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Cannabis biosynthesis: Threat or opportunity?

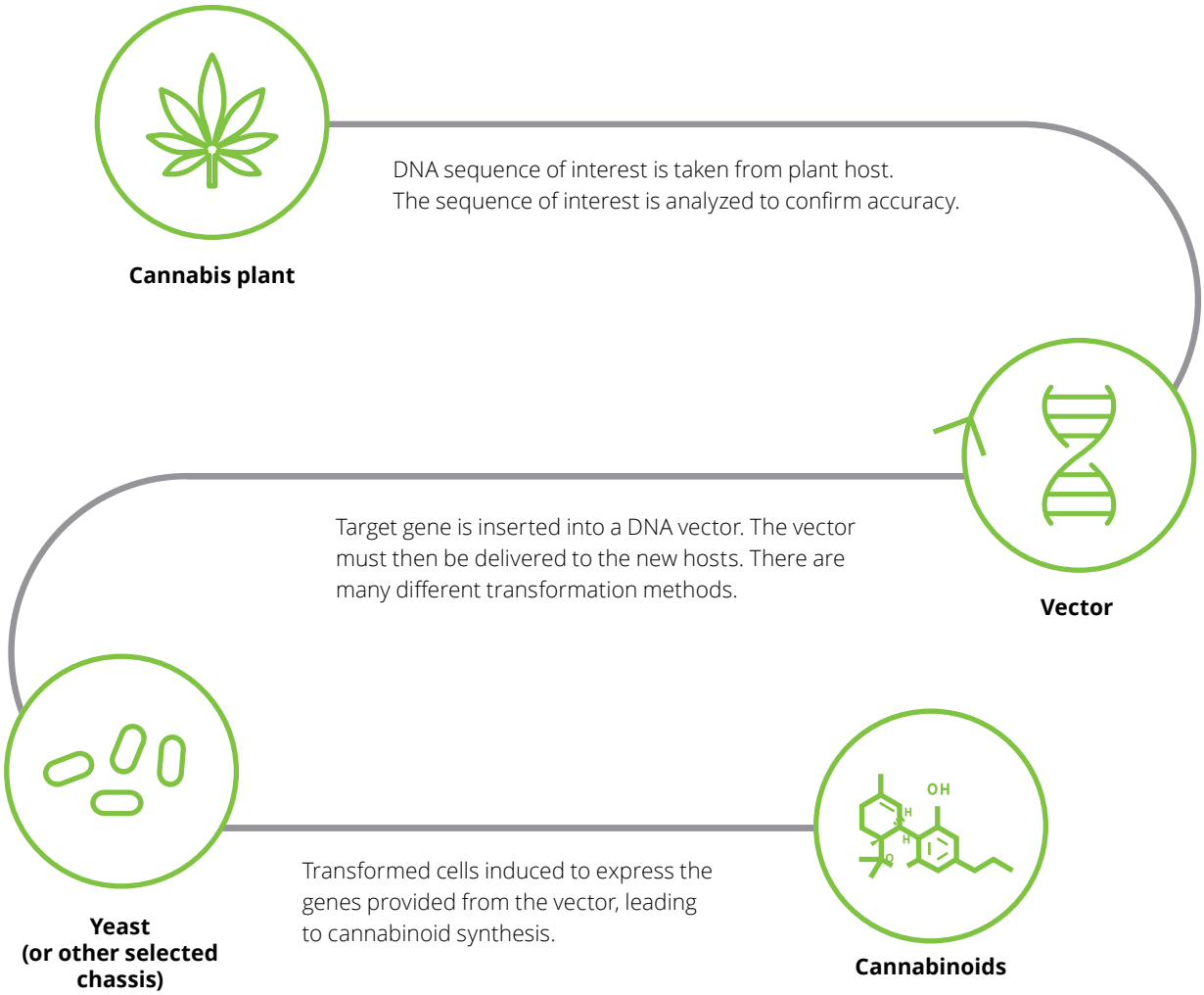
As the global cannabis industry regroups and recovers from an especially tumultuous period, licensed producers (LPs) worldwide are building on lessons learned to strengthen their businesses and move forward. All companies involved in the cannabis industry will be keenly scanning the market for new opportunities and challenges, particularly as major players from outside the cannabis space begin to make inroads.

One development in particular has the potential to disrupt the world of cultivation-focused LPs and reshape supply chains: cannabis biosynthesis. LPs should make the time to understand how this technology could change the competitive landscape— and prepare to defend themselves or seize the opportunity.

