Plant and Crop DNA Extraction Performance

High-throughput DNA extraction workflows for diverse plant and crop samples used in SNP genotyping and next-generation sequencing pipelines.

Note: Data on seed and grain performance can be found in the Seed and Grain Dataset

Performance Summary

METRIC	RESULT
SPECIES TESTED	Wheat, Pine, Citrus, Grapevine, Soybean, Rice, Maize, Sunflower, Oat
SAMPLE TYPES TESTED	Leaves, needles, seeds, grain
TYPICAL YIELD	5ng/µL – 50ng/µL (dsDNA, fluorescence-based quant – Qubit)
INPUT MASS	5-70mg
FRAGMENT SIZE	10-25kb
FORMAT	Magnetic Bead, 384/96 Filter Plate
AUTOMATION COMPATIBILITY	KingFisher, Hamilton, Tecan, Vacuum Manifold

Large-scale plant and crop genotyping programs require DNA extraction workflows that deliver consistent DNA yield and fragment integrity at high throughput while maintaining low per-sample costs.

Sample types such as seeds, leaf tissue, grain or kernels, roots, seedlings, and pollen vary in cellular composition and often contain inhibitors such as polysaccharides, polyphenols, and starches that can affect downstream assays.

Azora Biosciences has developed extraction workflows optimised for plant and crop samples across cereals, oilseeds, legumes, fibre crops, and horticultural species, supporting high-volume genotyping pipelines used in breeding programs, seed testing, trait screening, and agricultural diagnostics.

Core DNA Extraction Technology

Samples are lysed using proprietary buffer systems incorporating surfactants and polymer-based additives to efficiently disrupt plant cell walls and membranes while mitigating the effects of polyphenols and other inhibitory compounds. RNA depletion can be incorporated during the lysis phase to reduce RNA carryover. DNA is subsequently captured via alcohol-mediated binding to silanol or carboxyl functionalized solid phases, using either magnetic beads or 384-well filter plates. Multiple wash steps are applied to remove polysaccharides, proteins, and residual inhibitors, followed by elution in a customized buffer system designed for compatibility with downstream genotyping and sequencing workflows.

Fluorescence-quantified dsDNA Yields

Species	Sample Type	Binding Technique	Yield (dsDNA, Qubit, ng/µL)	Fragment Size Peak
Radiata Pine	25mg, fresh needle	Magnetic Beads (-COOH)	31.9	Not Available
Citrus	20mg, dried leaf	Magnetic Beads (-COOH)	5.2	Not Available
Grapevine	25mg, dried leaf	Magnetic Beads (-COOH)	42.2	Not Available
Soybean	5mg fresh leaf	Magnetic Beads (-COOH)	5.0	27.3kb
Rice	5mg fresh leaf	Magnetic Beads (-COOH)	6.3	Not Available
Maize	5mg fresh leaf	Magnetic Beads (-COOH)	9.8	Not Available
Sunflower	5mg fresh leaf	Magnetic Beads (-COOH)	5.4	14.9kb
Wheat	5mg fresh leaf	Magnetic Beads (-COOH)	9.2	16.1
Barley	5mg fresh leaf	Magnetic Beads (-COOH)	6.5	18.6kb
Barley	20mg fresh leaf	Magnetic Beads (-COOH)	20.2	16.6kb
Soybean	5mg fresh leaf	384-well Filter Plate, *Guanidine-free formulation*	29.3	10.6kb
Radiata Pine	25mg, fresh needle	384-well Filter Plate	11.3	Not Available
Lime	25mg, fresh leaf	384-well Filter Plate	5.8	Not Available
Oat*	70mg grain*	Magnetic Beads (-COOH), RNA-depleted	15.4	Not Available
Soybean*	5mg seed*	Magnetic Beads (-COOH)	11.0	Not Available

Note: DNA yields are quantified using fluorescence-based dsDNA assays (Qubit), which measure only double-stranded DNA. Spectrophotometric methods (A260) commonly used in competitor specifications may overestimate DNA yield due to co-quantification of RNA and other contaminants.

