CYCLOHEXIMIDE

Task 4: Exposure Profile

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Exposure Profile - Cycloheximide

Introduction

Cycloheximide is an antifungal antibiotic registered as a fungicide and plant growth regulator. Annual use of cycloheximide in the United States is about 10,000-15,000 pounds. More than 95% of the usage is on golf course turf to control various fungal pathogens. Minor use sites include trees and ornamentals for control of foliar fungal pathogens. Cycloheximide is formulated as 0.027, 2.1, 2.26, and 4.22% ai wettable powders (WP) and a 4% ai emulsifiable concentrate (EC). The 2.26 and 4.22% ai WP and 4% ai EC are no longer marketed, and their use is restricted to existing stocks. Formulations registered for turf use are the 2.1 and 2.26% ai WP. The 0.027 and 2.1% ai WP and the 4% ai EC are registered for use on trees and ornamentals. The 4.22% ai WP is registered for use on citrus trees in Florida to stimulate abscission of fruit to be used for processing. Cycloheximide is applied by ground rig, by hand sprayers, or aerially (for citrus only), and applicators need not be certified to apply cycloheximide.

All Formulations

Adequate data are not available to fully assess the potential for exposure of humans and wildlife to cycloheximide.

Although cycloheximide leaches readily in sand (Staten et al., 00011189) and silty clay loam (Helling et al., 05001190) soils, it is transformed in water at rates depending on pH and temperature (Garrett and Notari, 00011594 and 00011595) and available data indicate that the parent compound has a half-life of <5 days in soil (Gottlieb et al., No MRID; Petzold and Chapman, 00011196 and 00012845; Petzold et al., 00012843). Cycloheximide was not detectable in groundwater (<20 cm from the surface of sandy soil) for 5 days following treatment with 4.23% ai WP and irrigation with 2 inches of water (Petzold et al., 00012843). However, data are not available on the nature of degradation products formed in soil. Radiolabeled products of [^{14}C]cycloheximide aged in sand soil readily leached (Staten et al., 00011190). Therefore, data are needed on the nature of these products to fully assess the potential for exposure through groundwater contamination.

Adequate data are not available to assess respiratory exposure to cycloheximide. When [^{14}C]cycloheximide was aged in sand soil, 27% of the applied ^{14}C was volatilized after 30 days (Staten et al., 00011190). Similarly, more than 80% of the applied ^{14}C was volatilized during 9 days of incubation of [^{14}C]cycloheximide in a mixture of three soils at 35 C (Petzold and Chapman, 00012845).

The use pattern is characterized by relatively low dosage rates and precludes significant quantities of cycloheximide from entering aquatic systems via runoff from treated areas. Cycloheximide is soluble in water (2.1% at 2 C; Merck Index, 1976) and should have a low octanol/water partition coefficient. Cycloheximide is transformed in water (Garrett and Notari, 00011594 and 00011595; Petzold et al., 00012843), and cycloheximide and its residues do not accumulate in bluegill sunfish (Petzold and Chapman, 00012864 and 00012880). Therefore, exposure of humans to cycloheximide via ingestion of contaminated fish is not expected.

Human exposure to cycloheximide during mixing and application cannot be assessed due to the lack of available data. Respiratory exposure would result from "puff-back" when the products are opened and could be minimized through the use of respirators. Dermal and ocular exposure would result from splashing during mixing or application, and could be minimized by protective clothing.

Data are not available to assess the potential for dermal and inhalation exposure of golfers, spectators, or groundskeepers following turf applications, for workers entering citrus orchards sprayed with cycloheximide, or for those living or working around treated lawns, trees, or ornamental plants. Wildlife may be exposed to cycloheximide through contact with treated turf, foliage, plants, or soil residues.

References

Garrett, E.R., and R.E. Notari. 1965. Cycloheximide transformations. II. Kinetics and stability in a pharmaceutically useful pH range. J. Pharm. Sci. 54(2):209-215. (00011595)

Garrett, E.R., and R.E. Notari. 1966. Cycloheximide transformations. I. Kinetics and mechanisms in aqueous acid. J. Org. Chem. 31:425-434. (00011594)

No. 120-9760-92. (Unpublished study including letter dated Jan. 24, 1974, from F.W. Staten. A.M. Thornton, and W.M. Wright to A.W. Neff, received Sept. 29, 1977, under 1023-50; submitted by Upjohn Co., Kalamazoo, MI; CDL:097214-J). (00011190)

Staten, F.W., W.M. Wright, and A.M. Thornton. 1974. Soil leaching studies on cycloheximide: Report No. 120-9760-93. (Unpublished study including letter dated Jan. 25, 1974, from F.W. Staten, W.M. Wright, and A.M. Thornton to A.W. Neff, received Sept. 29, 1977, under 1023-50; submitted by Upjohn Co., Kalamazoo, MI; CDL:097214-I). (00011189)