



Pyrethroid Use in Cannabis Production

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Prepared for:

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Triple M Pyrethrin Use in Cannabis Production

M3 Ventures (Triple M) is a locally owned and operated company that is focused on providing the best all-natural marijuana for medical use to registered patients at Triple M's dispensaries in Plymouth and Mashpee, Massachusetts. Dried cannabis flower from Triple M tested negative for pesticides including synthetic pyrethrins, also known as pyrethroids, bifenthrin and cyfluthrin, per Massachusetts state testing requirements for medical cannabis. While it is not required for Triple M to test for pyrethrins or prallethrin (a pyrethroid), Triple M is moving forward with testing of their product for these compounds in response to the detection of very low concentrations of pesticides in the soil used to cultivate their cannabis.

On November 19, Triple M was inspected by the Massachusetts Department of Agriculture Resources, who tested water and soil samples.

- Water samples tested positive for piperonyl butoxide (PBO), a relatively non-toxic, non-pesticide chemical that increases the potency of certain pesticides, at concentrations ranging from 0.85 parts per billion (ppb) to 11.2 ppb.
- Soils tested positive for PBO (three detections of 38 ppb, 60.8 ppb, and 276 ppb), prallethrin (three detections of 17.6 ppb, 42.8 ppb, and 262 ppb), bifenthrin (one detection of 0.49 ppb), and pyrethrin (two detections of 15.2 ppb and 58 ppb).

To put this into perspective, one ppb would be equivalent to adding a pinch of salt to a 10-ton bag of potato chips or adding one drop of ink in a 9,000-gallon tanker truck.

Pyrethrins and pyrethroids are commonly used in the cultivation of food and cannabis products. Pyrethrins are naturally occurring from the chrysanthemum flower and pyrethroids are synthetic pesticides modeled after pyrethrins. Pyrethrins and pyrethroids are relatively non-toxic to humans when used as directed. In fact, treatment of certain skin parasite conditions in humans involves direct applications of pyrethrins. Inhalation of pyrethrins and pyrethroids from cannabis use is unlikely as these chemicals decompose rapidly when exposed to heat (Ensley 2018).

As a benchmark, the US Environmental Protection Agency has established tolerance residue levels for specific pesticides on food crops. Current residue tolerance levels are 50 ppb to 3,000 ppb for pyrethrins, 50 ppb to 70,000 ppb for bifenthrin, and 1,000 ppb for prallethrin.

- The highest amount of prallethrin found in Triple M's soil was 276 ppb. This means that Triple M's soil tested at 27% of what a zucchini could have and be safe for human consumption.
- Residue tolerances for PBO range from 100 ppb to 20,000 ppb on foods. For reference, apples have a PBO residue tolerance level of 8,000 ppb post-harvest. The highest amount of PBO found in Triple M's soil was 262 ppb, meaning Triple M's soil tested at 3% of what could be on an apple and be safe to eat.

Triple M ceased using all pesticides, including those approved for organic crop production, on September 10, 2018 to comply with Massachusetts law. Pyrethrins have a half-life, or the time it takes to reduce the concentration by 50%, of approximately 2 to 10 days (Hansen et al. 2015). Pyrethroids are longer-lasting in soils with half-lives ranging from 5 to 170 days (Laskowski 2002). Detections of pyrethrins at low concentrations on November 19, or 40 days after ceasing application, is consistent with a typical agronomic application before September 10, 2018.

Based on the recent testing results, no health risk is anticipated to consumers from the use of any cannabis produced by Triple M. Triple M has never applied pyrethroid pesticides, including prallethrin and bifenthrin, to their product, as these do not comply with organic cultivation requirements. Triple M takes great care in producing a high-quality cannabis product previously cultivated using only products approved for organic crop production.

Federal regulation permits low-level contamination of pesticides with other compounds (including pesticides). For example, bifenthrin detection at 0.49 ppb is over 100 times less than the lowest tolerance residue level of 50 ppb. Triple M is examining all potential routes of contamination to ensure that its product has been and will remain the highest quality.

References

1. Bond, C.; Buhl, K.; Stone, D. (2014) *Pyrethrins General Fact Sheet*; National Pesticide Information Center, Oregon State University Extension Services. <http://npic.orst.edu/factsheets/pyrethrins.html>.
2. Code of Federal Regulations. 40 CFR Part 180.127. Piperonyl butoxide; tolerances for residues.
3. Code of Federal Regulations. 40 CFR Part 180.128. Pyrethrins; tolerances for residues.
4. Code of Federal Regulations. 40 CFR Part 180.442. Bifenthrin; tolerances for residues.
5. Code of Federal Regulations. 40 CFR Part 180.545. Prallethrin; tolerances for residues.
6. Ensley, S.M. 2018. Chapter 39 - Pyrethrins and Pyrethroids. In: *Veterinary Toxicology*, 3rd Edition. Elsevier. Accessed at: <https://www.sciencedirect.com/science/article/pii/B9780128114100000398>. Pp. 515-520.
7. Hanson, B.; Bond, C.; Buhl, K.; Stone, D. 2015. *Pesticide Half-life Fact Sheet*; National Pesticide Information Center, Oregon State University Extension Services. <http://npic.orst.edu/factsheets/half-life.html>.
8. Laskowski, DA. 2002. Physical and chemical properties of pyrethroids. *Rev Environ Contam Toxicol*. 74:49-170.
9. Roberts, J.R. 2013. Chapter 4: Pyrethrins and Pyrethroids. In: *Recognition and Management of Pesticide Poisonings*. 6th Ed. United States Environmental Protection Agency. Accessed at: <http://npic.orst.edu/rmpp.htm>.