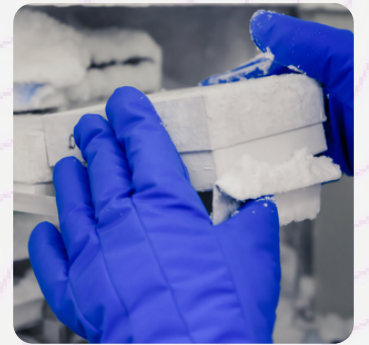


The **bionivid** Science Blog

THE SCIENCE OF SAMPLE HARVESTING

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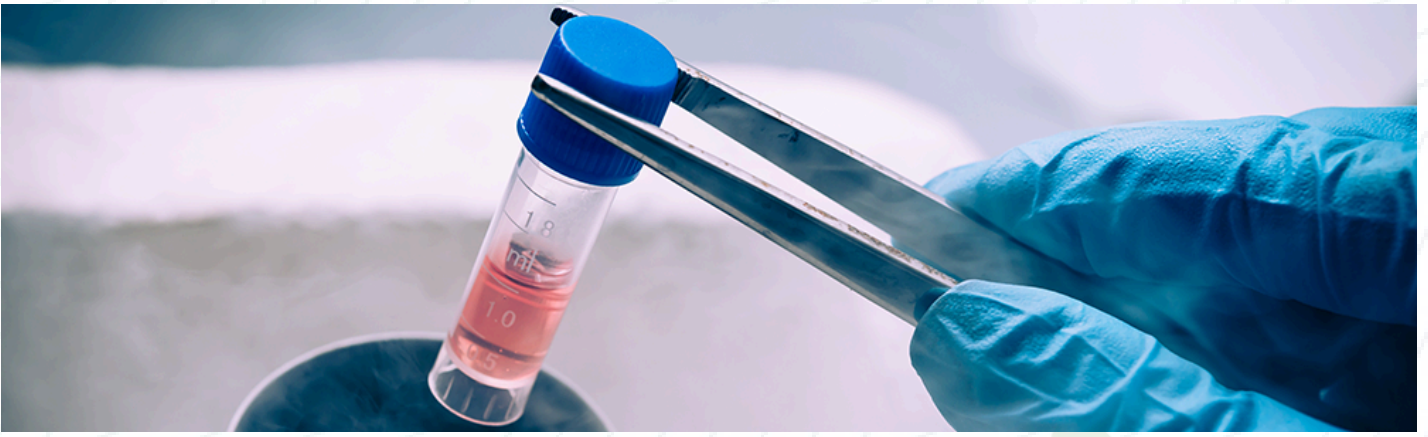


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In the rapidly evolving domain of genomics, innovations that transform medical, agricultural, and environmental sciences invariably commence with a fundamental procedure—*sample harvesting*. Although it often remains underappreciated, the fidelity of a sample constitutes the bedrock upon which every significant advancement is established. Spanning the spectrum from flora and fauna to microorganisms, the intricate practice of sample harvesting is essential for guaranteeing that the invaluable genetic material we procure is preserved in an uncontaminated and intact state, thus making it appropriate for the complex requirements of Next-Generation Sequencing (NGS).

Let's explore why the process of sample harvesting is far more than just a procedural task—it's a critical step that sets the stage for genomics research.

The Underappreciated Significance of Sample Harvesting:

Sample harvesting is a meticulous process that requires an understanding of both the biological material and the downstream analysis techniques. Whether you are studying plant genetics, animal physiology, or microbial ecosystems, the way a sample is harvested directly impacts the quality of NGS data. In essence, this first step is not merely the collection of biological material but an investment in the quality of the research.



Plant Samples: From Field to Freezer

Choose Your Green Gold

Young leaves and meristematic tissues are the gold standard for plant sampling. They're rich in nucleic acids and metabolically active. Mature midrib sections? Skip them—they've had their time to shine.

Timing is Key

Early mornings aren't just for coffee. Collect your samples at dawn when plants are hydrated, as this preserves RNA and DNA integrity. Bonus: the calm hours make for an optimal fieldwork experience.

Sterility is Next to Accuracy

Using sterile scissors or scalpels ensures that your samples stay pure and uncontaminated. Think of it as suiting up for a clean battle against potential microbial intruders.

