UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Spirotetramat (PC Code 392201): EFED Response to Comments on Pesticide Product Registration Approval.

TO: Rita Kumar, Risk Manager Reviewer
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Insecticide Branch
Registration Division (7505P)

FROM: Joseph DeCant, Ecologist
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Environmental Fate and Effects Division (7507P)
Joseph P. DeCant 12/10/09

Thru: Mah Shamim, Branch Chief
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The Environmental Fate and Effects Division (EFED) has reviewed the public comments submitted in response to the publication of the Pesticide Product Registration Approval for spirotetramat. This document provides the EFED responses to those comments which relate to the ecological effects and environmental fate of spirotetramat.

Spirotetramat Pesticide Product Registration Approval: Response to Comments

Comment:
EPA scientists have indicated to me that they were not allowed to validate the statistical results of the ecological effects assessment for Movento. Page 11 of the Environmental Risk Assessment indicates that summaries of studies were utilized. Summaries of data generated by industry! I am outraged that such information was taken at face value. Honeybees are in a state of crisis in this country. Please, go the extra mile and at least perform the verifications necessary, as EPA scientists are requesting, to assess the integrity of this Austrian data – Joel Levie

Response:
The review of the registration package for spirotetramat involved a multi-national effort. In agreement with international governmental partners associated with registration efforts for this pesticide, the primary reviewers for ecological effects data were the Austrian Agency for Health and Food Safety (AGES). The U.S. Environmental Protection Agency (hereafter referred to as the Agency) served as secondary reviewers of the AGES' evaluations as they appeared in Volume 3, Annex B.9: Ecotoxicology monograph for registration in Europe. After primary review, the AGES provided that these reviews and the studies to the EPA, but only allowed one month for the secondary reviews. This timeframe was too short to allow for a thorough evaluation of the statistical results for each study. However, the Environmental Fate and Effects Division of the Agency provided an example of a statistical reevaluation of the results for a study on avian reproduction to the AGES.

In the case of global reviews, as performed for spirotetramat, each country has its own criteria for acceptability when reviewing the results of toxicity studies. Austria provided primary reviews of toxicity studies related to a variety of nontarget organisms. While Austria performs its reviews according to its own methods, which included the independent statistical verification of the results that it felt warranted further evaluation, the Agency may independently analyze the data associated with all studies. In the event that a particular study does not satisfy the requirements established by the U.S. EPA 40 CFR part 158.850 guidelines, then the Agency may require a new study be conducted by the registrant.

Comment:
Bees pollinate nearly 70 percent of the world's flowering plants, contributing billions of dollars to U.S. agriculture every year. The U.S. EPA approved a new pesticide, spirotetramat, despite evidence that it could cause "serious harm to bees".

Response:
By their nature, many pesticides may pose some risk to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms. At the same time, pesticides are often useful because of their ability to control disease-causing organisms,

insects, weeds, or other pests. To allow the use of a toxic pesticide, while preventing harm to nontarget organisms, the Agency requires testing to determine which nontarget organisms might be vulnerable to adverse effects from the proposed use of that pesticide. The Agency then imposes restrictions on the use of the pesticide, to provide protection for those nontarget organisms that might be at risk, including pollinators.

The Agency recognizes the importance of pollinators for a variety of beneficial functions in human society and in nature. The Agency agrees with the comments that bees pollinate many of the world's flowering plants, and therefore play an important role in ecosystem functioning. In addition, the Agency acknowledges the importance of pollinators to the healthy functioning of many crops in U.S. agriculture. In the case of spirotetramat, testing showed that the product is practically nontoxic to adult bees on an acute contact and an acute oral exposure basis. However, feeding tests in field studies showed substantial detrimental effects to the colony, including the brood. Semi-field tests with honeybee colonies confined to a tent enclosure also indicated effects to developing brood soon after application of the test compound. However, these semi-field studies did not reveal any long-term effects on colony survival. Although the effects on overall brood development in some studies appeared to be transient, there was uncertainty regarding the potential long-term effects on the colony as a whole. Because of this uncertainty, the reviewers concluded that the use of this chemical could present significant risk to bees. Given this uncertainty, the Agency required use restrictions on the product labeling to reduce the potential exposure for bees during use of the compound.

