U. S. ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

Date: December 13, 2007
Chemical: Tebuconazole
PC Code: 128997
DP Barcode: D333331, D332261, D332172

MEMORANDUM

SUBJECT: **Environmental Fate and Effects Division Risk Assessment for the Section 3 New Use Registration of Tebuconazole**

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12/13/07

Please find the attached Environmental Fate and Effects Division's (EFED) environmental risk assessment for the proposed new use registration of tebuconazole. The proposed-labels evaluated in this risk assessment are Folicur 3.6 F (EPA Reg. No. 264-752) and Orius 3.6 F (EPA Reg. No. 66222-117) for use on brassica leafy vegetables, garden beets, green onions, and dry bulb vegetables. The maximum proposed single foliar application rate is 0.203 lb a.i./A with annual maximum of 0.812 lb a.i./A for use on garden beets. Application of tebuconazole to dry bulb vegetables for treatment of white rot disease includes one in-furrow application at the time of planting at 0.567 lb a.i./A with 4 -6 inch bandwidth. The in-furrow application may be followed by two foliar applications at 0.169 lb a.i./A.

Tebuconazole is currently registered for use on peanuts, and recently a risk assessment has been completed for use on turf (golf courses and sod farms), ornamentals (residential and commercial uses), almonds, asparagus, barley, beans, corn (foliar and seed treatment), cotton, cucurbits, hops, lychee, okra, pecan, pistachio, pome fruit, soybean, stone fruit (except cherries), sunflower, turnip, and wheat (D316942, Section 3 Nov 2006).

A screening-level (Level I) risk assessment, based on proposed new uses, suggests that levels of tebuconazole (parent compound only) in the environment are likely to result in direct chronic risk to freshwater and estuarine/marine fish, acute risk estuarine/marine crustaceans, chronic risk to mammals, and risk to listed terrestrial dicot plants. Based on the potential for direct effects to these taxa, there may be potential indirect effects to species of concern that depend on these taxa as a source of food, habitat, pollination, etc. Specific risk conclusions for each crop can be found in the assessment.

To estimate exposure concentrations of tebuconazole in aquatic ecosystems, PRZM-EXAMS models were used to estimate environmental concentrations (EECs) in aquatic environments of parent tebuconazole. Terrestrial EECs for tebuconazole were calculated using the terrestrial Tier I model T-REX. Exposure to terrestrial plants was calculated using Terrplant model. All exposures estimations were based on the maximum application rates of the proposed uses.

Listed Species

Fish, estuarine/marine crustaceans, mammals and terrestrial dicot plants were identified as being of potential concern for direct effects for listed species for certain proposed uses (Table 1). There is potential for the use of tebuconazole to exert indirect effects upon the listed organisms by, for example, perturbing forage or prey availability, altering the extent of nesting habitat, altering pollination and/or dispersal, etc. With additional refinement, such as exploring more detailed use patterns and species biology (*e.g.*, geographic location, specific feeding habits, time of year likely to utilize crop fields), it may be determined that some (or all) listed species may not be affected.

Table 1. Direct and indirect adverse effects to federally-listed threatened or endangered plants and animals (listed species)

Listed Taxon	Direct Effects		Indirect Effects	
	Use sites	Finding	Use Sites	Finding
Terrestrial and semi-aquatic plants - monocots	--	No	--	No
Terrestrial and semi-aquatic plants - dicots	All uses	Yes Risk in semi-aquatic areas to listed dicots	--	No
Terrestrial invertebrates	--	No	All uses	Yes Direct effects to dicot plants
Birds (surrogate for terrestrial-phase amphibians and reptiles)	--	No	All uses	Yes Direct effects to dicot plants, fish, marine crustaceans
Mammals	All uses	Yes Chronic risk to mammals (35 g) consuming short grass, broadleaf plants, and small insects	All uses	Yes Direct effects to dicot plants, fish, marine crustaceans
Freshwater fish (surrogate for aquatic-phase amphibians)	All uses	Yes Chronic risk	Garden beets	Yes Direct effects to listed vascular plants
Freshwater crustaceans	--	No	Garden beets	Yes Direct effects to listed vascular plants
Marine/estuarine fish	All uses	Yes Chronic risk	Garden beets	Yes Direct effects to listed vascular plants
Marine/estuarine crustaceans	Garden beets	Yes Acute effects	Garden beets	Yes Direct effects to listed vascular plants
	Brassica leafy veg., garden beets, green onion	Chronic Effects		
Marine/estuarine oysters	--	No	--	No
Aquatic Plants	Garden beets	Yes Listed vascular plants	--	No

