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SUBJECT: REVIEW OF THE PROPOSED FIELD TRIAL FOR THE BIOPESTICIDE XYLPHAGE FOR THE CONTROL OF *XYELLA FASTIDIOSA* INFECTION ON MATURE GRAPEVINES

Overview

The Human Health Assessment Branch reviewed the proposed field trials of the biopesticide XylPhage proposed by Dr. Carlos Gonzalez (Texas A&M University) on April 11, 2016. The goal of the field trial is to examine its efficacy against bacterial pest on mature grapevines. XylPhage is a mixture of wild-type bacteriophage isolates selected for efficacy against their target pest: *Xylella fastidiosa*. *X. fastidiosa is* a complex of closely related gram negative bacterium known to cause Pierce's Disease in grapevines that is spread by xylem feeding insect vectors. The most recent outbreak of Pierce's disease in California was likely facilitated by an invasive glassy-winged sharpshooter (*Homalodisca vitripennis*) that was capable of directly infecting grapevines by spreading *X. fastidiosa* from riparian vegetation to adjacent vineyards. The proposed field trials would be conducted with the cooperation of UCD Plant Pathology and would involve multiple applications of XylPhage (0.0001% Bacteriophage; 2 µg/vine by direct injection) at two sites: UCD Plant Pathology Farm in Solano County and in the Montebello region of the Santa Cruz Mountains. At the latter site, 13 *X. fastidiosa*-infected chardonnay grape vines (< 0.01 acre) would be treated. The experimental design to be used for the trials is based on knowledge gained from previously completed trials.

HHAB Summary

XylPhage is not a genetically engineered organism but rather a mixture of wild-type bacteriophage isolates. As such, its introduction into the environment does not represent a novel

hazard or exposure risk. According to the trial's principle investigator, the risk of *X fastidiosa* spread from the trial site will be eliminated through the control of insect vector activities and weed control. The risk of human dietary exposure to XylPhage is expected to be minimal because any fruit produced by surviving plants will be destroyed or used only for research purposes until such time that the USEPA issues an Exemption from Tolerance for the XylPhage bacteriophage strains. HHAB is in agreement with USEPA's present conclusion (see Background of Bacteriophage-Based Biopesticides) that XylPhage and similar biopesticides likely present minimal to no risks of toxicity or exposure.

Background of Bacteriophage-Based Biopesticides

The USEPA considered a similar biopesticide product that was based on naturally occurring (wild-type) bacteriophages "non-toxic and non-pathogenic", non-irritating, and non-sensitizing to humans by acute oral, dermal, and inhalation exposure routes. Further, no immunotoxicity or endocrine disruption hazards were found to be of concern. Negligible to no risk was expected for dietary and bystander exposures while occupational exposure risks were considered to be minimal. The above determinations were based, in part, on the following observations:

"Phages are ubiquitous, naturally occurring viruses that are found in soil, food, and drinking water. The mode of action of these phages is lysogenic. They attack the host bacteria causing the bacterial wall to rupture, thus killing the bacteria."

"The literature cited demonstrate that bacteriophages are ubiquitous; prevalent in soil and drinking water. Humans consume bacteriophages in their daily diets. (Eayre *et. al.*, 1995)."

References

Gonzalez, C.F.; Pesticide Research Authorization (DPR-REG-027a) for XylPhage; 05 April 2016

Eayre, C.G., J.A. Bartz and D.E. Concelmo. Bacteriophages of Erwinia carotovora and Erwinia ananas isolated from freshwater

US Environmental Protection Agency; Office of Pesticide Programs; BIOPESTICIDES REGISTRATION ACTION DOCUMENT (Xanthomonas campestris pv. vesicatoria and Pseudomonas syringae pv. tomato specific Bacteriophages) (Chemical PC Codes 006449 and 006521)