5-25-94

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

BRIEFING MEMORANDUM

SUBJECT: Registration of New Chemical (Biological Fungicide) Bacillus subtilis MBI 600

FROM: Stephen L. Johnson, Acting Director
Registration Division (7505C)

TO: Daniel M. Barolo, Acting Director
Office of Pesticide Programs

BACKGROUND

A petition from Gustafson, Inc. requesting an exemption from the requirement of a tolerance for the residues of the biofungicide Bacillus subtilis strain MBI 600 in or on all raw agricultural commodities when applied as a seed treatment for growing agricultural crops in accordance with good agricultural practices was received by the Agency on March 2, 1993. A notice of the Agency's proposal to establish an exemption from the requirement of a tolerance was published on April 13, 1994. The notice of application to register Bacillus subtilis MBI 600 as a new active ingredient was published in the Federal Register (58 FR 67791) on December 22, 1993. The product name is Gus 376 Concentrate Biological Fungicide. It contains 2.75% active ingredient with not less than 5.5 x 10^{10} viable Bacillus subtilis spores/gram. No comments were received in response to either Federal Register notice.

The active ingredient in the product is a naturally occurring isolate of the spore-forming genus Bacillus which was first isolated from faba bean plants growing at Nottingham University School of Agriculture, Sutton Boningham, United Kingdom. Bacillus subtilis is a soil saprophyte found world-wide. Strains of this organism are not generally regarded as human or animal pathogens.

The product is intended to be used for formulating other end-use products or as a seed treatment. When applied to seeds, the bacteria colonize the developing root system, competing with

CONCURRENCES								
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disease organisms which attack roots. The product is applied using standard commercial slurry seed treating equipment at the application rate of 0.25 to 1.0 oz./100 pounds of seed.

SCIENCE FINDINGS

Summary Science Statement

The results of the toxicity/pathogenicity studies submitted indicated that the product was not toxic, pathogenic, or infective to test animals when applied by oral, dermal, intratracheal or intravenous methods of application. The results of toxicity testing place the product in Toxicity Category IV (Caution). There have been no reports of hypersensitivity due to this organism.

Requests for waiver of requirements for testing of avian (aquatic), aquatic organisms, non-target insect and honey bees were granted. Non-target plant studies indicated that Bacillus subtilis MBI 600 was not pathogenic to soybean seed. An avian oral pathogenicity/toxicity study adequately demonstrated that the product, washed spores and water soluble metabolites were not toxic or pathogenic to bobwhite quail. The product will not pose a risk to wild mammalian species.

Data for environmental fate are not triggered under current requirements for the proposed product since the organism is a naturally occurring species and the results of initial Tier I tests did not trigger the need for additional testing.

Toxicological Characteristics

Acute oral toxicity/pathogenicity test: It was concluded from the results of this test that the product was not toxic, infective or pathogenic to rats when given an oral dose containing Bacillus subtilis MBI 600 at 2.0×10^8 colony forming units (CFU) per animal.

Acute dermal toxicity: A single 2 ml/kg body weight dose (5.0×10^{10} CFU) administered dermally to rabbits was not toxic. The product is in Toxicity Category IV for dermal effects.

Acute pulmonary toxicity/pathogenicity: The product was not toxic, pathogenic or infective to rats dosed intratracheally with 3.4×10^8 CFU of test material. The product is in Toxicity Category IV for pulmonary effects.

Acute intravenous toxicity/pathogenicity: When rats were dosed intravenously with 4.0×10^7 CFU of test material, the product was not infective, pathogenic or toxic to the animals.

Primary eye irritation: The product produced slight ocular

irritation in rabbits when a single 0.1 gram ocular dose was administered which dissipated 4 days after dosing. The product is in Toxicity Category IV (Caution) for eye irritation.

Skin sensitization: An overall moderate skin sensitization reaction was noted in treated guinea pigs 24 to 72 hours after treatment.

Hypersensitivity: There have been no reports of hypersensitivity due to this organism.

Ecological Characteristics

The avian acute testing requirement for Mallard duck was waived because of natural occurrence of the organism and the lack of aquatic exposure from a seed treatment use. Testing requirements for other aquatic organisms were also waived for these reasons and there are no reports of pathogenicity or toxicity of the organism to aquatic species in the public literature.

Based upon lack of toxicity, pathogenicity and infectivity to rats, the product should not pose a risk to wild mammalian species. Studies on non-target insects and honey bees were waived because of lack of exposure of insects to the product from seed treatment.

There have been published reports indicating that Bacillus subtilis may cause seed decay in soybeans so data were requested to demonstrate the lack of pathogenicity or phytotoxicity of the product when applied to soybean seed. Results of the tests showed that there was no effect on the number of germinated seedlings produced after 8 days from seed treated with the product. It was concluded that this bacterial strain is not a seed decay organism.

An avian oral pathogenicity/toxicity study on bobwhite quail was conducted. Birds were administered the technical concentrate, washed spores and water soluble metabolites of Bacillus subtilis MBI 600. Clinical observations gave no indication of pathogenicity. When compared to the negative control and infectivity control group, there were no apparent treatment related effects on body weight or feed consumption in any groups. None of the findings in the treatment or infectivity control groups indicated evidence of pathogenicity or other treatment related effects.

It was concluded that no risk to endangered avian, aquatic, plant or insect species is expected from the use of this product because of lack of documented toxicity and little, if any, exposure.

BENEFITS

The bacteria in the product, when applied to seeds, colonize

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the developing root system of the plant and compete with disease organisms which attack roots. The bacteria continue to live on the root system and extends protection throughout the growing season. The protection afforded by the bacteria will allow the plants to establish a vigorous root system which generally results in a more uniform stand and more vigorous plants. Since Bacillus subtilis is a spore-forming bacterium, the product is more stable than other bacterial pesticides and viability is retained even if treated seed is stored for prolonged periods.

This biological fungicide may be an effective alternative to chemical seed treatment fungicides and therefore could replace more hazardous products. Because the bacteria continue protection throughout the growing season, the need for additional post-planting applications of chemical fungicides to control soil-borne plant pathogens of roots may be reduced or eliminated.

TOLERANCE ASSESSMENT

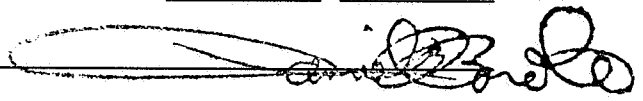
An exemption from the requirement of a tolerance is proposed to be established for the residues of Bacillus subtilis strain MBI 600 in or on all raw agricultural commodities when applied as a seed treatment for growing agricultural crops in accordance with good agricultural practices. Based upon the lack of toxicity of this organism in the Tier 1 mammalian toxicity/pathogenicity studies, an exemption from tolerance requirements is warranted. Also, the organism would be destroyed by heat during cooking and would be removed from produce by normal cleaning and washing operations prior to consumption or processing.

SUMMARY OF MAJOR DATA GAPS

There are no remaining data gaps for this biological fungicide.

RECOMMENDATION

I recommend that you concur with this section 3(c)(5) registration for Bacillus subtilis MBI 600.

Concur: 

Do not concur: _____

Date: MAY 25 1994

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