

# Trichoderma harzianum rifai strain KRL-AG2

Review Date: 06/03/2013

CAS #: 67892-31-3

|                |                                                                            |
|----------------|----------------------------------------------------------------------------|
| Type           | Biological fungicide                                                       |
| Controls       | Controls fungi that can cause seed rot as well as root and plant diseases. |
| Mode of Action | Suppression of fungal growth.                                              |

## Thurston County Review Summary:

Trichoderma harzianum rifai strain T-22 (also known as strain KRL-AG2) is a naturally occurring soil fungus that is used to protect plants and seeds from other types of fungi and fungal diseases. Thurston County's integrated pest management program recommends the use of effective biological agents for pest control, as long as the biological agent is not suspected to introduce a hazard to the environment. Biological agents are living organism used for controlling a pest problem (moths, goats, microorganisms, etc.) and Thurston County's pesticide review process is designed to identify chemical hazards - so much of the review criteria is not applicable.

Risk of toxicity to humans, pets, and wildlife from exposures to Trichoderma harzianum rifai strain KRL-AG2 from fungicidal use is rated low in hazard and products containing it as a sole active ingredient pass Thurston County's pesticide review criteria.

## MOBILITY

| Property                    | Value          | Reference | Value Rating |
|-----------------------------|----------------|-----------|--------------|
| Water Solubility (mg/L)     | Not applicable |           |              |
| Soil Sorption (Kd=mL/g)     | Not applicable |           |              |
| Organic Sorption (Koc=mL/g) | Not applicable |           |              |

### Mobility Summary:

Trichoderma harzianum rifai strain KRL-AG2 is dispersible with water but is expected to become incorporated into the soil and since it occurs naturally in all soil types, movement off the site of application is not a concern.

## PERSISTENCE

| Property                                | Value          | Reference | Value Rating |
|-----------------------------------------|----------------|-----------|--------------|
| Vapor Pressure (mm Hg)                  | Not applicable |           |              |
| Biotic or Aerobic Half-life (days)      | Not applicable |           |              |
| Abiotic Half-life (days)                | Not applicable |           |              |
| Terrestrial Field Test Half-life (days) | Not applicable |           |              |
| Hydrolysis Half-life (days)             | Not applicable |           |              |
| Anaerobic Half-life (days)              | Not applicable |           |              |
| Aquatic Field Test Half-life (days)     | Not applicable |           |              |

### Persistence Summary:

Trichoderma harzianum rifai strain KRL-AG2 will survive in favorable soil conditions. The hazard for persistence is high because it can reproduce and persist in soil, although the amount of Trichoderma harzianum rifai strain KRL-AG2 is likely to remain elevated above natural levels for only a short period of time.

## BIOACCUMULATION

| Property                            | Value          | Reference | Value Rating |
|-------------------------------------|----------------|-----------|--------------|
| Bioaccumulation Factor              | Not applicable |           |              |
| Bioconcentration Factor             | Not applicable |           |              |
| Octanol/Water Partition Coefficient | Not applicable |           |              |

### Bioaccumulation Summary:

Trichoderma harzianum rifai strain KRL-AG2 was quickly eliminated from rats in oral and intravenous studies without any adverse effects (Reference 3). The hazard for bioaccumulation is rated low.

# ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

| Test Subject               | Value                    | Reference | Value Rating |
|----------------------------|--------------------------|-----------|--------------|
| Mammalian (LD50)           | >100,000,000 CFU         | 3         | Low          |
| Avian (LD50)               | >4,000,000,000 CFU/kg bw | 3         | Low          |
| Honey bee or insect (LD50) | Value not found          |           |              |
| Annelida -worms (LC50)     | Value not found          |           |              |
| Fish (LC50)                | Value not found          |           |              |
| Crustacean (LC50)          | Value not found          |           |              |
| Mollusk (LC50)             | Value not found          |           |              |
| Amphibian (LD50 or LC50)   | Value not found          |           |              |

## Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing did not kill any test animal, so no lethal dose level was determined. No adverse effects were observed in toxicity testing of *Trichoderma harzianum* in birds, wild mammals, terrestrial insects, earthworms, or soil microorganisms (Reference 3). Exposure to *Trichoderma harzianum* rifai strain KRL-AG2 to bees and hives did not produce any observable effects (Reference 3). The potential to cause toxicity to pets and wildlife from exposures to *Trichoderma harzianum* from fungicidal use is rated low in hazard.