Key Uncertainties and Information Gaps

The following uncertainties and information gaps were identified for the fate assessment:

- The Folicur 3.6 F label for the proposed food uses indicates that the maximum application rate is for garden beets at 0.203 lb a.i./A per application and allows 0.812 lb a.i./A per season with no more than 4 aerial applications per season. These restrictions limit use per season; however, there are crops, such as brassica leafy vegetables, that often have more that one season in a year. In this risk assessment, RQs are based on one season per year and risk is underestimated for crops that have more than one growing season per year.

- The environmental fate and transport database is complete with the exception of the aerobic and anaerobic aquatic metabolism data (162-4 and 162-3). The water column metabolism parameter used by EXAMS was estimated from the aerobic soil metabolism by multiplying the aerobic soil metabolism input parameter by 2 to reflect the uncertainty in this extrapolation. The data would be beneficial in characterizing tebuconazole dissipation in the aquatic environment, as well as it would also eliminate the uncertainty associated with the selection of the water column parameter for aquatic modeling.

- Formulation effects on the dissipation of tebuconazole in the environment are not known at this time. For purposes of the risk assessment, it is assumed that formulation types do not alter dissipation rates and pathways when compared to the technical product.

- The assessment addresses the risk from the parent only. The ecological risk from tebuconazole degradate 1,2,4-trizole and tebuconazole intermediate degradates were not discussed in this document. Based on laboratory and field studies submitted to date, tebuconazole transformation products were detected at levels below ten percent of the applied parent. 1,2,4-Triazole degradate was detected at the maximum of 9% of the applied tebuconazole (Bayer Report # 103804).

The following uncertainties and information gaps were identified for the effects assessment:

- The risk assessment is based on two terrestrial invertebrate toxicity studies that have not been reviewed by EFED. Tebuconazole is categorized as practically non-toxic (contact LD_{50} 176 µg a.i./bee) to worker honeybees (Bayer Report 99753, 1987); therefore, the potential for tebuconazole to have adverse effects on pollinators and other beneficial insects is minimal. Technical tebuconazole showed no toxicity to earthworms in an acute study. The LC_{50} and NOEC based on mortality and weight loss were reported as 1381 and 178 mg a.i./kg dry soil, respectively (Bayer Report 99754, 1987). The estimated residue of tebuconazole is 0.457 mg a.i./kg dry soil is over two orders of magnitude less than the NOAEC of 178 mg a.i./kg based on the toxicity study; therefore, there is not potential for risk to earthworms. These two studies should be submitted to EFED for review.

- There is uncertainty associated with risk to sediment dwelling organisms. Based on CFR Part 158, whole sediment toxicity chronic data for benthic invertebrates is required for tebuconazole. In a recent study, it was shown that tebuconazole is toxic to the freshwater

benthic harpacticoid copepod, *Attheyella crassa* (Turresson *et al*, 2007). Larval body length was the most sensitive endpoint. Given that the EECs for the proposed uses are greater than the toxicity endpoints observed in this study, there is a potential for risk to benthic organisms exposed to tebuconazole. However, it should be noted that this data has not been officially reviewed by EPA and is for reference purposes only.

Labeling Recommendations

According to the Label Review Manual, the following label statements are recommended:

Environmental Hazards

This pesticide is toxic to mammals, fish, and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

Ground Water Advisory

"Tebuconazole is known to leach through soil into ground water under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination."

Surface Water Label Advisories

"This product may contaminate water through drift of spray in wind. This product has a high potential for runoff for several months or more after application after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours."