances. The kit provides bead tubes that can be used to homogenize microorganisms on a filter (not provided), and then both the RNA and DNA are column purified in under 45 minutes using a single column. The purified RNA and DNA are highly concentrated, and can be used directly in a number of downstream applications including real time PCR, reverse transcription PCR, Northern blotting, Southern blotting and sequencing reactions.

Purification is based on spin column chromatography using Norgen's proprietary resin as the separation matrix. The process involves the homogenization of a water filter (not provided) with Lysis Buffer E by vortexing for 5 minutes followed by a 10 minute incubation at 65°C. After incubation the lysate is collected, ethanol is added and the solution is loaded onto a spin-column. Norgen's resin binds nucleic acids in a manner that depends on ionic concentrations, thus only the RNA and DNA will bind to the column while the proteins are removed in the flowthrough. Next, an optional step can be carried out in which the genomic DNA can be digested allowing for a more pure RNA sample to be isolated. Alternatively, the RNA can be digested resulting in a more pure genomic DNA sample. The bound nucleic acid is then washed twice with the provided Wash Solution A in order to remove any impurities, and the purified RNA and/or DNA is eluted with the Elution Buffer H. The kit purifies genomic DNA, and all sizes of RNA, from large mRNA and ribosomal RNA down to microRNA (miRNA) and small interfering RNA (siRNA).

Procedure

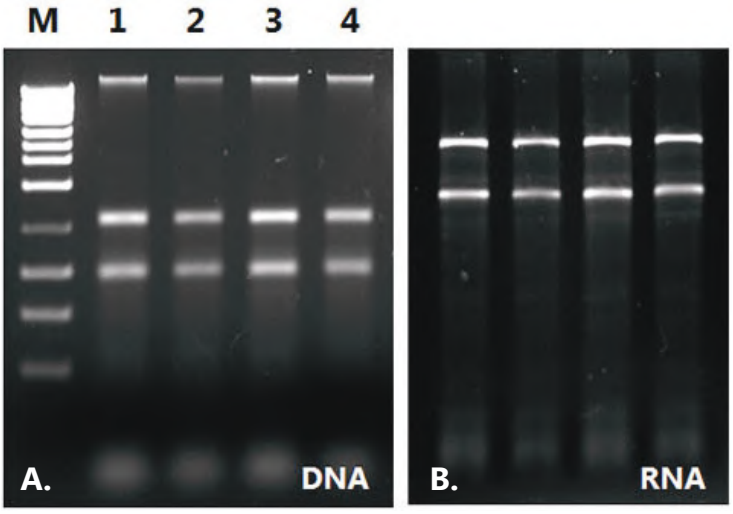


Figure 1. High Yield and Purity of RNA and DNA. Total RNA and DNA were simultaneously isolated from 50 mL of water sample containing 10^7 cfu/mL E.coli using Norgen's Water RNA/DNA Purification Kit and subsequently run on gels for visual analysis. Panel A shows 10 µL aliquots (no RNase treatment) of the 50 µL elutions run on a 1% TAE agarose gel. Genomic DNA and 16S and 23S rRNA bands were visable. Panel B shows 5 µL aliquots (on-column DNase was applied) of the elution run on a 1.5% formaldehyde agarose gel. 16S and 23S rRNA was seen without DNA contamination. From observing the gels it can be seen that the kit allows for the isolation and purification of high yields of concentrated and high quality RNA and DNA.

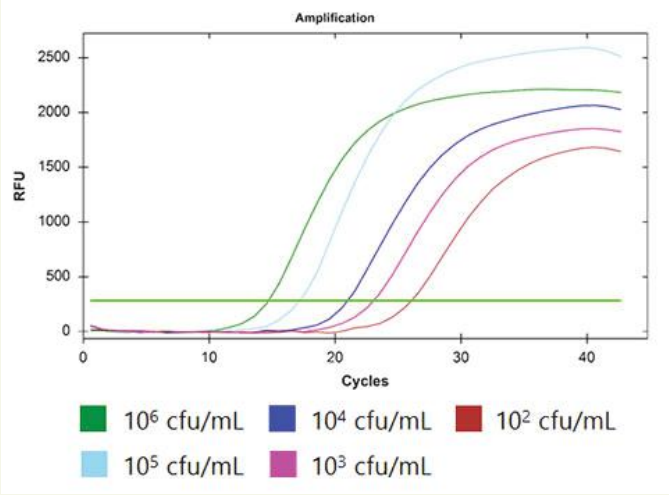


Figure 2. Detection of E. coli 16S rDNA by Real-Time PCR (SYBR Green). Fifty mL water samples spiked with increasing amounts of E.coli were filtrated through 0.45 µm water filter columns, and RNase-treated DNA was isolated from the filter by following Norgen's Water RNA/DNA Purification Kit manual. Next, 2 µL of DNA from the 50 µL elutions was mixed in 18 µL of total real-time PCR reaction master mix and real-time PCR was performed (95°C for 3 minutes and 40 cycles at 95°C for 15 second and 60°C for 30 seconds). All tested water samples containing different E.coli amounts were found to correspond to the real-time PCR results. E.coli was specifically detected by E. coli 16S rDNA primers down to 102 cfu/ml, indicating the quality of DNA and the efficiency of filtering system.

Ordering Information

Description	Size	Cat. No
Water RNA/DNA Purification Kit	50 preps	26480
Water RNA/DNA Purification Kit - 0.45 µm	25 preps	26450
Water RNA/DNA Purification Kit - 0.22 µm	25 preps	26400

For more detailed information on this product please scan the **QR code** with your mobile device.

For more information
SCAN HERE

Soil Total RNA Purification Kit

Cat No. 27750

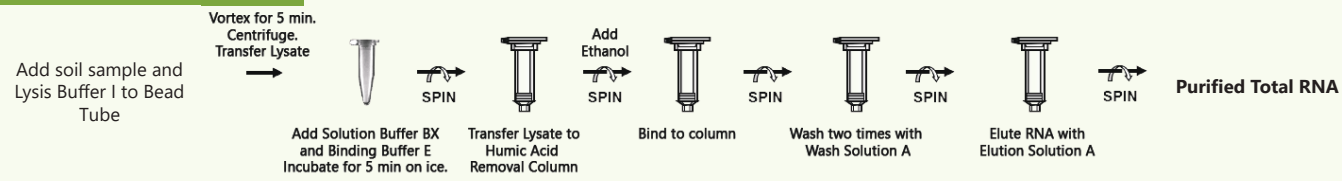
- Isolate high quality total RNA from a variety of soil samples
- Process all types of soil, including common soil, compost and manure
- Remove all traces of humic acids and other inhibitors of PCR
- Isolates all sizes of RNA, including microRNA, without phenol
- Complete kit including bead tubes and humic acid removal columns (HAR)

Rapid preparation of inhibitor-free total RNA from soil

Norgen's Soil Total RNA Purification Kit provides a convenient and rapid method to purify total RNA from small amounts of soil samples. All types of soil samples can be processed with this kit, including common soil samples and difficult soil samples with high humic acid content such as compost and manure. The kit removes all traces of humic acid using the provided Bead Tubes and a combination of chemical and physical homogenization and lysis. A simple and rapid spin column procedure is then used to further purify the RNA. The kit purifies all sizes of RNA, from large mRNA and ribosomal RNA down to microRNA and small interfering RNA. The protocol does not rely on the use of phenol or chloroform, thereby providing a user friendly procedure and allowing high-throughput analysis on the lab bench. The purified RNA is of the highest integrity, and can be used in a number of downstream applications including real time PCR and reverse transcription PCR for gene expression analysis.

Purification is based on spin column chromatography using Norgen's proprietary resin as the separation matrix. The purified RNA is of the highest integrity, and can be used in a number of downstream applications.

