

## Azadirachtin

A nematicide and insecticide used in products against a wide range of insect species.

**Resistance code:** Not classified.

**NOMENCLATURE Approved name:** Azadirachtin A. **Common name:** No common name.

**CAS RN** 11141-17-6.

**IUPAC** dimethyl (2aR,3S,4S,4aR,5S,7aS,8S,10R,10aS,10bR)-10-acetoxy-3,5-dihydroxy-4-[(1aR,2S,3aS,6aS,7S,7aS)-6ahydroxy-7a-methyl-3a,6a,7,7a-tetrahydro-2,7-methanofuro[2,3-b]oxireno[e]oxepin-1a(2H)-yl]-4-methyl-8-[[[(2E)-2-methylbut-2-enoyl]oxy]octahydro-1H-naphtho[1,8a-c:4,5-b?c?]difuran-5,10a(8H)-dicarboxylate.

**BIOGEOGRAPHY** Derived from from *Azadirachta indica* seed extracts. *Azadirachta indica* is native to India, Iran, Pakistan and Bangladesh.

**TARGETS** Lepidoptera (butterfly and moth); Aleyrodidae (whitefly); Coleoptera (beetle); Thripidae (thrips).

**CROPS** Leafy or stem vegetables; Root, bulb or tuberous vegetables; Sugar beet; Other temporary oilseed crops; Fibre crops; Fruit-bearing vegetables; Pome fruits and stone fruits; Citrus fruits; Spice crops; Nuts; Mushrooms and truffles; Berries; Sweet potatoes; Grapes; Lentils; Grasses and other fodder crops; Cassava; Tropical and subtropical fruits; Maize; Soya beans; Potatoes; Groundnuts; Yams; Chick peas. *Indicative list only: always check the country-specific label for detailed list of registered crops.*

**BIOLOGICAL ACTIVITY Mode of action:** Acts as a feeding deterrent, interferes with the synthesis of hormones vital to development and moulting, and directly damages a number of tissues.

**PRODUCTS** Molt X (Bioworks Inc.); Neemazal (Agrichembio); Neemix 4.5 (Certis USA); Azadirachtin (AgriLife); Neemazad 1% (Certis USA).

**MAMMALIAN TOXICOLOGY Acute oral LD<sub>50</sub>:** Not available. **Acute dermal LD<sub>50</sub>:** Not available. **Acute inhalation LD<sub>50</sub>:** >0.72 mg/l (rat, Trifolio-M product); >2.45 mg/l (rat, Sipcam product). **Acute intratracheal LD<sub>50</sub>:** Not available. **Irritancy:** Nonirritating. **Sensitisation:** Sensitising. **General comments:** Azadirachtin extract presents low acute toxicity when administered either by the oral, dermal or inhalation route. It is not a skin or eye irritant, but a potential for skin sensitisation is observed. Upon short-term exposure, the liver is the main target organ, the relevant NOAEL is 32 mg/kg bw/day. The acceptable daily intake (ADI) of azadirachtin extracts is 0.1 mg/kg bw/day, based on the 90-day study in rat, applying a safety factor of 300. Unlikely to present genotoxic potential to humans. No evidence of carcinogenic potential.

**ECOLOGICAL TOXICOLOGY Fish:** LD<sub>50</sub> 0.048 mg azadirachtin A/l. **Birds:** Not available. **Aquatic invertebrates:** Insects, chronic NOEC = 0.0016 mg azadirachtin A/l.

**Algae:** Not available. **General comments:** The risk assessments for acute, short-term and long-term exposure of mammals and birds indicate there is an acceptable risk. Very toxic to aquatic organisms. Low risk to earthworms, soil dwelling micro- and macro-organisms.

**ENVIRONMENTAL FATE** Soil persistence: low to moderate ( $DT_{50 \text{ lab } 20^{\circ}\text{C}} = 1.7\text{--}25$  days). Soil mobility: low to very high mobile ( $K_{oc} = 20.6\text{--}875.1$  ml/g).

## **Cinnamaldehyde**

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*A fungicide used in products against mushroom diseases.*

**Resistance code:** Not classified.

**NOMENCLATURE** **Approved name:** cinnamaldehyde. **Common name:** No common name. **Other name:** Cinnamic aldehyde.

**CAS RN** 104-55-2.

**IUPAC** Not applicable.

**BIOGEOGRAPHY** Cinnamaldehyde occurs as the major component of oil found in cassia plants (*Cassia tora* L. (synonym *Cassia obtusifolia* L.)).

**TARGETS** *Verticillium* spp.; *Sclerotinia homoeocarpa* (dollar spot (turf)); *Verticillium fungicola* (dry bubble, brown spot (mushroom)); *Rhizoctonia* spp.

**CROPS** Mushroom. *Indicative list only: always check the country-specific label for detailed list of registered crops.*

**BIOLOGICAL ACTIVITY** **Mode of action:** The mode of action of cinnamaldehyde is not understood. Its specificity to particular genera of plant pathogens suggests that it is more than a simple disruption of the fungal membranes. Its repellent and attractant properties are based on its strong odour.

**PRODUCTS** Cinnamaldehyde (limited or no products currently available).

**MAMMALIAN TOXICOLOGY** **Acute oral**  $LD_{50}$ : 2.25 or 3.35 g/kg (rat); 1.15 g/kg (guinea pig). **Acute dermal**  $LD_{50}$ : >1.2 g/kg (rat). **Acute inhalation**  $LC_{50}$ : >2.03 mg/l (rat). **Acute intratracheal**  $LD_{50}$ : Not available. **Irritancy:** Moderately irritant to eyes and skin. **Sensitisation:** Not available.

**ECOLOGICAL TOXICOLOGY** **Fish:** Not available. **Birds:** Not available.

**Aquatic invertebrates:** Not available. **Algae:** Not available.

**General comments:** Cinnamaldehyde is not expected to pose any hazard to nontarget organisms because it is not soluble in water and is degraded rapidly in the soil. With respect to aquatic toxicity the EPA has ruled that the following statement be carried on the labels of cinnamaldehyde-based products: do not apply directly to water, or to areas where surface