MACHEREY-NAGEL

NucleoMag® Plant

Automated purification of genomic DNA from plant samples on the HAMILTON® Nimbus® Presto workstation

Introduction

The efficient and rapid isolation of genomic DNA from a wide range of plant samples is an integral step in plant research and plant breeding facilities. Molecular biological approaches such as CRISPR/Cas9, TILLING (Targeting Induced Local Lesions in Genomes), simple sequence repeat (SSR) or quantitative trait loci (QTL) mapping analyses often demand a reliable high throughput genomic DNA extraction for screening purposes.

Two common problems regarding DNA extractions arise in this setting: Low quality of the isolated DNA due to secondary metabolites present in plant samples and limited sample throughput.

In this application note we address both of these problems by combining the MACHEREY-NAGEL NucleoMag® Plant kit with the Hamilton® Nimbus® Presto workstation.

The solution delivers pure DNA from up to 96 samples in 70 minutes, ready to be used in the downstream application of your choice.

Your advantages at a glance

- Proven NucleoMag® lysis and purification procedure suitable for diverse plant samples
- Automated plate prefilling and plate handling by the Hamilton® Nimbus® liquid handling system
- High speed nucleic acid purification by the integrated KingFisher™ Presto instrument
- Continue with downstream application without manual intervention

The Nimbus® Presto workstation combines liquid handling and magnetic rod processing for fully automated, high throughput nucleic acid extractions.

Nimbus® Presto Workstation	
Technology	Automated liquid handling platform (Hamilton® NIMBUS) with integrated magnetic rod processing unit (KingFisher™ Presto)
Capacity	1–96 samples (≤ 200 µL sample volume)
Processable volume	50–5000 µL
Footprint	L 1359 mm | W 709 mm | H 889 mm

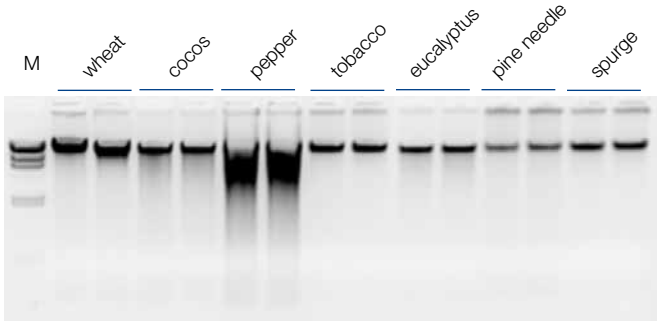
NucleoMag® Plant	
Technology	Magnetic beads
Sample material	≤ 20–50 mg Plant tissue (wet weight)
Elution volume	50–200 µL
Fragment size	300 bp–approx. 50 kbp
Preparation time	Approx. 70 min (excl. lysis) / 96 samples

Material and Methods

The NucleoMag® Plant kit is designed for isolation of plant DNA from diverse plant species. Up to 50 mg homogenized plant material (e.g. leaf, root) can be used as input for the extraction. The Lysis Buffer MC1 contains CTAB for efficient removal of polysaccharides. The subsequent isolation is based on reversible adsorption of nucleic acids to paramagnetic beads (NucleoMag® C-Beads). Nucleic acid binding is enabled by addition of Binding Buffer MC2. After magnetic separation and removal of the supernatant, contaminants and salts are removed by subsequent washing steps. The NucleoMag® C-Beads are air dried before highly pure nucleic acids are finally eluted under low ionic strength conditions in Elution Buffer MC6.

