

STATE OF MAINE

# Guidance for Preventing and Managing Pests in Maine Medical Marijuana Cultivation

---

**Maine Department of Agriculture, Conservation and Forestry  
10/16/2015**

This document describes practices for preventing and managing arthropods, rodents, plant pathogens and other pests using combinations of physical, mechanical, biological, cultural and chemical methods in an integrated pest management (IPM) program. The intent of this document is to provide science-based information to assist Maine growers of medical cannabis to successfully manage pest problems while complying with state and federal pesticide regulations. Maine permits the use of pesticides on medical marijuana only in accordance with Best Management Practices for Pest Management in Medical Marijuana approved by the Commissioner of the Maine Department of Agriculture, Conservation and Forestry which can be found at [www.maine.gov/ipm](http://www.maine.gov/ipm) or by contacting the Maine Board of Pesticides Control (207-287-2731 or [pesticides@maine.gov](mailto:pesticides@maine.gov)) or the Maine Department of Health and Human Services Medical Use of Marijuana Program. The goal of this guidance document is to guide growers in the production of an uncontaminated product while providing a safe workplace environment for workers.

# Guidance for Preventing and Managing Pests in Maine Medical Marijuana Cultivation

## What is the Purpose of this Guide?

This document is intended to provide additional guidance to growers of medical marijuana to support compliance with Maine's pesticide regulations. In accordance with Maine regulations, pesticides may only be used in the cultivation of medical marijuana in accordance to Best Management Practices for Pest Management in Medical Marijuana approved by the Commissioner of the Maine Department of Agriculture, Conservation and Forestry, which can be found at [www.maine.gov/ipm](http://www.maine.gov/ipm) or by contacting the Maine Board of Pesticides Control (207-287-2731 or [pesticides@maine.gov](mailto:pesticides@maine.gov)) or the Maine Department of Health and Human Services Medical Use of Marijuana Program. This Guidance for Preventing and Managing Pests in Maine Medical Marijuana Cultivation is intended to support compliance with state and federal regulations while helping growers to prevent and manage pest-associated losses and minimize risks of product contamination.

These recommended practices are based on the principles of Integrated Pest Management (IPM). IPM is successfully used to minimize pest-caused damage in all crops and settings. IPM offers a menu of options. Each grower must select and adapt practices and methods that work best for their situation.

*Note: Throughout this document the term 'pest' refers to any living organism posing unacceptable levels of risk and includes but is not limited to insects, mites, plant pathogens, mold and mildew, weeds, birds, and animals. Furthermore, under Maine law, a pesticide is any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest and includes disinfectants, insecticides, herbicides, fungicides, plant regulators, defoliants and plant desiccants.*

## What is Integrated Pest Management?

**Integrated pest management (IPM)** is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. The basic components of IPM are 1) accurate identification of pests and pest-caused damage, 2) pest prevention, 3) systematic pest monitoring, 4) reliance on combinations of biological, mechanical, cultural, or other pest prevention and mitigation methods to keep pests at or below acceptable levels, and 5) documentation and periodic review. Each of the pest prevention and pest management tactics listed in this document have been shown to be effective under certain conditions, however the specific set of tactics selected by a grower may vary depending on the pests encountered, cultivation systems used, economic factors and other conditions.

## Step 1: Know Your Pests

Can you tell the difference between a winged green peach aphid and a fungus gnat? Does it matter? Yes! Just as different cultivars of plants have different characteristics, different species of pests vary in their habits so different strategies may be needed to manage them and prevent their recurrence. Knowledge is power when it comes to managing pests.

- Use a good hand-lens to get up close and personal. Take a photo with a macro-lens, then enlarge it for a closer look.
- Learn to recognize common pests and their damage. Compare your pest with images and descriptions on trusted websites or in books to correctly identify insects, mites and plant diseases.