Biosynthesis in brief

For decades, life sciences companies have used biosynthesis to produce a range of pharmaceutical therapies, including insulin and human growth hormone. Scientists have recently begun to explore whether it can accelerate cannabinoid production. In 2019, University of California Berkeley researchers discovered how to genetically engineer ordinary brewer's yeast to produce both tetrahydrocannabinol (THC) and cannabidiol (CBD), as well as some novel cannabinoids not found in the plant. (See Figure 1 for a simplified example of one biosynthesis technique.)

Figure 1: Simplified overview of the steps in creating a microbial host for cannabis biosynthesis



Biosynthesis' advantages over traditional production

Lab-based cannabinoid biosynthesis offers several advantages over traditional production methods. Today, cultivation-focused LPs must plant, grow, and harvest huge quantities of cannabis plants—with those cultivated indoors requiring large capital investments and energy costs—before extracting and purifying THC and CBD. Plus, cannabis grown traditionally like this produces such low yields of trace cannabinoids that it is simply unfeasible for cultivation-oriented LPs to extract and purify them.

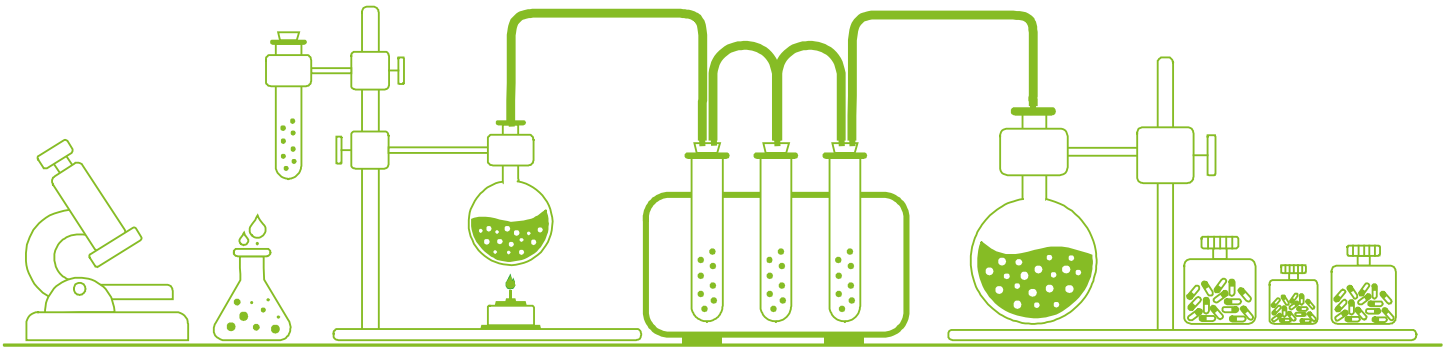
In contrast, biosynthesis allows cannabinoids to be developed in batch runs under highly controlled conditions. It's more efficient and cost-effective, uses fewer resources, and provides more opportunity for consistency and quality. It makes it easier to isolate single cannabinoids to determine the correlation between cause and effect. It enables the production of minor or trace cannabinoids that would be virtually impossible to produce at scale using traditional methods. It can enable novel cannabinoid-like molecules with unique chemical and even biological properties. In short, LPs with massive acreage under cultivation worldwide could in future find themselves competing against companies that can produce particular cannabinoids at scale and with consistent quality. For cannabis companies outside the cultivation sector, cannabis biosynthesis could open up new sources of low-cost cannabinoids.

Commercializing the biosynthesis of insulin replaced a traditional process that required thousands of pig and cow pancreases to produce a fraction of the amount of insulin that's available today. Insulin biosynthesis has saved millions of lives by supplying the quantity and quality of insulin required worldwide while greatly reducing production costs and resource needs.

LPs should prepare now for biosynthesis

At the moment, cannabinoid biosynthesis faces a number of challenges. Much of the work to date involves small-scale experiments producing minute amounts of cannabinoid compounds. Developing hosts capable of large-scale production could be an incredibly slow, painstaking process. Moving to a larger production environment could also introduce unexpected quirks and problems.

However, biosynthesis itself is proven technology. And the tremendous interest in the therapeutic benefits of THC, CBD, and other cannabinoids means that research into large-scale cannabis biosynthesis will inevitably continue. Today's LPs, particularly those heavily focused on cultivation, should take advantage of this moment to explore the potential impact of cannabis biosynthesis on their business and mitigate any risks, as well as look for ways to capitalize on the technology to strengthen their own competitive position.



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