



Agriculture
Canada

Canada

Food Production
and Inspection Branch

Direction générale,
Production et inspection des aliments

Pesticides Directorate

Direction des pesticides

Note to CAPCO

C92-05

SCHEDULING OF MENTHOL FOR HONEY BEE TRACHEAL MITE CONTROL

BACKGROUND

The honey bee tracheal mite (Acarapis woodi (Rennie)) is a parasite that infests the tracheae of adult bees. It is found in most provinces of Canada. Low levels of tracheal mites apparently do not affect either honey bee colony production or the wintering ability of the bees, however, the bee colony can be adversely affected if the mite infestation is allowed to build up to high levels.

Menthol treatments have been demonstrated to be effective in the control of honey bee tracheal mites in Canada. The success of the treatments depends on the external ambient temperature which affects the vaporization rate of the menthol crystals. Although menthol is a common substance, widely used as a flavoring agent in food and also used in perfumes, cigarettes, cough drops, nasal inhalers, etc., its use for the control of mites of honey bees renders this particular application subject to the Pest Control Products (PCP) Act.

JULY 2, 1992

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Menthol has been available on a limited basis in Canada to extension and research personnel via research permits issued by the Pesticides Directorate of Agriculture Canada. However, in regions where the tracheal mite occurs at low levels, beekeepers require ready access to a control substance such as menthol to prevent the increase of mites to levels known to cause economic loss.

PROPOSED USE AND USE PATTERN

The proposed use of menthol for honey bee tracheal mite control is for food-grade menthol (L-isomer) of >99% purity to be applied to honey bee colonies at rates of 50 g per colony (two-storey colony, 15+ frames), 25 g per colony (one-storey colony, 5-9 frames), or in lesser amounts (e.g., 10-15 g menthol) for nucleus hives (1-4 frames).

Menthol would not be applied to honey bee colonies during periods of honey production in order to prevent the contamination of marketable honey or wax with unwanted menthol residues.

HUMAN RISK ASSESSMENT

Dietary Exposure

The Food Directorate of Health and Welfare Canada regards menthol as a flavouring agent and does not regulate menthol under the Food and Drugs Act and Regulations. As a flavouring agent, menthol is found in non-alcoholic beverages at concentrations of up to 35 ppm and in chewing gum at concentrations of up to 1100 ppm. The World Health Organization has established an allowable daily intake (A.D.I.) for menthol of 0.2 mg/kg body weight/day.

The U.S. EPA estimates that the ubiquitous presence of menthol in the environment would result in natural background levels of up to 1 ppm menthol in honey. It is further estimated that the use of menthol for tracheal mite control would raise the level of menthol in honey to no more than 5 ppm (see Federal Register Vol. 53, No. 206, Page 42981). Residue levels of menthol in honey from menthol-treated hives in Saskatchewan (Beelines, May 1991) are consistent with these estimates.

Occupational Exposure

The Environmental Health Directorate of Health and Welfare Canada has made a cursory review of the literature in the Hazardous Substances Data Bank File which indicates that menthol is acutely toxic via the oral route in humans with the probable oral lethal dose between 50-500 mg/kg.

Menthol is irritating to the eyes and mildly irritating to the skin. Menthol was not found to be a sensitizing agent. Information regarding the inhalation route of exposure was not available. It should be noted that as temperature rises, menthol evaporates more easily. To avoid exposure to vapours that may be formed within the colonies, it is recommended that treated hives be vented for several minutes prior to use.

Very little information is available regarding the non-acute hazards which may be associated with the use of this product. The U.S. National Cancer Institute has conducted a cancer bioassay study using menthol and concluded that there was no evidence of tumor induction in either mice or rats, although the study could not be properly evaluated due to a lack of sufficient detail. No information regarding teratogenicity, reproduction, mutagenicity, or metabolism is apparently available on menthol. Occupational or bystander exposure estimates are also not available for this particular application of menthol.

Based on the available information, a complete assessment of the potential hazards and risks associated with the use of menthol for honey bee tracheal mite control to humans is not possible. However, menthol is currently accepted for use in both food and pharmaceutical areas, and no health concerns have been raised by the World Health Organization.

REGULATION OF MENTHOL

It is proposed that menthol be exempt from registration and be regulated under Schedule II of the PCP Regulations (Section 5.1.c.i) because of the widespread use of this material in other applications such as food flavorings and pharmaceutical products.

The Food Directorate of Health and Welfare Canada has no special requirements for the use of menthol in bee hives and does not object to the scheduling of this compound under the PCP

Regulations. The Environmental Health Directorate of Health and Welfare Canada and Environment Canada will support the scheduling of menthol provided that specific labelling requirements are followed.

The regulation of menthol under Schedule II of the PCP Act will formally sanction the use of menthol for the control of tracheal mites by beekeepers under the terms and conditions set out in the schedule. Because the amendment of the PCP Regulations to accommodate menthol in Schedule II will require 1-2 years to complete, Agriculture Canada would not object to the judicious use of menthol for tracheal mite control provided that safe handling procedures are used. These procedures consisting of use directions and safety precautions (attached) have been developed in cooperation with the Canadian Association of Professional Apiculturists and Health and Welfare Canada.