## **Step 2: Prevent Pests.**

Design and maintain facilities to prevent introduction and spread of pests while promoting good plant health and worker safety. Establish and utilize sanitation protocols to prevent the introduction and spread of arthropod pests and pathogens within the facility. Provide optimal growing conditions to promote healthy plant growth, encourage natural enemies and minimize pest-conducive conditions.

- Design and maintain facilities to provide good moisture control and drainage.
- Design and operate facilities to permit isolation and sanitation processes necessary to minimize the risks of introduction, establishment and spread of pests.
- Control weeds within and immediately surrounding the facility. Weeds provide harborage and food for pests and obstruct air movement.
- Keep cultivation and processing areas free of plant debris, empty pots, and unused equipment. Do not use cultivation areas for storage.
- Control mold, mildew and algae in cultivation and processing areas.
- Sterilize propagation tools before each cut by dipping them in disinfectant solution and rinsing with sterile water.
- Train workers in all appropriate biosafety protocols such as inspecting and brushing off clothing, disinfecting shoes and tools, and washing hands before entering or moving between different cultivation areas. Train workers to start in the cleanest, most pest-free plants or sites first, progressing to infested or less protected sites while working. Avoid moving from infested areas into uninfested areas.
- Provide facilities for workers to change into clean clothing before entering facility and to shower and change clothing at the end of their work day. Provide hair nets, hats, beard covers, or other effective hair restraints to workers to reduce risk of pests being transported into and within the facility.
- Place disinfectant mats at entrance to each cultivation and processing room or area. Alternatively provide workers with footwear or shoe-covers dedicated for use in each cultivation or processing area.
- Inspect any new plant material or equipment upon arrival to the facility after working in an infested section. Keep newly introduced plant material quarantined, with sufficient barriers to prevent spore and insect movement to cultivation area, for a period of time to ensure it is pest-free before moving it into a cultivation area. Remove any diseased foliage or plants promptly. Seal it in a plastic bag to prevent spreading disease inoculum while carrying it out and dispose in sealed container outside of the facility.
- Keep hose nozzles off the floor/ground.
- Disinfect all surfaces using a disinfectant labeled and registered for this use. Use disinfectants only in accordance with label requirements. (Note: all disinfectants are classified as pesticides).

- Avoid reusing growing media. Heat-sterilize any media which has been open or exposed to microbes or other pests. Keep growing media in sterile, sealed containers until used.
- Disinfect pots or other containers before use.
- Select pest-tolerant and disease-resistant cultivars if available.
- Provide adequate spacing around each plant to prevent them from touching one another to prevent pest movement among plants and to allow adequate air circulation. Prune foliage if needed to allow good air movement among plants and to prevent plants from touching one another.
- Avoid foliar applications of carbohydrate-based products such as molasses-based fertilizers, flavorings, leaf washes, leaf shines, and other products that can promote mold and mildew and adulterate the crop.
- Use tools, such as foliage or soil analysis, to determine an appropriate nutrient program. Use electrical conductivity (EC) meter to formulate and test nutrient solutions. Use EC readings or the “pour through” method to monitor salt levels in the growing medium.
- Test water source for presence of carbonates and other minerals that can interfere with maintaining proper pH.
- Maintain optimal moisture level in growing medium. Overwatering promotes insect pests and plant disease. Inspect and maintain irrigation equipment to ensure optimal delivery of water and nutrients. Water at the base of the plant taking care to avoid splashing and wetting foliage.
- In indoor facilities:
  - Operate ventilation, fans, heating/cooling and lighting systems to keep humidity, light and temperatures at optimal levels that support plant growth and natural enemies while discouraging pests. For pre-flowering plants, maintaining relative humidity at 50% or less reduces risk of plant diseases and spider mites while encouraging spider mite predators. Ventilate to minimize condensation and encourage air exchange, at sunset if possible.
  - Create positive airflow to direct air out of growing spaces, not into them.
  - Screen openings where possible. Seal all cracks and crevices to prevent entry by insects, mites, birds, rodents, or other animals. Seal all gaps around exterior doors with weather stripping, door sweeps, and/or properly adjusted thresholds.
  - Design growing spaces to allow them to be periodically emptied and thoroughly cleaned and disinfected between crops.
  - If growing in pots, install tables or benches made of material that allows air flow and which can be cleaned and disinfected, such as wire or mesh, to support pots above the floor.
  - Cover floors with material that can be cleaned and disinfected, permits drainage, and discourages weed and algae growth.
  - Keep floors, tables and benches, and other surfaces clean and dry. Eliminate standing water. Disinfect and repair irrigation systems.

