



BIOPESTICIDES REGISTRATION ACTION DOCUMENT

***Bacillus pumilus* strain GHA 180**
Pesticide Chemical (PC) Code: 016485

**U.S. Environmental Protection Agency
Office of Pesticide Programs
Biopesticides and Pollution Prevention Division**

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BIOPESTICIDES REGISTRATION ACTION DOCUMENT TEAM

Office of Pesticide Programs (OPP) Biopesticides and Pollution Prevention Division Microbial Pesticides Branch

Science Reviews

Joel V. Gagliardi, Ph.D., Microbial Ecologist
John L. Kough, Ph.D.
Gail Tomimatsu, Ph.D.

Product Analysis, Human Health
Product Analysis, Human Health
Environmental Effects

Regulations

Sheryl K. Reilly, Ph.D.
Alan Reynolds
Susanne Cerrelli

Chief, Microbial Pesticides Branch
Team Leader, Microbial Pesticides Branch
Regulatory Action Leader

I. EXECUTIVE SUMMARY

Bacillus pumilus strain GHA180 is a new microbial active ingredient discovered in an apple tree rhizosphere in Mexico. This active ingredient is a bacterium that produces metabolites that suppress the fungal plant pathogens *Pythium ultimum*, *Fusarium oxysporum*, *Rhizoctonia solani* and *Alternaria spp.* This bacterium colonizes plant roots, forming a biofilm.

Premier Horticulture Ltd. has proposed to register three end-use pesticide products (EPs):

- **GHA 180 Biological Fungicide**, an aqueous suspension, to incorporate into peat moss or growing media or as a soil drench in greenhouses and enclosed nurseries to suppress plant pathogens that attack root systems. (Contains 0.37 % *Bacillus pumilus* strain GHA180, a minimum of 1×10^9 viable spores/ml)
- **Pro-Mix GHA180 and Pro-Mix Tandem**. Both Pro-Mix products are a series of growing media formulations that contain *Bacillus pumilus* strain GHA180 to suppress plant pathogens that attack root systems. (Both Pro-Mix products contain *Bacillus pumilus* strain GHA180 at 0.001%, with a minimum of 5×10^4 viable spores per a gram of media.)

Pro-Mix GHA180 and Pro-Mix Tandem are each formulated into eight different custom blended growing mixes: BX, HP, TA, FPX, MPX, PGX, VFT and BRK Blends. There are 16 different blended growing mixes in total.

Environmental Protection Agency (EPA) scientists have reviewed product analysis, toxicology, and nontarget organism data and information (40 Code of Federal Regulations (CFR) §§ 158.2120, 158.2140, and 158.2150, respectively) submitted to support the registration of the three proposed *Bacillus pumilus* strain GHA 180 products. Overall, these data and information are adequate for risk assessment purposes, fulfill current data requirements, and allow for registration under Section 3(c)(5) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Acceptable guideline studies to support the proposed use of these products fulfilled product analysis data requirements for *Bacillus pumilus* strain GHA 180, including product chemistry and composition, analysis of samples, and physical and chemical characteristics.

Adequate mammalian toxicology data and information were submitted to support *Bacillus pumilus* strain GHA 180 pesticide products.

EPA has concluded that there is a reasonable certainty that no harm will result to the United States population, including infants and children, from aggregate exposure to residues of *Bacillus pumilus* strain GHA 180. No dietary risks are expected from use of *Bacillus pumilus* strain GHA 180 as an active ingredient in pesticide products.

The proposed use sites for *Bacillus pumilus* strain GHA180 are limited to greenhouse and contained nurseries. It was determined that the use sites for *Bacillus pumilus* strain GHA180 on the proposed labels would not result in significant nontarget species exposure and did not trigger the nontarget and environmental fate data requirements under [40 CFR § 158.2150](#).

On October 1, 2009, EPA announced a new policy to provide a more meaningful opportunity for the public to participate in major registration decisions before they occur. Under this policy, EPA provides a public comment period prior to making a registration decision for the following types of applications: new active ingredients; first food uses; first outdoor uses; first residential uses; or any other registration actions for which EPA believes there may be significant public interest.

Consistent with the policy of making registration actions more transparent, the proposed registration and first food use of pesticide products containing the new active ingredient, *Bacillus pumilus* strain GHA 180, were subject to a 30-day comment period. During this comment period, no comments were received. The registrations of this new active ingredient includes the first food use for *Bacillus pumilus* strain GHA 180. The Agency's risk assessments and conclusions that the standards for registration under FIFRA section 3(c)(5) have been met for the proposed active ingredient, *Bacillus pumilus* strain GHA 180 and are provided in this Biopesticide Registration Action Document (BRAD).

II. ACTIVE INGREDIENT OVERVIEW

Biological Name: *Bacillus pumilus* strain GHA 180

Culture Deposit: International Depository Authority of Canada, under the reference number IDAC No. 260707-01

OPP Chemical Code: 016485

Type of Pesticide: Microbial Pesticide – Fungicide

See [Appendix B](#) for specific information (e.g., use sites, application rates, methods of application, formulation types, and target pests) regarding the registered pesticide products containing this active ingredient.

III. REGULATORY BACKGROUND

A. Applications for Pesticide Registration

On February 14, 2010, Premier Horticulture, (address: 1, avenue Premier, Rivière-du-Loup, Quebec, Canada G5R6C1) submitted applications to register three end-use products, GHA 180 Biological Fungicide (EPA File Symbol 74267–E), Pro-Mix GHA 180 (EPA File Symbol 74267–G) and Pro-Mix Tandem (EPA File Symbol 74267–U) under FIFRA section 3. At that time Premier Horticulture applied to register GHA 180 Biological Fungicide (EPA File Symbol 74267–E) also as a manufacturing product. On November 24, 2010, EPA announced receipt of these applications to register pesticide products containing a new active ingredient ([75 Federal Register \(FR\) 71698](#)) and opened a 30-day public comment period pursuant to the provisions of FIFRA section 3(c)(4). No comments were received following this publication.