Procedure



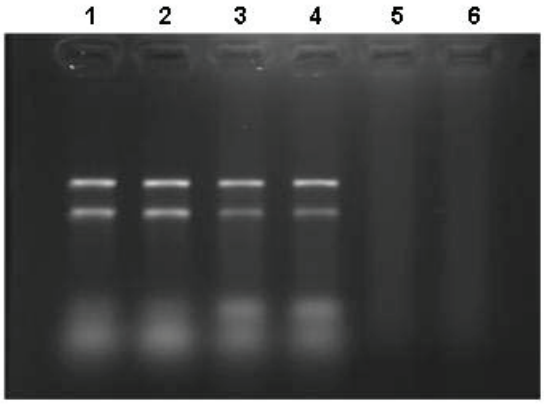


Figure 1. Isolation of Total RNA from Bacteria in Soil. ***Pseudomonas fluorescens*** was spiked into 250 mg samples of autoclaved soil and total RNA was isolated using Norgen's Soil Total RNA Purification Kit. RNA was visualized by running 7.5 µL of each 75 µL elution on a 1.2% agarose-formaldehyde RNA gel. Total RNA (large and small) of ***Pseudomonas fluorescens*** was recovered from the autoclaved spiked soil without any significant degradation, indicating that high integrity RNA can be purified from the microorganisms in the soil. Lanes 1 and 2 contain total RNA from ***Pseudomonas fluorescens***, Lanes 3 and 4 contain total RNA purified from the autoclaved soil spiked with Pseudomonas fluorescens, and Lanes 5 and 6 contain RNA purified from the autoclaved soil (no RNA was found).

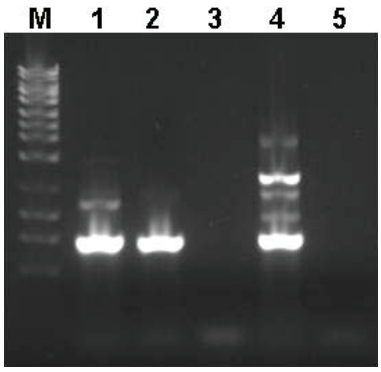


Figure 2. High Quality RNA Free from PCR Inhibitors. ***Pseudomonas fluorescens*** was spiked into 250 mg samples of autoclaved soil and total RNA was isolated using Norgen's Soil Total RNA Purification Kit. One microliter of each elution was then used as the template in a 20 µL RT-PCR reaction to detect the 16s rRNA. Lane 1 contains the results when total RNA from ***Pseudomonas fluorescens*** was used as the input, Lane 2 is the results when total RNA isolated from the autoclaved soil spiked with ***Pseudomonas fluorescens*** was used as the input, Lane 3 is the results when RNA purified from non-spiked autoclaved soil was the input, Lane 4 is a positive control and Lane 5 is the Negative control. As it can be seen the RNA purified from soil using Norgen's kit was of a high quality and can be successfully used in sensitive downstream applications.

Ordering Information

Description	Size	Cat. No
Soil Total RNA Purification Kit	50 preps	27750

For more detailed information on this product please scan the **QR code** with your mobile device.

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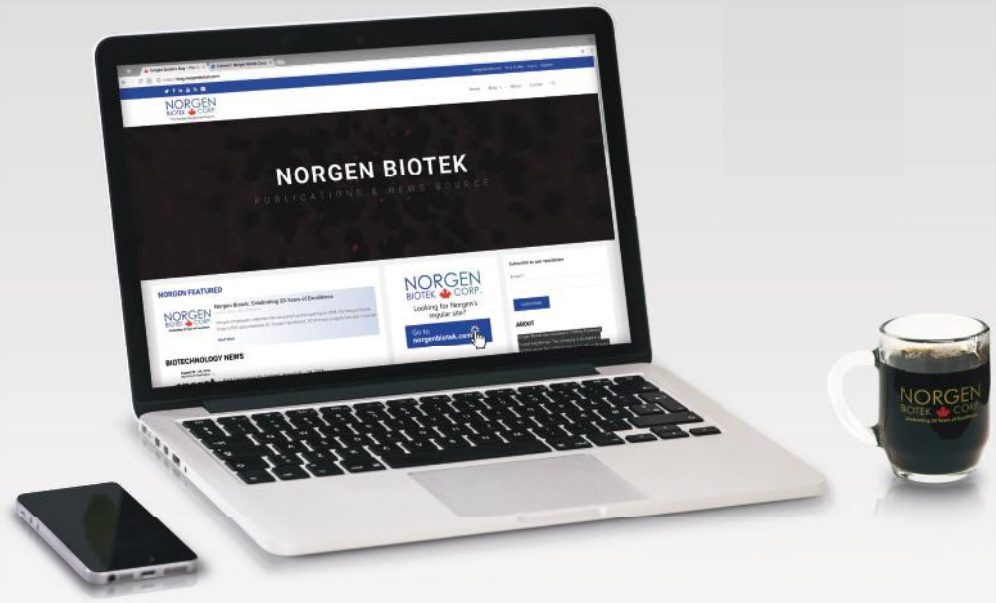
NORGEN BIOTEK CORP.

Publications & News Source



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Norgen Biotek offers comprehensive services for Next-Generation Sequencing (NGS) in an accredited state-of-the-art laboratory from sample isolation to sequencing and bioinformatics analysis. We have extensive expertise in sample preparation, sequencing and analysis of all types of samples, specializing in ultra-low input samples including liquid biopsies (plasma/serum, urine and exosomes).

www.norgenbiotek.com/services

Fungi/Yeast Genomic DNA Isolation Kit

Cat No. 27300, 27350

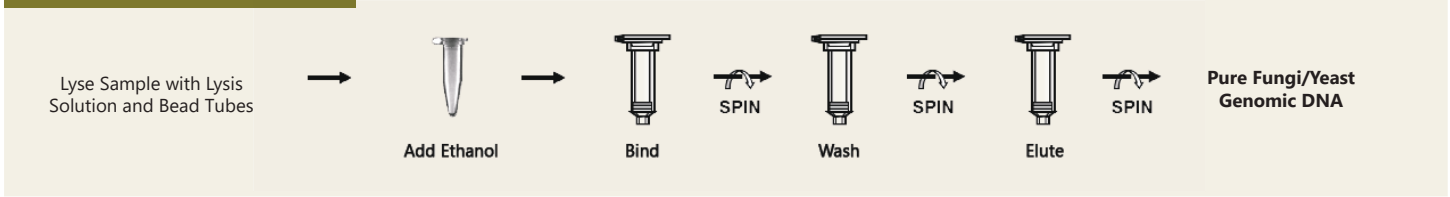
- Rapid spin column purification of genomic DNA from viable yeast cells, fungal spores or mycelium, and bacteria including Gram-positive
- Includes bead tubes to allow for effective mechanical homogenization
- Protocol includes an optional lyticase treatment step for certain fungal & yeast species
- Purified DNA is of high quality and integrity and compatible with any sensitive downstream applications such as PCR, qPCR, RFLP and more

Rapid purification of DNA from yeast cells and fungal spores or mycelium

Norgen's Fungi/Yeast Genomic DNA Isolation Kit is designed for the rapid preparation of genomic DNA from viable yeast cells, fungal spores or mycelium and Gram-positive bacteria. Genomic DNA is efficiently extracted from the cells by a combination of heat treatment, detergents and the use of provided Bead Tubes. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications such as PCR and Southern Blot analysis. Typical yields of genomic DNA will vary depending on the cell density of the yeast or fungal culture and species. The option of an additional lyticase treatment is also provided in order to allow for improved DNA yields for certain fungal and yeast species. Preparation time for a single sample is less then 30 minutes, and each kit contains sufficient materials for 50 preparations.

The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications such as PCR, Restriction Fragment Length Polymorphism (RFLP) and Amplified Fragment Length Polymorphism (AFLP).

