United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508C) | EPA-738-F-04-012 September 2005

EPA R.E.D. FACTS

Thidiazuron

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA (the Agency), based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides, which were first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. To implement provisions of the Food Quality Protection Act (FQPA) of 1996, EPA considers the special sensitivity of infants and children to pesticides, as well as aggregate exposure of the public to pesticide residues from all sources, and the cumulative effects of pesticides and other compounds with common mechanisms of toxicity. The Agency develops any mitigation measures or regulatory controls needed to effectively reduce each pesticide's risks. EPA then registers pesticides that meet current health and safety standards and can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA explains the basis for its decision with the Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document.

Use Profile

Thidiazuron [1-phenyl-3-(1,2,3-thidiazol-5-yl) urea] is used as a pre-harvest cotton defoliant or growth regulator. It removes green leaves and immature fruiting structures, which contribute to cotton staining. There are no registered residential uses. Thidiazuron can be applied with aerial or ground equipment, such as groundboom sprayers. There are eighteen active products containing thidiazuron (one technical and seventeen end-use products). End-use product formulations include: wettable powders, soluble concentrates, and emulsifiable concentrates.

Regulatory History

Thidiazuron has been registered in the United States for use as a cotton defoliant since 1982.

EPA completed the reassessment for the 22 thidiazuron tolerances on September 28, 2005. Since there are no residential uses, an aggregate exposure assessment was conducted. The Agency concluded that there is a reasonable certainty of no harm to any population subgroup from aggregate exposure to thidiazuron from dietary (food and water) exposure. Some tolerances will be proposed for revocation and one new tolerance will be proposed for establishment.

Human Health Assessment

Toxicity

Thidiazuron is considered to have low acute toxicity. Thidiazuron is placed in the following acute Toxicity Categories: oral III; dermal IV; inhalation IV; eye irritation IV; and, dermal irritation IV. Thidiazuron is classified as "not likely to be carcinogenic to humans."

Dietary Risks

EPA determined that there is reasonable certainty that no harm to any population subgroup will result from aggregate exposure to thidiazuron when considering dietary (food and water) exposure. An acute dietary assessment was not performed on thidiazuron, because there were no effects observed in the available toxicology studies that could be attributable to a single exposure (dose). However, a chronic dietary assessment was conducted for thidiazuron. Chronic dietary exposure is expected to be less than 8% of the chronic Population Adjusted Dose (cPAD) for the general U.S. population and all population subgroups, and is therefore below the Agency's level of concern. A cancer dietary risk assessment was not conducted for thidiazuron. Carcinogenicity studies in both rats and mice produced no treatment-related increase in tumor incidence and the standard battery of genotoxicity and neurotoxicity tests were negative. Therefore, thidiazuron has been classified as "not likely to be carcinogenic to humans."

The estimated annual average (chronic) surface water concentration for the parent and both photoproducts, photo-thidiazuron and 1-cyano-3-phenylurea, was 1.0 ppb. This conservative estimate of 1.0 ppb was used for the chronic groundwater concentration to assess chronic risk, which included thidiazuron and both photoproducts, photo-thidiazuron and 1-cyano-3-phenylurea. The dietary exposure analyses for thidiazuron resulted in dietary risk estimates for food and water that are below the Agency's level of concern for chronic dietary exposure.

Residential and Other Non-Occupational Risks

There are no registered residential uses for thidiazuron. Therefore, residential exposure is not expected.

FQPA Considerations

The FQPA Safety Factor (as required by the Food Quality Protection Act of 1996) is intended to provide up to an additional 10-fold safety factor (10X), to protect for special sensitivity in infants and children to specific pesticide residues in food, drinking water, or residential exposures. EPA chose to waive the FQPA safety factor (i.e., reduce it to 1X) based on a conclusion of no increased susceptibility to children and no residual uncertainty.

EPA did not perform a cumulative risk assessment for thidiazuron because unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding for thidiazuron and any other substances. Therefore, EPA has assumed that thidiazuron does not share a common mechanism of toxicity with other compounds.

Worker Risks

Occupational workers can be exposed to a pesticide through mixing, loading, and/or applying a pesticide, or re-entering treated sites. Occupational handlers of thidiazuron include the following: (i) individuals who mix/load liquids for groundboom and aerial application; (ii) individuals who mix/load wettable powders for groundboom and aerial application; (iii) applicators who apply liquids via aerial application; (iv) applicators who apply via groundboom equipment; and (v) flaggers for liquid sprays. Non-cancer risks for all of these potentially exposed populations is measured by a Margin of Exposure (MOE), which determines how close the occupational exposure comes to a No Observed Adverse Effect Level (NOAEL), taken from an animal study. For thidiazuron, MOEs greater than 100 do not exceed the Agency's level of concern. All short-term and intermediate-term inhalation MOEs are not of concern to the Agency when all handlers wear baseline level of protection (i.e., long-sleeved shirt, long pants, shoes plus socks, and no respirator). An occupational post-application assessment for agricultural workers (following application to cotton) was not conducted, because there were no dermal toxicological endpoints of concern identified, and because post-application inhalation exposure is expected to be negligible once sprays have dried.

