

*Final Environmental Impact Statement
for the Use of Pesticides Containing Isoxaflutole
in Wisconsin*

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Wisconsin Department of Agriculture, Trade and Consumer Protection

Agricultural Resource Management Division

Agricultural Resource RM Management



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CHAPTER 1 - THE PROPOSED ACTION

Introduction

Background

Isoxaflutole (trade name Balance Pro, formerly Balance) is a selective herbicide for control of certain broadleaf and grass weeds in field corn. The United States Environmental Protection Agency (EPA) granted a conditional registration in September 1998 to Aventis CropScience, the manufacturer of Balance, for use in 17 Central and Great Plains states. Balance was first used in crop year 1999. EPA conditioned the registration for Balance due to concerns over impacts on water quality. An 18th state, Pennsylvania, was added to the registration in 2001. In November 2001 EPA extended the conditional registration of isoxaflutole (current trade names of Balance Pro and as part of a mixture with flufenacet in Epic) for an additional three years. The extension is based on waiting for the completion of studies and EPA review of the studies on the phytotoxic effects of the RPA 202248 degradate of isoxaflutole on non-target plants including plants irrigated with water containing isoxaflutole or RPA 202248 residues.

Aventis has proposed to include Wisconsin on the federal label for Balance or Balance Pro each year since 1998. Use in Wisconsin has been denied, however, because information available at the time suggested that there could be adverse effects on Wisconsin water resources if additional restrictions were not placed on the use of the product.

Aventis and Wisconsin corn growers have again requested that the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) allow the use of Balance Pro in Wisconsin in 2003. They cite the potential advantages Balance Pro provides for certain weeds and its potential to serve as part of a one-pass, pre-plant option for season-long weed control. Allowing the use of Balance Pro in Wisconsin while it is conditionally registered by EPA is considered a major action by DATCP. This major action requires an Environmental Impact Statement (EIS) and public hearings before a decision on the use of Balance Pro in Wisconsin is made.

Process to Consider the Use of Balance Pro Herbicide (isoxaflutole) in Wisconsin

To permit use of Balance Pro in Wisconsin, DATCP proposes to seek a registration under Chapter ATCP 29.72, Special Local Needs. Special local needs registrations give DATCP the authority to register a pesticide product which is not federally registered under Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) or allow a new use of a currently registered product. The standards that have to be met to register a product under ATCP 29.72 include 1) that the registration is necessary for a current or imminent pest problem in Wisconsin that cannot be controlled by any other available federally registered product, and 2) that the pesticide product will not have unreasonable effects on persons, property, or the environment.

As part of this process a request may be made to EPA to grant a supplemental label under FIFRA Section 24(c). The supplemental label must include all restrictions on the use of the product that DATCP requires. Before taking this action, DATCP is required to develop an Environmental

Assessment (EA) or an EIS under ATCP 3.02(1)(b) Pesticide Permits and ATCP 3.03(1) Actions requiring an environmental impact statement. The decision to allow use of Balance Pro in Wisconsin is considered a major action, which requires an EIS. The decision to allow use under a 24(c) label cannot be made until the EIS, which includes a public hearing, is completed. The supplemental label would be effective for five years assuming continuing registration by EPA. The following is a description of the procedure and timeframe for this process.

To start the process, an agreement with the manufacturer was reached regarding product use restrictions to be required on the 24(c) label, product stewardship measures, and groundwater monitoring requirements. This agreement took approximately 30 days to reach. It was implemented through the issuance of a special order that also required approximately 30 days to complete and was issued on March 28, 2002.

With the agreement and special order in place, an EA is required under ATCP 3.02(b) Environmental Assessments, Permits. Since an EA would likely have concluded that granting the permit constitutes a major action (potentially affecting the quality of the human environment), DATCP proceeded directly to drafting an EIS. The draft EIS took approximately 45 days to complete and was issued on April 22, 2002. DATCP can not make a final decision to proceed with the action until a final EIS is completed. DATCP held four public hearings at the following locations: Tomah, June 18, 2002; Stevens Point, June 19, 2002; Fond du Lac, June 25, 2002; and, Madison, June 26, 2002. DATCP received comments on the draft EIS until July 5, 2002. After receipt of comments a final EIS was prepared and issued on July 26, 2002.

Prior to making a final decision on allowing Balance Pro use in Wisconsin, DATCP will meet with an advisory committee. DATCP will make a final decision on the proposed section 24(c) label for use of Balance Pro in Wisconsin and, if appropriate, submit a request to EPA. No final decision on the action may be made earlier than 30 days after the issuance of the final EIS or 90 days after the issuance of the draft EIS, whichever is later. The total time required to reach a decision on Balance Pro use in Wisconsin will be approximately 230 days, assuming DATCP makes its decision in early September.

The Proposal

DATCP proposes to register isoxaflutole under Chapter ATCP 29.72, and to request a FIFRA, Section 24(c) label from EPA for use in Wisconsin for the 2003 growing season. ATCP 29.72 and FIFRA 24(c) allow DATCP to request registration for additional uses of federally registered pesticides for distribution and use within Wisconsin to meet special local needs. Special local need is defined as an existing or imminent pest problem within a state for which DATCP, based on satisfactory supporting information, has determined that an appropriate federally registered pesticide product is not sufficiently available.

DATCP has concerns about isoxaflutole's environmental fate characteristics, its phytotoxicity to other non-target plants at very low concentrations, and its potential to cause cancer in humans. DATCP is proposing three measures to limit adverse affects related to the use of Balance Pro in Wisconsin: 1) a label for use in Wisconsin that is more stringent than the federal label, 2)

groundwater monitoring at 15 fields where the isoxaflutole is used, and 3) a requirement that the manufacturer conduct stewardship training for dealers and growers on the appropriate handling, use and disposal of Balance Pro.

The Proposed Label

DATCP is proposing that a supplemental label be prepared for the use of Balance Pro in Wisconsin under section 24(c) of FIFRA. This supplemental label will be distributed with each unit of the product sold in Wisconsin. The supplemental label will contain four additional restrictions (as compared to the federal label) that are designed to minimize the potential adverse environmental or human health effects in Wisconsin. A copy of the draft 24(c) supplemental label is included in Appendix I. Appendix II contains a copy of the federal label currently used in other states. The additional restrictions relate to areas in Wisconsin known to be susceptible to groundwater contamination, areas expected to be susceptible to groundwater contamination, limiting the timing of applications statewide to minimize the potential of runoff or leaching of isoxaflutole, and requiring management of irrigation on fields treated with isoxaflutole.

Use of isoxaflutole will not be allowed in certain areas of the state already identified as being susceptible to groundwater contamination from agricultural herbicides. These areas consist of coarse textured soils with low organic matter overlying coarse textured subsoils and a shallow depth to groundwater. The lower Wisconsin river valley and the following counties will be listed on the 24(c) label as areas where isoxaflutole can not be used: Portage, Langlade, Juneau, Marathon, Adams, Waushara, Waupaca, and Wood. The lower Wisconsin river valley is defined as the flood plain of the Wisconsin river between Prairie du Sac and the confluence with the Mississippi river. Other soils with similar characteristics to these areas were identified and will be listed on the 24(c) label by soil series name. Use on some of the soils series listed on the label is prohibited. Use on other soils listed will only be allowed if one of three mitigating factors is present at the application site: 1) an organic matter of 2% or greater in the top twelve inches of soil, 2) a finer-grained sub soil present under the coarse textured surface soil, or 3) a depth to groundwater of greater than twenty-five feet.

Additionally, the 24(c) label will limit the timing of isoxaflutole applications to between April 15 and July 31. This requirement will limit the amount of time that isoxaflutole can be applied when evaporation and transpiration are low, and reduce the potential for leaching to groundwater. Finally, irrigation of fields treated with isoxaflutole will only be allowed if an irrigation management plan is followed. The irrigation management plan must be designed so that the field moisture capacity in the root zone of the soil being irrigated is not exceeded. This is designed to minimize the leaching of isoxaflutole due to over irrigation. An example of an irrigation management plan is the Wisconsin Irrigation Scheduling Program (WISP) developed by the UW Extension and the UW College of Life Sciences.

Groundwater Monitoring

As part of the proposal to allow the use of isoxaflutole in Wisconsin, DATCP will require the manufacturer to monitor shallow groundwater in Wisconsin at 15 fields where isoxaflutole is used. DATCP believes this is an integral part of allowing the use of this product in Wisconsin given the

environmental fate characteristics of the compound. Groundwater monitoring at sites where isoxaflutole is used will allow DATCP to evaluate its potential to leach to groundwater in Wisconsin more quickly than other types of monitoring that could be conducted. Results from the monitoring wells will allow DATCP to quickly modify or discontinue the use of isoxaflutole and limit the extent of potential groundwater contamination.

Groundwater quality will be monitored at the 15 sites for five years. Four monitoring wells will be installed in each of the 15 fields where the landowner has agreed to use isoxaflutole. The monitored fields will cover the range of soil settings. DATCP will evaluate isoxaflutole movement in different soil landscapes based on soil texture and organic matter. DATCP will sample each well quarterly. The area treated with Balance Pro will extend at least 300 feet in all directions from all in-field monitoring wells.

The grower will use isoxaflutole on the monitored field at the highest labeled use rate for the specific application being made. Isoxaflutole will be used in at least two of the first three years of the study and at least three times in total during the five-year study. Other pesticides and fertilizers can be applied as needed. The grower will select the tillage and application method best suited for the operation.

The results of the study will be analyzed by DATCP and presented to an advisory panel for input annually. If at any time there are detections of isoxaflutole or its toxicologically significant degradates in groundwater above a threshold level, the advisory committee will be convened and recommendations will be solicited. The threshold level is currently set at 30% of the sites with two consecutive detections at or above 310 parts per trillion (ppt). A recommendation will then be made to modify or place additional label restrictions on the use of isoxaflutole or to discontinue its use in Wisconsin.

Surface Water Monitoring

The manufacturer will provide sampling kits in which to collect water samples to test for the presence of Balance Pro in water. DATCP will conduct reconnaissance sampling of surface waters in the state to test for the presence of Balance Pro in Wisconsin's surface waters. As DATCP expands its monitoring program to include surface water resources, analysis of isoxaflutole will be added to the list of analytes and the monitoring system design will place an emphasis on isoxaflutole.

Actions that Will be Taken along with the Proposed Actions to Minimize Adverse Environmental Effects

Product Stewardship

DATCP will require that the manufacturer develop and implement a product stewardship training plan. The plan may include several elements. The manufacturer will develop training presentations (slide sets on label restrictions and proper use) and present the information at dealer, applicator and grower training meetings. The manufacturer will conduct applicator training in

association with grower and chemical association meetings. The manufacturer will also coordinate with University of Wisconsin (UW) to include the Balance Pro stewardship training as part of their winter outreach meetings. Stewardship training may also be provided at meetings where credits for crop advisor certification will be given. Training will be provided at sales representatives' dealer meetings. The manufacturer will maintain a list of attendees at training sessions. The 24(c) label, and brochures, and stewardship information will be posted on the manufacturer's web site. The manufacturer will be required to collect and maintain any corn or non-target crop injury reports related to the use of Balance Pro.

Education Activities

DATCP will provide training to its Environmental Enforcement Specialists on the use and environmental fate of Balance Pro. DATCP will request that UW-Extension specialists present information on the correct use of Balance Pro in Wisconsin at various conferences and training seminars presented throughout the state and include information relating to Balance Pro in the Pesticide Applicator Training manual.

Environmental Sample Analysis

The manufacturer will provide necessary assistance and reference chemical standards to DATCP to develop the laboratory capabilities to analyze for isoxaflutole and its degradates of concern in soil, water and plant tissue.

Advantages and Disadvantages of the Proposal

Advantages

One of the main advantages of the proposed label is that it attempts to match the use of Balance Pro in Wisconsin with an increased degree of water resource protection. The proposal would allow use of Balance Pro only in areas of Wisconsin where the potential for its use to result in adverse human health or environmental problems is minimized. This would provide corn growers an additional tool for controlling weeds.

Another advantage is that the proposed label restrictions are based on geographic and environmental conditions in Wisconsin. They attempt to restrict use where there is a risk of groundwater contamination and allow use where contamination is less likely. All coarse-textured soil series in Wisconsin were analyzed for susceptibility to leaching and groundwater contamination and use restrictions were then placed on each series as needed.

Under this proposal, groundwater monitoring would be conducted at representative use sites to determine if unacceptable groundwater impacts occur. If groundwater impacts are detected, the use restrictions can be modified or use can be discontinued. The monitoring well network will provide an early warning system to detect any groundwater problems before extensive contamination could occur.

Disadvantages

One disadvantage of the proposal is that it is based on a theoretical analysis of the factors (environmental conditions) that affect leaching of isoxaflutole to groundwater. Since isoxaflutole has not been used in Wisconsin, there are no empirical data on which to base use restrictions. The use restrictions in this proposal are based on general theories about the conditions where it may be safe to use the product. The use restrictions are also based on the assumption that any potential groundwater impacts would be limited to areas of coarse soils and shallow depth to groundwater. Experience with other agricultural chemicals in Wisconsin has shown impacts in other environmental settings such as medium-textured soils and deeper depths to groundwater. Even with the additional use restrictions and the monitoring well network, it is possible that groundwater contamination will occur and have an impact on drinking water supplies and water used for irrigation. Based on experience with other mobile pesticides used in Wisconsin, once contamination occurs it will persist for many years and it will be difficult to identify all the impacted wells.

The proposed 24(c) label also has the disadvantage of being somewhat complicated. The potential user has to know the depth to groundwater, soil series name, and organic matter content at the site in order to know if use is allowed under the label. Depth to groundwater can be difficult to determine in many areas of the state and, in areas of irregular topography, the depth to groundwater can vary considerable across a field.

One option for determining depth to groundwater is looking at well construction reports for nearby water supply wells. This can provide useful information, but in many locations construction reports are not available and in areas of hilly topography the information at the well site would only apply to a very limited area. Another method is to obtain county scale maps that show the elevation of the water table above sea level and then subtract this number from the elevation of the ground surface as shown on a topographic map. This method would require significant effort on the part of the grower and the county level maps are available for less than half the counties in Wisconsin.

Soil series names will have to be obtained from a NRCS Soil Survey, and a given field may contain multiple series. Soil organic matter content would have to be determined by lab analysis since NRCS Soil Survey data often is presented in ranges and is not adequate to make determination about use under the label. A soil organic matter analysis is relatively inexpensive and may be part of soil testing for fertility recommendations.

The label would also be difficult to enforce by DATCP field investigators for many of the same reasons that it would be difficult to use by corn growers. In determining if a specific use of isoxaflutole is allowable at a site, the investigator may have to determine the depth to groundwater and may have to collect soil samples for organic matter analysis.

A disadvantage of the groundwater monitoring program is that there is no definitive groundwater quality standard or trigger level to use in interpreting the results. While the EPA has set a drinking water level of concern (DWLOC) at 3100 parts per trillion (ppt) this number does not have the same regulatory effect as a federal maximum contaminant level (MCL) or state enforcement

standard (ES). DATCP will convene an advisory committee annually to review the results of the groundwater monitoring and other information relating to isoxaflutole and its degradates. The advisory committee may recommend modifying the use restrictions for isoxaflutole. The proposed trigger level is 310 ppt in groundwater and is based on concerns for human health and phytotoxicity if potentially contaminated groundwater is used for irrigation. However, there is not currently definitive information to assure that 310 ppt is the appropriate level. Thirty percent of the monitoring well sites would have to exceed this trigger before the DATCP would convene an additional meeting of the advisory committee to consider steps to reduce the risks associated with use of isoxaflutole. At present, no trigger levels have been established for surface waters. However, sampling reports will be provided to the advisory committee set up to review environmental data on Balance Pro.

CHAPTER 2 - WEED CONTROL PROFILE OF ISOXAFLUTOLE

Overview

Isoxaflutole (Balance Pro) is a selective herbicide for control of certain broadleaf and grass weeds in field corn. It can be used as a preplant (surface-applied or incorporated) or preemergence herbicide. It can not be applied after the corn emerges or crop injury may occur. Balance Pro can be used in conventional, conservation tillage, or no-till tillage systems.

Isoxaflutole is a pigment inhibitor. It works by preventing the biosynthesis of carotenoid pigments, which protect chlorophyll from decomposition by sunlight. Without carotenoid pigments, chlorophyll pigments are photo-oxidized and chloroplasts break down. Without the energy-collecting action of the chlorophyll, the whole plant eventually dies.

Application rates of Balance Pro on the federal label range from 1.5 fluid ounces/acre (0.047 pounds active ingredient/acre) for a preplant application on coarse soils to 4.5 fluid ounces/acre (0.14 pounds active ingredient/acre) for an early preplant application to a fine-textured soil. Rates depend on soil texture, soil organic content, and the timing of the application.

Balance Pro has a relatively wide spectrum of weed control. It can control a wide range of broadleaf weeds when used alone or when tank-mixed with atrazine or simazine. Examples of broadleaf weeds that are controlled include velvetleaf, pigweed, waterhemp, common lambsquarters, common ragweed, smartweed, nightshade, and wild mustard.

Balance Pro can also control a range of grass weeds (when applied at full rates) including large crabgrass, smooth crabgrass, green foxtail, and giant foxtail. Balance Pro will control or suppress early emerging field sandbur, yellow foxtail, wild proso millet, and woolly cupgrass. Full season control of these grass weeds will be improved by tank mixing Balance Pro with a preemergence grass herbicide.

Comparison with other Broadleaf Herbicides used in Wisconsin

Other preemergence broadleaf herbicides for use on corn in Wisconsin include atrazine, Banvel/Clarity (dicamba), Callisto (mesotrione), Hornet (flumetsulam and clopyralid), Princep (simazine), and Python (flumetsulam). Each of these compounds has unique strengths and limitations. Balance Pro also has some of these same limitations such as risk of injury to corn and rotational restrictions. Some of the limitations of currently available broadleaf herbicides include:

- Atrazine use is prohibited on over one million acres in Wisconsin and rates are restricted in the rest of the state. It also has rotational restrictions and some weeds are triazine resistant. At these reduced rates, atrazine often does not provide adequate residual control of key broadleaf weeds such as velvetleaf or giant ragweed. It also has rotational restrictions that prohibit use the year before vegetable crops, small grains, and alfalfa. Populations of lambsquarters, smooth pigweed, and velvetleaf are also resistant to atrazine in Wisconsin.

- Banvel and Clarity have a risk of injury to corn and provide inadequate control of velvetleaf and giant ragweed when applied preemergence.
- Callisto is expensive for preemergence use and provides inadequate control of common ragweed. Callisto also has rotational restrictions that prohibit use the year before alfalfa and most vegetable crops.
- Hornet provides inadequate control of giant ragweed and has risk of injury to corn.
- Princep has rotational restrictions, inadequate control of velvetleaf and giant ragweed, and triazine resistance problems.
- Python controls a limited spectrum of broadleaf weeds, has a risk of injury to corn, and has ALS resistance problems.

Comparison with other Grass Herbicides used in Wisconsin

Balance Pro also provides considerable control of certain grass weeds in Wisconsin including crabgrass, giant foxtail, and woolly cupgrass. Other products that are available for preemergence grass control in corn production in Wisconsin are Harness/Surpass (acetochlor), Dual (metolachlor), Outlook (dimethenamid), Define (flufenacet), and Prowl (pendimethalin). Balance Pro provides slightly better control of woolly cupgrass than these other products but somewhat poorer control of crabgrass and giant foxtail.

In some cases Balance Pro is used at lower rates to reduce the risk of corn injury. At lower rates, some annual grasses may not be fully controlled. Balance Pro is commonly tank mixed with a reduced rate of another preemergence grass herbicide and these tank mixtures are effective in controlling annual grasses. If additional weed control is needed after a preemergence application of Balance Pro, it can be followed with cultivation, a postemergence broadleaf herbicide, or a postemergence grass herbicide.

Cost Comparisons

The cost per acre of Balance Pro is at the higher end of the range of broadleaf herbicide treatments. However, Balance Pro also provides grass control or suppression. As a result, the grass herbicide application rate would be reduced in most Balance Pro plus grass herbicide tank mixes, which would offset the higher Balance Pro cost. The total cost of one-pass programs that include Balance Pro appear to be cost competitive with other herbicide programs. Table 1 compares the costs of several common preemergence broadleaf herbicide treatments.

Table 1. Cost Comparisons for Common Preemergence Broadleaf Herbicides in Wisconsin.

Product	Application Rate	Price per Acre
Balance Pro	2.25 ounces/acre	\$15.08
Atrazine	1.5 pounds/acre	\$3.80
Python#	1 ounce/acre	\$9.40
Hornet WDG	4 ounces/acre	\$13.20
Marksman	3.5 pints/acre	\$12.70
Callisto*	6 ounces/acre	\$24.80

Python is usually tank-mixed with another product which is not reflected in this price

* Callisto is more commonly used as a postemergence product at 3 ounces/acre

Weed Control Scenarios and Cost Comparisons

DATCP reviewed several sources of information on the efficacy and costs of Balance Pro compared to other herbicide programs.

WeedSOFT

Based on hearing testimony requests, the department used WeedSOFT, a decision support system from the University of Nebraska-Lincoln. DATCP received assistance from the UW Nutrient and Pest Management program in using WeedSOFT. This tool assists growers and consultants in making proactive and reactive weed control decisions. WeedSOFT provides treatment information according to specific field conditions while factoring in economic and environmental principles. Because Balance Pro has not been used in Wisconsin, the Illinois version of WeedSOFT was used to represent Wisconsin conditions. The main limitation of using the Illinois version was that the maximum atrazine application rates in Illinois are higher than in Wisconsin.

Several weed control scenarios for corn were run using WeedSOFT. The complete results are presented in Appendix III. The first scenario involved preemergence herbicide applications on a cornfield with velvetleaf, pigweed, common lambsquarters and giant foxtail. Output is presented in terms of net gain per acre compared to no treatment. In this scenario Atrazine DF applied at 2 pounds ai per acre was the most cost-effective treatment with a net gain per acre of \$93.10. Balance Pro at 2.25 ounces per acre provided somewhat better control of velvetleaf and giant foxtail but had a lower net gain per acre of \$85.24.

Preemergence scenario 2 involved preemergence herbicide treatments on a cornfield with velvetleaf, waterhemp, common lambsquarters, black nightshade, smooth crabgrass, and woolly cupgrass. The most cost-effective treatment in this scenario was Balance Pro applied at 2.25 ounces per acre. The net gain per acre was \$53.24. Bullet applied at 3 quarts per acre was very close with a net gain per acre of \$53.21. Prowl 3.3 EC +Atrazine 90 DF (3.6 pints and 2 pounds ai per acre) was also very competitive with a net gain per acre of \$52.91. The results from this

scenario suggest that Balance Pro has a slight advantage when woolly cupgrass is present but other herbicides are also very competitive.

Weed Control Comparisons from Bayer CropScience

Bayer CropScience, the manufacturer of Balance Pro, also provided an analysis of the economic benefits of Balance Pro compared to other corn herbicides used in Wisconsin. Full details are provided in Appendix IV. They state that in Wisconsin, a one-pass, preemergence application with Balance Pro included in the spray mixture will cost 22% to 34% less per acre than a typical sequential program. They state that in those situations where a single preemergence application will control the weed spectrum, the use of Balance Pro will still save the grower 6-20% compared to a standard preemergence only program. On acres infested with woolly cupgrass or wild proso-millet, a Balance Pro-based preemergence program will cost about 33%-43% less than a sequential program required to control these weeds. It should be noted that a math error in this analysis leads to overstating the economic benefits of Balance Pro. It appears that if the math error were corrected the upper range of the cost savings would really be the lower number reported above.

Bayer also presents data on how the use of Balance Pro affects the need for postemergence applications which are used to control the weeds that escape the preemergence herbicide application. They state that postemergence treatments following a Balance Pro preemergence application were only needed 24% of the time. Postemergence treatments following preemergence treatments with acetochlor and metolachlor-based treatments were needed 36% and 43% of the time, respectively.

Strengths of Balance

It appears that Balance Pro is better than other preemergence herbicide treatments for control of woolly cupgrass. On fields that have infestations of woolly cupgrass, Balance Pro may be the only herbicide option that would potentially provide a one-pass weed control treatment. Other herbicide treatments for control of woolly cupgrass may require a sequential herbicide application and may increase the total cost. Other herbicide products that are labelled for control of woolly cupgrass include Accent, Axiom, Bicep, Dual, Frontier, Harness, Lasso, and Prowl.

Balance Pro also has the advantage that it controls certain herbicide-resistant weed biotypes such as triazine-resistant pigweed, lambsquarters, and velvetleaf and ALS-resistant waterhemp, eastern black nightshade, and ragweed. Balance Pro is an HPPD-inhibiting herbicide. Currently there are no reported cases of HPPD-resistant weed biotypes in the world, but this mode of action has not been used extensively. The lack of current cases of resistance does not preclude development of resistance problems in the future.

Limitations of Balance Pro

Rotational crops vary in their crop response to low concentrations of Balance Pro remaining in the soil. The amount of Balance Pro left in the soil following use on corn depends on soil moisture, soil temperature, application rate, the time since the application, and other factors. Rotational intervals, geographic limitations, and other stipulations that have been established for rotational crops are shown in Table 2.

TABLE 2. Rotational Restrictions for Use of Balance Pro Use in Wisconsin.

Rotational Interval	Crop	Geography	Requirement
0 months	Field Corn	All	None
4 months	Wheat	All	None
6 months	Soybeans, Barley, Sweet corn, Popcorn, Potato, Grain Sorghum, and Sunflower	All	None
10 months	Alfalfa	All	15 inches of cumulative precipitation from application to planting of rotational crop.
10 months	Dry Beans and Sugar beets	East of the Mississippi River	15 inches of cumulative precipitation from application to planting of rotational crop.
18 months	All other crops	All	15 inches of cumulative precipitation from application to planting of rotational crop.

Crop injury potential must also be considered when using Balance Pro. Use of Balance Pro on coarse-textured soils with less than 1.5% organic matter is not allowed on the label because of the risk of crop injury. Cold, wet weather may increase the frequency and severity of crop injury. The risk of crop injury with Balance Pro is higher than the other broadleaf herbicides with the exception of preemergence dicamba-containing products such as Marksman.

Summary of Weed Control Issues

Balance Pro controls a broad spectrum of weeds in Wisconsin. It is comparable to other currently available broadleaf herbicides in terms of weeds controlled but it is at the high end of the price range for these products, which reflects the added value of its grass weed control. Balance Pro also controls a number of grass weeds that are problems in Wisconsin, especially in combination with other preemergence grass herbicides. Balance Pro may provide an increased likelihood that a one-pass preemergence herbicide treatment program on fields that have woolly cupgrass will be effective. Farmers need to weigh these advantages against disadvantages such as potential for crop injury and rotational restrictions to determine if they should use Balance Pro. Comparisons of the cost and weed control benefits of Balance Pro with other herbicides available in Wisconsin are inconclusive.

CHAPTER 3 - ENVIRONMENTAL FATE AND TOXICOLOGY OF ISOXAFLUTOLE

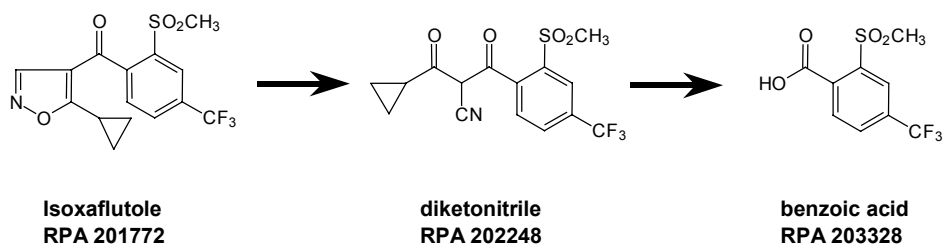
The following sections on the chemical nature, environmental fate, toxicology, phytotoxic characteristics, and prospective groundwater studies of isoxaflutole were taken in large part from EPA's September 15, 1998 Fact Sheet on isoxaflutole. Where available, more recent EPA Science Reviews have been cited. More detailed information on the studies summarized in this chapter are available for viewing at DATCP or by contacting EPA. See Appendix V for a listing of EPA cleared science reviews for isoxaflutole.

Table 3. Chemical Characteristics of Isoxaflutole.

Property	Technical	End-Use
Physical State	Granular powder	Granular solid
Color	Yellow	Tan
Odor	Slight acetic acid-like odor	None
Melting Point	135 to 136°C ($\pm 1^\circ\text{C}$)	N/A
Density	1.416 g/mL @ 20°C	43 lb./cu. ft.
Solubility (Water)	6.2×10^{-4} mg/100L @ pH 5.5	N/A
Vapor Pressure	1.0×10^{-6} Pa @ 25°C	N/A
Octanol/Water Partition Coefficient	Log P = 2.34 @ 20°C	N/A
PH	4.6 @ 25°C	4.6 @ 25°C

Environmental Fate of Isoxaflutole

Isoxaflutole residues are mobile and are expected to persist and accumulate in surface water and groundwater. Modeling data show that parent isoxaflutole and its primary metabolite RPA 202248 may accumulate to concentrations that would result in harm to non-target plants. Isoxaflutole's metabolite RPA 203328 is expected to persist and accumulate, but does not demonstrate phytotoxicity. The major degradation pathway of isoxaflutole in plants and soil is shown below.



Studies, including prospective groundwater studies and surface water monitoring, continue to be conducted to determine whether isoxaflutole and its primary metabolite RPA 202248 exceed concentrations deemed potentially harmful to the environment.

Table 4. Environmental Fate Characteristics of Isoxaflutole.

Study Type	Half Life/Other
Hydrolysis	11.1 hours at pH 5; 20.1 hours at pH 7; 3.2 hours at pH 9
Photolysis in Water	6.7 days
Photolysis on Soil	23 hours
Aerobic Soil Metabolism	2.4 days
Anaerobic Aquatic Metabolism	Less than 2 hours
Mobility-Unaged Leaching	Very mobile in sand and sandy loam soils; Moderately mobile in sandy loam soil; Essentially immobile in silty clay soil and loam sediment
Mobility-Aged Leaching	Generally not found below 6 cm of soil depth
Terrestrial Field Dissipation	1.4 to 3.0 days

Table 5. Environmental Fate Characteristics of RPA 202248.

Study Type	Half Life/Other
Hydrolysis	Stable at pH 7
Photolysis in Water	Stable
Aerobic Soil Metabolism	61 days
Mobility	Potentially very mobile

Table 6. Environmental Fate Characteristics of RPA203328.

Study Type	Half Life/Other
Hydrolysis	Stable at pH 7
Photolysis in Water	Stable
Aerobic Soil Metabolism	977 days
Mobility	Potentially very mobile

Environmental Monitoring Studies

Prospective Groundwater Studies

Three prospective groundwater studies were conducted to evaluate the impact of isoxaflutole applications on groundwater quality. Some detections of isoxaflutole were confirmed in the unsaturated zone. There was only one detection of isoxaflutole in groundwater at just over 1 part per billion (ppb) which did not persist. The manufacturer states that a defect in well construction may have led to the detection.

Tile Drain Studies

In 1999, five tile-drain studies were conducted in Iowa and Ohio. Water resources were contaminated with the RPA 202248 metabolite at concentrations well above 22 parts per trillion (ppt) for 1 to 2 months immediately following application of 2.25 ounces active ingredient/acre. These results indicate that surface water potentially used for irrigation water may be contaminated. There may also be carryover of RPA 202248 from one growing season to another in surface water reservoirs. Further testing showed tile drain water exceeding 1,000 ppt of RPA 202248 at all sites. River water concentrations down stream of two of the tile drain sites reached about 1,000 ppt for a brief period (< 4 weeks) after application. In 2000, continued manual sampling showed

concentrations in drainage water from these sites peaked above 10,000 ppt (10 ppb). Sampling of these sites in 2000 using automated samplers showed higher peak concentrations being detected in tile drain water (20,000 to 70,000 ppt).

State Water Monitoring

The manufacturer provided sampling kits to collect water so that States could conduct water quality monitoring at their discretion. Aventis CropScience provided the analysis of the water samples. In 1999, the Iowa Geological Survey found that 62% of stream sites selected had detections of RPA 202248 with a mean concentration of 19.9 ppt and a maximum concentration of 186 ppt. In June 2000, the rate of detections of RPA 202248 reached 88%. The Nebraska Department of Agriculture sampled water resources in 2000 and detected isoxaflutole or its metabolites in 71% of streams tested. They also detected isoxaflutole metabolites in 2 of 3 pond/lake samples at average RPA 202248 metabolite concentrations of 277 ppt. Irrigation reuse pits also had detections, with average concentrations of the two metabolites of isoxaflutole totaling 569 ppt. There were no groundwater detections.

Impact of Run-off (Field perimeter/littoral zone monitoring in Iowa and Illinois)

Rainfall simulations produced isoxaflutole concentrations of up to 50,000 ppt in runoff after application. The manufacturer believes these were extreme simulations and that the effects of this runoff on non-target plants were temporary and did not affect yield or composition of the plant communities near treated fields.

Toxicology of Isoxaflutole

Acute Toxicity (Isoxaflutole Technical)

- Acute Oral Toxicity in Rats - LD50 > 5000 mg/kg in males and females; Toxicity Category IV
- Acute Dermal Toxicity in Rats - LD50 > 2000 mg/kg in males and females; Toxicity Category III
- Acute Inhalation Toxicity in Rats - LC50 > 5.23 mg/L in males and females; Toxicity Category IV
- Primary Eye Irritation in Rabbits - Non-irritating; Toxicity Category III
- Primary Dermal Irritation in Rabbits - Non-irritating; Toxicity Category IV
- Primary Dermal Sensitization in Guinea Pigs - Did not exhibit any sensitization potential.

Acute Toxicity (Balance Herbicide)

- Acute Oral Toxicity in Rats - LD50 = 5000 mg/kg in males and females; Toxicity Category IV
- Acute Dermal Toxicity in Rats - LD50 > 2000 mg/kg in males and females; Toxicity Category III
- Acute Inhalation Toxicity in Rats - LC50 = 5.26 mg/l for males and females; Toxicity Category IV
- Primary Eye Irritation in Rabbits - Mild irritation cleared in 72 hours; Toxicity Category III

- Primary Dermal Irritation in Rabbits - Very slight irritation cleared in 7 days; Toxicity Category IV
- Primary Dermal Sensitization in Guinea Pigs - Did not exhibit any sensitization potential.

Based upon a battery of acute toxicity studies, Balance Herbicide is classified as Toxicity Category III and carries the Signal Word, Caution.

Subchronic Toxicity

In a 21-day dermal toxicity study in rats, treatment-related marginal increase in relative liver weight was observed in both sexes of rats at 1,000 mg/kg/day. This finding was considered as an adaptive response to isoxaflutole treatment. There were no differences between the control and treated groups in any of the other parameters measured. The systemic toxicity lowest observable effect level (LOAEL) is greater than 1,000 mg/kg/day for males and females. The systemic toxicity no observable effect level (NOEL) is 1,000 mg/kg or greater for males and females. The dermal toxicity LOAEL is greater than 1,000 mg/kg/day for males and females. The dermal toxicity NOEL is 1,000 mg/kg/day or greater for males and females.

In a 28-day oral subchronic toxicity study, RPA 203328 (a metabolite of isoxaflutole) was administered in the diet to male and female rats. There were no compound related adverse effects on survival, clinical signs, body weight, food consumption, clinical chemistry, hematology, and gross or microscopic pathology. The LOAEL is greater than 1,117.79 mg/kg/day in males and 1,268.73 mg/kg/day in females. The NOEL for both sexes is 1,117.79 mg/kg/day in males and 1,268.73 mg/kg/day in females.

Chronic Toxicity/Carcinogenicity

In a chronic toxicity study with dogs, a LOAELs of 453 mg/kg/day for males and 498 mg/kg/day for females were established based on reduced weight gains compared to controls and intravascular hemolysis with associated clinical chemistry and histopathological findings. The NOEL is 44.81 mg/kg/day for males and 45.33 mg/kg/day for females.

In a combined chronic toxicity/carcinogenicity study in rats, evidence of systemic toxicity was observed at 500 mg/kg/day and included abnormal gait, limited use of limbs, lower body weight gains and food consumption, decreased food efficiency during the first 14 weeks of the study, elevated cholesterol levels throughout the 104-week study, increased absolute and relative liver weights, and thyroid hyperplasia. Increased incidence of periacinar hepatocytic hypertrophy, portal tract (senile) bile duct changes, focal cystic degeneration of the liver was observed in males at 20 mg/kg/day and greater, females at 500 mg/kg/day. Eye opacity, gross necropsy changes in eyes, corneal lesions, degeneration of sciatic nerve and thigh muscles was observed in males at 20 mg/kg/day and higher doses and in females at 500 mg/kg/day. The chronic LOAEL is 20 mg/kg/day based on liver, thyroid, ocular, and nervous system toxicity in males and liver toxicity in females. The chronic NOEL is 2.0 mg/kg/day.

Under the conditions of this study, isoxaflutole induced benign and malignant tumors of the liver in both sexes at 500 mg/kg/day hepatocellular adenomas and hepatocellular carcinomas. Combined

incidences of liver adenoma/carcinoma in males and females showed animals bearing carcinomas in the majority. Thyroid follicular adenomas occurred with increased frequency in 500 mg/kg/day males. The tumor incidences exceeded the historical incidence of these tumors for this strain in the laboratory. The study demonstrated that isoxaflutole is carcinogenic to rats at a dose of 500 mg/kg/day. The chemical was administered at a dose sufficient to test its carcinogenic potential. At 500 mg/kg/day, there were alterations in most of the parameters measured including clinical signs of toxicity, body weight gain, food consumption, food conversion efficiency, and clinical as well as post-mortem pathology. Thyroid stimulating hormone (TSH) was not measured in this study. However, in a separate special study investigating the mechanism of action of isoxaflutole on the thyroid, tested at the same doses as this study, TSH was indirectly measured since there was a significant reduction in T4 level and thyroid gland weights were significantly increased. These results were sufficient to support the hypothesis that isoxaflutole may have induced thyroid tumors in male rats through a disruption in the thyroid-pituitary hormonal feedback mechanisms.

In a 78-week carcinogenicity study, isoxaflutole had no significant effect on the survival of animals. Systemic signs of toxicity in the treated groups included decreased body weight gain in both sexes at 500 ppm and 7,000 ppm and for females at 25 ppm group. Food consumption was unaffected except food efficiency was lower for both sexes at 7,000 ppm during the first 14 weeks of the study. Absolute and relative/body liver weights were significantly increased in both sexes at 7,000 ppm and at 500 ppm relative liver weight was increased in males at 52 weeks and in females at 78 weeks. Gross necropsy at 78-week sacrifice revealed increased occurrences of liver masses in both sexes at 7,000 ppm. Non-neoplastic lesions of the liver occurred at 52-week sacrifice in males at 500 ppm and in males and females at 7,000 ppm. At termination, the 500 ppm group males exhibited increased incidence of hepatocyte necrosis. At 7,000 ppm, significant increase in non-neoplastic lesions in both sexes included periacinar hepatocytic hypertrophy, necrosis, and erythrocyte-containing hepatocytes. In addition, males at the high dose had pigment-laden hepatocytes and Kupffer cells, basophilic foci, and increased ploidy; extramedullary hemopoiesis in the spleen was noted in both sexes. Increase incidences of hepatocellular adenoma and carcinoma were observed at 7,000 ppm in the 52-week and 78-week studies.

Among scheduled and unscheduled deaths in the 78-week study, there were significant occurrences of hepatocellular adenomas in 52% of the males and 29% of the females, and carcinomas in 33% of the males and 8% of the females (non-significant). The incidences of these tumors exceeded the corresponding historical incidence with this species in the laboratory. Combined adenoma and carcinoma incidences at 7,000 ppm were 73% for males and 35% for females. At 500 ppm, the incidences of 17% adenomas and 15% carcinomas in males and 2% adenomas in females were not statistically significant, but exceeded the means for historical controls. The 52- and 78-week studies revealed a dose-related decrease in the first occurrence of carcinomas in males. The earliest carcinomas were observed at 78, 71, 52, and 47 weeks at the 0 through 7,000 ppm doses. There were no carcinomas in females up to 78 weeks at 0, 25, or 500 ppm, although, the earliest finding at 7000 ppm was at 60 weeks.

The LOAEL for this study is 64.4 mg/kg/day for males and 77.9 mg/kg/day for females (500 ppm), based on decreased body weight gains, increased liver weights, and increased incidences of histopathological liver changes. The NOEL is 3.2 mg/kg/day for males and 4.0 mg/kg/day for females (25 ppm). Although body weight was decreased marginally in females at 25 ppm, there

were no corroborating findings of toxicity at this dose. Under conditions of this study, isoxaflutole appears to induce hepatocellular adenomas and carcinomas in male and female CD-1 mice. The chemical was tested at doses sufficient to measure its carcinogenic potential.

Based on these studies, isoxaflutole has been classified as a Group B2 carcinogen (probable human carcinogen). However, EPA concludes that there is a reasonable certainty that no harm will result from aggregate exposure to isoxaflutole residues.

Developmental Toxicity

Isoxaflutole has demonstrated developmental toxicity in a variety of test animals. In a developmental toxicity study in rats, maternal toxicity was observed at 500 mg/kg/day, manifested as an increased incidence of salivation, decreased body weight, weight gain, and food consumption during the dosing period. The maternal LOAEL is 500 mg/kg/day, based on increased incidence of clinical signs and decreased body weights, body weight gains, and food consumption. The maternal NOEL is 100 mg/kg/day. Developmental toxicity, observed at 100 and 500 mg/kg/day, were manifested as increased incidences of fetuses/litters with various anomalies: growth retardations (decreased fetal body weight; increased incidence of delayed ossification of sternbrae, metacarpals and metatarsals). In addition, an increased incidence of vertebral and rib anomalies and high incidence of subcutaneous edema were observed at 500 mg/kg/day. The incidences of these anomalies were higher than the concurrent control values and in some cases exceeded the range for historical controls. The LOAEL for developmental toxicity is 100 mg/kg/day, based on decreased fetal body weights and increased incidences of skeletal anomalies. The developmental NOEL is 10 mg/kg/day.

In a developmental toxicity study in rabbits, maternal toxicity was observed at 100 mg/kg/day, manifested as increased incidence of clinical signs (little diet eaten and few feces) and decreased body weight gain and food consumption during the dosing period. The maternal LOAEL is 100 mg/kg/day, based on increased incidence of clinical signs, decreased body weight gains and food consumption. The maternal NOEL is 20 mg/kg/day. Developmental toxicity, observed at 5 mg/kg/day, consisted of increased incidence of 27th pre-sacral vertebrae. Additional findings noted at 20 and 100 mg/kg/day were manifested as increased number of postimplantation loss and late resorptions, as well as growth retardations in the form of generalized reduction in skeletal ossification, and increased incidence of 13 pairs of ribs. At 100 mg/kg/day, an increased incidence of fetuses with incisors not erupted was also observed. Incidences of these anomalies, on a litter basis, were higher than the concurrent control values and in some cases exceeded the range for historical controls. The LOAEL for developmental toxicity is 5 mg/kg/day, based on increased incidence of fetuses with 27th pre-sacral vertebrae. The developmental NOEL was not established.

Reproductive Toxicity

In a 2-generation reproduction study in rats, evidence of toxicity was observed in the male and female parental rats of both generations. At 20 and 500 mg/kg/day, increased absolute and relative liver weights associated with liver hypertrophy was observed. At 500 mg/kg/day (HDT), decreased body weight, body weight gain and food consumption during pre-mating and gestation, and increased incidence of subacute inflammation of the cornea of the eye in F0 adults as well as

keratitis in F1 adults were reported. There were no other systemic effects that were attributed to treatment, nor was there any indication, at any treatment level, of an effect on reproductive performance of the adults. Treatment-related effects were observed in F1 and F2 offspring. At 20 and 500 mg/kg/day, reduction in pup survival was noted. At 500 mg/kg/day, decrease in body weights of F1 and F2 pups throughout lactation, increased incidence of chronic keratitis, low incidence of inflammation of the iris, as well as retinal and vitreous bleeding in F2 pups and weanlings were observed. Necropsy of F1 and F2 pups culled on Day 4 revealed an increased number of pups with no milk in the stomach and underdeveloped renal papillae. The Systemic LOAEL is 17.4 mg/kg/day for males and females, based upon increased liver weights and hypertrophy and the Systemic NOEL is 1.76 mg/kg/day for males and females. The Reproductive LOAEL is greater than 437 mg/kg/day, based on lack of reproductive effects and the Reproductive NOEL is greater than or equal to 437 mg/kg/day.

Mutagenicity

For parent isoxaflutole, in a *Salmonella typhimurium* reverse gene mutation assay, independently performed tests were negative in *S. typhimurium* strains up to insoluble doses (500 ug/plate +/- S9) and was non-cytotoxic. In a mouse lymphoma L5178Y forward gene mutation assay, independently performed tests were negative up to insoluble (150 ug/mL +/-S9) or soluble (75 ug/mL +/-S9) doses. An in vitro cytogenetic assay in cultured human lymphocytes tested negative up to insoluble concentrations (300 ug/mL -S9; 600 ug/mL +S9) and was non-cytotoxic. A mouse micronucleus assay tested negative in male or female CD-1 mice up to the highest administered oral gavage dose (5000 mg/kg). No evidence of an overt toxic response in the treated animals or a cytotoxic effect on the target cells was observed. The EPA Cancer Peer Review Committee agreed that isoxaflutole is not mutagenic.

For the major metabolite RPA 202248 in a *Salmonella typhimurium* reverse gene mutation assay, independently performed plate incorporation or preincubation modification to the standard plate incorporation tests were negative in *S. typhimurium* strains up to the highest dose assayed (5000 ug/plate +/- S9).

For the minor metabolite RPA 203328 in a *Salmonella typhimurium* reverse gene mutation assay, independently performed plate incorporation tests were negative in *S. typhimurium* strains up to cytotoxic doses (2500 ug/plate +/- S9). In an in vivo mouse micronucleus assay, there was no indication of a clastogenic and/or aneugenic effect associated with administration of RPA 203328. In a CHO/HGPRT forward mutation assay with duplicate cultures and a confirmatory assay, there was no indication of cytotoxicity ñS9 at the highest dose level of 2,700 ug/mL. Overall, there was no evidence of any increase in mutation frequency resulting from exposure to RPA 203328. In an in vitro cytogenetics assay in cultured Chinese hamster ovary cells (CHO), no effect on mitotic indices was observed at the highest dose level. The positive controls induced the expected high yield of cells with chromosome aberrations. There was, however, no evidence that RPA 203328 induced a clastogenic response at any dose or harvest time.

Neurotoxicity

In an acute neurotoxicity study in rats, no treatment-related effects were observed on survival, body weight, body weight gain or food consumption. There were significant decreases in landing foot splay measurements in males at 2000 mg/kg during functional observational battery (FOB) tests indicating impairment of neuromuscular function. At 500 mg/kg, males exhibited significant decreases in landing foot splay measurements on day 15. The LOAEL was 500 mg/kg based on significant decreases in landing foot splay on day 15. The NOEL was 125 mg/kg.