# ACUTE HUMAN TOXICITY - Risk Assessment

| Subject and Scenario                   | Route | Dose of Concern | Exposure | Margin of Safety | Reference | Value Rating |
|----------------------------------------|-------|-----------------|----------|------------------|-----------|--------------|
| Short-term exposures weren't evaluated |       |                 |          |                  |           |              |
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## Acute Toxicity Risk Assessment Summary:

*Trichoderma harzianum* rifai strain KRL-AG2 is naturally occurring in soil and use of fungicides containing it is not expected to significantly increase the natural amounts for a long period of time (Reference 3). Because *Trichoderma harzianum* rifai strain KRL-AG2 is not known to cause toxicity or disease and because humans are exposed to it daily without concern, the hazard from potential exposures from fungicidal use of *Trichoderma harzianum* rifai strain KRL-AG2 is rated low in hazard.

# CHRONIC HUMAN TOXICITY HAZARDS

| Property                       | Value                           | Adverse Effect                         | Reference | Rating |
|--------------------------------|---------------------------------|----------------------------------------|-----------|--------|
| Carcinogenicity                | Not toxic                       | - -                                    | 3         | Low    |
| Mutagenicity                   | Not toxic                       |                                        |           |        |
| Neurotoxicity - (NOAEL)        | Not toxic                       |                                        |           |        |
| Endocrine Disruption           | Value not found                 | No adverse effects to endocrine system | 3         | Low    |
| Developmental Toxicity (NOAEL) | Not toxic                       |                                        |           |        |
| Reproductive Toxicity (NOAEL)  | Not toxic                       |                                        |           |        |
| Chronic Toxicity (NOAEL)       | 10,000,000 Colony Forming Units | Enlargement of spleen                  | 3         | Low    |

## Chronic Toxicity Hazard Summary:

"No evidence of toxicity in various laboratory tests" (Reference 1). Testing with animals indicates that *Trichoderma harzianum* rifai strain KRL-AG2 is not toxic or infectious when ingested, injected or inhaled (Reference 3). Toxicity testing did not produce any adverse effects to the endocrine or immune system (Reference 3). *Trichoderma harzianum* rifai strain KRL-AG2 is rated low in hazard for toxicity potential.

# CHRONIC HUMAN TOXICITY - Risk Assessment

| Subject and Scenario                  | Route | Dose of Concern | Exposure | Margin of Safety | Reference | Value Rating |
|---------------------------------------|-------|-----------------|----------|------------------|-----------|--------------|
| Long-term exposures weren't evaluated |       |                 |          |                  |           |              |
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## Chronic Toxicity Risk Assessment Summary:

Occupational applicators are expected to wear long sleeved shirts, long pants, gloves, a NIOSH approved respirator (with any N, P, R or HE filter), shoes and socks (Reference 3). Potential exposures to applicators using the recommended protective clothing is rated low in hazard.

## Metabolites and Degradation Products:

Metabolites of *Trichoderma harzianum* include antibiotic peptides also known as peptaibols and secondary metabolites include; alkyl pyrones, isonitriles, polyketides, oxygen heterocyclic compounds, diketopiperazines, and terpenoids (Reference 3). Secondary metabolites are not expected to be found at toxicologically significant levels (Reference 3).

## Comments:

*Trichoderma harzianum* rifai strain KRL-AG2 may be a skin sensitizer (Reference 3). It is considered a very minor eye irritant although some of the products containing it are also known to contain other ingredients that are more irritating to the eyes (Reference 3).

## References

- USEPA. Office of Pesticide Programs. *Trichoderma harzianum* Rifai Strain T-22 (ATCC # 20847) (119202) Fact Sheet. August 2001.
- Health Canada Pest Management Regulatory Agency. RootShield Biological Fungicide, *Trichoderma harzianum* Rifai strain KRL-AG2. February 8, 2010.
- Health Canada Pest Management Regulatory Agency. Proposed Registration Decision [PRD2009-13]: RootShield Biological Fungicide, *Trichoderma harzianum* Rifai strain KRL-AG2. 23 October 2009.