***For additional data on seed and grain performance, please see the Seed and Grain Dataset**

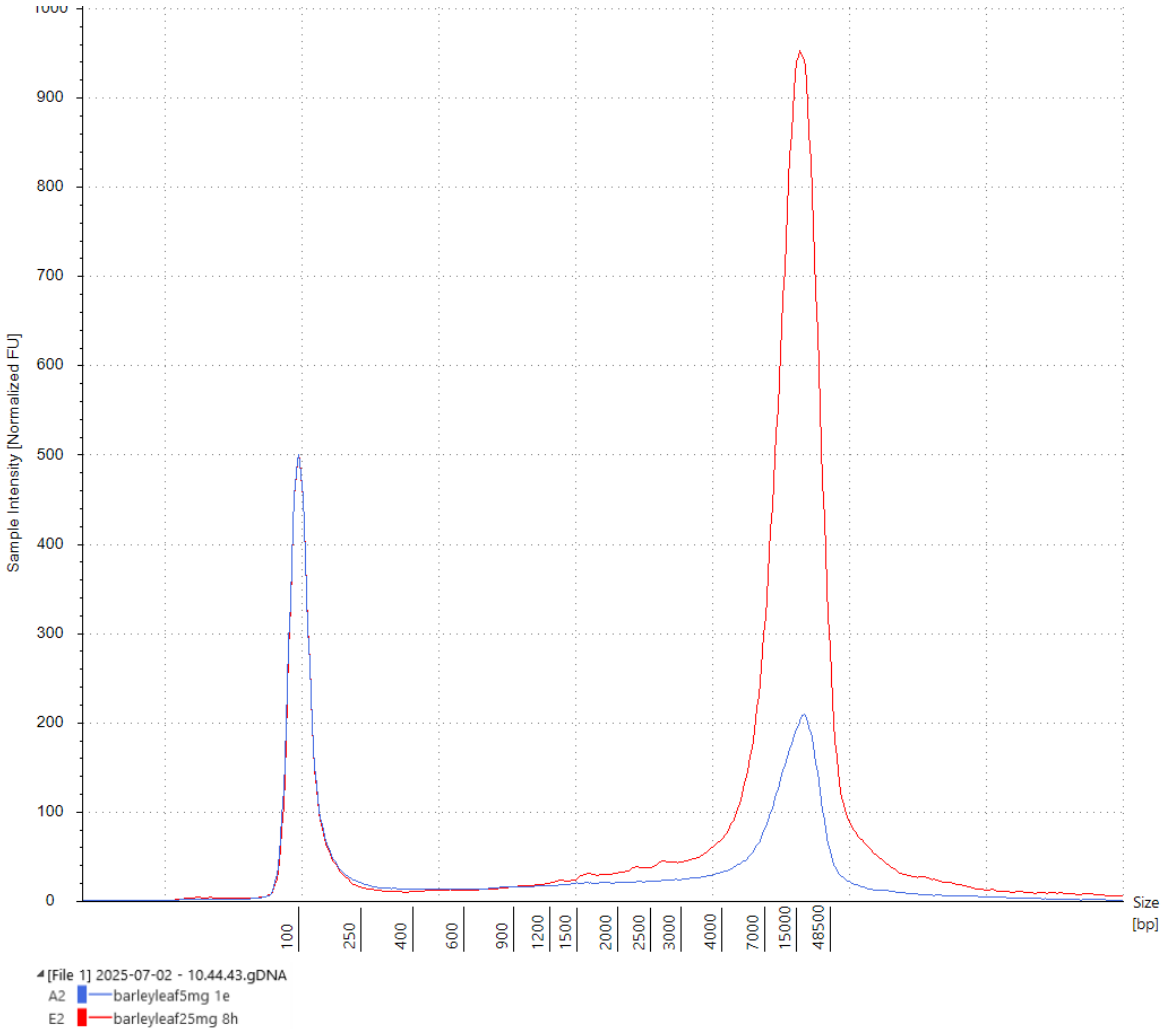

Figure 1. Fragment size distribution of 5mg (blue) and 25mg (red) barley leaf samples.

Downstream Genotyping Compatibility

- SNP Genotyping Microarrays (Infinium, Axiom)
- Sequence-Based Genotyping inc. WGS, genotyping-by-sequencing (GBS), and targeted NGS
- PCR-based SNP genotyping (KASP, PACE, TaqMan, HRM)

Use Cases

- Plant breeding programs
- Marker-assisted selection (MAS) and genomic selection

- Variety identification and seed purity testing
- Trait screening and validation
- Agricultural and crop diagnostics