In a subchronic neurotoxicity study in rats, treatment-related effects observed in high-dose males consisted of decreases in body weight and body weight gain. The LOAEL was established at 25 mg/kg/day based on significant decreases in mean hind limb grip strength in male rats at 25 mg/kg/day (LDT) during both trials at week 13 as well as a non-significant decrease in mean forelimb grip strength at week 13.

Exposures and Risks

Dietary exposure was calculated by using an Anticipated Residue Concentration (ARC). ARCs are calculated using percent crop treated data and anticipated residue data. For this calculation it was assumed that 34% field corn crops are treated. The resulting margins of exposure (MOE) and drinking water levels of concern (DWLOC) for the general population and most vulnerable subgroup(s) are summarized in Table 7. A MOE is a measure of how close the high end exposure comes to the NOEL (the highest dose at which no effects were observed in the laboratory test) and is calculated as the ratio of the NOEL to the exposure ($\text{NOEL/exposure} = \text{MOE}$). Generally, acute dietary margins of exposure greater than 100 tend to cause no dietary concern when results are compared to animal derived data. Chronic DWLOCs are calculated based on chronic dietary exposure and default body weights and water consumption figures. The EPA default water consumption numbers are 70 kg/2L (adult male), 60 kg/2L (adult female), and 10 kg/L (child). The lowest chronic DWLOC is based on carcinogenic risk and is 3.1 ppb.

Table 7. Margins of Exposure and Drinking Water Levels of Concern for Isoxaflutole.

Acute Risk				
Sub-Population	Acceptable MOE	Estimated MOE	DWLOC (ppb)	
U.S. Population	1,000	125,000	4,200	
Females (13+ years)	3,000	10,000	36	
Children (1-6 years)	1,000	125,000	1,200	
Chronic (Non-Cancer) Risk				
Sub-Population	% RfD Utilized	DWLOC (ppb)		
U.S. Population	1%	Males	Females	Children
Non-Nursing Infants	<1%	70	60	19
Carcinogenic Risk				
Acceptable Cancer Risk		Estimated Cancer Risk		
1 X 10 ⁻⁶		9.8 X 10 ⁻⁸		

Metabolism

In a metabolism study, 14C-isoxaflutole was rapidly and extensively absorbed and metabolized. RPA 202248, a major metabolite represented 70% or more of the radioactivity excreted in the urine and feces from the two lowest dose groups. The other minor metabolite, RPA 203328, was more polar. Elimination was rapid and dose-dependent. The mean total recovery was 99.21%. Urinary elimination was predominant in the two low dose groups while the major portion of radiolabel was excreted via the feces in the high dose group. The higher fecal elimination possibly resulted from the saturation of absorption resulting in elimination of unchanged parent compound. The majority of the radiolabel was eliminated in the first 24 and 48 hours for the low and the high dose groups, respectively. The elimination half-lives were similar among single low and high dose groups, with an estimated mean blood half-life of 60 hours. No sex differences were observed in the metabolism of 14C-isoxaflutole.

Ecological Characteristics

Terrestrial

Isoxaflutole and primary metabolite RPA 202248 is practically non-toxic to the mallard duck and the bobwhite quail on an acute basis (LD50 > 2,150 mg/kg) and slightly toxic to the mallard duck and the bobwhite quail on a sub-acute basis (5-day LD50 > 4,255 ppm). It is practically non-toxic to rats (LD50 > 5,000 mg/kg) and honey bees (LD50 > 100 ug/bee).

Aquatic - Freshwater

Isoxaflutole is moderately toxic to the rainbow trout (96-hour LC50 > 1.7 ppm) and to the bluegill sunfish (96-hour LC50 > 4.5 ppm). It is also moderately toxic to *Daphnia magna* (48-hour EC50 > 1.5 ppm). The primary metabolite RPA 202248 is, at worst, slightly toxic to rainbow trout (96-hour LC50 > 30.6 ppm).

Aquatic - Estuarine/Marine

Isoxaflutole is highly toxic to the mysid shrimp (96-hour LC50/EC50 = 0.018 ppm) and moderately toxic to the eastern oyster (96-hour LC50/EC50 = 3.3 ppm). It is moderately toxic to the sheepshead minnow (96-hour LC50 > 6.4 ppm). The primary metabolite RPA 202248 is moderately toxic to mysid shrimp (96-hour LC50 = 3.6 ppm).

Plants

Isoxaflutole is highly toxic terrestrial plants (EC25 = 0.00005 pounds active ingredient/Acre). Due to the low vapor pressure of this herbicide, and due to the fact that it is only to be applied using ground equipment, risk to nontarget plant species is not expected from the parent compound. The primary metabolite RPA 202248, however, is mobile and is expected to move off-site. EPA is requiring additional studies, including prospective groundwater studies and surface water monitoring, will be conducted to determine whether isoxaflutole and its primary metabolite RPA 202248 exceed concentrations deemed potentially harmful to the environment.

Phytotoxicity Data - Lab Studies vs. Field Studies

The data available at this time indicate that isoxaflutole is very phytotoxic. As noted above, Aventis conducted a number of lab studies to estimate the concentration at which isoxaflutole would be toxic to non-target crops. The initial lab results showed that a sensitive crop (turnip) may be damaged if irrigated with 2 inches of irrigation water containing as little as 22 parts per trillion (ppt) of isoxaflutole. According to the manufacturer, this result could not be reproduced at this level. The manufacturer believes that a reliable lab result exists for lettuce with showed measurable effects at 600 ppt. The manufacturer then conducted field studies that showed no effect at 3,200 ppt on turnip but did show 18% apparent yield reduction in cotton when irrigated twice at 4,000 ppt isoxaflutole. EPA and the manufacturer have not agreed upon a level of phytotoxic concern for isoxaflutole or RPA 202248.

CHAPTER 4 - THE POTENTIAL ENVIRONMENT AFFECTED BY AND THE POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

Affected Environment

The environment that may be affected by the proposed use of the herbicide Balance Pro (isoxaflutole) is mainly the areas of the state where corn is grown. An estimated 3.9 million acres of corn is planted annually. Thus the environment potentially affected by our decision to allow Balance Pro herbicide use covers approximately 11% of Wisconsin's land area.

Realistically, all corn acres would not receive Balance Pro applications. In other states, within the first three years of its introduction, Balance captured 8% of the corn herbicide market. Assuming the same linear market share trend as in other states, and a constant number of corn acres that might be treated, we estimated that 12% of Wisconsin's corn acres will receive applications of Balance Pro within the first 5 years of use in Wisconsin. The application rate of isoxaflutole is 1.5-4.5 ounces of product (0.05 to 0.14 pounds of active ingredient) per acre. Treating 12% of Wisconsin's corn acres with Balance Pro (468,000 corn acres) would result in the introduction of 23,000-66,000 pounds of isoxaflutole to the environment annually.

Wisconsin water resources are not uniformly susceptible to contamination by pesticides. Although the mechanisms of migration to surface and groundwater are not completely understood, it is clear that some areas have experienced more problems than other areas. The consideration of soil texture and establishing higher-level restrictions for certain areas of the state recognizes, to some extent, the differences in susceptibility to groundwater contamination. The Atrazine Rule (ATCP 30) set a precedent in Wisconsin for considering potential for groundwater contamination based on differences in soil texture. Based on EPA studies and results from other states monitoring, it can be expected that isoxaflutole residues will be detectable in surface waters downstream of application sites for some period.

Isoxaflutole has been detected in shallow groundwater where the soils are fine grained. Therefore Balance Pro may affect groundwater in areas with soils not normally considered vulnerable due to heterogeneities in soil characteristics such as coarse layers in a fine matrix or fracturing. Additionally, finer textured soils generally have a greater runoff potential and therefore are more likely to impact surface waters to a greater degree particularly when surface waters are near the fields of application. However, coarse textured soils are potentially more susceptible to groundwater contamination because of higher infiltration rates.

Although the spatial distribution of agricultural land relative to soil type and distance to surface water are important considerations, we cannot predict exactly where Balance Pro will be used. However, of Wisconsin's 3.9 million total corn acres, 930,000 acres (or 24%) occur on coarse soils. Twenty five percent of the corn acres occurring on coarse soils (230,000 acres) are estimated to be disqualified from receiving Balance Pro applications based on soil type and other site specific factors such as organic matter content and depth to groundwater. Additionally, DATCP proposes to ban the use of Balance Pro in eight counties and the Lower Wisconsin River Valley (520,000 ineligible corn acres) that are known to have a high contamination potential. Taking the above into

account, the total number of estimated corn acres eligible to receive Balance Pro equals 3.1 million acres.

The highest potential for impacts to surface water comes from agricultural activities within the water quality management areas (WQMAs) of streams and lakes (1,000 feet of lakes and 300 feet of streams). We found that a significant amount of eligible land (470,000 corn acres) or 15% of the total eligible corn acres (12 % of the total corn acres in the state) are located within these WQMAs.

Potential Environmental Effects

Isoxaflutole and its primary metabolite are highly mobile and EPA expects isoxaflutole residues to persist and that they may accumulate in surface water and groundwater. Evidence suggests that lakes, ponds and reservoirs continue to receive fresh inputs of isoxaflutole months after a single application. Concentrations in surface water have been found at 1,000 times the EC₂₅ of 22 ppt that can be phytotoxic to non-target terrestrial plants and are of particular concern to non-target aquatic plants. Less is known regarding the impacts of isoxaflutole to groundwater. The potential effects to surface and groundwater are described below.