Procedure



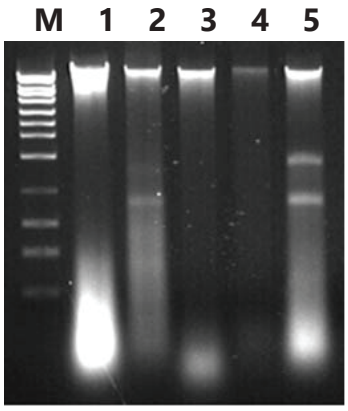


Figure 1. DNA Isolation from Different Fungi Species and Yeast. To demonstrate the purification of DNA from different fungal species, 30 mg of fungi were collected from plate cultures of *Pichia sp, Aspergillus niger, Cladosporium cladasporioides, Botrytis cinerea* and *Mucor racemosus*, and the DNA was extracted using Norgen's Fungi/Yeast Genomic DNA Isolation Kit. The bead system efficiently lysed the fungal cell walls with the provided Lysis Solution, and total DNA was eluted in 100 µL. For analysis, 10 µL from each elution was loaded in 1% 1xTAE agarose gel. Lane 1: Yeast (*Pichia sp.*), Lane 2: *Aspergillus niger;* Lane 3: *Cladosporium cladosporioides;* Lane 4: *Botrytis cinerea;* Lane 5: *Mucor racemosus;* Lane M: Norgen's HighRanger 1kb DNA Ladder. The optional RNase treatment was not performed during the process.

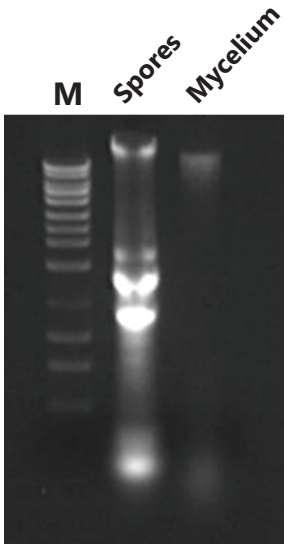


Figure 3. DNA can be Isolated from Spores and Mycelium. Genomic DNA was extracted from the spores and mycelium of *Botrytis cinera* using Norgen's Fungi/Yeast Genomic DNA Isolation Kit. For the spores, 10^5 spores/mL were collected from a plate culture by adding 3 mL of 0.9% NaCl to the fungi culture plate and gently shaking to extract the spores. For mycelium, 20 mg of mycellium was collected with sterilized forceps. DNA was isolated using Norgen's Fungi/Yeast Genomic DNA Isolation Kit with the provided Bead Tubes. For analysis, 10 µL from each 100 µL elution was loaded on a 1% 1xTAE agarose gel. Lane M: Norgen's HighRanger 1kb DNA Ladder. Optional RNase treatment was not performed during the extraction. As it can be seen, DNA could be successfully isolated from both the spores and mycelium.

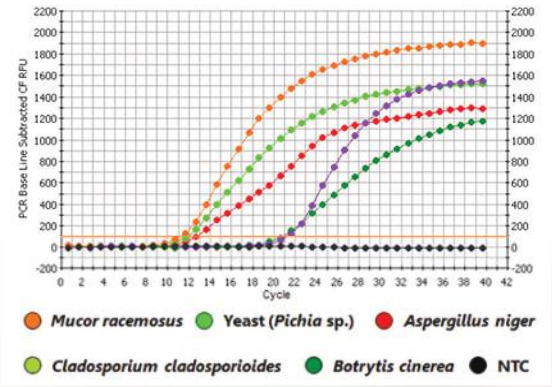


Figure 3. Identification of Fungal and Yeast Species in a Real-time PCR (SYBR Green). DNA was isolated from 50 mg samples (wet weight) of yeast *(Pichia sp)* and fungi including *Aspergillus niger*, *Cladosporium cladasporioides*, *Botrytis cinerea* and *Mucor racemosus* using Norgen's Fungi/Yeast Genomic DNA Isolation Kit, and 2 µL of each of the 100 µL DNA elutions was used in a qPCR (SYBR Green) reaction with specific fungal and yeast primers. The qPCR was successful in amplifying and detecting all the yeast and fungal DNA, indicating that the DNA is of a high quality and can be used in sensitive downstream applications.

Ordering Information

Description	Size	Cat. No
Fungi/Yeast Genomic DNA Purification Kit	50 preps	27300
Fungi/Yeast Genomic DNA Isolation 96-Well Kit	2 x 96-well plates	27350

For more detailed information on this product please scan the **QR code** with your mobile device.

For more information
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Phage DNA Isolation Kit

Cat No. 46800, 46850

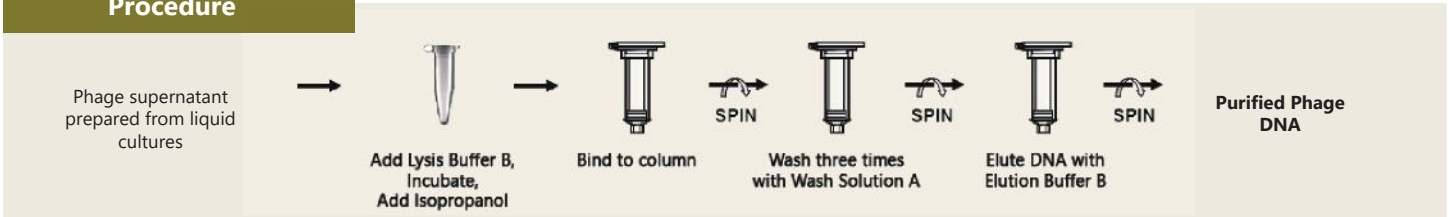
- Isolate high quality DNA from a broad variety of phage strains
- High yields of total DNA
- Fast and easy processing using a rapid spin-column format
- No phenol or chloroform extractions or cesium chloride banding required
- High yields of DNA recovered 3-1^{5} µg DNA from 10^{6}-1010 pfu/ mL of enriched phages

For the rapid purification of total DNA from bacteriophages

Norgen's **Phage DNA Isolation Kit** provides a rapid method for the isolation and purification of total DNA from bacteriophages propagated in bacteria grown in liquid cultures. The DNA is isolated without the use of phenol, chloroform or cesium chloride. The spin-column based procedure is rapid, and can be completed in less than 45 minutes. The kit is highly efficient for processing small volumes of phage supernatant (1 mL). The purified DNA is of the highest integrity, and can be used in a number of downstream applications including Southern Blot, Restriction Fragment Length Polymorphism (RFLP), sequencing, cloning and *real time PCR*.

Purification is based on spin column chromatography. The phage DNA is preferentially purified from other cellular components such as proteins without the use of phenol, chloroform or cesium chloride. Norgen's spin column binds nucleic acids in a manner that depends on ionic concentrations, thus only the DNA will bind to the column while most of the RNA and proteins are removed in the flowthrough. The bound DNA is then washed with the provided Wash Solution A in order to remove any remaining impurities, and the purified total DNA is eluted with the Elution Buffer B. The purified total phage DNA is of the highest integrity, and can be used in a number of downstream applications.

Procedure



Effective Host Genomic DNA Removal

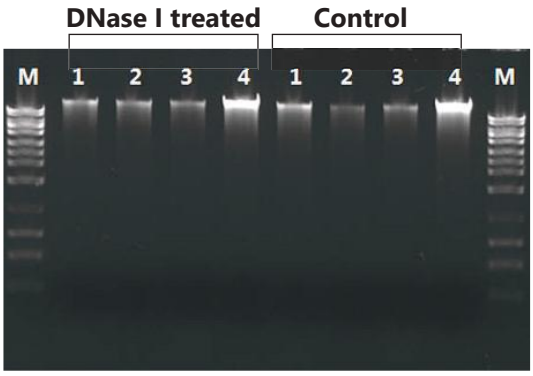


Figure 1. Effective Host Genomic DNA Removal without Reducing Phage DNA Yield. Total DNA was isolated from four enriched phage cultures using Norgen's Phage DNA Isolation Kit. A DNase I pre-treatment was performed prior to adding the provided Lysis Buffer. Briefly, 20 units of DNase I was added to 1 mL of enriched phage culture and the mixture was incubated at room temperature for 20 minutes. After the DNAase I treatment the procedure was followed. As a control, DNA was isolated from aliquots of the same 4 cultures using Norgen's Phage DNA Isolation Kit without performing the DNase I treatment. For DNA analysis 10 µL of each 50 µL elution was loaded onto a 1X TAE agarose gel. As it can be seen, the phage DNA was safely protected from the DNase I treatment by its coat protein, while the host genomic DNA was efficiently degraded by the DNase I. Thus the DNase I pre-treatment resulted in less host gDNA contamination in the final phage elution without influencing the total phage DNA yield. Lane M is Norgen's Highranger 1 kb DNA Ladder (Cat. 11900).