B. Food Tolerance Exemption

Concurrent with its registration applications and under Federal Food, Drug, and Cosmetic Act (FFDCA) section 408(d), Premier Horticulture submitted a petition to establish an exemption from the requirement of a tolerance for *Bacillus pumilus* GHA180 (Pesticide Petition (PP) 0F7698). In the Federal Register of September 30, 2010 ([75 FR 60452](#)), EPA announced that Premier Horticulture proposed to establish an exemption from the requirement of a tolerance for residues of the fungicide, *Bacillus pumilus* GHA180 in or on all agricultural commodities and water systems when applied as described in the draft label and opened a 30-day comment period. No comments were received following this publication.

IV. RISK ASSESSMENT

In the Federal Register of October 26, 2007, EPA issued a Final Rule on the data requirements to support registration of microbial pesticides and updated the definition for microbial pesticides ([72 FR 61002](#)). The rule became effective on December 26, 2007. The data and information evaluated for this BRAD were considered in light of these requirements.

The classifications for each data submission are assigned by EPA science reviewers and indicate the usefulness of the information contained in the documents for risk assessment. A rating of “acceptable” indicates the study is scientifically sound and is useful for risk assessment. A “supplemental” rating indicates the data provide some information that can be useful for risk assessment. The studies may have certain aspects determined not to be scientifically acceptable (“supplemental: upgradeable”). If a study is rated as “supplemental: upgradeable,” EPA always provides an indication of what is lacking or what can be provided to change the rating to “acceptable.” If there is simply a “supplemental” rating, the reviewer often will state that the study is not required by 40 CFR Part 158. Both “acceptable” and “supplemental” studies may be used in the risk assessment process as appropriate. An “unacceptable” rating indicates that new data need to be submitted.

For the acute toxicity data requirements, Toxicity Categories are assigned based on the hazard(s) identified from studies and/or other information submitted to EPA in support of a pesticide registration. The active ingredient or particular product is classified as Toxicity Category I, II, III, or IV, where Toxicity Category I indicates the highest toxicity and Toxicity Category IV indicates the lowest toxicity.

A. Product Analysis Assessment ([40 CFR § 158.2120](#))

Bacillus pumilus strain GHA180 is a new microbial active ingredient discovered in an apple tree rhizosphere in Mexico. This bacterium produces metabolites that suppress the fungal plant pathogens *Pythium ultimum*, *Fusarium oxysporum*, *Rhizoctonia solani* and *Alternaria spp.* and colonizes plant roots, forming a biofilm. All product analysis data requirements for *Bacillus pumilus* strain GHA180 were fulfilled to support current use sites. Refer to Tables 1, 2, 3, 4, 5, and 6 in [Appendix A](#) for a brief summary of the data requirements, including both generic and product-specific information.

B. Human Health Assessment ([40 CFR § 158.2140](#))

1. Toxicity

All toxicology data requirements for *Bacillus pumilus* strain GHA180 were fulfilled. Acceptable Tier I mammalian toxicology data and information support registration of the *Bacillus pumilus* strain GHA180 pesticide products. Furthermore, Tier II and Tier III studies were not required for *Bacillus pumilus* strain GHA180 because of the lack of acute toxicity/pathogenicity in the Tier I studies.

For a comprehensive summary of the generic toxicology data requirements described in sections IV(B)(1)(a) and IV(B)(1)(b), as well as additional product-specific data submitted to support the individual registrations, refer to Table 7 in [Appendix A](#).

a. Acute Toxicity/Pathogenicity – Tier I

Acute Oral Toxicity/Pathogenicity (Office of Chemical Safety and Pollution Prevention (OCSPP) Guideline 885.3050; and Acute Pulmonary Toxicity/Pathogenicity (OCSPP Guideline 885.3150; Master Record Identification Number (MRID No 48005019.):

Waiver rationale for acute oral and pulmonary toxicity/pathogenicity data requirements were submitted by Premier Horticulture Ltd, based on the acute injection toxicity and pathogenicity study and the oral, dermal and inhalation acute toxicity study results discussed below. All of those tests showed no evidence of infectivity, pathogenicity, toxicity, or other adverse effects. EPA determined that in light of these results, adverse effects from exposure to *Bacillus pumilus* GHA180 are not expected, and waived the acute oral toxicity/pathogenicity and acute pulmonary toxicity/pathogenicity data requirements for this active ingredient.

Acute Injection Toxicity/Pathogenicity (OCSPP Guideline 885.3200; MRID No. 48005025):

Thirty young adult rats (15/sex) were injected intravenously with *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) at a dose of 6.8×10^7 CFU/animal. Two control groups (5/sex/treatment) were treated with inactivated *Bacillus pumilus* GHA180 TGAI, and saline. The animals were observed for up to 21 days. Bacterial cell counts were made on the blood, liver, kidney, spleen, lungs, mandibular lymph node, brain, and cecum contents of the rats given live bacteria on study days 0, 7, 14 and 21, and on day 21 for the control groups. All animals gained weight and appeared normal during the study, and no visible abnormalities were noted at necropsy. The test organism completely cleared from the blood, kidneys, mandibular lymph nodes and cecum contents of the animals by day 14, and it showed a pattern of clearance but had not completely cleared from the liver and spleen by day 21. No *Bacillus pumilus* GHA180 was detected in the tissues/organs of the animals treated with the inactivated test material or the untreated control group. *Bacillus pumilus* GHA180 was not toxic, infective or pathogenic to rats when dosed intravenously at 6.8×10^7 CFU/animal. This study was classified as Acceptable.

Hypersensitivity Incidents (OCSPP Guideline 885.3400):

No hypersensitivity incidents, including immediate-type or delayed-type reactions of humans and domestic animals during research, development, or testing of *Bacillus pumilus* GHA180 were reported by the applicant. Any future hypersensitivity incidents must be reported per OCSPP Guideline 885.3400.

Cell Culture (OCSPP Guideline 885.3500):

This study was not required because *Bacillus pumilus* strain GHA180 is not a virus (refer to test note #4 of 40 CFR § 158.2140(d)).

Acute Oral Toxicity (OCSPP Guideline 870.1100; MRID No. 48005020):

Using the up and down method, 3 fasted young adult female rats were given a single oral gavage dose of *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) at a concentration of 5000 mg/kg body weight (bw), and observed for 14 days. All animals gained weight and appeared normal throughout the study. No visible abnormalities were found at necropsy. The $LD_{50} > 5000$ mg/kg bw. This study was classified as Acceptable; EPA Toxicity Category IV.

