

# Cinnamaldehyde (040506) Fact Sheet

**Date Issued:** October 1998; updated December 2000

**Reason for Issuance:** New Use Pattern on Food Crop; Tolerance Exemption For All Food Commodities

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## I. Description of the Biochemical

**Generic Name of the Active Ingredient:** Cinnamaldehyde

**OPP Chemical Code:** 040506

**Year of Initial Registration:** 1994

**Pesticide Type:** Antifungal agent; corn rootworm attractant; dog and cat repellent

### U.S. and Foreign Producers:

A.H. Hoffman, Inc., Lancaster, NY 14086  
Micro Flo Co., Lakeland, FL 33807  
Monterey Laboratories, Watsonville, CA 95076;  
Proguard, Inc., Suisun, CA 94585

## II. Use Sites, Target Pests, and Application Methods

- o **Use site(s):** Soil casing for mushroom; Row crops, horticultural crops and turf; all food commodities

- **Target Pests:** Verticillium spot, Dry Bubble from Verticillium; Rhizoctonia; Pythium; Dollar spot; Pitch canker disease.
- **Additional Registered Uses:** Registered by other companies for 1) corn rootworm bait, 2) dog and cat repellent.

### III. Science Findings

The Agency believes that the product, applied as labeled, will perform its intended function and can foresee no unreasonable adverse effects to humans, non-target organisms, or the environment.

#### A. Human Health

Cinnamaldehyde (cinnamic aldehyde) is the main component in cassia oil as well as cinnamon bark oil and is used in flavoring compounds to impart a cinnamon flavor. Considerable safety data exist from the food and flavoring industry which utilizes food grade cinnamaldehyde in non-alcoholic beverages, ice cream, candy, baked goods, chewing gum, condiments and meats at levels ranging from 9 ppm to 4900 ppm. Cinnamaldehyde is Generally Recognized As Safe (GRAS) by the Flavoring Extract Manufacturers' Association and is approved for food use (21 CFR 182.60) by the Food and Drug Administration (FDA). Cinnamon oil, which contains 70% to 90% cinnamaldehyde, is also classified as GRAS, and, like cinnamaldehyde, is used in the food and flavoring industry.

#### Toxicology Assessment

**Vertigo Wettable Powder Fungicide: Monterey Laboratories,  
Watsonville, CA 95076**

The toxicological data provided in support of the exemption from the requirement of a tolerance include the following: two acute dermal toxicity studies and published data/information for acute oral toxicity, eye irritation, dermal irritation and dermal sensitization. Waivers were granted for the remaining acute mammalian toxicology requirements (Series 152B) on the basis of the low toxicity profile of the active ingredient as outlined in 40 CFR 158.690.

**Acute Oral Toxicity:** oral LD<sub>50</sub> of 1.15 g/kg (guinea pig), 2.25 g/kg or 3.35 g/kg (rat). Toxicity Category III.

**Acute Dermal Toxicity - Rat:** LD<sub>50</sub> > 1.2 g/kg (dermal studies submitted). Correlates well with Material Safety Data Sheets (MSDS). Toxicity Category II.

**Primary Eye Irritation:** Primary eye irritant as determined by exposure of human subjects to solutions of 8% active ingredient. Although no corneal involvement was observed in this study, no information was provided as to the time for the eye irritation to clear. Toxicity Category II.

**Primary Dermal Irritation:** No primary dermal irritation was observed in human subjects exposed for 48 hours to a solution of a 3% active ingredient, while severe primary dermal irritation was observed in human subjects after exposure to 8% active ingredient. Dermal irritant.

**Dermal Sensitization:** Cinnamaldehyde was considered a sensitizer based on published results of the dermal effects of a 2% active ingredient on guinea pigs. Strong sensitizer.

**Other Toxicology Data:** Reference Dose (RfD) and maximum permissible intake (MPI) considerations are not relevant because of the low toxicity of the pesticide as reported in the data submitted.

**Cinnacure A3005 (30% a.i.): Proguard, Inc., Suisun, CA 94585**

**Acute Dermal Toxicity:** Dermal LD<sub>50</sub> > 2000 mg/kg (rat). Toxicity Category III.

**Acute Inhalation:** LC<sub>50</sub> > 2.03 mg/L (rat). Toxicity Category IV.

**Primary Eye Irritation:** Moderate eye irritant. Toxicity Category III.

**Primary Skin Irritation:** Moderate skin irritant. Toxicity Category III.

**Applicability of Tolerance Exemption for Cinnamaldehyde**

Residue chemistry data are necessary only if the submitted toxicology studies indicate that additional Tier II or III toxicology data would be required as specified in 40 CFR 158.165(e). The submitted toxicology data for this use indicate that the product is of low mammalian toxicity via the oral route. Therefore, neither Tier II or III toxicology data nor residue chemistry data were required for this registration action.

The toxicological data provided are sufficient to demonstrate that there are no foreseeable human health hazards likely to arise from cinnamaldehyde when applied

as a pesticide to all food crops because of its low toxicity profile and the long history of use of both the active and inert ingredients in the food and flavoring industry.

### **Tolerance exemption**

Based on the submitted product identity data/information, the mammalian toxicology data, low toxicity profile of the fungicide and the long history of safe use of both the active ingredient and inerts, the Agency has exempted this active ingredient, cinnamaldehyde, from the requirement of a tolerance on all food commodities.