Preserve Like a Pro

Snap-freezing in liquid nitrogen is the ultimate preservation method, locking in nucleic acids for the long haul. Can't freeze? Opt for RNA-stabilizing agents like RNAlater or TRIzol. It's the equivalent of giving your samples a high-tech time capsule.

Precision in Size

100 mg to 1 g of fresh tissue is the sweet spot for downstream analysis. Too much material can overwhelm extraction processes, while too little may leave you with insufficient data.

Label with Intent

A well-labeled sample is a well-prepared one. Include species name, collection date, specific plant part, location, and collector details. Your future self—and your research collaborators—will thank you for the clarity.



Animal Samples: From Collection to Cold Storage

Blood's Role

Blood is the go-to sample for many studies, but you've got to keep it cool (literally and figuratively). Use sterile techniques and anticoagulant-coated tubes like EDTA, heparin, or citrate to prevent clotting and keep those precious nucleic acids intact.

Tissue Samples: Small Size, Big Impact

Tissue collection is like solving a mystery—each sample holds vital clues! Use sterile instruments to grab 50-100 mg from key areas, and remember, speed and precision are crucial for the best results!

The Many Faces of Animal Samples

It's not all about blood and tissue—fecal samples offer a peek into digestion and microbiomes, while saliva is as simple as a sterile swab. Need hair or fur? A quick snip with sterilized scissors, and you're good to go!

Preserve Like a Pro

Time is critical! Snap-freezing at -80°C is the gold standard for preserving nucleic acids and proteins. If freezing isn't immediate, RNAlater can protect RNA until you're ready to process it.

Label Like You Mean It

Don't skip the details! Each sample needs clear labeling with species, collection date, location, and collector's name to ensure traceability and accurate future analysis.

Collecting animal samples for research isn't just about getting the right tissue—it's an art form that combines technical expertise with ethical responsibility.



Microbial Samples: From Culture to Storage

Microbial sample collection might sound like a routine, but nailing it requires precision, a pinch of care, and a dash of scientific savvy.

Bacteria

Bacteria are at their prime during the logarithmic (log) phase—when they're metabolically buzzing and dividing like there's no tomorrow. Harvest them by centrifuging liquid cultures at $4,000 \times g$ for 10 minutes to form a neat pellet. Resuspend that precious pellet in lysis buffer, and you're ready for extraction.

Pro Tip: To hit that sweet spot of DNA or RNA yields, aim for about 1×10^8 cells.

Fungi

Mycelium or fruiting bodies—whatever your fungal flavour, collection requires sterile scalpels or forceps. Handle with care to avoid damaging the genetic material, and don't skimp on storage. Snap-freeze in liquid nitrogen or stash them at -80°C to keep nucleic acids intact and happy.

The Golden Rules of Microbial Mastery

Stay Sterile: Flame-sterilized tools, aseptic techniques, and laminar flow hoods are your squad against contamination.

Freeze Fast: Liquid nitrogen is your ally for long-term preservation.

Metadata is Magic: Document everything—strain, date, location. Future-you will thank you when you're deep into analysis.



The Art of Preservation: Ensuring Sample Quality

Once a sample is harvested, preserving its integrity is the next challenge. RNA is particularly sensitive, requiring immediate stabilisation, while DNA requires careful handling to avoid degradation.

RNA Preservation

Methods such as RNAlater, ethanol-based solutions, and TRIzol reagent help maintain RNA integrity at various temperatures, with snap-freezing at -80°C being the gold standard for long-term storage.

DNA Storage

Similar to RNA, DNA can be preserved through snap-freezing or the use of stabilising reagents, ensuring minimal degradation for downstream analysis.

Conclusion: The Science Starts Here

In the race to unlock the secrets of life through genomics, sample harvesting is where it all begins. It's not just about collecting a piece of biological material; it's about securing the foundation for every subsequent analysis and discovery. From the precision of plant tissue collection to the ethical considerations in animal sampling, and the sterility required in microbial harvesting, each step demands attention to detail and scientific rigor.

Ultimately, the art of sample harvesting ensures that what we study is a true reflection of the organism's genetic blueprint, providing the highest quality data for transformative discoveries in genomics.

Remember, science starts here—with every carefully harvested, precisely preserved sample.



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