

CANNABIS ENVIRONMENTAL BEST MANAGEMENT PRACTICES GUIDE

INTEGRATED

PEST MANAGEMENT



DENVER
PUBLIC HEALTH &
ENVIRONMENT

OCTOBER 2019

INTEGRATED PEST MANAGEMENT

EXECUTIVE SUMMARY

Pest control is a critical component of cannabis cultivation. The goal of an Integrated Pest Management program (IPM) is to apply a combination of control methods to prevent, reduce, or maintain pest populations at non-damaging levels by utilizing a variety of mechanical, physical, and biological controls.

An effective IPM program requires knowledgeable cultivation staff that has been trained in the identification of insect pests such as aphids, whiteflies, and thrips, and diseases such as powdery mildew. Equally important is the use of Standard Operating Procedures (SOPs) for a number of processes, including daily/weekly inspections, identification, logging and immediate control of pests. All data must be recorded in a pest and disease monitoring log to track pest presence or population.

EPA's Worker Protection Standard (WPS) is a pesticide safety training program that is mandated for all agricultural workers who have the potential for pesticide exposure. Cannabis cultivators who use pesticides must maintain a WPS program and ensure all property training, as well as provide all necessary personal protective equipment

A proactive strategy to reduce the need for pesticide use on cannabis crops is the use of Biological Control Agents ("BCAs"), with the goal of eliminating pesticide residues for product quality and patient health. BCAs provide a desirable solution for insect and mite control due to their ability to effectively kill, and keep at bay, common insect and mite pests

on cannabis crops. BCAs demand a proactive strategy in which action is taken prior to insect and mite pest presence, or at the first sign of their presence. BCAs work by preventing the buildup of these pest populations.

The use of pesticides on cannabis is strictly regulated by most states, and in Colorado by the Department of Agriculture (CDA). CDA maintains an updated list of approved pesticides and rules for use on their website. Operators should first consider products listed by the Organic Materials Review Institute (OMRI) for prevention and control of pests and diseases. Along with OMRI-listed EPA-registered products, an operator may consider using a natural oil or combination of oils, usually found on a 25b (aka "minimum risk") labeled product. The pesticides approved for use in Colorado expressly allow for use on plants intended for human consumption and are allowed for use on tobacco.

Because of the sensitive nature of cannabis plants and the limited ability to utilize synthetic methods to control pests, maintaining a culture of cleanliness is essential for the cultivation areas and staff practices. Most cultivations use foot baths or mats with a mild bleach solution placed outside of every door that leads into a room where cannabis plants are present. Staff are required to step onto these rubber mats prior to entering the room and upon exit. Additional measures include adhesive tacky mats outside of cultivation and production areas, and facility- or area-specific uniforms and shoes.



INTRODUCTION

The goal of an Integrated Pest Management program (IPM) is to apply a combination of control methods to prevent, reduce, or maintain pest populations at non-damaging levels by utilizing a variety of mechanical, physical, and biological controls. An effective IPM program, implemented and monitored by a facility's staff trained in IPM, can eliminate potentially high levels of crop damage, mitigate risk, and control pests. Early identification of pest infestations is critical. All staff that work in the cultivation area should be trained in and responsible for weekly plant inspection, pest identification and documentation.

OVERVIEW

An effective IPM program requires the use of Standard Operating Procedures (SOP) for a number of processes, including daily/weekly inspection, identification, logging and immediate control of pests. All data shall be recorded in a pest- and disease-monitoring log to track pest presence or population. The ideal cannabis cultivation environment is one with tightly sealed sterile rooms under strict ventilation control and monitoring. This includes consideration for certain biosafety level inclusions to mitigate odor, pests, and disease.

Facility air handling intake points should be equipped with bird screen and 2-inch MERV 8 pre-filter and HEPA filters capable of capturing at least 99.95% of particulates. IPM programs are typically structured to follow the multivariable approach outlined below:

1. Prevention;
2. Biological controls (natural predators and parasites);
3. Removal of infected plants;
4. Organic controls;
5. Synthetic controls should only be used when approved by the appropriate regulatory agency (in Colorado, the Colorado Department of Agriculture).