Acute Dermal Toxicity (OCSPP Guideline 870.1200; MRID 48005021):

Ten young adult rats (5/sex) were exposed to 5050 mg/kg of *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) for 24 hours on a clipped area of skin (~10% of the body surface area), and observed for 14 days. One female died on day 1; at necropsy, mottled lungs and a deformed liver were noted but not attributed to the test substance. All other animals gained weight and appeared normal during the study. No dermal irritation resulted from exposure to the test material, and observable abnormalities were not found at necropsy. The LD_{50} was > 5050 mg/kg bw. This study was classified as Acceptable; EPA Toxicity Category IV.

Acute Inhalation Toxicity (OCSPP Guideline 870.1300; MRID 48005022):

Groups of young adult rats (5/sex/group) were exposed nose-only to *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) aerosol for 4 hours at a concentration of 2.18 mg/L, then observed for 14 days. All animals gained weight and appeared normal throughout the study. No abnormalities were observed at necropsy. The $LC_{50} > 2.18$ mg/L. This study was classified as Acceptable; EPA Toxicity Category IV.

Acute Eye Irritation (OCSPP Guideline 870.2400; MRID 48005023):

Three New Zealand White rabbits (2 male, 1 female) were exposed to 0.1 mL of undiluted *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL; instilled into the conjunctival sac of the right eye) and observed for eye irritation at 1, 24, 48, and 72 hours after exposure. Corneal opacity was observed in 1 male at 1 hour post exposure, which cleared by 48 hours. No iritis or conjunctival irritation was noted in any animal throughout the study. The maximum average score was 17.3 at 1 hour after exposure. *Bacillus pumilus* GHA180 TGAI was mildly irritating to the eye. This study was classified as Acceptable; EPA Toxicity Category III.

Primary Dermal Irritation (OCSPP Guideline 870.2500; MRID 480050-24):

The skin of 3 rabbits (1 male, 2 female) were exposed to 0.5 mL (under a patch) of *Bacillus pumilus* GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) for 4 hours on an approximately 2.5×2.5 cm area of the body surface. The animals were observed at 1, 24, 48, and 72 hours after patch removal. Very slight erythema was noted on 1 animal at 1 hour after patch removal; this cleared by 24 hours. No other rabbit exhibited skin irritation during the study. The primary irritation index was 0.1. This study was classified as Acceptable; EPA Toxicity Category IV.

**b. Acute Toxicology and Subchronic Toxicity/Pathogenicity – Tier II;
Reproductive Fertility Effects, Carcinogenicity, Immunotoxicity, and
Infectivity/Pathogenicity Analysis – Tier III**

Tier II and Tier III studies were not required for *Bacillus pumilus* GHA 180 based on the lack of acute toxicity/pathogenicity in the Tier I studies.

c. Endocrine Disruptors

As required under FFDCA section 408(p), EPA has developed the Endocrine Disruptor Screening Program (EDSP) to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a “naturally occurring estrogen, or other such endocrine effects as the Administrator may designate.” The EDSP employs a two-tiered approach to making the statutorily required determinations. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid (E, A, or T) hormonal systems. Chemicals that go through Tier 1 screening and are found to have the potential to interact with E, A, or T hormonal systems will proceed to the next stage of the EDSP where EPA will determine which, if any, of the Tier 2 tests are necessary based on the available data. Tier 2 testing is designed to identify any adverse endocrine-related effects caused by the substance, and establish a quantitative relationship between the dose and the E, A, or T effect.

Between October 2009 and February 2010, EPA issued test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients. This list of chemicals was selected based on the potential for human exposure through pathways such as food and water, residential activity, and certain post-application agricultural scenarios. This list should not be construed as a list of known or likely endocrine disruptors.

Bacillus pumilus GHA 180 is not among the group of 58 pesticide active ingredients on the initial list to be screened under the EDSP. Under FFDCA section 408(p), EPA must screen all pesticide chemicals. Accordingly, EPA anticipates issuing future EDSP orders/data call-ins for all pesticide active ingredients.

For further information on the status of the EDSP, the policies and procedures, the list of 67 chemicals, the test guidelines and the Tier 1 screening battery, please visit our website: <http://www.epa.gov/endo/>.

2. Federal Food, Drug, and Cosmetic Act (FFDCA) Considerations

Section 408(c)(2)(A)(i) of FFDCA allows EPA to establish an exemption from the requirement for a tolerance (the legal limit for a pesticide chemical residue in or on a food) only if EPA determines that the exemption is “safe.” Section 408(c)(2)(A)(ii) of FFDCA defines “safe” to mean that “there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information.” This includes exposure through drinking water and in residential settings but does not include occupational exposure. Pursuant to section 408(c)(2)(B) of FFDCA, in establishing or maintaining in effect an exemption from the requirement of a tolerance, EPA must take into account the factors set forth in section 408(b)(2)(C) of FFDCA, which require EPA to give special consideration to exposure of infants and children to the pesticide chemical residue in establishing a tolerance and to “ensure that there is a reasonable certainty that no harm will result to infants and children from aggregate exposure to the pesticide chemical residue...” Additionally, section 408(b)(2)(D) of FFDCA requires that EPA consider “available information concerning the cumulative effects of [a particular pesticide's] residues and other substances that have a common mechanism of toxicity.”

EPA performs a number of analyses to determine the risks from aggregate exposure to pesticide

residues. First, EPA determines the toxicity of pesticides. Second, EPA examines exposure to the pesticide through food, drinking water, and through other exposures that occur as a result of pesticide use in residential settings.

Consistent with section 408(b)(2)(D) of FFDCA, EPA has reviewed the available scientific data and other relevant information, and considered its validity, completeness, and reliability and the relationship of this information to human risk. EPA has also considered available information concerning the variability of the sensitivities of major identifiable subgroups of consumers, including infants and children.

Based on the acute toxicity/pathogenicity data and information discussed previously and presented in Table 7 in [Appendix A](#), the data required for a FQPA risk assessment for *Bacillus pumilus* strain GHA 180 have been fulfilled. Hence, EPA determined that the exemption is “safe”.

a. Aggregate Exposure

In examining aggregate exposure, section 408 of FFDCA directs EPA to consider available information concerning exposures from the pesticide residue in food and all other nonoccupational exposures, including drinking water from ground water or surface water and exposure through pesticide use in gardens, lawns, or buildings (residential and other indoor uses).

Dietary Exposure and Risk Characterization: *Bacillus* spp. including *Bacillus pumilus* are commonly found in agricultural settings (i.e. soils) and are present on fresh produce of all kinds with no known adverse effects. The Manual of Clinical Microbiology (9th edition) mentions that dried food such as spices, milk powder and grains often contain large amounts of *Bacillus* spores. *Bacillus pumilus* has been described as a natural, halotolerant component of fermented fish sauce and in cocoa bean fermentations (Doyle et. al, 1997). *Bacillus pumilus* strain GHA180 is not known to produce any mammalian toxins, and no foodborne disease outbreaks associated with *Bacillus pumilus* strain GHA180 or foodborne toxin production from *Bacillus pumilus* strain GHA180 have been reported. Based on extensive testing of *Bacillus pumilus* strain GHA180 TGAI, no toxicity, infectivity, pathogenicity or other adverse effects from dietary exposure to *Bacillus pumilus* strain GHA180 are expected. Even if oral exposure should occur by ingesting harvested fruit vegetables, and/ or tobacco, EPA concludes that there is a reasonable certainty that no harm will result from exposure to such residues because of the lack of toxicity, infectivity, and or pathogenicity in the previously described toxicological studies (see section IV(B)(1)(a) and Table 7 in [Appendix A](#)).

Drinking Water Risk Characterization: Since *Bacillus pumilus* is naturally present in soils, exposure to *Bacillus pumilus* from surface and possibly groundwater can be expected. No adverse effects are expected or have been reported from exposure to *Bacillus pumilus* through drinking water. According to the World Health Organization, *Bacillus* species are often detected in drinking water even after going through acceptable water treatment processes, largely because the spores are resistant to these disinfection processes (World Health Organization, 2011). Should this microbial pesticide be present in drinking water, no adverse effects are expected from exposure to *Bacillus pumilus* GHA180 through drinking water, based on the results of toxicity studies described in section (B)(1)(a) and Table 7 in [Appendix A](#).

Non-occupational, Residential Risk Characterization: The use sites for these products include greenhouse and contained nurseries. As stated previously, *Bacillus pumilus* is naturally present in many habitats. Based on the studies and other information submitted to satisfy data requirements for registration of the end-use pesticide products containing the active ingredient *Bacillus pumilus* strain GHA180, no toxicity, infectivity, pathogenicity or other adverse effects from non-occupational exposure are expected (see section IV(B)(1)(a), above, and Table 7 in [Appendix A](#)).

b. Cumulative Effects from Substances with a Common Mechanism of Toxicity

Section 408(b)(2)(D)(v) of FFDCA requires that, when considering whether to establish, modify, or revoke a tolerance exemption, EPA consider “available information concerning the cumulative effects of [a particular pesticide’s] residues and other substances that have a common mechanism of toxicity.”

EPA has not found *Bacillus pumilus* strain GHA180 to share a common mechanism of toxicity with any other substance, and *Bacillus pumilus* strain GHA180 does not appear to produce a toxic metabolite as its mode of action against target pests. Therefore, for the purposes of this tolerance action, EPA has assumed that *Bacillus pumilus* strain GHA180 does not have a common mechanism of toxicity with other substances. For information on EPA’s efforts to determine which chemicals have a common mechanism of toxicity and to evaluate the cumulative effects of such chemicals, see EPA’s website at <http://www.epa.gov/pesticides/cumulative>.

c. Determination of Safety for the U.S. Population, Infants and Children

FFDCA section 408(b)(2)(C) provides that EPA shall assess the available information about consumption patterns among infants and children, special susceptibility of infants and children to pesticide chemical residues, and the cumulative effects on infants and children of the residues and other substances with a common mechanism of toxicity. In addition, FFDCA section 408(b)(2)(C) provides that EPA shall apply an additional tenfold (10X) margin of safety for infants and children in the case of threshold effects to account for prenatal and postnatal toxicity and the completeness of the database on toxicity and exposure unless EPA determines that a different margin of safety will be safe for infants and children. This additional margin of safety is commonly referred to as the FQPA Safety Factor. In applying this provision, EPA either retains the default value of 10X or uses a different additional safety factor when reliable data available to EPA support the choice of a different factor.

Based on the acute toxicity and pathogenicity data summarized in section IV(B)(1)(a) and Table 7 in [Appendix A](#), EPA concludes that there is a reasonable certainty that no harm will result to the U.S. population, including infants and children, from aggregate exposure to the residues of *Bacillus pumilus* strain GHA180. This includes all anticipated dietary exposures and all other exposures for which there is reliable information. EPA has arrived at this conclusion because the data and information available on *Bacillus pumilus* strain GHA180 does not demonstrate toxic, pathogenic, and/or infective potential to mammals. Because there are no threshold effects of concern, the provision requiring an additional margin of safety does not apply.

3. Occupational Exposure and Risk Characterization

Handler exposure to *Bacillus pumilus* strain GHA180 is not expected to pose any undue risk. Appropriate personal protective equipment and precautionary statements are required on pesticide product labels to mitigate any potential risks to pesticide handlers due to prolonged or numerous exposures. Handlers applying *Bacillus pumilus* strain GHA180 liquid end-use products in agricultural settings must wear a long-sleeved shirt, long pants, socks, shoes, waterproof gloves, and a dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Additional PPE, other than the standard described above, may be required on a product-specific basis.

4. Human Health Risk Characterization

EPA considered human exposure to *Bacillus pumilus* strain in light of the standard for registration in FIFRA and the relevant safety factors in FFDCa. A determination has been made that no unreasonable adverse effects to the U.S. population in general, and to infants and children in particular, will result when *Bacillus pumilus* strain GHA180 pesticide products are used in accordance with EPA-approved labeling.

