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

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OFFICE OF
PREVENTION PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Evaluation of Public Interest Documentation for the Conditional Registration of Topramezone on Field Corn, Sweet Corn, and Pop Corn, D313195.

FROM: Nicole Zinn, Biologist
Biological Analysis Branch
Biological and Economic Analysis Division (7503C)

THRU: Arnet Jones, Chief
Biological Analysis Branch
Biological and Economic Analysis Division (7503C)
05/12/2005

TO: Jim Stone, Product Manager
Registration Division (7505C)

PEER REVIEW PANEL: May 11, 2005

Summary

Topramezone (BAS 670 H) is an herbicide proposed for use on field corn, popcorn, seed corn, and sweet corn. Topramezone works by inhibiting 4-hydroxyphenylpyruvate dioxygenase. The registrant submitted a package that included several reasons for a public interest finding, for several different herbicide programs in corn. These claims were supported by the submitted data. The most compelling points are that topramezone will control several important weeds in sweet corn and popcorn production while maintaining crop tolerance, and that topramezone may be used as a resistance management tool. Topramezone may also be useful to field corn growers as a resistance management tool, and would be the only HPPD inhibitor available for post-emergence application that would not have insecticide restrictions on the label. BEAD believes that the registration of this herbicide meets the criteria for a public interest finding because of these factors.

Agency Public Interest Finding Policy

The registration of a new pesticide ingredient is presumed to be in the public interest if one or more of the following criteria are applicable: 1) it involves a replacement for another pesticide

that is of continuing concern to the Agency; 2) it involves a use for which a Section 18 emergency exemption has been granted, if the basis for the exemption was the lack of a suitable alternative; and 3) involves a use against a pest of public health significance.

For pesticides which do not meet any of the criteria listed above for the presumption of public interest, one of the following three criteria must be met: 1) there is a need for the new pesticide that is not being met by currently registered pesticides; 2) the new pesticide is less risky than currently registered pesticides; 3) the benefits from the new pesticide are greater than those from currently registered pesticides or non-chemical control measures. This review focuses on items 1 and 3 (needs and benefits).

General Information About Topramezone

Mode of action: Inhibits 4-hydroxyphenylpyruvate dioxygenase (HPPD), which results in secondary effects on photosynthesis, membrane structure, and carotenoid pigment formation.
Use rates: 0.5 to 1.0 fl oz/acre (0.011 to 0.022 lb ai/acre)
Proposed Crops: Field corn, popcorn, seed corn, sweet corn
Pests targeted: Grass and broadleaf weeds. Broadleaf weeds on the proposed label are redroot pigweed, common ragweed, Eastern black nightshade, common lambsquarters, velvetleaf, Palmer amaranth, carpetweed , common cocklebur, jimsonweed, kochia, venice mallow (suppression), morningglory spp. (suppression), mustard spp., black nightshade, hairy nightshade, other pigweeds (prostrate, smooth, and tumble), giant ragweed, prickly sida, smartweed (ladysthumb and Pennsylvania), sunflower (volunteer and wild), Canada thistle (suppression), waterhemp (common and tall). Grass weeds controlled include: barnyardgrass, large crabgrass, smooth crabgrass, giant foxtail, goosegrass. Grass weeds suppressed include: woolly cupgrass, Johnsongrass (seedling), wild proso millet, broadleaf signalgrass, green foxtail, yellow foxtail, fall panicum.
Application methods: Postemergence application with ground or aerial equipment
Any other relevant information: 45 day PHI

Analysis of Registrant's Claims for Public Interest

Registrant's Claims

The registrant lists numerous reasons why topramezone is in the public interest, which are included below. Claims that may be relevant to other divisions, such as reduced environmental loading, are not included here nor evaluated in this document.

1) Compared to mesotrione, topramezone offers the following benefits: Comparable broadleaf weed control and better grass control; reduced hybrid restrictions and greater margins of tolerance for sweet corn, popcorn and seed corn production; and, flexibility for use over soil insecticide programs without risk of interactions that may result in corn injury.

2) Topramezone can be combined with glyphosate to prevent or manage resistant weeds and may

allow reduced rates of glyphosate.

3) Compared with traditional corn herbicide programs, topramezone will allow growers to transfer more herbicide dependency to the postemergence segment (fosters IPM), and offer an alternative mode-of-action for replacement or reduction in use of ALS inhibitor or atrazine products that face growing weed resistance issues.

4) Sweet corn and popcorn growers have fewer herbicide alternatives than field corn growers. Mesotrione is resticted from use on white popcorn hybrids and also has limitations on sweet corn hybrids. Mesotrione cannot be used on areas treated with organophosphate or carbamate soil or foliar applied insecticides. Topramezone will offer control of many problem weeds including ALS and triazine resistant biotypes while maintaining needed crop tolerance margins, and fill gaps in weed management needs left by the cancellation of cyanazine.

Analysis

BEAD has reviewed the registrant's claims, as well as data submitted on efficacy and crop tolerance.

General Evaluation

Efficacy and crop tolerance data have been previously evaluated by Canada's Pest Management Regulatory Agency, and that review was subsequently reviewed by BEAD (Zinn, 2004). BEAD also reviewed similar data submitted in the public interest finding package, as appropriate.