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## **B. Occupational and Residential Exposure and Risk Mitigation**

### **Mixer/loader/Applicator**

An initial overestimate of the exposure of the mixer/loader/applicator to the biochemical fungicide, cinnamaldehyde, indicates that the use of this pesticide will not pose an unreasonable hazard to workers. The Pesticide Handlers Exposure Database (PHED v. 1.1) was used to estimate exposure of workers who open, pour, mix, load and apply the pesticide to soil casing. The data analyzed for this exposure scenario indicate acceptable Margins of Exposure for M/L/A provided he/she wear Personal Protective Equipment (PPE) recommended by the Worker Protection Standards (WPS). For the mixer/loader/applicator of Vertigo, the following PPE are recommended: Coveralls over long pants, short sleeve shirt, socks, shoes, chemical resistant gloves, a full-face respirator (MSHA/NIOSH approval number prefix TC-21C or equivalent bearing the NIOSH prefix N-95, P-95 or R-95) or goggles and a dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C, or equivalent bearing the NIOSH prefix N-95, P-95 or R-95). For Cinnacure, the mixer/loader/applicator must wear long sleeved shirt and long pants, shoes, socks, water proof gloves and protective eyewear.

### **Early- entry workers**

The use of cinnamaldehyde on mushrooms is a soil application and the pre-harvest Interval (PHI) is 48 hours. Consequently, early entry workers are not likely to be exposed to foliar residues. Post-application exposure of early entry workers to soil residues will be mitigated if the early entry workers wear Personal Protective Equipment (PPE) recommended by the Worker Protection Standards (WPS).

On the basis of acute dermal effects, a Restricted Entry Interval (REI) of 24 hours for a Toxicity Category II chemical is applicable to Vertigo. During the REI the Agency recommends that the early entry workers wear coveralls over long pants and short sleeve shirt, shoes, socks, chemical resistant gloves, a full-face respirator (MSHA/NIOSH approval number prefix TC-21C, or equivalent bearing the NIOSH prefix N-95, P-95 or R-95) or goggles and a dust/mist filtering respirator for post-application activities (MSHA/NIOSH approval number prefix TC-21C, or equivalent bearing the NIOSH prefix N-95, P-95 or R-95).

A Restricted Entry Interval (REI) of 4 hours is applicable to Cinnacure. During the REI the Agency recommends that early entry workers wear coveralls over long-sleeved shirt and long pants, shoes, socks and waterproof gloves.

### **Mushroom Harvesters**

Although mushrooms are hand-picked, post-application dermal exposure of the harvester to cinnamaldehyde is not likely to pose an unreasonable hazard, providing that harvesters use appropriate PPE as recommended by the WPS. At a minimum, the Agency recommends that harvesters wear long sleeve shirt, long pants, socks, shoes and chemical resistant gloves.

## **C. Environmental Fate and Ecological Effects**

**Tier I Ecological Effects, Guidelines [154B-6 (Avian Oral LD<sub>50</sub>), 154B-7(a) Avian Dietary LD<sub>50</sub>), 154B-8(a) (Freshwater fish LC<sub>50</sub>), 154B-9 (Acute LC<sub>50</sub> Freshwater Invertebrates)].**

Because Cinnamaldehyde is not soluble in water and rapidly degraded in the soil it is not expected to pose any hazard to non-target organisms. Therefore series 154 data requirements were waived.

**Tier II Environmental Fate Effects, Series 155 of Subdivision M: guidelines 155B-4 (Volatility), 155B-6 (Absorption desorption), 155B-9 (Hydrolysis), 155B-10 (Aerobic Soil Metabolism).**

Studies in support of these guidelines are not required since Tier I data requirements were waived on the basis of low exposure and low toxicity potential of the pesticide.

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## **IV. Summary of Data Gaps**

All of the appropriate data have been submitted or waived. There are no data gaps.

## **V. Label Requirements**

### **. Agricultural Use Directions**

#### **Vertigo Wettable Powder**

To protect workers and all classes of pesticide handlers, the label must include appropriate Personal Protective Equipment. The Agency recommends that mixer/loaders, applicators and early-entry workers wear coveralls over a long-sleeved shirt, long pants, shoes, socks, chemical resistant gloves, and a full face respirator (MSHA/NIOSH approval number TC-21C) or goggles and a dust-mist filtering respirator meeting NIOSH standards with prefix N-95, R-95 or P-95. A Restricted-Entry Interval of 24 hours must also be on the label.

#### **Cinnacure A3005**

The Agency recommends that mixer/loaders and applicators wear a long-sleeved shirt, long pants, shoes, socks, waterproof gloves and protective eyewear. Early-entry workers must wear coveralls over long-sleeved shirt and long pants, shoes, socks and waterproof gloves.

### **A. Environmental Hazard Statement**

The following additional precautionary statements need to be placed on the label under Environmental Hazards: "Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water by cleaning of equipment or disposal of equipment wash waters."

## **VI. Additional Contact Information**

[Ombudsman, Biopesticides and Pollution Prevention Division](#) (7511P)  
Office of Pesticide Programs  
Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, D.C. 20460