C. Environmental Assessment ([40 CFR § 158.2150](#))

The Agency has performed an environmental risk assessment for the proposed uses of *Bacillus pumilus* strain GHA180. The proposed use sites for *Bacillus pumilus* strain GHA180 were limited to greenhouse and contained nurseries. EPA determined that these use sites for *Bacillus pumilus* strain GHA180 would not result in significant nontarget species exposure and did not trigger the nontarget and environmental fate data requirements under [40 CFR § 158.2150](#). Further testing of nontarget organisms at higher tier levels (i.e., Tiers II, III, and IV) is not required for the current uses and application methods.

For a comprehensive summary of the generic data requirements described in sections IV(C)(1), refer to Table 8 in [Appendix A](#).

1. Threatened and Endangered Species Assessment

A “No Effect” determination is also made for direct and indirect effects to listed species and their designated critical habitats from proposed uses of *Bacillus pumilus* strain GHA180 as labeled. The exposure of nontarget organisms to *Bacillus pumilus* strain GHA180 is not expected to increase the amount of *Bacillus pumilus* above levels that are found naturally in the environment because the use of products containing this active ingredient are limited to green house and enclosed nurseries. Further testing of nontarget organisms at higher tier levels is not required. Based on the data, literature citations, and data waiver rationale provided by the applicant, BPPD has determined that adverse effects to nontarget organisms are not anticipated from the proposed uses of *Bacillus pumilus* strain GHA180.

V. ENVIRONMENTAL JUSTICE

EPA seeks to achieve environmental justice—the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income—with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair

treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal environmental programs and policies. Meaningful involvement means that (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected. EPA has this goal for all communities and persons across the United States.

EPA sought information on any groups or segments of the population who, as a result their location, cultural practices, or other factors, may have atypical, unusually high exposure to *Bacillus pumilus* strain GHA180 compared to the general population. No public comments were received on this particular matter.

For additional information regarding environmental justice issues, please visit EPA's web site at <http://www.epa.gov/compliance/environmentaljustice/index.html>.

VI. RISK MANAGEMENT DECISION

Section 3(c)(5) of FIFRA permits for the registration of a pesticide provided that all the following determinations are made:

- (1) Its composition is such as to warrant the proposed claims for it;
- (2) Its labeling and other material required to be submitted comply with the requirements of FIFRA;
- (3) It will perform its intended function without unreasonable adverse effects on the environment; AND
- (4) When used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criterion 1, the *Bacillus pumilus* strain GHA180 pesticide products have well-known properties. EPA has no knowledge that would contradict the claims made on the GHA 180 Biological Fungicide, Pro-Mix 'GHA180', and Pro-Mix Tandem EP labels. These products are not expected to cause unreasonable adverse effects on the environment when used according to label instructions. Criterion 2 is satisfied by the current product labels, as well as the data and information presented in this document. It is believed that the *Bacillus pumilus* strain GHA180 1 will not cause any unreasonable adverse effects on the environment, and the GHA 180 Biological Fungicide, Pro-Mix 'GHA180', and Pro-Mix Tandem EPs (end-use products), in particular, are likely to protect against fungal pests as claimed, thereby satisfying criterion 3. Criterion 4 is satisfied in that the *Bacillus pumilus* strain GHA180 pesticide products are not expected to cause unreasonable adverse effects when used according to label instructions. Therefore, the GHA 180 Biological Fungicide, Pro-Mix 'GHA180', and Pro-Mix Tandem (all containing *Bacillus pumilus* strain GHA180 as a new active ingredient) are eligible for registration under FIFRA section 3(c)(5) for labeled uses. If the applicant proposes uses that are more extensive in the future (e.g., outdoor or aquatic applications), EPA will likely require that additional data be submitted in conjunction with a registration amendment request.

VII. ACTIONS REQUIRED BY THE REGISTRANT

A. Final Printed Labeling

Before releasing pesticide products containing *Bacillus pumilus* strain GHA180 for shipment, the registrant is required to provide appropriate final printed labeling to EPA.

B. Reporting of Adverse Effects and Hypersensitivity Incidents

Notwithstanding the information stated in the previous sections, it should be clearly understood that certain, specific data are required to be reported to EPA as a requirement for maintaining the federal registration for a pesticide product. A brief summary of these types of data are described below.

Reports of all incidents of adverse effects to the environment must be submitted to EPA under the provisions stated in FIFRA section 6(a)(2). Additionally, all incidents of hypersensitivity (including both suspected and confirmed incidents) must be reported to EPA under the provisions of 40 CFR § 158.2140(d).

VIII. GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ASAE	American Society of Agricultural Engineers
BPPD	Biopesticides and Pollution Prevention Division
BRAD	Biopesticides Registration Action Document
bw	body weight of animal
CFR	Code of Federal Regulations
cfu	colony-forming unit(s)
cfu/kg	colony-forming units per kilogram
cfu/mL	colony-forming units per milliliter
cP	centipoise
DSMZ	Deutsche Sammlung von Mikroorganismen und Zellkulturen (the German Strain Collection for Microorganisms)
EDSP	Endocrine Disruptor Screening Program
EP	end-use product
EPA	Environmental Protection Agency (the “Agency”)
FFDCA	Federal Food, Drug, and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FQPA	Food Quality Protection Act
FR	Federal Register
g/mL	gram per milliliter
LC ₅₀	median lethal concentration. A statistically derived concentration of a substance that can be expected to cause death in 50% of test animals. It is usually expressed as the weight of substance per weight or volume of water, air, or feed (e.g., mg/L, mg/kg, or ppm).
LD ₅₀	median lethal dose. A statistically derived single dose that can be expected to cause death in 50% of the test animals when administered by the route indicated (oral, dermal, or inhalation). It is expressed as a weight of substance per unit weight of animal (e.g., mg/kg).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MP	manufacturing-use product
MRID No.	Master Record Identification Number
NIOSH	National Institute for Occupational Safety and Health
NRRL	Northern Regional Research Laboratory
OCSP	Office of Chemical Safety and Pollution Prevention
OPP	Office of Pesticide Programs
PC Code	Pesticide Chemical Code
PP	Pesticide Petition
PPE	personal protective equipment
ppm	parts per million
TGAI	technical grade of the active ingredient
ULV	ultra low volume