Both the mesotrione and topramezone labels contain statements about combination with atrazine for better weed control. Rates of topramezone at the lower end of the range (0.011 – 0.016 lb ai/acre) when combined with low rates of atrazine (0.225 lb ai/acre) provided good to excellent control of many grass and broadleaf species. Additional data were submitted on combinations with other herbicides. These data supported the registrant's claims that topramezone will fit into a variety of corn herbicide programs, and that lower rates of topramezone may be used effectively with various herbicide combinations.

Evaluation of Registrant's Claims

1) There are two other herbicides registered with the HPPD inhibitor mode of action, isoxaflutole and mesotrione. These herbicides have been increasing in the marketplace. Isoxaflutole and mesotrione were registered in 1998 and 2001, respectively, and in 2003, isoxaflutole was used on 8 percent and mestrione was used on 13 percent of the field corn acreage (USDA, 2004). Isoxaflutole is registered for preemergence applications on field corn, and use is limited to certain states. Mesotrione is registered for both preemergence and postemergence applications in field corn, production seed field corn, field corn grown for silage, yellow popcorn, and sweet corn. Most of the grass weeds listed on the proposed topramezone label are not included on the mesotrione label, including giant foxtail, the most important grass weed in field corn (Field Corn PMSP, 2002). In addition, topramezone will provide

postemergence control for weeds, such as kochia, not controlled by mesotrione.

The mesotrione label and ALS herbicide labels have restrictions for organophosphate and carbamate insecticides because of corn injury concerns that may occur when these chemicals interact. The topramezone label does not include any restrictions for these products. Organophosphate and carbamate insecticides are widely used in sweet corn and, to some extent, popcorn (USDA, 2003; Popcorn PMSP, 2002). The registrant submitted data that showed injury with corn insecticide treatments was much greater with mesotrione than topramezone. The percent injury ranged from 1 to 42 percent with mesotrione, and 0 to 5 percent with topramezone.

2) In 2003, glyphosate was used on 19 percent of the field corn acreage (USDA Chemical Usage, 2004). Glyphosate-tolerant field corn was first planted in 1998. In 2004, herbicide-tolerant field corn was grown on approximately 13 percent of corn acreage, a subset of this which was glyphosate-tolerant. If used in conjunction with glyphosate-tolerant soybeans, selective pressure is in favor of weed species that are tolerant of glyphosate. Herbicide-tolerant soybeans were grown on approximately 85 percent of soybean acreage in 2004, much of which was glyphosate-tolerant (USDA Acreage, 2004; Proper Weed Management Key with Herbicide-Tolerant Crops, 2004). Therefore, there is a chance that selection may occur in favor of glyphosate-tolerant weeds in corn/soybean rotations, especially if glyphosate-tolerant crop production continues to increase. Glyphosate-resistance has occurred in three weed species in the United States (Heap, 2005). In addition, weed shifts may occur to those weed species not well controlled by glyphosate. Since topramezone has a different mode of action, the use of this herbicide in conjunction with glyphosate, may aid in resistance management.

3) As a postemergence herbicide, topramezone fosters IPM because it allows growers to scout for the presence of weeds before applying an herbicide. Postemergence herbicides also serve as a control options for weeds that escape preemergence applications.

A number of weeds are treated with ALS inhibitor and triazine herbicides and resistance has occurred in a number of common weeds in corn, including foxtail, pigweed, cocklebur, kochia, and lambsquarters (Heap, 2005). These are some of the most severe weeds in field corn and are becoming more prevalent (Field Corn PMSP, 2002). For those crops and situations where another HPPD inhibitor herbicide is not available, topramezone will essentially be a new mode of action to control these weeds. Topramezone is also a resistance management tool when used in conjunction with ALS inhibitor or triazine herbicides.

4) Yield losses in sweet corn and popcorn from weed competition can be substantial. According to a Crop Profile, "Although losses from weeds in field corn average from 3 to 7 percent annually, losses attributed to weeds in sweet corn total losses can be 15 percent or more" (Crop Profile for Sweet Corn, 2003). A similar statement is included in the Popcorn Pest Management Strategic Plan, 2002.

Many varieties of sweet corn and popcorn are sensitive to injury from herbicides. Both the

mesotrione and topramezone labels have similar language statements regarding sensitive varieties and state that not all hybrids have been tested. However, the data submitted in the public interest finding package suggests that fewer varieties will be susceptible to topramezone. The registrant submitted the results of crop tolerance trials that compared topramezone to mesotrione (23 hybrids) and nicosulfuron (14 hybrids). Topramezone had fewer instances of injury, and a lower average and range of injury than mesotrione and nicosulfuron. Although no data was submitted on white popcorn tolerance, the registrant claims that trials have shown that topramezone may be used on all popcorn hybrids.

(See item 1 above for the evaluation of insecticide application restrictions).

Conclusions and Recommendations

The registration of this herbicide meets the criteria for a public interest finding because it fills a niche. Topramezone will provide a new mode of action for certain sweet corn and white popcorn hybrids. Growers of these crops have fewer herbicide options available than field corn growers. These growers have concerns with triazine and ALS inhibitor resistance, few grass herbicides, and crop tolerance. Mesotrione is not registered for use on white popcorn hybrids and data suggests that certain sweet corn varieties are senstitive to this herbicide. Topramezone may also be useful to field corn growers as a resistance management tool, and would be the only HPPD inhibitor available for post-emergence application that would not have insecticide restrictions on the label. For these reasons, BEAD believes that the registration of this herbicide meets the criteria for a public interest finding.

References

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