Pest control is approached as a progression of steps, with prevention as the first and most important step in controlling pests. The logical progression of methods in accomplishing IPM includes prevention, suppression, and eradication.

SUSTAINABILITY

ASPECTS AND IMPACTS

Effluent discharge

Regulatory compliance

Indoor air quality

Employee well-being

Regional stakeholder alignment

Ecosystems

Water quality

Community Relations

Operational and compliance budgets



1. Prevention methods utilized include:

- Cultural practices such as: spacing, pruning, and sanitation, as well as staff access prevention and mitigation;
- Evaluating the cost of prevention in relation to yield and quality improvements (economic threshold);
- Observational practices that ensure cultivation areas are properly sealed;
- Maintaining a controlled environment and removing pest habitats;
- Trap setting; and
- Pest scouting

2. Suppression methods that include:

- Cultural practices, such as pruning;
- Immediate removal of diseased plants;
- Biological controls; and
- Low-dose natural oils

3. Eradication methods that include:

- Increased natural oil dose and increased biological controls, if approved by the Department

BIOLOGICAL CONTROL AGENT (BCA) PLAN

In nearly all cases, production of cannabis crops relies on the use of Biological Control Agents (BCA) for product quality and patient health. BCAs provide a desirable solution for insect and mite control due to their ability to effectively kill, and keep at bay, common insect and mite pests on cannabis crops. BCAs demand a proactive strategy in which action is taken prior to insect and mite pest presence or at the first sign of their presence. BCAs work by preventing the buildup of these pest populations. Control of moderate insect and mite pest populations may be achieved with BCAs, but this reactive control will come with a higher price tag and greater effort. BCAs are also effective at preventing pathogenic and microbial based outbreaks.

For greatest success, use of BCAs must be an active endeavor from the time of first planting.

Crops should be scouted, and release rates adjusted, based on detected insect and mite pests and the observance of any expanding populations. It is also important to maintain

the proper nutrient mix and general health of the crop to avoid extra stressors that will make crops more susceptible to insect and mite pests. Successful use of BCAs requires dedicated scouting and strong recordkeeping for both pest and BCA populations throughout the crop. BCAs will effectively prevent the establishment of insect and mite pest populations when the BCAs are released early. Pest control will be achieved by layering several BCAs to provide control against multiple life stages of the insect and mite pests or to simply augment the BCA activity. For indoor cultivations, the need to layer the BCAs for greatest impact is significant, as rescue treatment options are very limited or prohibited at certain crop stages. It is also important to recognize that releases must be planned and executed over the entire crop cycle.



Considerations:

Before using any prevention, suppression, or eradication methods, facility staff must consider the:

- Status of infestation;
- Location, size and density of infestation;
- Potential to spread;
- Pest and crop life cycle stage;
- Regulatory considerations;
- Public perception;
- Environmental impacts; and
- Previous results of pest control measures.

IPM methodologies include inspecting all new cannabis plants or products entering the facility, and documenting any pest populations, outbreaks, treatment methods,

and treatment results. Pest-monitoring traps should be utilized and grow media should never be reused. As part of the IPM program, the trained cultivation staff will proactively manage any identified pest outbreaks prior to the issuance of a treatment order and document the outbreak and treatment. Good facility maintenance practices include keeping facility areas clean, dry, orderly, and free of clutter or trash. The facility managers and staff should ensure the proper repair and maintenance of cracks, window frames, door frames, drain areas, and floor joints with sealant to limit pest movement. Eradicating any weeds or pest habitats surrounding the facility and utilizing appropriate traps and baits on a regular basis are good practices.

Cultural controls

Because of the sensitive nature of cannabis plants and the inability to utilize synthetic controls to control pests, maintaining a culture of cleanliness is essential. Most cultivations utilize:

Foot baths or mats with a mild bleach solution placed outside of every door that enters into a room where cannabis plants are present. Require staff to step onto these rubber mats prior to entering the room and upon exit. Foot baths and mats must be regularly maintained or they can make issues worse.