IX. BIBLIOGRAPHY

A. Studies Submitted to Support the *Bacillus pumilus* GHA180 Pesticide Product Registrations

MRID	Citation Reference
48005000	Premier Horticulture (2010) Submission of Product Chemistry and Toxicity Data in Support of the Application for Registration of GHA 180, Pro-Mix GHA 180, and Pro-Mix Tandem and the Petition for Tolerance of <i>Bacillus pumilus</i> GHA 180. Transmittal of 25 Studies.
48005001	Libman, G. (2009) Product Chemistry for (<i>Bacillus pumilus</i> GHA 180). Unpublished study prepared by Premier Tech, Ltd. 33 p.
48005002	Libman, G. (2009) Product Chemistry for PRO-MIX 'BX' Tandem. Project Number: PHL/LA/WI/137E3/USA. Unpublished study prepared by Premier Tech, Ltd. 77 p.
48005003	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'BX' Blend. Unpublished study prepared by Premier Tech, Ltd. 89 p.
48005004	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'HP' Blend. Unpublished study prepared by Premier Tech, Ltd. 80 p.
48005005	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'TA' Blend. Unpublished study prepared by Premier Tech, Ltd. 92 p.
48005006	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'FPX' Blend. Unpublished study prepared by Premier Tech, Ltd. 90 p.
48005007	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'MPX' Blend. Unpublished study prepared by Premier Tech, Ltd. 80 p.
48005008	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'PGX' Blend. Unpublished study prepared by Premier Tech, Ltd. 92 p.
48005009	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'VFT' Blend. Unpublished study prepared by Premier Tech, Ltd. 92 p.
48005010	Libman, G. (2010) Product Chemistry for Pro-Mix GHA 180 'BRK' Blend. Unpublished study prepared by GNL Consultation Services and Premier Tech, Ltd. 80 p.
48005011	Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'BX' Blend. Unpublished study prepared by Premier Tech, Ltd. 126 p.
48005012	Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'HP' Blend. Unpublished study prepared by Premier Tech, Ltd. 118 p.
48005013	Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'TA' Blend. Unpublished study prepared by Premier Tech, Ltd. 94 p.
48005014	Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'FPX' Blend. Unpublished study prepared by Premier Tech, Ltd. 92 p.
48005015	Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'MPX' Blend. Unpublished study prepared by Premier Tech, Ltd. 82 p.

- 48005016 Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'PGX' Blend. Unpublished study prepared by Premier Tech, Ltd. 94 p.
- 48005017 Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'VFT' Blend. Unpublished study prepared by Premier Tech, Ltd. 94 p.
- 48005018 Libman, G. (2010) Product Chemistry for Pro-Mix Tandem 'BRK' Blend. Unpublished study prepared by Premier Tech, Ltd. 77 p.
- 48005019 Libman, G. (2010) Waiver Request for Microbial Pesticide Data Requirements: *Bacillus pumilus* GHA 180 and Formulated Products. Unpublished study prepared by Premier Horticulture. 35 p.
- 48005020 Kuhn, J. (2009) Acute Oral Toxicity Study (UDP) in Rats: *Bacillus Pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11547/08. Unpublished study prepared by Stillmeadow, Inc. 12 p.
- 48005021 Kuhn, J. (2010) Acute Dermal Toxicity Study in Rats: *Bacillus pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11548/08. Unpublished study prepared by Stillmeadow, Inc. 15 p.
- 48005022 Carter, L. (2009) Acute Inhalation Toxicity Study in Rats: *Bacillus pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11549/08. Unpublished study prepared by Stillmeadow, Inc. 19 p.
- 48005023 Kuhn, J. (2009) Acute Eye Irritation Study in Rabbits: *Bacillus pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11550/08. Unpublished study prepared by Stillmeadow, Inc. 18 p.
- 48005024 Kuhn, J. (2009) Acute Dermal Irritation Study in Rabbits: *Bacillus pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11551/08. Unpublished study prepared by Stillmeadow, Inc. 13 p.
- 48005025 Monds, K. (2009) Acute Intravenous Toxicity/Pathogenicity Study in Rats with a Microbial Pest Control Agent (MPCA): *Bacillus pumilus* GHA-180 TGAI: Amended Final Report. Project Number: 11552/08. Unpublished study prepared by Stillmeadow, Inc. 21 p.
- 48391500 Premier Horticulture, Inc. (2011) Submission of Product Chemistry Data in Support of the Applications for Registration of GHA 180 Biological Fungicide, Pro-Mix GHA 180 and Pro-Mix Tandem. Transmittal of 1 Study.
- 48391501 Libman, G. (2011) Addendum to Product Process *Bacillus pumilus* GHA 180 and Formulated Products: Addendum to MRID 48005001. Unpublished study prepared by: GNL Consultation Services and Premier Horticulture, Inc. 12 p.
- 48537300 Premier Horticulture, Inc. (2011) Submission of Product Chemistry Data in Support of the Application for Registration of Pro-Mix GHA 180, GHA 180 Biological Fungicide and Pro-Mix Tandem. Transmittal of 2 Studies.
- 48537302 Libman, G. (2011) Clarification about Storage Stability Data of Promix GHA 180 and Promix Tandem. Unpublished study prepared by Premier Horticulture, Ltd. 8 p.
- 48537303 Libman, G. (2011) Microbiological Analyses: Certificates of Analysis for GHA -

180. Project Number: STIS/10109. Unpublished study prepared by Premier Horticulture, Ltd. 8 p.

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48559502 Libman, G. (2011) Product Chemistry for (Bacillus pumilus GHA180). Project Number: PHL/LA/WI/128E2. Unpublished study prepared by GNL Consultation Services. 31p.

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U.S. EPA. 2011b. *Bacillus pumilus* strain GHA180. Review of deficiency responses. Memorandum from Joel V. Gagliardi, Ph.D., and J. L. Kough, Ph.D., to S. Cerrelli dated October 20, 2011.