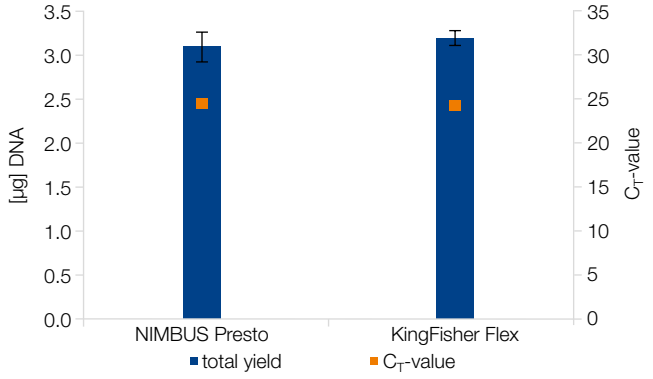
We demonstrate this automated purification workflow for different sample materials including leaves and roots exemplarily. The tailored protocol allows flexible processing of up to 96 samples per run.

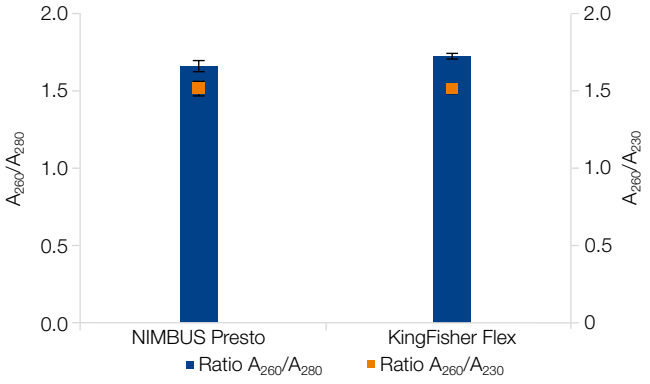
Application data



Isolation of genomic DNA from diverse plant materials

Genomic DNA was isolated using the NucleoMag® Plant kit on the Nimbus® Presto workstation with seven different plant materials, among them challenging materials containing high amounts of fats (cocos), essential oils (pine needle, euwcalyptus), polysaccharides or other metabolites, like nicotin (tobacco). High molecular weight DNA was successfully isolated from all samples- Pepper yielded the largest amount of DNA. Pine needles contain substantially lower amounts of DNA.





Competitive DNA yield, purity and PCR performance from plant samples

Genomic DNA was isolated from 20 mg fresh leaves (n = 8) using the NucleoMag® Plant kit on the Nimbus® Presto workstation and the KingFisher Flex system. Both platforms deliver comparable DNA yields (left figure; bars) and purities (right figure; bars = $A_{260/280}$, squares = $A_{260/230}$). The performance in a downstream qPCR assay is equivalent (left figure; squares). qPCR analysis was performed with a Taqman® Probe for a 103 bp actin amplicon using the SensiFast™ Probe Lo-ROX kit from Bioline on an Applied Biosystems® 7500 Real-Time PCR System.

A rapid, fully automated solution for DNA isolation from plant samples

MACHEREY-NAGEL and Hamilton® deliver a tailored solution for your high throughput genomic DNA extractions from plant samples.

Here, we demonstrate the successful use of the NucleoMag® Plant kit for isolation of plant DNA from diverse species and organs and subsequent PCR analysis.

The powerful combination of the NucleoMag® technology and the Nimbus® Presto workstation has several advantages over standard nucleic acid purification procedures:

- Save hands-on time by using automated plate-prefilling and plate-handling performed by the NIMBUS® workstation
- Benefit from the high-speed extraction procedure of the integrated KingFisher™ Presto unit
- Reliable yields and performance in downstream assays

Ordering information

Product	Specifications	Pack of	REF
NucleoMag® Plant	Magnetic bead-based kit for the isolation of genomic DNA from plant samples; including NucleoMag® C-Beads, buffers, RNase A, Elution Plate U-bottom	1 x 96 preps	744945.1
		4 x 96 preps	744945.4
		24 x 96 preps	744945.24
Nimbus® Presto	Automated liquid handling platform with 4 pipetting channels, a CO-RE gripper, barcode scanner, and many additional features		Hamilton*

* For more detailed information, please visit www.hamiltoncompany.com/robotics. To find a Hamilton® subsidiary or distributor in your area, please visit www.hamiltoncompany.com/contacts.