SCHEDULING REQUIREMENTS FOR MENTHOL

Quality of Menthol: Food-grade menthol (L-isomer and >99% purity) must be used in both natural crystal and synthetic formulations.

Labelling of Menthol Products: Label claims, safety precautions, directions for use, etc. must conform to the following prescribed standards:

- A) Menthol (>99% purity) is to be applied at rates of:
- 1) 50 g per colony (two-storey colony, 15+ frames) placed on bottom board (or above cluster) until vaporization is complete (approximately 2 weeks).
 - 2) 25 g per colony (one-storey colony, 5-9 frames).
 - 3) Lesser amounts (e.g., 10-15 g menthol) for nucleus hives (1-4 frames).
- B) Menthol must not be applied to honey bee colonies during periods of honey production in order to prevent contamination of marketable honey or wax by unwanted residues. In the spring, treatment must be discontinued no later than 2 weeks before the anticipated honey flow. Treatment can also be implemented after the honey crop is removed and before fall feeding begins.

C) Menthol must be in a package and have a label that has a display panel (i.e., one principal display panel and at least one secondary display panel) which conforms to the labelling standards set out in the Registration Guidelines and the PCP Regulations and:

1) The principal display panel includes:

DANGER - EYE IRRITANT
KEEP OUT OF REACH OF CHILDREN

2) The secondary display panel includes:

a) **PRECAUTIONS:**

- KEEP OUT OF REACH OF CHILDREN
- Fatal if swallowed. Causes irreversible eye damage.
- May cause skin irritation.
- Avoid getting into eyes, on skin or on clothing. Wear goggles or face shield to avoid eye contact. Suitable chemically resistant gloves and long-sleeved coveralls must be worn during handling.
- Avoid breathing vapors. Use with adequate ventilation.
- When opening treated hive, allow accumulated vapors to vent several minutes before working hive.
- When using, do not eat, drink, or smoke. Wash skin thoroughly with soap and water after handling.
- Remove contaminated clothing immediately after use. Store and wash contaminated clothing separately from household laundry before reuse.
- Do not contaminate water supply, ponds, lakes and streams with this product.

b) **FIRST AID:**

SKIN CONTACT: Wash with soap and water. Get medical attention if irritation persists.

IF IN EYES: Flush eyes with lukewarm water for 15 minutes. Call a physician immediately.

IF SWALLOWED: Drink one or two glasses of water and induce vomiting by touching back of throat with finger. Repeat until vomit fluid is clear. Do not induce vomiting or give anything by mouth to an unconscious person. Call a physician or Poison Control Center

immediately. Take container or label or the product name with you to emergency/hospital or physician.

IF INHALED: Remove victim to a safe, uncontaminated area. If victim has ceased breathing, clear airway and start artificial respiration. Never give anything by mouth to an unconscious person. Obtain medical attention. Take container or label or the product name with you to emergency/hospital or physician.

c) Instructions for **Time of Application**:

- Best results are achieved if menthol treatment begins in mid-May to early June (or as soon as ambient day time temperatures reach 21°C) and is discontinued no later than 2 weeks before the anticipated honey flow. Treatment can also be implemented immediately after the honey crop is removed and before fall feeding begins.

d) Instructions for **Method of Application**:

- i) If commercial formulations (available in dosages of 50 grams per porous bag) are positioned above the cluster, it should be done in such a manner as to prevent any menthol crystals from falling onto brood combs. The bag can also be placed on the bottom board.
- ii) Menthol (50 g) can be placed on a piece of aluminum foil which is folded over a piece of wire mesh (15 cm by 15 cm) to enclose the menthol and allow vaporization. The packet can be placed on the bottom board or above the cluster.
- iii) Shortening-menthol mix:
 - an equal weight of menthol and shortening can be combined by adding menthol crystals to liquid shortening just at melting point (i.e., 65°C).
 - sheets of corrugated cardboard (30 cm by 30 cm) are to be immersed into the shortening-menthol mixture until the cardboard is saturated (approximately 20 g of menthol). The cardboard is then to be removed and cooled (can be stored in freezer until needed). One sheet of cardboard placed on bottom board is to be

replaced once or twice a week.

- as an alternative to dipping cardboard into the menthol-shortening mix, 50-100 g of the mix (once hardened) can be spread onto cardboard and placed in the hive.

- f) The statement: "Menthol will disrupt colony activities and may cause a temporary decline in brood production".
- g) Information on **Storage**:
"Keep container tightly closed. Store in original container in a cool place (e.g., freezer)."
- h) Information on **Disposal**:
"Follow provincial instructions for any required cleaning of the container prior to its disposal. Dispose of the container in accordance with provincial requirements. For information on the disposal of unused, unwanted product and the cleanup of spills, contact the regional office of Environmental Protection, Environment Canada."

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Public Interest and User Groups

June 24, 1992

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