Surface Water

Isoxaflutole has been detected in surface water reservoirs at total residue concentrations up to 2,394 ppt (2.4 ppb) as long as 10 months after application. Results of drain-tile studies have a bearing on both surface water and groundwater. DKN (the primary degradate) concentrations in tile drain water of one study exceeded 1000 ppt (1.0 ppb) on 34 days. Continued sampling of drain tiles have shown peaks of up to 70,000 ppt (70 ppb). These levels are similar to concentrations produced in runoff simulations (50 ppb). Large spikes in DKN are well correlated with rainfall events.

These and other studies (see Chapter 2) suggest that within 3 years of use, isoxaflutole will 1) be widespread in surface waters, 2) may accumulate in surface water from year to year, and 3) may exceed levels considered toxic to aquatic organisms (see Table 8 below). Aquatic toxicity tests also do not take into consideration the effects of longer-term chronic exposures and potential changes in ecosystem structure and function, which could occur by placing certain species at an ecological disadvantage. Overland flow of isoxaflutole could potentially impact terrestrial plants or crops.

Table 8. Affects of Isoxaflutole and its Degradates on Aquatic Organisms.

Test Organism	Test/Result	Test Duration	NOEC	LOEC	EPA Tox Class
Isoxaflutole Parent					
Blue-Green Algae (Anabaena flos-aquae)	EC ₅₀ = 180 ppb	120 hr	8.6 ppb		
Freshwater diatom (Navicula pelliculosa)	EC ₅₀ = 380 ppb	120 hr	3.1 ppb		
Green Algae (Selenastrum capricornutum)	EC ₅₀ = 140 ppb	120 hr	16 ppb		
Duckweed (Lemna gibba)	EC ₅₀ = 4.9 ppb		1.1 ppb		
Sheepshead minnows (Cyprinodon variegatus, Menidia sp.)	LC ₅₀ > 6400 ppb	96 hr	6400 ppb		Moderately toxic
Marine Mysid shrimp (Mysidopsis habia)		28 days	1.0 ppb	1.9 ppb	v. highly toxic
Marine diatom (Skeletonema costatum)	EC ₅₀ = 110 ppb	120 hr	2.2 ppb		
Marine Oyster (Crassostrea virginica)	EC ₅₀ = 3300 ppb	96 hr	980 ppb		Moderately toxic
RPA 202248 (DKN)					
Rainbow Trout (Oncorhynchus mykiss)	LC ₅₀ > 30,600 ppb	96 hr			Slightly toxic
Daphnia magna	LC ₅₀ > 59,600 ppb	96 hr			Slightly Toxic
Marine Mysid shrimp (Mysidopsis habia)	LC ₅₀ = 3,600 ppb	96 hr	830 ppb		
RPA 203328					
Daphnia magna	EC ₅₀ > 150,000 ppb	48 hr	150,000 ppb		Practically non-toxic
Rainbow Trout (Oncorhynchus mykiss)	LC ₅₀ = 160,000 ppb	96 hr			Practically non-toxic
Green Algae (Selenastrum capricornutum)	EC ₅₀ = 5,900 ppb	120 hr	2,400 ppb		

Groundwater

Less is known about the impacts of isoxaflutole on groundwater than on surface water. Prospective studies of Balance Pro in monitoring wells show only one well at a concentration of 1.1 ppb. No other detects have been reported, and based on human health concerns the chronic drinking water level (DWLOC) set by EPA for isoxaflutole and its metabolites is 3.1 ppb. However, few other

groundwater studies besides the prospective studies have been completed and few of the wells that have been sampled by State agencies have been located in areas where Balance Pro has been used.

Based on the DATCPs environmental monitoring experience, we know that within 5 years of the introduction of a new herbicide compound (acetochlor) to the environment, parent and/or metabolites were detected in private drinking water supplies. Currently, we do not have enough information to predict what concentrations of isoxaflutole, RPA 202248 or RPA 203328 to expect in groundwater. However, the potential exists for Balance Pro use to lead to exposure of a class B2 carcinogen through consumption of groundwater, though EPA concludes that there is a reasonable certainty that no harm will result from aggregate exposure to isoxaflutole residues.

Non-Target/Endangered Species

Modeling data show that isoxaflutole residues may accumulate in surface water to concentrations that would result in harm to non-target plants. Therefore, concerns remain for terrestrial plant species that are host for endangered species like the Karner Blue butterfly. Furthermore, the mode of action of isoxaflutole is a pigment inhibitor, which affects carotenoid biosynthesis in plants.

CHAPTER 5 - SIGNIFICANT ECONOMIC, SOCIAL, AND OTHER EFFECTS OF THE PROPOSED ACTION

Effects on Corn Growers

The proposed action would affect corn growers by providing another option for chemical control of the weeds discussed in Chapter 2. According to the manufacturer, Balance Pro can provide corn growers with a one-pass protection on a range of grass and broadleaf weeds.

Corn producers will need education on the proper use and handling of Balance Pro because of the potential environmental risks and crop injury concerns. The use of isoxaflutole could lead to a potential for phytotoxicity problems to non-target plants as well as injury to the target corn crop. There are also concerns for both ground water and surface water contamination. Because of these potential problems, there will be restrictions on the proposed label about where the product can be used and at what rates. There are also areas of the state where isoxaflutole use will not be allowed. This will create some challenges for producers that have land both in and out of restricted areas.

Phytotoxic Effects on Non-target Crops

There is potential for damage to sensitive non-target plants being irrigated with water contaminated by isoxaflutole. EPA states that 22 parts per trillion (ppt) is the level of concern for irrigation water. Aventis believes the level of phytotoxic concern is much higher. Vegetable crops appear to be the most sensitive to phytotoxic effects (see Chapter 3 for phytotoxicity data). Problems for vegetable producers that irrigate could arise if contaminated groundwater is used as irrigation water.

Effects on the Pesticide Industry

Every year many new pesticide products are introduced to the market, but relatively few new active ingredients are introduced. The proposed action would affect the manufacturer by providing an increased market for isoxaflutole in Wisconsin.

There are some conditions placed on the manufacturer under the proposed action. One condition is the installation of 15 monitoring well sites that meet the approval of DATCP. In conjunction with this a sampling protocol established by DATCP will need to be followed. The manufacturer will be required to provide analysis of the water samples that are collected quarterly by DATCP staff. They will also be required to provide analytical standards and methods development assistance to the DATCP lab.

Other pesticide manufacturers will be affected by the increase in competition from a new herbicide active ingredient. This could lead to reduction in sales of existing herbicides used for control of the same weeds. According to the manufacturer, in the 2001 growing season isoxaflutole was used on 8% of the corn acres in the 18 states where it has a conditional label from EPA. If a similar level of

use is realized in Wisconsin, sales of some other herbicides will be displaced. This will have an adverse effect on other chemical companies by reducing their market share in Wisconsin.

Farm chemical dealers will be affected in a way similar to corn producers. They will have another herbicide to sell and commercially apply for control of certain weeds. They will be affected by the added need for education on proper use, handling, and stewardship techniques for Balance Pro.

Effects on Residents in the State

The reason that isoxaflutole has not received a full registration from EPA is that there is concern for the potential to contaminate groundwater and phytotoxicity to non-target plants. Approximately 70% of Wisconsin residents rely on groundwater for their drinking water supply. The EPA has listed isoxaflutole as a probable (B2) human carcinogen. Because of the potential for isoxaflutole to leach to groundwater and the fact that it is a B2 carcinogen, there is a potential for this action to cause unsafe drinking water in areas where it is used. However, EPA concludes that there is a reasonable certainty that no harm will result from aggregate exposure to isoxaflutole residues.

Effects on Land Use

The proposed rule is not likely to have an effect on land use in the state. It is not likely that there will be an increase in corn acres because of the introduction of isoxaflutole. Land values should not be affected as a result of the use of isoxaflutole, although that could change if there are areas of groundwater or surface water contamination. If there are major problems with use of isoxaflutole such as over-spray or drift in areas near non-agricultural land uses, there could be some potential for land values to be affected. However, the use of agricultural chemicals has not had an effect on land values and that is not expected to change with the proposed action.

Because of the rotational restrictions on the product label, there could be some changes in crop rotation by producers who use isoxaflutole. Careful adherence to the rotation restrictions on the product label will be needed to ensure there is no risk to sensitive crops in the rotation.

Effects on Cost to Consumers

There are no expected effects on cost to consumers of corn-derived products as a result of the proposed action. Corn production is not likely to change because of the use of isoxaflutole. There have not been any changes in states where the product has already been registered and used.

Social Effects

There are no known social effects of the proposed action.

Effects on State and Local Governments

The Wisconsin Groundwater Law (Chapter 160 of Wisconsin Statutes) and Administrative Rule ATCP 31 give DATCP regulatory authority for protection of groundwater from agriculture chemicals including pesticides. DATCP would be affected by an increase in staff time to oversee the groundwater monitoring studies that are a condition of the 24(c) registration for isoxaflutole. These studies will require considerable staff time in collecting and handling samples and analysis of the data. If isoxaflutole contaminates groundwater, further regulation of the product, including possible revocation of the special registration, will be necessary. DATCP laboratory, with help from the manufacturer, will need to develop analytical methods and train their staff.

Other state agencies could be affected by the introduction of isoxaflutole. DHFS and DNR may need to develop surface and groundwater standards if it is found to impact these water resources.

Potentials for phytotoxicity problems and groundwater contamination will necessitate the education of State and Local government officials. With phytotoxicity problems there will be a need to identify isoxaflutole damage and distinguish it from other causes. For groundwater contamination, government officials will need to be able to explain the risks of using water from a well that is contaminated by isoxaflutole and provide information on possible ways to mitigate the problem. University of Wisconsin weed specialists and county extension agents would likely incorporate information about Balance Pro into their educational programs for growers and dealers.

