

# Using Tissue Culture to Prevent Hop Latent Viroid (HLVd) Contamination in Cannabis Cultivation Facilities

## Introduction

Hop Latent Viroid (HLVd) has emerged as one of the most significant pathogen threats facing the cannabis and hemp industries. HLVd is a small, infectious RNA molecule that can spread rapidly through cultivation facilities and cause severe reductions in plant vigor, cannabinoid production, terpene expression, rooting success and overall yield. Because infected plants may remain asymptomatic for extended periods, HLVd often spreads undetected through mother plants and clones, making prevention and remediation challenging.

Tissue culture, particularly meristem-tip culture combined with rigorous pathogen testing, has become one of the most effective strategies for preventing and eliminating HLVd contamination in cannabis production. By establishing clean planting stock and reducing pathogen transmission, tissue culture programs can significantly improve biosecurity and long-term genetic preservation.

## How HLVd Spreads in Cannabis Facilities

HLVd is primarily transmitted through vegetative propagation and contamination through contact. Common transmission pathways include contaminated pruning tools, scissors, gloves, irrigation systems and the repeated cloning of infected mother plants. Because commercial cannabis cultivation relies heavily on clonal propagation, a single infected mother plant can distribute HLVd throughout an entire facility.

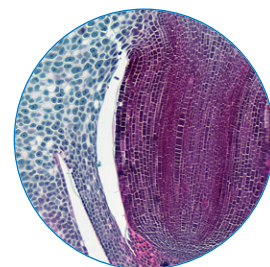
Once established, the viroid can spread rapidly among plants and may remain hidden until production losses become significant. Studies have reported widespread contamination across commercial cultivation operations, emphasizing the importance of clean-stock programs and routine testing.

## Preventing HLVd with Meristem-Tip Culture

Tissue culture involves growing plant material under sterile laboratory conditions on nutrient media. For HLVd remediation, the most important technique is meristem-tip culture. The apical meristem consists of rapidly dividing cells at the shoot tip that often contain little or no viroid material because vascular tissues, where the viroid commonly accumulates, are not yet fully developed.

During the process, technicians excise extremely small meristematic tissues under a microscope and place them into sterile culture media. These tissues can be regenerated into complete plants under controlled conditions. Regenerated plants are subsequently tested using molecular diagnostic methods, such as PCR, to verify the absence of HLVd before being reintroduced into production.

Recent research has demonstrated that combining meristem-tip culture with cold treatment can further improve HLVd eradication rates. In one study involving multiple cannabis cultivars, researchers successfully eliminated HLVd from several infected varieties by using cold environmental conditions, demonstrating the effectiveness of this approach as a remediation strategy.



## Benefits of Tissue Culture for Cannabis Cultivation

Implementing a tissue culture program provides several advantages for cannabis cultivation facilities:

**Establishment of Clean Mother Stock** – Tissue culture enables the creation of pathogen-tested, HLVd-free mother plants that serve as a foundation for propagation programs.

**Reduction of Disease Transmission** – Plants maintained in sterile culture vessels are protected from many common contamination sources, reducing opportunities for pathogen spread.

**Genetic Preservation** – Valuable cultivars can be stored and maintained in vitro while minimizing disease risk and genetic degradation associated with repeated cloning.

**Improved Facility Sanitation Programs** – Tissue culture works synergistically with routine HLVd testing, sanitation protocols, employee training and clean-room propagation practices to create a comprehensive biosecurity system.



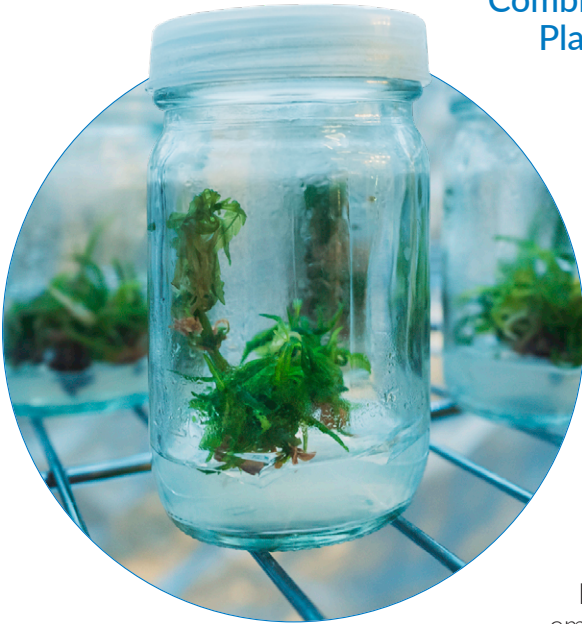
## Best Practices for Preventing HLVd Return

While tissue culture is a powerful remediation tool, preventing reintroduction of HLVd is equally important. Facilities should:

- Maintain dedicated clean-stock propagation areas.
- Routinely test mother plants and propagation material using validated molecular assays.
- Regularly sanitize tools and equipment between contacting different plants.
- Isolate new and incoming plants until testing confirms pathogen-free status.
- Train employees in the identification of contamination risks and prevention procedures.
- Replace infected mother stock with tissue-culture-derived clean plants when necessary.

## Conclusion

Hop Latent Viroid represents a major threat to cannabis cultivation due to its ability to spread silently and significantly reduce crop performance. Tissue culture, particularly meristem-tip culture combined with pathogen testing and thermotherapy, provides a scientifically validated method for producing HLVd-free planting material. By integrating tissue culture into a broader biosecurity program, cannabis cultivation facilities can protect valuable genetics, improve crop health and reduce the economic impact of HLVd contamination.



## Combine Percival Tissue Culture and Plant Growth Chambers to Mitigate Your Risk

For more than 60 years Percival Scientific has been a global leader in the innovative design and manufacture of environmental chambers, including [plant growth chambers](#) and [tissue culture chambers](#). Integrating a Percival tissue culture chamber into your cultivation facility provides an effective risk-mitigation strategy to remediate and prevent HLVd contamination.

Make an investment with even greater impact by combining a tissue culture chamber with Percival's plant growth chambers to maintain a contamination-free and optimized growth environment for your mother plant stock. Incorporating chambers designed for both mature plants and tissue culturing can prevent significant crop losses and investigation headaches.

To learn more about how we can help you mitigate HLVd contamination, [contact us](#) through our website, email [info@percival-scientific.com](mailto:info@percival-scientific.com) or call 800.695.2743.

## References

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