Additional measures that can be utilized include:

- A requirement that all staff who work within a restricted access area enter through a locker area where they are required to remove all street clothes and shower prior to their shift;
- A requirement that staff wear a company-provided uniform, which includes shoes that must never be worn outside of the restricted access area;
- A requirement that staff step onto "sticky" mats prior to entering and exiting a room with cannabis plants.
- Installing and using an air hose to blow away any undesired hitchhikers (grasshoppers, mites, aphids, etc.) from staff prior entering the cultivation facility.

Master Pesticide Application Logs, Safety Data Sheets, & Labels

Marijuana Pesticide Application Log

Date					
Beginning Time/End Time					
Name of Applicator					
Signature of Applicator					
MED Badge #					
EPA # Pesticide/CAS #*					
Active Ingredients					
Brand/Product Name					
Restrictive Entry Interval**					
Harvest Batch applied***					
Total amount applied ^					

* of any other Agricultural Chemical(s) applied
** from the product label
*** from the product label

THIRD-PARTY PEST MANAGEMENT

- Many companies choose to contract with a local certified environmentally conscious pest management company to maintain regular inspections and rodent traps, and preventatively spray the exterior of the building in compliance with all applicable regulations.
- Pesticides
- When all other aspects of IPM have not been enough to control pests and diseases, destruction of the infected plants, or if allowed, chemical controls may be necessary. The use of pesticides on cannabis is strictly regulated in Colorado by the Department of Agriculture (CDA). CDA maintains an updated list of approved pesticides and rules for use on their website.
- It is always important to test incoming pesticides before using. Test the selected product for fungal content and banned pesticides. Also test the product on a small number of plants to evaluate any phytotoxic effects, before applying more broadly.
- In addition to consulting state and local pesticide rules, operators should first

consider products listed by the Organic Materials Review Institute (OMRI) for prevention and control of pests and diseases. Along with OMRI-listed EPA-registered products, an operator may consider using a natural oil or combination of oils, usually found on a 25b (aka "minimum risk") labeled product.

- EPA-registered pesticides have gone through extensive testing and are required to list all active ingredients on the label. It is preferred that if a registered pesticide is used, that it is labeled in a way that all of these criteria are met:
 1. All active ingredients of the pesticide product are exempt from the requirements of a tolerance, as established under 40 C.F.R. Part 180, Subparts D and E.
 2. The pesticide product label allows use on the intended site of application. The term "site" for purposes of this Rule includes any location or crop to which the application is made.
 3. The pesticide product label expressly allows use on crops or plants intended for human consumption.
 4. The active ingredients of the pesticide product are allowed for use on tobacco by the Environmental Protection Agency.
(from 3-30-2016 Colorado Department of Agriculture Pesticide Applicators Act rule update - Use of Pesticides in Cannabis; attached)

When allowed by the local and state regulatory bodies, use of synthetic pesticides may be considered. If the use of organic and natural pesticides hasn't been enough to control the pest or disease and the economic threshold for the destruction of the crop by the pest has been reached, the operator may decide to use a synthetic pesticide.

HELPFUL LINKS

Colorado Department of Agriculture Pesticide Information: <https://www.colorado.gov/pacific/agplants/pesticide-use-cannabis-production-information>

Organic Materials Review Institute Lists: <https://www.omri.org/omri-lists>

EPA registered pesticide information: <https://www.epa.gov/pesticide-registration/registration-information-type-pesticide>

EPA Minimum Risk Pesticide information: <https://www.epa.gov/minimum-risk-pesticides>

National Pesticide Information Center, organic pesticide ingredients information: <http://npic.orst.edu/ingred/organic.html>

EPA Worker Protection Standard information: <https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps>

<https://www.epa.gov/pesticide-worker-safety/pesticide-worker-protection-standard-how-comply-manual>

Colorado marijuana occupational safety and health resources:

<https://www.colorado.gov/pacific/cdphe/marijuana-occupational-safety-and-health>



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