Environmental Assessment

Ecological Fate

In soil, thidiazuron is persistent, as evidenced by laboratory and field half-lives of approximately one year. It has intermediate soil adsorption coefficients. Such persistence and intermediate mobility would allow some year-to-year accumulation and the potential for runoff from application sites to occur. Based on its solubility, vapor pressure, and other laboratory evidence, thidiazuron is non-volatile. In addition, based on its relatively low octanol/water partitioning coefficient, thidiazuron is not expected to bioconcentrate. When thidiazuron reaches surface water, photolysis is expected to be the major route of transformation. Aqueous photolysis rapidly yields two photoproducts. One of the photodegradates

(photothidiazuron) is a structural isomer of the parent, while the other has a substantially altered chemical structure (1-cyano-3-phenylurea).

Ecological Risks

The environmental risks for thidiazuron were based on a screening-level assessment for both terrestrial and aquatic environments. The assessment was performed for geographic areas where the highest use rates and expected exposures are likely to occur. Results show that the use of thidiazuron on cotton indicates some potential ecological risks (exceedence of LOC) above the Agency's level of concern for: (1) 15g mammals foraging on short grass and broadleaf forage and small insects; and (2) terrestrial and semi-aquatic plants. However, in an effort to help mitigate environmental risks, the Agency is requiring specific label language clarifying allowable use rates and conditions for all thidiazuron products.

Risk Mitigation

Dietary Risk

For all supported commodities, the acute and chronic dietary exposure estimates (food and drinking water) are below the Agency's level of concern. Therefore, no risk mitigation measures are required to address exposure from food and drinking water.

Ecological Risk

The Agency has concluded that there are potential chronic risks of concern for terrestrial and semi-aquatic plants as well as some chronic risks to mammals when maximum EECs are assumed. In order to address the risks identified in the screening-level assessment for thidiazuron, registrants will be required to decrease the maximum labeled use rate from 0.2 lbs ai/acre to 0.125 lbs ai/acre under normal conditions of use, with an annual maximum application of 0.3 lbs ai/acre. However, under certain circumstances such as during periods of rank growth/high fertilizer conditions, extreme weather conditions (such as extended periods of rain and/or low temperatures – 60^{o} to 65^{o} degree Fahrenheit), as well as on full-season cotton varieties, the higher rate (0.2 lbs ai/acre) may be used but total seasonal use may not exceed 0.3 lbs ai/acre.

Additional Data Required

The generic database supporting the reregistration of thidiazuron has been reviewed and determined to be substantially complete. However, the following additional data requirements have been identified by the Agency as confirmatory and are listed below.

OPPTS GLN 850.2300	Avian Chronic Tests on the Mallard Duck and Bobwhite Quail
OPPTS GLN 850.4225	Tier 2 Terrestrial Plant Toxicity (seedling emergence) on Onion and Oat
OPPTS GLN 860.1340	Residue Analytical Method - Livestock
OPPTS GLN 860.1380	Storage Stability Data - Plant and Livestock
OPPTS GLN 860.1480	Meat, Milk, Poultry, and Eggs - (Additional data for the ruminant feeding study is required).

Regulatory Conclusion

The use of currently registered products containing thidiazuron in accordance with approved labeling will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all uses of these products are eligible for reregistration, in compliance with FIFRA, provided that: the risk mitigation outlined in the RED document is adopted and label amendments are made to reflect these measures. These products will be reregistered once the required product specific data, confidential statements of formula (CSFs), and revised labeling are received and accepted by EPA.

For More Information

To obtain a copy of the thidiazuron RED document, please contact the OPP Public Docket (7502C), US EPA, Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460-0001, telephone: (703) 305-5805. Electronic copies of the thidiazuron RED and all supporting documents are also available on the Agency's electronic docket at http://www.epa.gov/edocket.

For more information about EPA's pesticide reregistration program or the thidiazuron RED, please contact the U.S. EPA, OPP, Special Review and Reregistration Division (7508C), 1200 Pennsylvania Avenue, NW, Washington, DC 20460, telephone (703) 308-8000.

For more information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticide Information Center (NPIC). Call toll-free (800) 858-7378, from 6:30 am to 4:30 pm Pacific Time, or 9:30 am to 7:30 pm Eastern Standard Time, seven days a week. The NPIC internet address is http://www/npic.orst.edu.