### **Step 3: Systematically Monitor Pests and Plant Health**

Scouting, or methodically checking plants in each section of the facility on a regular basis, is a key element of IPM.

- Learn to identify common pests and beneficial organisms. Get an accurate identification of any new insect, mite, weed, disease or other organism encountered.
- Develop pest-monitoring protocol for each section of each facility.
- Thoroughly inspect plants at least weekly. Look for insects, mites, and diseases or signs of plant stress and/or damage such as off-color, thin or missing foliage, irregular growth, or holes or stippling on leaves. In a small crop, you can check every plant. In a large crop, walk through the crop in a zig-zag pattern, stopping to look closely at 5 randomly selected plants located in 5-10 representative locations throughout the facility. Pay special attention to plants that tend to get pests early (indicator plants) and those located closest to doorways and vents.
- Keep records of what you find. Count and record the numbers of each species of pest counted per trap or plant. Record the numbers of natural enemies, such as ladybugs, too. When you find something, record what, where, when, how many and any action taken. Record findings with a tablet, clipboard or camera.
- For indoor cultivation, monitor insects with sticky cards, check cards weekly, record numbers of each insect species found on cards and change when needed. Cards can be used to for early detection and location of pest ‘hot spots’ so that timely action can be taken to more closely inspect for and manage pests.
- Train employees in all pest prevention, detection, identification, monitoring and record-keeping protocols.

### **Step 4: Use combinations of tactics to keep pests at or below damaging levels.**

Pest prevention and control methods can be grouped into biological, mechanical, cultural, or chemical methods. Using a diverse array of tactics provides the most effective, long-lasting defense against pests. Minimize or eliminate the use of pesticides to avoid pest resistance, protect natural enemies, safeguard workers, and ensure product quality.

- Use appropriate methods for weed control. Outdoors, control weeds within and immediately surrounding cultivation area by hoeing, hand-pulling, mulching, or other appropriate methods. For indoor operations, mow, burn, or hand-pull vegetation or install landscape fabric to keep vegetation 1-2 feet away from building exteriors. Indoors, hand-pull weeds or install weed barrier material.
- Consider biological methods (such as the use of beneficial organisms), cultural methods (such as controlling temperature and humidity to avoid and control pests), mechanical methods (such as pest traps, pruning, or hand removal of pests). If using natural enemies, purchase from reputable source, and release them using recommended rates, intervals and procedures.
- **See Important Note on Pesticides in text box below.** Pesticides should be used only in conjunction with non-chemical methods, when non-chemical methods have failed to keep pests below acceptable levels, and only used when and where needed. Use insecticides only against those pests for which effective natural enemies are not available. Ensure any pesticides used are compatible with natural enemies.

**Important Note on Pesticides:** *Under Maine law, a pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest and includes disinfectants, insecticides, herbicides, fungicides, plant regulators, defoliants and plant desiccants.*

**Home-made pest control substances (including food-based solutions) are not permitted.**

Pesticide products must be registered with, and not prohibited for the intended usage by, the Maine Department of Agriculture, Conservation and Forestry Board of Pesticides Control pursuant to Title 7, section 607, and must be used in a manner consistent with Best Management Practices (BMPs) approved by the Commissioner of Agriculture, Conservation and Forestry. Approved BMPs can be found at [www.maine.gov/ipm](http://www.maine.gov/ipm) or by contacting the Maine Department of Health and Human Services Medical Use of Marijuana Program.

