

assumed that thymol has a common mechanism of toxicity with other substances. For information regarding EPA's efforts to determine which chemicals have a common mechanism of toxicity and to evaluate the cumulative effects of such chemicals, see the final rule for Bifenthrin Pesticide Tolerances (62 FR 62961, November 26, 1997).

C. Aggregate Risks and Determination of Safety for U.S. Population, Infants and Children

The dietary exposure to residues of thymol to the U. S. population from use of ApiLife Var is not likely to add significantly to current dietary exposure to thymol. For instance, thymol has been measured in chewing gum at 100 mg/kg, in candy at 9.4 mg/kg, and in ice cream at 44 mg/kg. These values respectively are 200-, 20-, and 100-fold greater than the highest level of thymol (i.e., 0.48 mg/kg) measured in honey treated with ApiLife Var. In addition, thymol as measured in ice cream is about 300-fold higher than the average residue level of thymol (i.e., 0.16 mg/kg) in hives treated with ApiLife Var. Additionally, it is typical for language to appear on labels of honey that states "Do not feed to infants under 1 year," so there likely would be no exposure of this population to residues of thymol in the honey. Older children likely have been exposed to thymol residues from consumption of candy, ice cream, and baked goods. Consumption of honey from hives treated with ApiLife Var is unlikely to significantly increase exposure to thymol. Therefore, based on the long history of use of thyme, thyme oil, and thymol in the diet with no known adverse effects, it is reasonable to conclude that no harm will result from exposure to thymol in honey from beehives treated with ApiLife Var. Accordingly, EPA finds that exempting thymol from the requirement of a tolerance will be safe.

V. Aggregate Risk Assessment and Determination of Safety for Eucalyptus Oil

Consistent with section 408(b)(2)(D) of the FFDCA, EPA has reviewed the available scientific data and other relevant information in support of this action. EPA has sufficient data to assess the hazards of eucalyptus oil and to make a determination on aggregate exposure, consistent with section 408(b)(2) of the FFDCA, for exemptions from the requirement of a tolerance for residues of eucalyptus oil in or on honey and honeycomb. EPA's assessment of the dietary exposures and risks associated with establishing these

exemptions from the requirement of a tolerance follows.

A. Toxicological Profile

Consistent with section 408(b)(2)(D) of FFDCA, EPA has reviewed the available scientific data and other relevant information in support of this action and considered its validity, completeness and reliability and the relationship of this information to human risk. EPA has also considered available information concerning the variability of the sensitivities of major identifiable subgroups of consumers, including infants and children. The nature of the toxic effects caused by eucalyptus oil is discussed in this unit.

The EPA has not received nor does it have available any guideline studies on the mammalian toxicity of eucalyptus oil. Eucalyptus oil is obtained from steam distillation of the leaves of *Eucalyptus globulus* and, in addition to cineole, contains triterpenes, monoterpenes, sesquiterpenes, aldehydes and ketones. Information submitted by the applicant allows for the statements that acute oral LD₅₀ value for eucalyptus oil in rats is 2,480 mg/kg. Eucalyptol (1,8-cineole) which makes up 70% or more of eucalyptus oil may be safely used in foods as a synthetic flavoring substance when used in the minimum quantity to produce the intended effect (21 CFR 172.515). Eucalyptus globulus leaves also may safely be used in foods (21 CFR 172.510).

B. Exposure Assessment

In examining aggregate exposure, FFDCA section 408 directs EPA to consider available information concerning exposures from the pesticide residue in food and all other non-occupational exposures, including drinking water from ground water or surface water and exposure through pesticide use in gardens, lawns, or buildings (residential and other indoor uses).

1. Dietary exposure.—i. Food.

Eucalyptus oil is obtained from steam distillation of the leaves of *Eucalyptus globulus* and, in addition to cineole, contains triterpenes, monoterpenes, sesquiterpenes, aldehydes and ketones. Levels of eucalyptus oil reported in foods where it is permitted as a direct food additive have been stated as 0.5 to 50 ppm in ice cream, ices etc.; 1.7 ppm in non-alcoholic beverages; 1.0 ppm in alcoholic beverages; 130 ppm in candy; and 76 ppm in baked goods. Cineole in foods has been reported at 0.13 ppm in non-alcoholic beverages; 0.50 ppm in ice cream, ices, etc.; 15 ppm in candy;

0.5 to 4.0 ppm in baked goods, and 190 ppm in chewing gum.

Studies in Europe showed that when ApiLife Var was used for 8 weeks in the autumn over 1 to 5 years, residues of eucalyptus oil (measured as 1,8-cineole) were less than the limit of detection, i.e., <0.01 ppm.

ii. *Drinking water exposure.* No drinking water exposure is expected from the pesticidal use of eucalyptus oil which is confined to placement in beehives. Further, there are no products registered that will result in exposure to drinking water. Therefore, eucalyptus oil is not expected to found in drinking water.

2. *Other non-occupational exposure.* The potential for non-dietary exposure to eucalyptus oil residues for the general population, including infants and children, is unlikely because the proposed use-site is limited to beehives. Eucalyptus oil is a constituent of the human diet as a direct food additive. Eucalyptus oil is used as a component of decongestant products, as an expectorant component of cough and cold products, in various oral dosage forms (e.g., lozenges and syrups), and as an inhalant in vapor baths. It is used in dermally applied products for burns, blisters, and for muscle and joint aches. It may be a component of toothpaste, soaps, detergents and toiletries. It is reported to be used internally at 0.3 to 0.6 grams/day, and externally at 5% to 20% in paraffin, jelly, or vegetable oil bases. Oil of eucalyptus has antimicrobial properties, and has been registered as an active pesticide ingredient in an herbal flea collar pet product (active ingredient is in the product at 1.00%).

3. *Cumulative exposure to substances with a common mechanism of toxicity.* Section 408(b)(2)(D)(v) of the FFDCA requires that, when considering whether to establish, modify, or revoke a tolerance, the Agency consider "available information" concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity."

EPA does not have, at this time, available data to determine whether eucalyptus oil has a common mechanism of toxicity with other substances or how to include this pesticide in a cumulative risk assessment. Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, eucalyptus oil does not appear to produce a toxic metabolite produced by other substances. For the purposes of this exemption from the requirement of a