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APPENDIX A. MICROBIAL PESTICIDES DATA REQUIREMENTS (40 CFR PART 158 – SUBPART V)

TABLE 1. Product Analysis Data Requirements for the Technical Grade of the Active Ingredient (TGAI)/ GHA 180 (40 CFR § 158.2120)				
OCSP Guideline Number	Data Requirement	Results		MRID No.
		TGAI	GHA 180 (EP)	
885.1100	Product Identity	Submitted data fulfill the requirement for product identity.	Submitted data fulfill the requirement for product identity.	48005001 48559501
885.1200	Manufacturing Process	Submitted data fulfill the requirement for manufacturing process.		48005001 48391501
Not applicable	Deposition of a Sample in a Nationally Recognized Culture Collection	<i>Bacillus pumilus</i> strain GHA180 is on deposit at the International Depository Authority of Canada, IDAC No. 260707-01	Not applicable	48005001
885.1300	Discussion of Formation of Unintentional Ingredients	Submitted data fulfill the requirement for discussion of formation of unintentional ingredients		48005001
885.1400	Analysis of Samples	Submitted data fulfill the requirement for analysis of samples		48005001 48537303
885.1500	Certification of Limits	Not applicable	Limits listed on the confidential statement of formula are adequate/acceptable	CSFs dated July 12, 2011
Additional Studies				
830 .1800	Enforcement Analytical Method	Not applicable	Submitted data fulfill the requirement for an enforcement analytical method	48005001

TABLE 2. Physical and Chemical Characteristics for the Technical Grade of the Active Ingredient ((TGAI)/ GHA 180 Biological Fungicide (EP) (40 CFR § 158.2120)

OCSPP Guideline Number	Data Requirement	Results		MRID No.
		TGAI	GHA 180 Biological Fungicide (EP)	
830.6302	Color	Amber		48005001 48559502
830.6303	Physical State	Liquid		48005001 48559502
830.6304	Odor	Musty		48005001 48559502
830.6313	Stability to Normal and Elevated Temperatures, Metals, and Metal Ions	Vegetative cells expected to denature at >50°C.		48005001 48559502
830.6317	Storage Stability	Stable for at least one year; storage conditions not defined.		48005001
830.6319	Miscibility	Not required per OCSPP 830.1000(e)(2), the product is not an emulsifiable liquid.		
830.6320	Corrosion Characteristics	No corrosion observed during the storage stability testing		48005001
830.7000	pH	6-7.		48005001 48559502
830.7100	Viscosity	Not applicable	2 - 5 mPa.s at 20 °C	48005001
830.7300	Density/Relative Density/Bulk Density (Specific Gravity)	62.30 lbs/ft.		48005001 48559502

TABLE 3. Product Analysis Data Requirements for the End-Use Product (EP), Pro-Mix GHA 180 (40 CFR § 158.2120)			
OCSPP Guideline Number	Data Requirement	Results	MRID No.
885.1100	Product Identity	Submitted data fulfill the requirement for product identity.	48005003-48005010
885.1200	Manufacturing Process	Submitted data fulfill the requirement for manufacturing process.	48005003-48005010 48391501
Not applicable	Deposition of a Sample in a Nationally Recognized Culture Collection	Not applicable	Not applicable
885.1300	Discussion of Formation of Unintentional Ingredients	Submitted data fulfill the requirement for discussion of formation of unintentional ingredients for the current use sites. .	48005003-48005010
885.1400	Analysis of Samples	Submitted data fulfill the requirement for analysis of samples	48005003-48005010
885.1500	Certification of Limits	Limits listed on the confidential statement of formula are adequate/acceptable	48005003-48005010 CSFs dated 1/7/11
Additional Studies			
830.1800	Enforcement Analytical Method	An analytical method is not required for enforcement purposes since the Agency is establishing an exemption from the requirement of a tolerance without any numerical limitation.	48005003-48005010

TABLE 4. Product Analysis Data Requirements for the End-Use Product (EP), Pro-Mix Tandem (40 CFR § 158.2120)			
OCSPP Guideline Number	Data Requirement	Results	MRID No.
885.1100	Product Identity	Submitted data fulfill the requirement for product identity.	48005011-48005018
885.1200	Manufacturing Process	Submitted data fulfill the requirement for manufacturing process.	48005011-48005018 48391501
Not applicable	Deposition of a Sample in a Nationally Recognized Culture Collection	Not applicable	Not applicable
885.1300	Discussion of Formation of Unintentional Ingredients	Submitted data fulfill the requirement for discussion of formation of unintentional ingredients for the current use sites.	48005011-48005018
885.1400	Analysis of Samples	Storage stability was shown up to two years in peat growing mixes stored outdoors with temperature variations from -30 to +30°C	48005011-48005018
885.1500	Certification of Limits	Limits listed on the confidential statement of formula are adequate/acceptable	48005011-48005018 CSFs dated 1/7/11
830.1800	Enforcement Analytical Method	An analytical method is not required for enforcement purposes since the Agency is establishing an exemption from the requirement of a tolerance without any numerical limitation.	

TABLE 5. Physical and Chemical Characteristics for the End-Use Product (EP), Pro-Mix Tandem (40 CFR § 158.2120)			
OCSPP Guideline Number	Data Requirement	Results	MRID No.
830.6317	Storage Stability	Storage stability was shown up to two years in peat growing mixes stored outdoors with temperature variations from -30 to +30°C.	48005011-48005018 48537302
830.6319	Miscibility	Not applicable, the product is not an emulsifiable liquid.	
830.6320	Corrosion Characteristics	Not Required. The peat based soil mixes were not considered corrosive material	
830.7100	Viscosity	Not applicable, the product is a solid	
830.7300*	Density/Relative Density/Bulk Density (Specific Gravity)	8-10 lbs/ft ³	CSFs dated 1/7/11

TABLE 6. Physical and Chemical Characteristics for the End-Use Product (EP), Pro-Mix GHA 180 (40 CFR § 158.2120)			
OCSPP Guideline Number	Data Requirement	Results	MRID No.
830.6317	Storage Stability	Storage stability was shown up to two years in peat growing mixes stored outdoors with temperature variations from -30 to +30°C.	48005003- 48005010 48537302
830.6319	Miscibility	Not applicable, the product is not an emulsifiable liquid.	
830.6320	Corrosion Characteristics	Not Required. The peat based soil mixes were not considered corrosive material	
830.7100	Viscosity	Not applicable, the product is a solid	
830.7300*	Density/Relative Density/Bulk Density (Specific Gravity)	8-10 lbs/ft ³	CSFs dated 1/7/11