In addition to the use restrictions, it is also essential to thoroughly assess the exposure of spirotetramat to pollinators under field conditions, as well as to further assess the potential impacts to the brood of pollinators. Therefore, as another condition of registration, the Agency required field pollinator testing to address the potential for chronic risks to bees and the colony as a whole. Based on the results of field testing, additional use restrictions might be imposed.

Comment:
The National Honey Bee Advisory Board (NHBAB) mentioned that since this is a systemic product the impact on pollinators needs to focus more on chronic rather than acute effects. This necessitates more long-term field tests to determine toxicity. More studies need to be conducted on long-term effects on queens and brood in a beehive.

Response:
The Agency agrees that long-term studies are necessary to adequately assess the potential impacts of spirotetramat on pollinators. Previous studies revealed that spirotetramat at treatment rates equivalent to 0.032 – 0.141 lbs/A can adversely affect brood and that these effects may be related to the chemical's mode of action as an inhibitor of lipid synthesis. Finally, two other chemicals in the same class of ketoenol compounds, spiromesifen and spirodiclofen, demonstrate that compounds with this mode of action may adversely affect brood development while displaying low acute toxicity to adult forage bees. Each of these aspects, together with the low acute mortality toxicity of spirotetramat to adult forage bees, illustrate that future field pollinator studies should focus on the whole colony by examining whole hive indices. Therefore, the

Agency is requiring a field pollinator study under the conditional registration in order to address the uncertainty regarding potential toxicity to the colony and the brood.

Comment:
The NHBAB also commented that field tests on crops that are primarily pollen producers (almonds, apples, corn) need to be conducted to determine potential effects on honeybees. Also, woody trees can express systemic pesticides at dangerously elevated levels at the time of blossoming, both in the nectar and the pollen. Often the elevated levels do not show up until one or two seasons after application of the pesticide.

Response:
The Agency appreciates the input regarding the need to evaluate crops that primarily produce pollen rather than nectar. The Agency also recognizes that, depending on the chemical, a systemic pesticide can persist in the soil and the vegetation. The chemical can remain in the plant for an extended period of time, and may translocate to the blossoms, pollen, and nectar during bloom. In the case of spirotetramat, residue analysis in melon blossoms showed that residues decline over time but would persist for at least 10 days after application. In addition, residues in citrus blossoms will persist for at least 7 days after application. There are currently no studies that have been submitted related to the persistence of spirotetramat over several seasons after application. These suggestions are important to the Agency, and they will be taken into account in the design of tests that further assess the effects of spirotetramat on pollinators.

Comment:
The NRDC mentioned that all data gaps regarding risks to birds and pollinators must be promptly addressed and any uses that exceed the level of concern and/or present unreasonable risks to birds and beneficial insects should be cancelled.

Response:
The Agency acknowledges the importance of addressing any data gaps regarding risk to birds and pollinators. The Agency recently re-evaluated the required study regarding the effects of spirotetramat on avian reproduction. The Agency requires a new avian reproduction study in order to address deficiencies identified in the original. In addition, the Agency recently evaluated a number of studies that Bayer CropScience submitted in response to the conditional registration's data requirement for a field pollinator study. The Agency determined that the submitted studies were inadequate to address the hazard to the colony. It also determined that Bayer CropScience must submit a new field pollinator study because based on the available data and associated uncertainty, the EFED could not refute the hypothesis that the "Exposure to adult bees to direct treatment or residues on blooming crops can lead to effects on honey bee larvae", as stated on the label .

The EFED does not make decisions related to the cancellation of uses. However, the EFED risk assessment process, as outlined in the EFED Risk Assessment Overview document[1], helps to inform the Registration Division, which is responsible for the approval or cancellation of uses. In relation to beneficial insects, this risk assessment process does not evaluate "risk" to pollinators. Data are required to determine hazard to honeybees and depending on the results of the studies, specific label language, as defined by the Label Review Manual, is applied to the label. Additional precautionary language may be included.

Comment:
The NRDC suggested that the EPA must also conduct the required analysis of spirotetramat's economic, social, and environmental costs and benefits that it failed to conduct when registering this pesticide in 2008, and the EPA should modify its registration decision accordingly.

Response:
The EFED conducts assessments on the fate and effects of a pesticide to non-target plants and animals. These assessments focus on the potential risk that a chemical may pose to these taxa based on a variety of factors including the application rate, physical properties of the chemical, and the toxicity to each taxa. While EFED provides these assessments to the Registration Division regarding a chemical's potential to harm non-target species at a specified field application rate, it does not provide a cost/benefit analysis.

Comment:
Bayer CropScience highlights the statement in the U.S. EPA risk assessment, "Although spirotetramat can be classified as practically non-toxic to honey bees based on acute oral and contact studies, results of brood feeding studies and tunnel tests suggest the potential for effects to broods following spirotetramat application at rates lower than the maximum proposed label rates; significant brood effects including increased mortality in adults and pupae, massive perturbation of brood development, early brood termination, and decreased larval abundance were detected." Bayer CropScience claims that this statement is factually incorrect and misleading, and that they have submitted a number of studies showing that under actual field conditions, spirotetramat shows no negative impacts to honey bee brood or adults. In addition, they state that they have been coordinating with the NHBAB to further evaluate the safety of spirotetramat through a field study in citrus. Additional work is planned with the NHBAB for 2010.

Response:
Bayer CropScience claims that spirotetramat exposure to the brood, which will occur as shown by the residue analyses of the pollen and nectar stores inside the hives in tunnel studies, will not be toxic to honeybees at the application rates under actual field conditions. The submitted field studies reflect this lack of effects.

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[1] http://www.epa.gov/espp/consultation/ecorisk-overview.pdf

However, the field studies have some substantial limitations in addressing the potential toxicity of spirotetramat to honey bee colonies. Examples of study deficiencies include high variability and a low number replicates that reduce the power of the study to detect treatment effects, questionable hive performance given differences between treatments even before chemical application, exposure uncertainties related a decrease in blossom density or the lack of pollen identification analysis, application rates lower than the maximum labeled use rate and maximum seasonal rate, a lack of method reporting for toxicity endpoints, a sampling design that may not have captured the maximum exposure level, or a complete lack of control plots or replicates.

An additional limitation of the studies arises from the nature of the potential risk posed by spirotetramat. Previous feeding studies in the field and semi-field tunnel studies showed detrimental effects to the brood. The most recently submitted set of studies show that spirotetramat residues will accumulate and persist in honey bee colonies. As such, there appears to be both exposure and toxicity. Coupled with the previous semi-field and feeding studies, there is uncertainty regarding potential risk to the colony. However, the maximum length of time that the most recently submitted studies assessed honey bee colonies was approximately 1.5 months. This study duration is inadequate for the assessment of chronic hazard to honey bee brood and the colony as a whole.

The studies submitted thus far are therefore inadequate to address the uncertainty surrounding the potential of spirotetramat to affect honey bee brood and colonies. However, the EFED acknowledges the efforts of Bayer CropScience to address these uncertainties and looks forward to working with Bayer CropScience to further evaluate the potential effects of spirotetramat on pollinators.

Comment:
Bayer CropScience mentioned that there are many examples of chemicals which share the same chemistry class or mode of action, but result in a different spectrum of effects in both target and non-target receptors. It is incorrect to assume that all ketoenol chemistry or lipid biosynthesis inhibitors will have the same intrinsic potential to affect bee brood.

Response:
The EFED acknowledges that it would be presumptuous to assume that all chemicals that share the same chemistry class or mode of action would result in identical of effects. However, the idea that a chemical's activity can be related to its structure serves as a basis for [quantitative] structure-activity relationships ([Q]SARs). Each chemical has a unique chemistry and may or may not result in effects on the same endpoints or to the same extent. However, the potential exists for spirotetramat to result in similar toxic effects to bee colonies relative to both spiromesifen and spirodiclofen. Furthermore, spirotetramat has already been shown to have the intrinsic ability to disrupt the honey bee brood, while demonstrating relatively low acute toxicity to adult forage bees. Both of these characteristics are shared by its sister chemicals to varying degrees. As such, EFED has recommended field pollinator studies to address the uncertainty.