Propagation and Preservation of Cannabis Cultivars Using Tissue Culture

By Alan, CEO at Strainly

When it comes to cannabis propagation, seeds and clones are the most popular types of starting material. However, in conventional horticulture, tissue culture (TC) has been used for a few decades and is now entering the cannabis world. But what are the benefits of TC? What are its limitations? What hopes does the technique bring? And what concerns…?

A Brief Reminder of What Tissue Culture Is

Tissue culture is defined as the controlled aseptic culturing of whole plants, plant cells, tissues, organs and protoplasts. "Aseptic" means free from contaminants such as insects, germs or pathogens. While cloning consists of taking a cutting from the mother plant and giving it a nudge to produce new roots that will eventually give a new plant, potentially passing on pest and pathogens, tissue culturing implies taking a smaller explant that will be sterilized with a chemical solution (usually containing alcohol). The sterilized explant is then placed in a sterile glass container. As such, any contaminant on the surface of the mother plant would have been removed. Simply put, TC consists in micro-cloning inside clean glass containers *in vitro*.

The technique is already used for propagating bananas, rice, and corn and to preserve endangered species of plants. Once mastered, it allows propagating much faster than traditional propagation techniques, at scale.

TC has the potential of drastically impacting cannabis cultivation. [1] Whether its impact will generally be positive or negative on the cannabis industry remains unknown.

Benefits of Tissue Culture

When mastered, TC allows starting from many small fragments of plants that will eventually give clean mature plants. It's aseptic cloning with the potential of propagating on a very large scale, more frequently. Note that, in order to reach this stage, the upfront efforts and costs are significant. TC is probably the most capital-intensive propagation method, but with greater returns.

Like cloning, it provides plants that are identical to each other and to the mother plant, but with the additional benefit of being pest and disease-free, and more vigorous as a consequence.

TC offers the additional benefit of preserving varietals using less space and for a longer period of time. There's no need to explain why this is promising when countless phenotypes have been lost forever during prohibition, and others are still here, but contaminated. Some desired phenotypes *only* exist under contaminated form. With TC, we may be able to clean those contaminated phenotypes, thereby improving their vigorousness, and keeping them alive.

The Lab Perspective

TC allows removing most pest and pathogens that may have come from the mother plant. Does it allow removing pest and pathogens specific to cannabis plants? Only time will tell.

Cannabis varietals have not only been contaminated with pest and pathogens, but also with chemical compounds. We all know about the infamous stories in Canada and California (though it is highly probable that the situation is similar in other geographies) where growers who had never used pesticides had their flowers testing positive simply because they grew from clones that were coming from contaminated mother plants. Can TC help with removing chemical compounds from plant tissues? As far as we can tell, it is unlikely, though there is little literature available on this specific issue. Removing chemical compounds from plantlets would require developing specific TC solutions that would degrade pesticides that are *on* the plant (e.g. that were sprayed). However, systemic pesticides (usually absorbed via the roots and water channels within the plant's tissue) are by definition, *in* the plant's tissue and would therefore be resilient to TC cleaning, in theory. In short, for those varietals that are chemically contaminated, it has not yet been demonstrated that TC addresses the problem.

The Business Perspective

Can TC make financial sense without breeding GMOs? Will TC be made accessible to smaller growers or remain confined to Corporate Cannabis Ag? These are crucial questions for the future of our industry. TC is already used in crop improvement programs for flowers and cereals. The line is usually thin between TC-based crop improvement and GMOs.

We need cannabis TC labs to open and offer their propagation material to as many growers as possible, at an affordable price. In such conditions, we'll see an improvement in propagation and preservation abilities. Otherwise, TC may simply help concentrate genetics in the hands of a few entities and defeat preservation efforts.

In conclusion, TC is a double-edged sword. It will either support biodiversity if made accessible to the largest number of growers, or reduce it by helping resourceful entities acquire exclusive rights over cannabis varietals. At Strainly, our goal is to make TC accessible to *ALL* growers. The first TCs were recently dropped on the platform and we're looking forward to more labs offering their TC varietals to our members.

Reference

[1] https://blog.strainly.io/2018/10/24/cannabis-tissue-culture-an-alternative-propagation-method/