TABLE 7. Toxicology Data Requirements for the Technical Grade of the Active Ingredient (TGAI)/ and for the End-Use Products (EP), GHA 180 Biological Fungicide, Pro-Mix GHA 180 Pro-Mix Tandem (40 CFR § 158.2140)						
OCSP Guideline Number	Data Requirement	TGAI	GHA 180 Biological Fungicide (EP)	Pro-Mix GHA 180 (EP)	Pro-Mix GHA 180 Tandem (EP)	MRID No.
885.3050	Acute Oral Toxicity/ Pathogenicity	No evidence of infectivity, pathogenicity or toxicity were noted in the Acute Injection study or in any of the submitted acute studies listed below. Exposures through the pulmonary or oral routes are not expected to produce adverse effects based on existing test and product characterization information.	Not applicable	Not applicable	Not applicable	48005019
885.3150	Acute Pulmonary Toxicity/ Pathogenicity		Not applicable	Not applicable	Not applicable	
885.3200	Acute Injection Toxicity/ Pathogenicity	15 male and 15 female rats were injected with TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) at a dose of 6.8×10^7 CFU/animal and observed up to 21 days. All animals survived, gained weight, and appeared normal during the study. No observable abnormalities were noted in any animal at necropsy. The test organism completely cleared from the blood, kidneys, mandibular lymph nodes and cecum contents of the animals by day 14, and showed a pattern of clearance but had not completely cleared from the liver and spleen by day 21. No test organism was detected in the tissues/organs of the animals treated with the inactivated test material or the untreated control group. Classification: Acceptable – not toxic, infective or pathogenic to rats when dosed by IV at 6.8×10^7 CFU/animal.	Not applicable	Not applicable	Not applicable	48005025
885.3500	Cell Culture	Not applicable	Not applicable	Not applicable	Not applicable	
870.1100	Acute Oral Toxicity	Oral LD ₅₀ was >5000 mg/kg bw. Classification: Acceptable TOXICITY CATEGORY IV	Data on TGAI supports these EPs			48005020
870.1200	Acute Dermal Toxicity	The LD ₅₀ was >5050 mg/kg bw. Classification: Acceptable TOXICITY CATEGORY IV	Data on TGAI supports these EPs			48005021
870.1300	Acute Inhalation Toxicity	The LC ₅₀ Combined was > 2.18mg/L. Classification: Acceptable TOXICITY CATEGORY IV	Data on TGAI supports these EPs			48005022
870.2400	Acute Eye Irritation	Two male and one female rabbits were treated with 0.1 mL test material No iritis or positive conjunctival irritation was noted on any rabbit throughout the study. The maximum average score was 17.3 at one hour after test material instillation. <i>Bacillus pumilus</i> GHA180 TGAI was mildly irritating to the eye. Classification: Acceptable TOXICITY CATEGORY III	Data on TGAI supports these EPs			48005023
870.2500	Primary Dermal Irritation	One male and two female rabbits were dermally exposed to <i>Bacillus pumilus</i> GHA180 TGAI (1.4×10^{10} – 6.0×10^{10} CFU/mL) Very slight erythema was noted on one animal one hour after patch removal with clearance by 24 hours. No dermal irritation was noted on any other rabbit during the study. The primary irritation index was 0.1. CLASSIFICATION: Acceptable TOXICITY CATEGORY IV	Data on TGAI supports these EPs			48005024

TABLE 8. Nontarget Organism Toxicity and Environmental Fate Data Requirements for the Technical Grade of the Active Ingredient (TGAI), <i>Bacillus pumilus</i> train GHA180 . (40 CFR § 158.2150)			
OCSPP Guideline Number	Data Requirement	Results	MRID No.
Tier I			
885.4050	Avian Oral Toxicity	Not required per 40 CFR § 158.2150. The current label use patterns for greenhouse and nursery use would not result in significant nontarget species exposure.	48005019
885.4100	Avian Inhalation Toxicity/Pathogenicity		
885.4150	Wild Mammal Toxicity/Pathogenicity		
885.4200	Freshwater Fish Toxicity/Pathogenicity		
885.4240	Freshwater InvertebrateToxicity/Pathogenicity		
885.4280	Estuarine/Marine Fish and Invertebrate Testing		
885.4300	Nontarget Plant Testing		
885.4340	Nontarget Insect Testing		
885.4380	Honey Bee Testing		
Tiers II, III, and IV			
Not required for <i>Bacillus pumilus</i> strain GHA180 based on the current uses and application methods.			

APPENDIX B. PESTICIDE PRODUCTS

EPA File Symbol	Registration Name	Growing Medium Blends	Percentage Active Ingredient	Formulation Type	Use Site(s)	Method(s) of Application	Application Rate	Target Pest
74267-E	GHA 180 Biological Fungicide	Not applicable	0.37%	End-use Product	Greenhouses And Enclosed Nurseries Growing media of Ornamentals and vegetable transplants	Incorporation Into Peat Moss Or Growing Media Soil Drench	As directed on label	<i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i>
74267-G	Pro-Mix GHA 180	BX, HP, TA, FPX, MPX, PGX, VFT or BRK	0.001%	End-use Product	Horticultural and agricultural plants Tobacco germinating seeds	Plant in Growing Medium	Not applicable, pre-mixed potting mix	<i>Pythium</i> , <i>Fusarium</i> <i>Rhizoctonia</i> <i>Alternaria</i> <i>Aspergillus</i>
74267-U	Pro-Mix Tandem	BX, HP, TA, FPX, MPX, PGX, VFT or BRK	0.001%	End-use Product	Horticultural and agricultural plants Tobacco germinating seeds	Plant in Growing Medium	Not applicable, pre-mixed potting mix	<i>Pythium</i> , <i>Fusarium</i> <i>Rhizoctonia</i> <i>Alternaria</i> <i>Aspergillus</i>