Optional Proteinase K Treatment Improves Yield

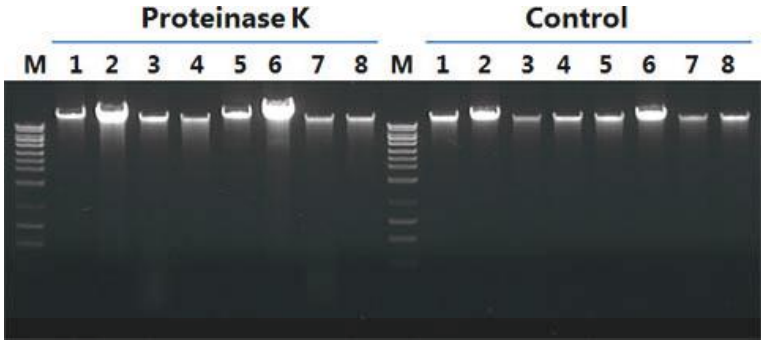


Figure 2. Optional Proteinase K Treatment Improves DNA Yield for Certain Phage Strains. Total DNA was isolated with and without the optional Proteinase K treatment using Norgen's Phage DNA Isolation Kit. Briefly, 4 µL of Proteinase K (20 mg/mL) was added to 1 mL of enriched phage culture and incubated at 55°C for 15 minutes with the phage Lysis Buffer. After the Proteinase K treatment the procedure was followed. As a control, DNA was isolated from aliquots of the same 8 cultures using Norgen's Phage DNA Isolation Kit without performing the Proteinase K treatment. For DNA analysis 10 µL of each 50 µL elution was loaded onto a 1X TAE agarose gel and the yield of DNA was compared from the eight different phage types (lane 1 to 8). As it can be seen, the optional treatment of Proteinase K improved the phage DNA yield in Lanes 2, 5 and 6 dramatically. Lane M is Norgen's Highranger 1 kb DNA Ladder (Cat. 11900)

Ordering Information

Description	Size	Cat. No
Phage DNA Isolation Kit	50 preps	46800
Phage DNA Isolation Kit	100 preps	46850

For more detailed information on this product please scan the **QR code** with your mobile device.

For more information
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Plant/Fungi DNA Isolation Kit

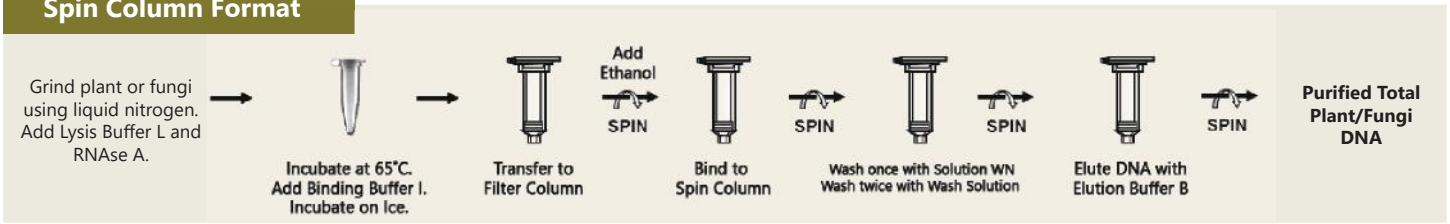
Cat No. 26200, 26250, 26900

- Rapid and simple procedure
- Excellent quality and yield of DNA
- Process a broad spectrum of plant species and filamentous fungi
- Isolate total DNA including pathogen DNA without phenol
- Available in spin column format and 96-well format for high throughput applications

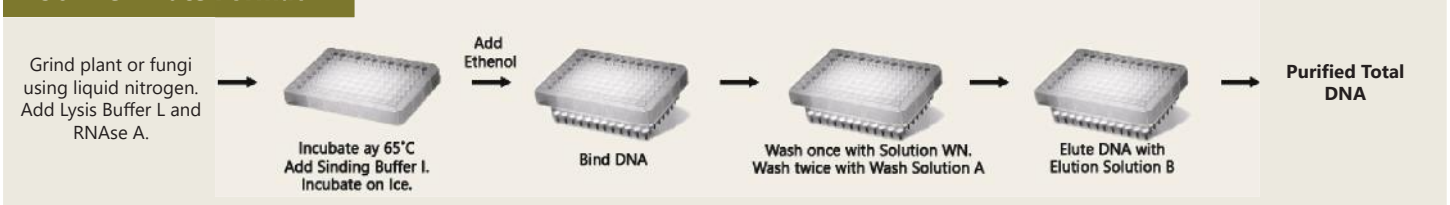
For rapid isolation of total DNA from plants and fungi

Norgen's **Plant/Fungi DNA Isolation Kit** provides a rapid method for the isolation and purification of total DNA from a wide range of plant and fungi species. Furthermore, the kit also provides a convenient method for the detection of pathogens which may be infecting a plant, as it allows for the purification of any pathogen DNA along with the purification of the total DNA. Total DNA can be purified from fresh or frozen plant tissues, plant cells or fungi samples using this kit. The DNA is preferentially purified from other cellular components, such as proteins, without the use of phenol or chloroform. The purified DNA is of the highest integrity, and can be used in a number of downstream applications including real time PCR, Southern blotting, SNP analysis and sequencing.

Spin Column Format



96-Well Plate Format



Isolate DNA from a Wide Range of Plants

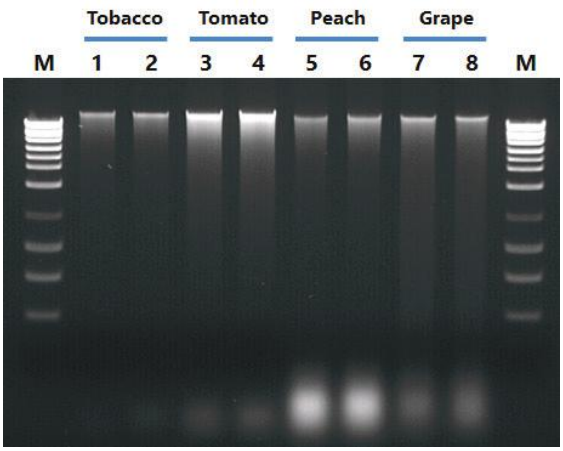


Figure 1. Isolate DNA from a Wide Range of Plants. DNA was isolated from 50 mg samples of tobacco leaves (Lanes 1 and 2), tomato leaves (lanes 3 and 4), peach leaves (Lanes 5 and 6) and grape leaves (lanes 7 and 8) using Norgene's Plant/Fungi DNA Isolation Kit, and 5 µL aliquots of the 100 µL elutions were run on a 1x TAE 1% agarose gel. As it can be seen, high quality DNA was isolated in all cases. The M lanes contain Norgen's HighRanger 1Kb DNA Ladder.

