

# Case Study: Transforming Clone Survival in a Commercial Cannabis Cultivation Facility

## Introduction: Context and Challenges

A large-scale cannabis cultivation business in Massachusetts faced escalating clone losses due to undiagnosed pathogen pressures, resulting in delayed production cycles, reduced yields, and financial strain. With a 43.3% infection rate in clones, the operation struggled to maintain genetic consistency and achieve target outputs. Rimrock Analytical was engaged to implement a strategic pathogen monitoring and management program to address these challenges.

## Objectives

The project aimed to:

- 1. **Reduce Clone Losses:** Minimize the 43.3% pathogen prevalence affecting young plants.
- 2. Improve Diagnostics: Identify specific pathogens contributing to the losses.
- 3. Establish Monitoring Protocols: Develop a proactive, ongoing pathogen surveillance program.

Key metrics included reductions in pathogen prevalence, increased clone survival, and measurable economic impact.

## **Conclusion and Impact**

Rimrock Analytical's tailored pathogen management plan transformed the client's operations:

- **Reduced Clone Losses:** From 43.3% prevalence to 3.2% and dropping.
- Increased Yields: Clone survival increased by nearly 50%, recovering an estimated 150 lbs. of product annually.
- **Operational Confidence:** Active pathogen spreading cycle was broken, effectively halting the outbreak. Ongoing monitoring ensures sustained pathogen control, protecting high-value genetic stock and production goals. Pathogen prevalence continues to decline at the time of writing with eradication of infectious agents from the facility projected soon.
- **Return on Investment:** An 11:1 ROI was achieved in the first year with ongoing returns from the newly captured efficiencies and proactive reduction in losses from active monitoring.

This case demonstrates how robust pathogen diagnostics and targeted interventions can deliver measurable economic and operational benefits.

## Approach: Rimrock Analytical's Solutions

- 1. Pathogen Screening:
  - Initial metagenomic analysis revealed the presence of Pythium, and Phytophthora.





• Quantitative polymerase chain reaction(qPCR) and enzyme-linked immunosorbent assay (ELISA) assays provided precise pathogen load data and was used in ongoing monitoring.

## 2. Sampling Strategies:

A composite of samples were taken from plant tissues, water sources, and facility surfaces.

• Spatial mapping identified infection hotspots, particularly in mother plants, wet walls and dehumidifiers.

## 3. Tailored Action Plan:

- Sanitation protocols were updated to address fungal reservoirs.
- Biosecurity measures were reviewed and updated to minimize risk of incoming pathogens.
- A bi-weekly monitoring schedule was established to track pathogen load.

#### Results

#### 1. Reduction in Pathogen Prevalence:

- Baseline pathogen prevalence was 43.3%.
- Post-intervention prevalence dropped to 3.2%, reflecting a **92.6% reduction** (*P*<sub>*r*</sub>).

$$P_r = \frac{43.3 - 3.2}{43.3} x \ 100 = 92.6\%$$

## 2. Economic Impact Analysis:

- **Clone Survival Rate:** Increased from 50% to over 96%.
- **Yield Recovery:** The reduction in clone losses resulted in an estimated yield recovery of 150 lbs. annually.
- **Revenue Impact:** At \$1,000 per pound, this translates to roughly \$150,000 in additional revenue annually.
- Cost-Benefit Ratio: Total implementation and intervention costs totaled \$13,350, yielding a costbenefit ratio of 11:1 annually.

## 3. Pathogen Load Reduction:

• qPCR data indicated a **90% reduction** in pathogen DNA copies per gram of tissue, confirming the effectiveness of sanitation and treatment protocols.

## 4. Outbreak Risk Mitigation:

Infection incidence rates dropped from 5 new infections per 100 clones weekly to fewer than 0.2 per 100 clones, effectively halting the spread of pathogens.





# **Epidemiological Insights**

- Basic Reproduction Number (R<sub>0</sub>):
  - $\circ$  Before intervention,  $R_0$  was estimated at 4 (each infected plant caused 4 new infections).
  - Post-intervention,  $R_0$  was reduced to <1, breaking the cycle of infection.

## **Visualizing Success**

The following quantitative improvements underscore the program's success:





# **Call to Action**

The given strategy describe here are broadly repeatable across a range of scenarios and cultivation sizes. Safeguard your cultivation operation with tailored pathogen monitoring solutions. Contact **Rimrock Analytical** today to reduce overhead, optimize crop health, and protect your genetic investments. Visit <u>www.RimrockAnalytical.com</u> to learn more.

