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OFFICE OF  
PREVENTION, PESTICIDES, AND  
TOXIC SUBSTANCES

MEMORANDUM

Subject: Zeneca Request for New Microencapsulated Formulation of Lambda -  
Cyhalothrin: KARATE CS Insecticide (D223935)

From: Anthony F. Maciorowski, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division (7507C)

To: George LaRocca, Product Manager  
Registration Division (7505C)

*Dr. H. T. Cawen*  
7/1/96

Zeneca has requested registration of a new microencapsulated formulation of lambda-cyhalothrin for use on crops that are already registered for the Karate 1E formulation, EPA Reg. No. 10182-96. The crops, use rate, timing and use restrictions on the proposed labeling is to be identical to that of the 1E formulation. The difference is that the proposed formulation consists of a liquid suspension of microcapsules containing the active ingredient. Zeneca submitted three acute studies on the formulation. These studies were reviewed by EEB and a synopsis of the study results is below:

CITATION: S.J. Kent, S.A. Sankey, J.E. Caunter and S.E. Magor 1995. Lambda-Cyhalothrin: Acute Toxicity to Bluegill Sunfish (*Lepomis macrochirus*) of a 25CS Formulation; Brixham Environmental Laboratory, Brixham, Devon, UK; sponsored by Zeneca Agrochemicals; Laboratory Report ID AA1091/C; MRID 4308812

This study is scientifically sound and classified core. The 96 hour acute LC50 of the 25 CS formulation to bluegill sunfish is 4.9 ppb based on final-measured concentrations.

CITATION: S.J. Kent, S.A. Sankey, J.E. Caunter and P.A. Johnson 1995. Lambda-Cyhalothrin: Acute Toxicity to Rainbow Trout (*Oncorhynchus mykiss*) of a 25CS Formulation; Brixham Environmental Laboratory, Brixham, Devon, UK; sponsored by Zeneca Ag Products; Laboratory Report ID AA1091/B; MRID No.:4308813

This study is scientifically sound and classified core. The 96 hour acute LC50 of the 25 CS formulation to rainbow trout is 11.2 ppb based on mean measured concentrations.

CITATION: Authors: S.J. Kent, S.A. Sankey, J.E. Caunter and P.A. Johnson 1995. Lambda-Cyhalothrin: Acute Toxicity to *Daphnia magna* Of a 25 CS Formulation; Brixham Environmental Laboratory, Brixham, Devon, UK; sponsored by Zeneca Ag Products; Laboratory Report ID AA1091/B; MRID 43908811.

This study is scientifically sound and classified core. The 48 hour EC50 of the 25 CS formulation to daphnids is 0.76 ppb based on final measured concentrations.

EEB's risk assessment findings are below.

#### Aquatic Organisms

Based on the submitted data, the acute toxicity of the microencapsulated formulation is similar to that of the Karate 1E formulation<sup>1</sup>. Both demonstrate extreme high acute toxicity to aquatic organisms. We defer to EFGWB with regards to fate of the formulated product in an aquatic environment. We have no information on the rate and duration of release of lambda-cyhalothrin from the capsules in an aquatic environment.

#### Avian Species

EEB cannot compare toxicity to avian species of the microencapsulated formulation to that of the Karate 1E formulation because data were not provided. For microencapsulated formulations, EEB may require acute and subacute testing on the formulated product to evaluate avian acute toxicity. Testing is not needed for this formulation, however, since laboratory studies have demonstrated that lambda-cyhalothrin is relatively non-toxic to avian species on an acute and subacute basis (LC50 and LD50 values >3900 ppm), and inert ingredients in the proposed formulation do not appear to be intrinsically toxic. No incremental risk to avian species is expected.

#### Bees

No bee data were provided. Zeneca believes the CS formulation is likely to have low risk to honey bees based on the following:

- o the microcapsule is designed as a fast release microcapsule, the capsule emptying within 1 to 2 days (based on leaf bioassay results).

<sup>1</sup> Acute toxicity values for encapsulated formulation are: EC50 = 0.76 ppb daphnid; LC50 = 4.9 ppb bluegill sunfish, and LC50 = 11.2 rainbow trout. Acute toxicity values for EC formulation are: 0.09 ppb daphnid; 2.2 ppb bluegill sunfish, and 3.4 rainbow trout.

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- o the average capsule size (2.5 to 3.0  $\mu\text{m}$ ) is substantially smaller than most pollen grains (e.g. oil seed rape pollen grain size is 20 - 30  $\mu\text{m}$ ); making it unlikely that honey bees will mistakenly collect and take capsules back to the hive (for comparison- microencapsulated methyl parathion average size is 30  $\mu\text{m}$ ).
- o the CS formulation has strong adhesive properties to plant surfaces (e.g. via use of stickers), so that the capsules will not collect on the body surfaces of bees.
- o the repellency effect demonstrated with the EC and WG formulations, which is well-documented in the literature, will be maintained with this formulation because of its rapid release.
- o because this product is microencapsulated, the contact toxicity (mortality when applied directly to foraging bees) is likely to be reduced.<sup>2</sup>

Overall, EEB agrees with Zeneca's assessment. However, in the absence of actual field data and more refined information of rate of release of the material (other than results of a single leaf bioassay), there is a low level of uncertainty. Therefore, EEB recommends that (1) a study under Guideline 141-5 Field Testing for Pollinators (i.e. a study following protocol similar to the studies that were performed in the UK in 1985 (Gough *et al.*, 1986) would be appropriate); and (2) more refined information on rate of release of the material from the capsules be required as a condition to registration.

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<sup>2</sup> we think it is more appropriate to state that the contact toxicity is likely to be no greater than that of the registered Karate 1E formulation. Otherwise, there appears to be a contradiction - the material strongly adheres to whatever it comes in contact with, including bees.