High Quality DNA

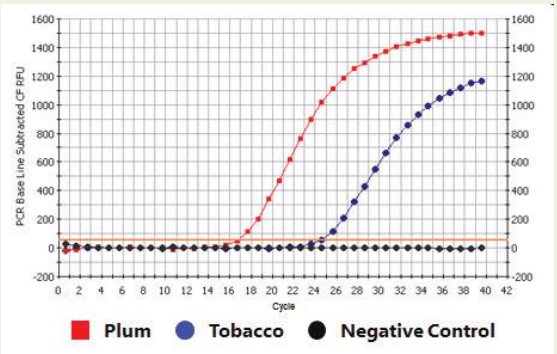


Figure 2. Purified DNA can be Amplified in a Real-time PCR Reaction (SYBR Green). DNA was isolated from 50 mg samples of plum and tobacco frozen leaves using Norgen's Plant/Fungi DNA isolation Kit, and 2 µL of the eluted DNA was used in a real-time PCR reaction (total reaction volume 20 µL) with 18sr DNA primers (95°C for 3 minutes and 40 cycles at 95°C for 15 seconds and 60°C for 30 seconds). The real-time PCR was successful in amplifying both the plum and tobacco DNA, indicating that the DNA is of a high quality and can be used in sensitive downstream applications.

Ordering Information

Description	Size	Cat. No
Plant/Fungi DNA Isolation Kit	50 preps	26200
Plant/Fungi DNA Isolation Kit	250 preps	26250
Plant/Fungi DNA Isolation 96-Well Kit	2 x 96-well plates	26900

For more detailed information on this product please scan the **QR code** with your mobile device.

For more information
SCAN HERE

Soil DNA Isolation Kits

Cat No. 64000, 64060, 62000, 26560, 58100, 62800

- Rapid and convenient method to detect microorganisms in soil samples
- Process all soil types
- Remove organic substances using the OSR Solution
- Remove all humic acid from DNA samples
- Fast and easy processing using a rapid spin-column format
- Isolate high quality total DNA from a variety of microorganisms including bacteria, fungi and algae

For the rapid preparation of inhibitor-free DNA from all types of soil, including difficult samples with high humic acid content

Soil DNA Isolation Plus Kit

Norgen's **Soil DNA Isolation Plus Kit** provides a convenient and rapid method for the detection of microorganisms from soil samples. All types of soil samples can be processed with this kit, including common soil samples and difficult soil samples with high humic acid content such as compost and manure. The kit removes all traces of humic acid and PCR inhibitors using the provided the OSR (Organic Substance Removal) Solution. A simple and rapid spin column procedure is then used to further purify the DNA. Total genomic DNA can be isolated and purified from all the various microorganisms found in soil, such as bacteria, fungi and algae. The purified DNA is of the highest quality and is fully compatible with downstream PCR applications, as all humic acid substances and PCR inhibitors are removed during the isolation.

Comparison of DNA Yield

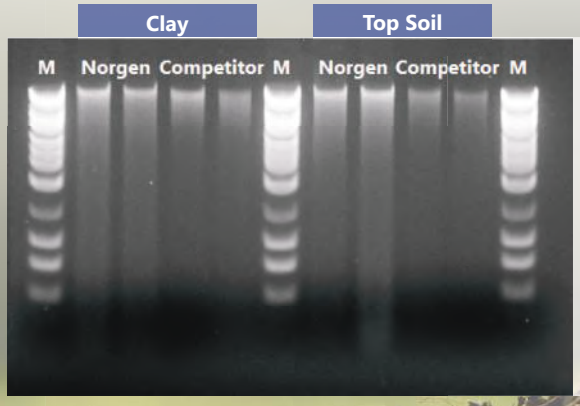


Figure 1. Comparison of DNA Yield from Top Soil and Clay Samples. Norgen's Soil DNA Isolation Plus Kit (Cat. 64000) and Competitor M's kit were used to isolate DNA from 250 mg of top soil and clay samples. Following isolation, 10 µL from each 100 µL elution was loaded on 1% TAE agarose gel. Lane M: Norgen's HighRanger 1kb DNA Ladder.

DNA Concentration (ng/µL)

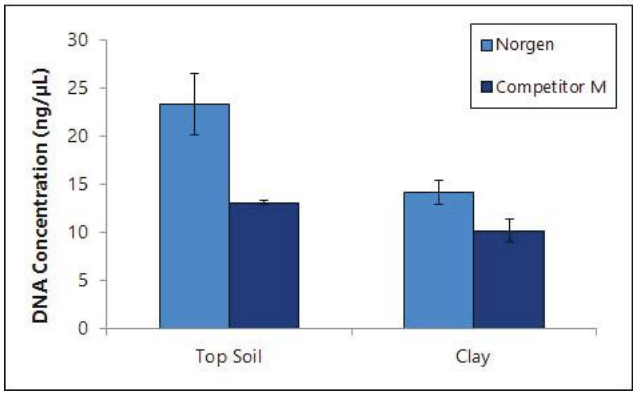


Figure 2. Comparison of DNA Concentration Isolated from Top Soil and Clay Samples. Norgen's Soil DNA Isolation Plus Kit (Cat. 64000) and Competitor M's kit were used to isolate DNA from 250 mg top soil and clay samples. Norgen's kit showed higher DNA concentrations for both samples in comparison to the competitor kit.

16s rRNA Detection (TaqMan)

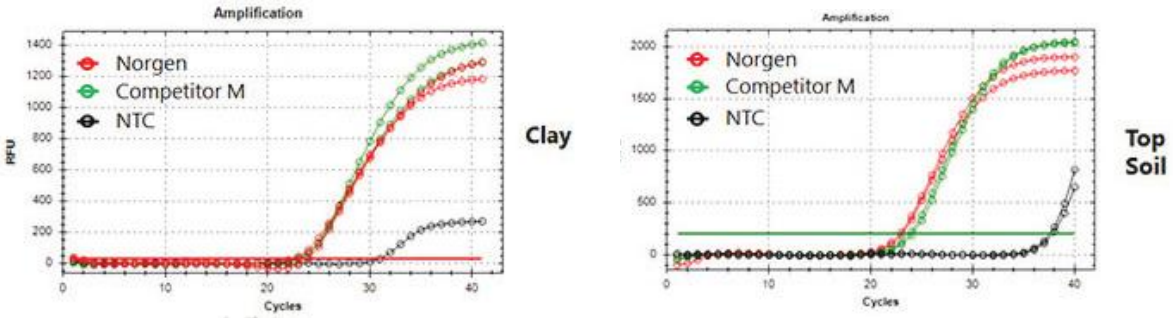


Figure 3. High Quality DNA confirmed by Real-time PCR. Soil DNA was isolated from 250 mg of clay (containing low humic acids) and top soil (containing high humic acids) samples using Norgen's Soil DNA Isolation Plus Kit and Competitor M's Kit. DNA quality was confirmed by Real-time PCR using 4 µL of soil DNA (total PCR reaction volume was 20 µL) to detect 16s rDNA from different soil samples. The earlier Ct value with Norgen's DNA samples (red lines) compared to Competitor M's samples (green lines) indicated a higher quality of soil DNA for downstream applications.

Comparison of Microbial Profiles from Soil Samples

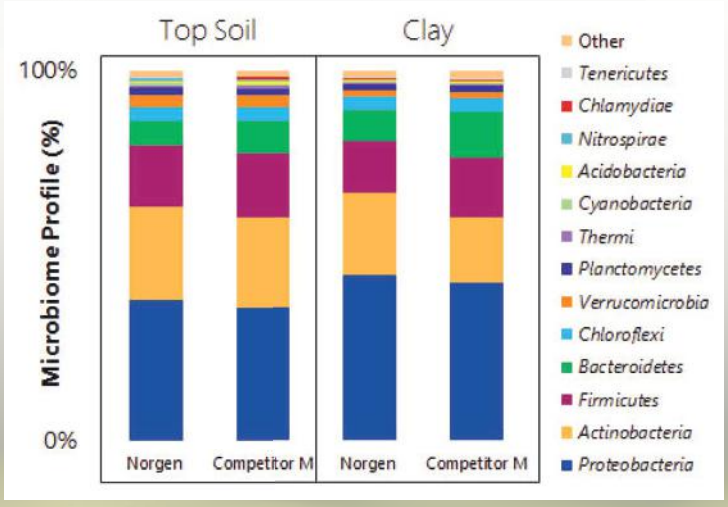


Figure 4. Microbial profiles from soil samples (clay and top soil) isolated using Norgen's Soil DNA Isolation Plus Kit (Cat. 64000) and Competitor M's kit. The relative abundance of phylum-level classifications indicates the efficiency of DNA isolation and the qualityof DNA. 16S rRNA genes (v3-4 region) were amplified and the amplicons were sequenced on Illumina® MiSeq™ (MiSeq Reagent Kit v3) using Norgen's 16S Metagenomic workflow with Illumina 16S Metagenomics Pipeline (v1.0.1).

Soil DNA Isolation Maxi Kit

Norgen's **Soil DNA Isolation Maxi Kit** provides a convenient and rapid method for the detection of microorganisms from large soil samples (up to 10 grams). All types of soil samples can be processed with this kit, including common soil samples and difficult soil samples with high humic acid content such as compost and manure. The kit removes all traces of humic acid using the provided Humic Acid Removal Column and the OSR (Organic Substance Removal) Solution. A simple and rapid spin column procedure is then used to further purify the DNA. Total genomic DNA can be isolated and purified from all the various microorganisms found in soil, such as bacteria, fungi and algae. The purified DNA is of the highest quality and is fully compatible with downstream PCR and NGS applications, as all humic acid substances and PCR inhibitors are removed during the isolation.

- Rapid and convenient method to detect microorganisms in up to 10 g of soil samples
- Process all soil types
- Efficiently remove organic substances using the OSR Solution
- Remove all humic acid from DNA samples using the Maxi Humic Acid Removal Columns
- Fast and easy processing using a rapid spin-column format
- Isolate high quality total DNA from a variety of microorganisms including bacteria, fungi and algae

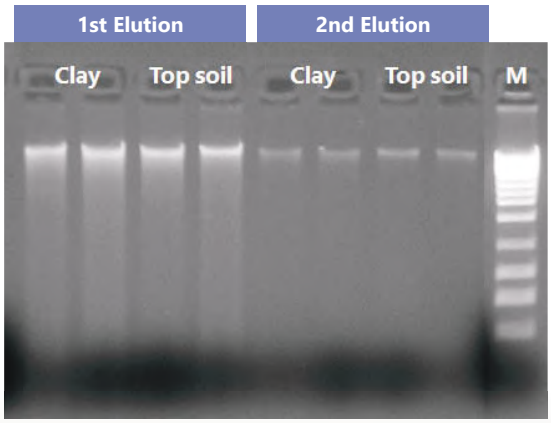


Figure 1. Resolution of DNA isolated from 10 g of two different soil types; regular soil (clay) and high humic acid soil (top soil) using Norgen's Soil DNA Isolation Maxi Kit. For evaluation, 10 µL from the 1st elution (2 mL) and 2nd elution (2 mL) from each soil sample was run on 1X TAE 1.2% agarose gel. Excellent DNA integrity and yield were observed from the Soil DNA Isolation Maxi Kit. Marker = Norgen's HighRanger DNA Ladder (Cat. 11900)

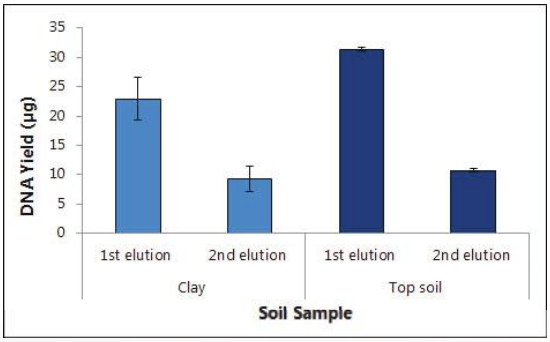


Figure 2. Difference in DNA yield between two soil types (clay and top soil) and elutions (1st and 2nd elution). Ten grams of soil was processed using Norgen's Soil DNA Isolation Maxi Kit. The second elution increased the total DNA yield by an additional 20-30%.

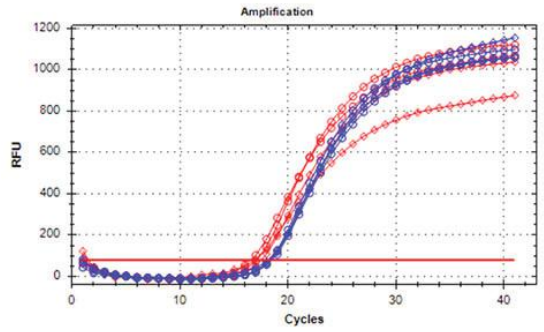


Figure 3. High soil DNA quality was confirmed by real-time PCR using 8 µL of soil DNA (total PCR reaction volume was 20 µL) isolated using Norgen's Soil DNA Isolation Maxi Kit to detect 16s rDNA. The 16s rRNA gene was successfully amplified in both the first elution (red) and second elution (blue) from two soil types (Clay = circle, Top soil = diamond) without PCR inhibition, indicating the excellent soil DNA quality from 10 grams of soil.

Soil DNA Isolation 96-well Kit

Norgen's **Soil DNA Isolation 96-Well Kit** provides a fast, reliable and simple procedure for high throughput isolation of DNA from all types of soil samples including common soil samples and difficult soil samples with high humic acid content such as compost and manure. A combination of chemical and physical homogenization effectively lyses all microorganisms in the soil sample, and the kit removes all traces of humic acid using the provided Organic Substance Removal (OSR) Solution and Humic Acid Removal plate (HAR). Total genomic DNA can be isolated and purified from all the various microorganisms found in soil, such as bacteria, fungi and algae. The purified DNA is of the highest quality and is fully compatible with downstream PCR applications for any metagenomic study, as all humic acid substances and PCR inhibitors are removed during the isolation.

- Fast and easy high throughput processing using either a vacuum manifold or centrifugation
- Process all soil types including clay, loam, sandy soils and high humic content soils such as peat, compost and manure
- Remove organic substances using the OSR Solution
- Remove all humic acid from DNA samples using the Humic Acid Removal plate
- Isolate high quality total DNA from all soil types - ready for any downstream PCR, qPCR
- Excellent DNA for metagenomic studies
- No phenol or chloroform extractions

Procedure

Consistent Yield of High Quality DNA

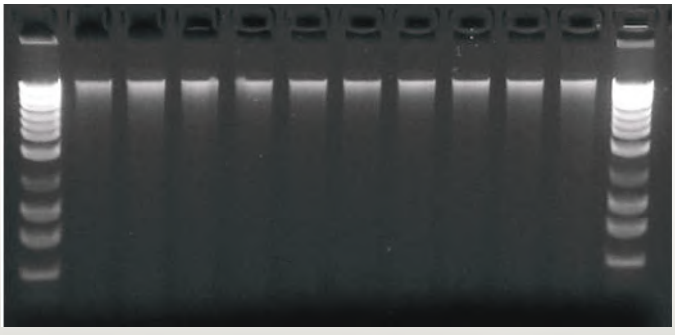


Figure 1. Consistent Yield of High Quality of Soil DNA. Total soil DNA was isolated from gardening top soil samples using Norgen's Soil DNA Isolation 96-Well Kit. For analysis, 10 µL from each 100 µL elution from 10 different wells was run on a 1.2% TAE agarose gel. Lane M is Norgen's High Ranger DNA ladder.

Consistent and High Quality DNA

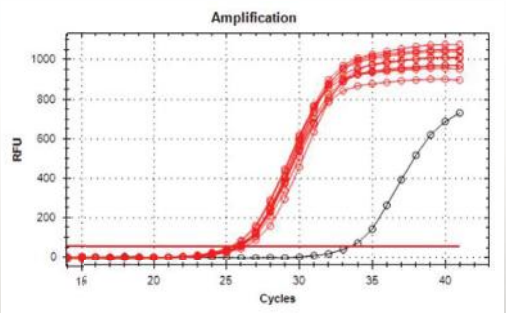
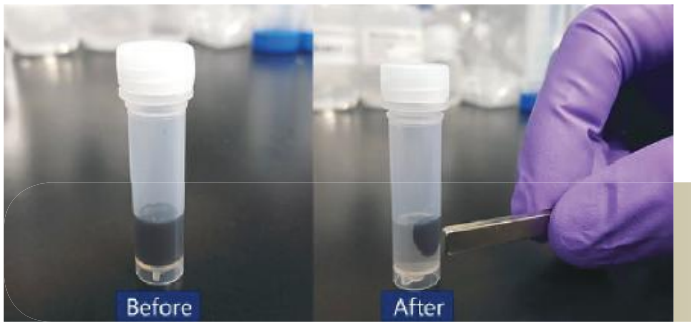


Figure 2. Consistent and high DNA quality. Total DNA was isolated from gardening top soil using Norgen's Soil DNA Isolation 96-Well Kit. For analysis of DNA quality, 3 µL from each 100 µL elution was used as the template in a real-time PCR reaction (SYBR Green) for the detection of the 16s rDNA. All DNA template from different wells showed a consistent Ct, indicating the consistent high DNA quality and yield. Black circle: NTC.

Soil DNA Isolation Kit (Magnetic Bead System)

Norgen's **Soil DNA Isolation Kit (Magnetic Bead System)** provides a fast and reproducible method for isolating genomic DNA from soil samples. All types of soil samples can be processed with this kit, including common soil samples and difficult soil samples with high humic acid content such as compost and manure. The kit removes all traces of humic acid using the provided the OSR (Organic Substance Removal) Solution. Total genomic DNA can be isolated and purified from all the various microorganisms found in soil, such as bacteria, fungi and algae. The purified DNA is of the highest quality and is fully compatible with downstream PCR applications, as all humic acid substances and PCR inhibitors are removed during the isolation.

- Fast and easy processing using a magnetic bead system
- Robust lysis system (chemical lysis combined with a mechanical homogenization)
- Isolate high quality genomic DNA
- High yields - Consistent, high yields of inhibitor-free DNA up to 50 kb plus
- Isolate sequencing quality total DNA from a variety of microorganisms including bacteria, fungi and algae
- Also available in a 96-well format that can be integrated with a robotic automation system



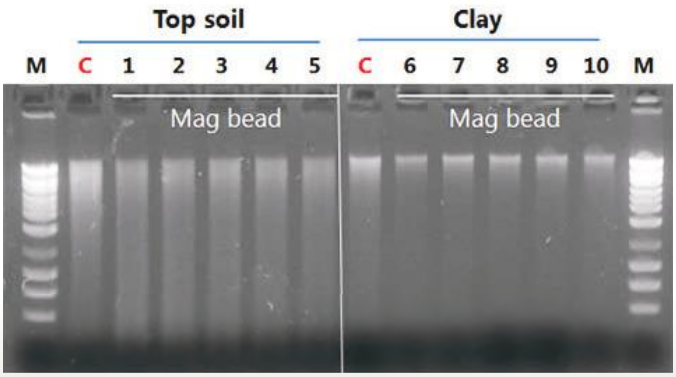


Figure 1. Resolution of DNA isolated from two different types of soil samples. DNA was isolated from high humic acid soil (top soil) and regular soil (clay) using Norgen's column-based Soil DNA Isolation Kit (Red C) and Norgen's Soil DNA Isolation Kit (Magnetic Bead System) (Mag Bead). For evaluation, 10 µL from the 75 µL elution was run on 1X TAE 1.2% agarose gel. Excellent DNA integrity and yield were observed from the Soil DNA Isolation Kit (Magnetic Bead System), indicating the robust performance comparable to the column based method. Marker = Norgen's HighRanger DNA Ladder.

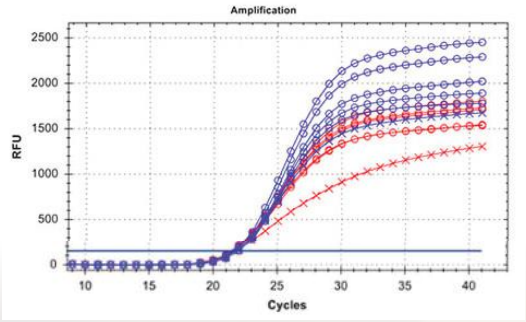


Figure 2. High soil DNA quality was confirmed by real-time PCR using 8 µL of soil DNA (total PCR reaction volume was 20 µL) isolated using Norgen's Soil DNA Isolation Kit (Magnetic Bead System) to detect 16s rDNA. PCR results from Norgen's Soil DNA Isolation Kit (Magnetic Bead System) (circle) were comparable to Norgen's column based Soil DNA Isolation Kit (cross) and showed the successful 16s rDNA detection without PCR inhibition, indicating the excellent soil DNA quality using Norgen's Soil DNA Isolation Kit (Magnetic Bead System).

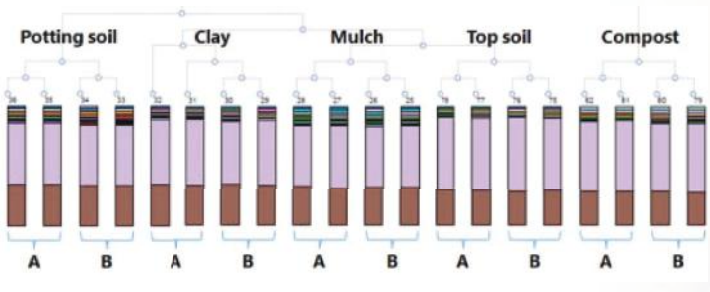


Figure 3. Hierarchical Clustering Dendrogram. High quality of soil DNA was successfully isolated from the 5 challenging soil types using Norgen's Soil DNA Isolation Kits (A: Soil DNA Isolation Kit (Magnetic Bead System) and B: Soil DNA Isolation Kit Spin Column) respectively. The Hierarchical Clustering Dendrogram is based on genus-level classifications and shows the relative abundance of its genus-level classifications among soil types.

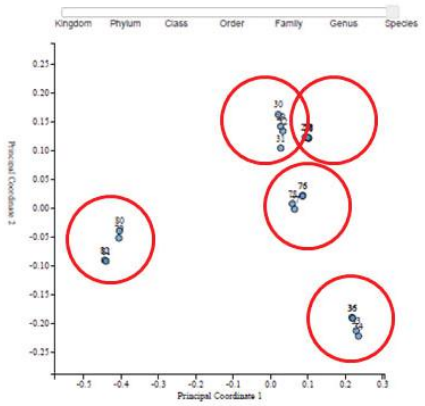


Figure 4. Principal Coordinate Analysis (PCoA) generated by Illumina MiSeq. Principal Coordinate Analysis of 20 samples (25-28: Mulch, 29-32: Clay, 33-36: Potting soil, 76-78: Top soil, 79-82: Compost) showing differences in the distribution of taxonomic classifications between samples up to species level. Each soil type is clearly clustered together and away from other types.

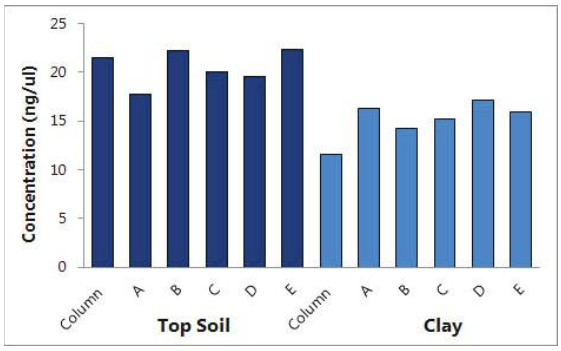


Figure 5. Two of Norgen's soil DNA isolation methods (Column vs Magnetic Bead System) were compared for DNA concentration. All DNA elutions isolated using Norgen's Soil DNA Isolation Kit (Magnetic Bead System) [A to E] showed a comparable DNA concentration to Norgen's Soil DNA Isolation Kit (Column Method; Cat. 26500), indicating the consistent and robust performance of the Soil DNA Isolation Kit (Magnetic Bead System).

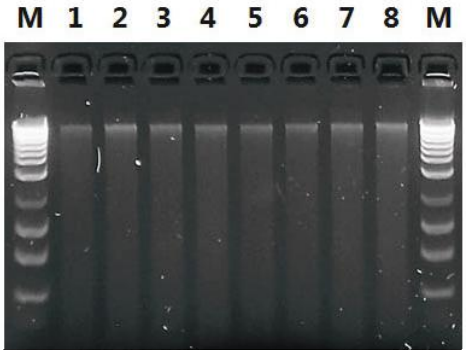


Figure 6. Resolution of DNA Isolated from Top Soil. DNA was isolated from high humic acid soil (top soil) using Norgen's Soil DNA Isolation 96-Well Kit (Magnetic Bead System). For evaluation, 10 µL from the 75 µL elution was run on 1X TAE 1.2% agarose gel. Excellent DNA integrity, consistency and yield were observed from the Soil DNA Isolation 96-Well Kit (Magnetic Bead System). Marker = Norgen's HighRanger DNA Ladder (Cat. 11900).

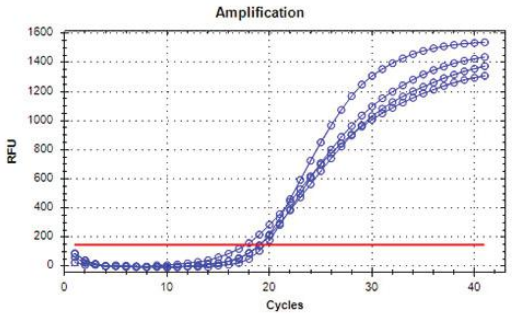


Figure 7. High Soil DNA Quality Was Confirmed By Real-time PCR Using 2 µL of Soil DNA (Total PCR Reaction Volume Was 20 µL) Isolated Using Norgen's Soil DNA Isolation 96-Well Kit (Magnetic Bead System) to Detect 16s rRNA. PCR results from Norgen's Soil DNA Isolation 96-Well Kit (Magnetic Bead System) showed the successful 16s rRNA detection without PCR inhibition, indicating the excellent soil DNA quality using Norgen's Soil DNA Isolation 96-Well Kit (Magnetic Bead System).

Ordering Information

Description	Size	Cat. No
Soil DNA Isolation Plus Kit	50 preps	64000
Soil DNA Isolation Plus Kit	100 preps	64060
Soil DNA Isolation Maxi Kit	10 preps	62000
Soil DNA Isolation 96-Well Kit	2 x 96-well plates	26560
Soil DNA Isolation Kit (Magnetic Bead System)	50 preps	58100
Soil DNA Isolation 96-Well Kit (Magetic Bead System)	2 x 96-well plates	62800

For more detailed information on this product please scan the QR code with your mobile device.

For more information
SCAN HERE

Biofilm DNA Isolation Kit

Cat No. 62300

- No phenol or chloroform extractions
- Yields high quality DNA that is ready for PCR and other downstream applications

Rapid and convenient method to isolate genomic DNA from different types of biofilm and biofilm forming-bacteria

Norgen's **Biofilm DNA Isolation Kit** is designed for the rapid preparation of genomic DNA from biofilm. Genomic DNA is efficiently extracted from the biofilm by a combination of heat treatment, detergents and the use of provided Bead Tubes. The kit is able to remove known PCR inhibitors typically found within the biofilm, including humic acid. The purified genomic DNA is fully digestible with all restriction enzymes tested, and is completely compatible with downstream applications such as PCR and Southern Blot analysis. Preparation time for a single sample is less than 45 minutes, and each kit contains sufficient materials for 50 preparations.

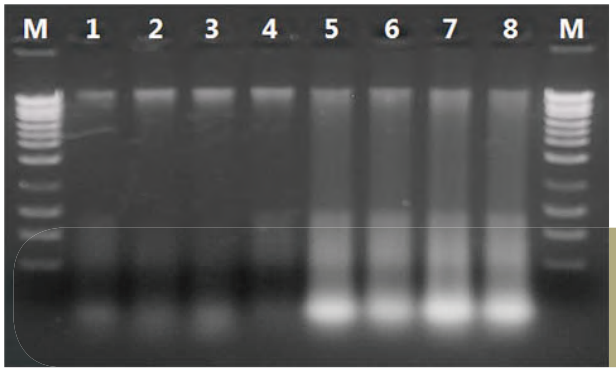


Figure 1. High quality and yield of DNA from biofilm formed by two different species, *Komagataeibacter xylinus* (1-4), *Komagataeibacter hansenii* (5-8). Total DNA was isolated from 200 mg of biofilm using Norgen's Biofilm DNA Isolation Kit. For evaluation, 10 µL of each 100 µL DNA elution was run on a 1.2 % agarose gel. Note the high yield and quality of the DNA in all lanes. Lane M: Norgen's HighRanger 1 kb DNA Ladder (cat. 11900).

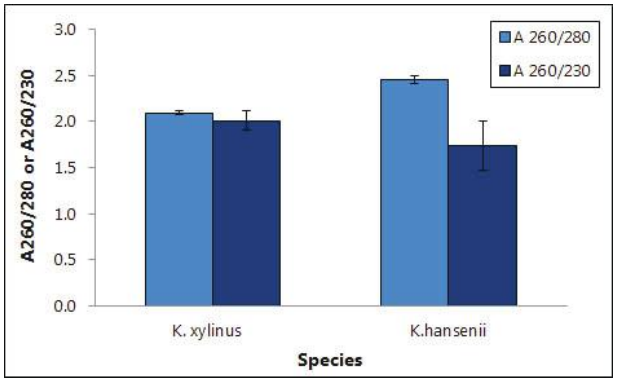


Figure 2. High DNA quality. DNA was isolated from a number of bioflim using Norgen's Biofilm DNA Isolation Kit. All DNA elutions isolated using Norgen's Biofilm DNA Isolation Kit showed an excellent DNA quality indicating the consistent and robust performance of the Biofilm DNA Isolation Kit.

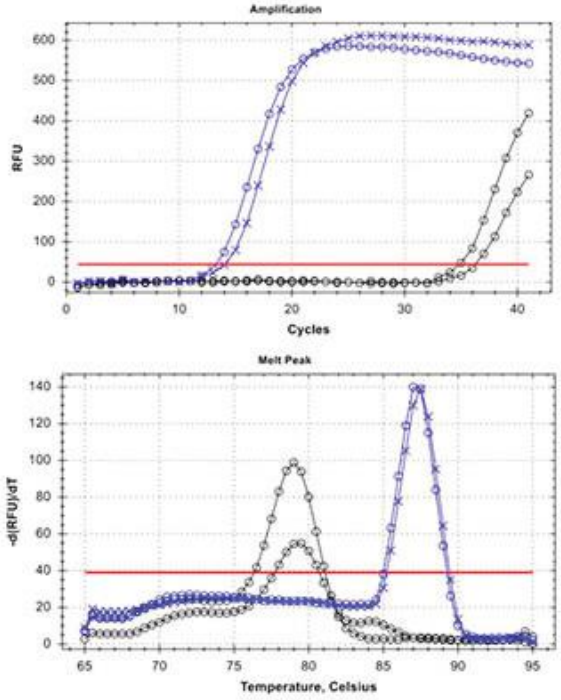


Figure 3. Amplification of bacterial cellulose synthesis (bcs), a gene from *Komagataeibacter xylinus* (circle) and *Komagataeibacter hansenii* (cross). From 100 µL elution, 5 µL of biofilm DNA was directly added to real-time PCR master mix (total reaction volume 20 µL), and the real-time SYBR Green PCR reaction was performed. The bcs gene was successfully amplified from the different samples without any inhibition and at the same Ct, indicating the excellent quality of biofilm DNA for downstream applications.

Ordering Information

Description	Size	Cat. No
Biofilm DNA Isolation Kit	50 preps	62300

For more detailed information on this product please scan the **QR code** with your mobile device.

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Ordering Information

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