- Ensure that any pesticides applied are permitted by state and federal regulations and are used only in strict accordance with the product label.
- Ensure pesticide application equipment is properly calibrated.
- Avoid the use of pesticides on flowering plants. Avoid the use of any liquids on late flowering plants to avoid mold and mildew contamination of product.
- Pesticides may only be used in strict accordance with the product label requirements including, but not limited to directions pertaining to application, storage and disposal of the pesticide product.
- Disposal of any pesticide solutions, including discharge of any waste water containing pesticides, may only be done in accordance with State and Federal regulations.
- When using a pesticide, ensure that the primary caregiver or the registered primary caregiver's employee is certified in the application of the pesticide pursuant to section 1471-D.
- Ensure that any employee who has direct contact with treated plants has completed safety training pursuant to 40 Code of Federal Regulations, Section 170.130.
- Ensure that an employee of the registered caregiver who is not certified pursuant to section 1471-D and who is involved in the application of the pesticide or handling of the pesticide or equipment must first complete safety training described in 40 Code of Federal Regulations, Section 170.230.
- Pesticide storage, mixing and use must be in compliance with Worker Protection Standards and must meet product label requirements for fire and chemical safety. Ensure all necessary personal protective equipment is available, clean, and properly stored.

### **Step 5. Evaluate your program regularly.**

Review your records often to determine where your trouble spots are, when they tend to occur, what processes were effective in preventing and controlling pests and where improvements are needed.

- Keep detailed insect and disease monitoring records. Record dates and numbers of each species of pest and beneficial organism found while scouting the crop. Record dates, and numbers of each species of pests caught in traps or on sticky cards.
- Record all steps taken to manage pests. If beneficial organisms are released, record species, source, release dates, numbers released, and release methods used.

- Fertilizers, watering, potting soil, and environmental conditions can be important to your pest management program. Record all cultivation processes used including nutrient records, seed and clone sources, disinfectant records, watering records, type and source of growth media used, types, sizes and sources of pots and other growth containers. Include fertilizers used (rates, nutrient analysis, product name, method of application) and daily environmental conditions (temperature, humidity and lighting regimes). Track and evaluate what methods worked and which didn't. Modify practices and adapt new strategies as needed.

## References

- Cohen, M, and J. Ziskind. 2013. Preventing Artificial Adulterants and Natural Contaminants in Cannabis Production: Best Practices. Botec Analysis Corp.  
[http://liq.wa.gov/publications/Marijuana/BOTEC%20reports/1b\\_Best\\_Practices\\_Contamination-Final.pdf](http://liq.wa.gov/publications/Marijuana/BOTEC%20reports/1b_Best_Practices_Contamination-Final.pdf)
- Marijuana Grower's Guide Deluxe. 1996. Red Eye Press. ISBN-13: 9780929349039.
- Marijuana Botany: An Advanced Study: The Propagation and Breeding of Distinctive Cannabis 1993. Ronin Publishing. ISBN-10: 091417178X; ISBN-13: 978-0914171782.
- Mass Production Made Easy: British Columbia Hydroponic Growers Guide. 2010. Armstrong Publishing. ISBN-13: 9781453719596.
- McPartland, J. M., R. C. Clarke, and D. P. Watson. 2002. Hemp Diseases and Pests: Management and Biological Control, first edition. CABI. ISBN-10: 0851994547; ISBN-13: 978-0851994543.
- McPartland, J.M. Common Names of Diseases of Hemp.  
<https://www.apsnet.org/publications/commonnames/Pages/Hemp.aspx>.
- Pest Management of Indoor-Grown Medical Marijuana in Colorado.  
[BugBooksDirect@yahoo.com](mailto:BugBooksDirect@yahoo.com). Fort Collins, CO.
- Rosenthal, E. 2010. Marijuana Grower's Handbook: Your Complete Guide for Medical and Personal Marijuana Cultivation. Quick Trading Company Publisher. ISBN-13: 9780932551467
- WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. 2003. World Health Organization. Geneva.