Regulations on chemical contamination of surface water exist for some types of surface water bodies. However, there are no standards set for pesticides that would trigger these regulations. The costs of establishing a sound surface water monitoring system would be considerable.

CHAPTER 6 - POSSIBLE ALTERNATIVES TO THE PROPOSED ACTION

Allow Use Under the Federal Label

Under this alternative, Wisconsin would be added to the EPA-approved federal label for the 18 states where use of Balance Pro is currently allowed. This label is contained in Appendix II. This alternative would not include the additional provisions in the proposed 24 (c) label (geographic restrictions, restrictions on certain coarse-textured soils, restrictions on application timing, and irrigation management). It should be noted that the manufacturer of Balance Pro has indicated that they would only support a federal label for Wisconsin that prohibited use in the Central Sands and lower Wisconsin River valley.

Advantages

The alternative of allowing use under the federal label would be simpler and require fewer resources because Wisconsin would not have to develop and administer use restrictions that are unique to the State. More use of isoxaflutole would be allowed in areas of coarse-textured soils as compared with the proposed 24(c) label. This would provide an additional tool to corn growers with weed problems that are controlled by isoxaflutole. The product label that corresponds to this alternative would be somewhat easier for users to interpret because soil restrictions would not be based on specific soil series names. This alternative would also be somewhat easier to enforce.

Disadvantages

The alternative of allowing use under the federal label would provide less groundwater protection because use would be allowed on more coarse-textured soils. Use would be allowed in portions of areas known to be susceptible to groundwater contamination such as the Central Sands and the Lower Wisconsin River Valley.

No Use in Wisconsin

Under this alternative no use of products containing isoxaflutole would be allowed in Wisconsin. This would include products that contain isoxaflutole as a single active ingredient or mixed with other active ingredients.

Advantages

The alternative of no use in Wisconsin would provide the highest degree of groundwater and surface water protection. It would be relatively easy to enforce because no product containing isoxaflutole should be in Wisconsin unless it is intended for use in another state.

Disadvantages

The alternative of no use in Wisconsin may be overly restrictive in that it may prohibit isoxaflutole use in areas where it could safely be used. A total prohibition would be a disadvantage to corn growers who may benefit from the weed control offered by isoxaflutole.

No Use on Coarse-Textured Soils in Wisconsin

Under this alternative, no use of isoxaflutole would be allowed on coarse-textured soils (sands, loamy sands, and sandy loams) in Wisconsin. Use would only be allowed on medium and fine-textured soils. There would also be no specific area-wide prohibition on use in the Lower Wisconsin River Valley or the counties in the Central Sands area. The user would need to know the texture of the soil at the intended use site, but would not need to know the depth to groundwater or the specific soil series name. Organic matter content in the surface soil would still be a factor in determining the application rate at the site.

Advantages

Prohibiting isoxaflutole use on coarse-textured soils in Wisconsin would have several advantages. It would be more protective of groundwater by not allowing use on coarse-textured soils that may have higher susceptibility to leaching. Also, this alternative would simplify the process of determining where allowable use sites are. Fields with coarse soils would be eliminated categorically without having to determine the depth to groundwater or the specific soil series name. This would be an advantage for both product users and Department enforcement staff. Because there would be no area-wide prohibitions, this option would allow use on medium and fine-textured soils in the eight central sands counties where use would be prohibited under the main (24c) option.

Disadvantages

A disadvantage of prohibiting use on coarse-textured soil is that use may be eliminated in some areas where the product could be used without threatening groundwater quality. A blanket prohibition does not recognize that there are differences in susceptibility to groundwater contamination within areas of coarse-textured soils. Use on coarse soils with higher organic matter content and deeper depth to groundwater may provide adequate groundwater protection.

Use of Isoxaflutole Every Other Year

Under this alternative isoxaflutole could only be used on the same field one out of two years. Over a period of years this would reduce by 50% the amount of active ingredient that could be applied to a given field as compared to use under the federal label.

Advantages

The alternative of every other year use would provide an additional measure of groundwater and surface water protection. By limiting use to every other year, it would reduce the potential for cumulative buildup of residues in the soil from two consecutive years of application.

Disadvantages

The alternative of every other year use would probably be over restrictive because available data do not indicate that significant concentrations of isoxaflutole persist in Wisconsin soils into the following growing season. Restricting use to one year out of two would be a disadvantage to corn growers who could benefit from more frequent use.

Reduced Rates of Isoxaflutole

Under this option the maximum allowable application rates of isoxaflutole would be 1.75 ounces/acre for soils with less than 1.5 % organic matter and 2.0 ounces/acre for soils with 1.5 % or greater organic matter. These rates are lower than the maximum rates allowed under the proposed 24(c) and current federal labels used in other states.

Advantages

Lower application rates would reduce the amount of isoxaflutole active ingredient entering the environment and provide an additional measure of groundwater and surface water protection.

Disadvantages

Lower allowable application rates may reduce the effectiveness of Balance Pro for weed control. Certain weeds that are controlled by full label rates of Balance Pro may not be controlled or may only be suppressed with reduced rates. This would be a disadvantage to corn growers who could benefit from full rates. Also, the Department does not have any specific data to determine the level of rate reduction that would provide significant additional groundwater and surface water protection.

Use of Isoxaflutole only on Fields with Infestations of Problem Weeds

Under this option Balance Pro could only be used on fields that had a significant woolly cupgrass infestation. This restriction would be in addition to the other restrictions on the proposed 24(c) label. A significant infestation would be defined as more than 200 woolly cupgrass plants per 100 square feet. This is the level of infestation at which seed production and competition with the corn crop would be unacceptable if the woolly cupgrass were not controlled. The infestation would have to be documented by a qualified agronomist or other specialist.

A variation of this option would replace agronomist documentation of woolly cupgrass infestation with farmer identification of the weed problem without documentation of the infestation. This variation could require submission of use information to the department for each field for which Balance Pro is applied. This would include use rate, application date, location, and other data already required for restricted-use pesticides.

Advantages

The advantage of only allowing use on certain problem weeds is that it would allow use of Balance Pro on fields where it can provide the greatest benefits. On fields where other herbicides are adequate to control the weeds that are present, Balance Pro would not be allowed and therefore risks to the environment and human health from Balance Pro would be eliminated. If Balance Pro use is documented on a field-by-field basis, monitoring programs could be designed to better characterize water resource impacts.

Disadvantages

The disadvantage of this option is that it would be somewhat burdensome to document that a field had a woolly cupgrass infestation above a threshold level, or optionally to submit use information. Also, Balance Pro can control other weeds than woolly cupgrass but its use would not be allowed unless woolly cupgrass was present.

Setbacks from Surface Water Resources

Under this option there would be setback restrictions on how close isoxaflutole could be applied to surface water bodies such as lakes, streams, and rivers. These restrictions would be in addition to the restrictions in the proposed 24(c) label and the goal would be to limit the amount of isoxaflutole entering surface water. The setbacks would indicate that Balance Pro could not be applied within 100 ft. of a stream or river and 200 ft. of a lake or reservoir.

Advantages

The advantage of application setbacks from surface water bodies is that it would add an extra degree of protection for surface water resources. Not applying Balance Pro near streams, rivers and lakes would help reduce the amount of isoxaflutole that runs off cornfields and enters surface water.

Disadvantages

Setbacks would limit the ability to use Balance Pro on cornfields located near surface water bodies. Some cornfields may have a portion where Balance Pro could be used and a portion where it would be prohibited. In this case a corn grower who wanted to use Balance Pro could not make an application to the whole field and may have to use two different herbicide programs on the same field. Also, setbacks from surface water bodies may not prevent concentrated runoff containing isoxaflutole from reaching surface water.

Prohibit Use of Balance Pro on Tile-Drained Fields

In this alternative use of isoxaflutole would be prohibited on fields with tile drainage. This restriction would be in addition to the restrictions in the proposed 24(c) label. Field monitoring studies in Ohio and Indiana have shown that isoxaflutole can move through soil, enter tile drainage lines and then enter surface water at the outlet of the tile drains. Concentrations of isoxaflutole up to 70 ppb have been detected in tile drainage water. Prohibiting use on tile-drained fields would help reduce a source of contamination to surface water resources.

Advantages

The main advantage of prohibiting use on tile-drained fields is that it would prevent isoxaflutole from entering surface water via tile drainage, a documented route of movement of isoxaflutole to surface water.

Disadvantages

The main disadvantage of this alternative is that it would further restrict the beneficial use of Balance Pro on corn acreage. Also, enforcement may be difficult because it is not always easy to document where tile drain lines are located and the exact land area that is being drained.

Groundwater Monitoring Networks

Any of the above alternatives (except the no use option) could be combined with a groundwater and surface water monitoring program to help detect any groundwater or surface water impacts from isoxaflutole use. More extensive monitoring networks would provide more ability to detect and characterize any water resource impacts, but also would have higher costs.

CHAPTER 7 - SUMMARY AND CONCLUSIONS

Balance Pro (isoxaflutole) is a selective herbicide for control of certain broadleaf and grass weeds in field corn. The United States Environmental Protection Agency (EPA) conditionally registered Balance Pro herbicide for use in 17 Central and Great Plains states in 1998 and it was first used in crop year 1999. EPA conditionally registered Balance Pro due to concerns about water quality. Wisconsin corn growers and Aventis CropScience, the manufacturer of Balance Pro, have requested that the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) allow the use of Balance Pro in Wisconsin in 2003, citing the potential advantages it provides for control of certain weeds and its potential to serve as part of a one-pass herbicide program. Allowing the use of Balance Pro in Wisconsin while it is conditionally registered by EPA is considered a major action by DATCP. This major action requires an Environmental Impact Assessment (EIS) and public hearings before a final decision is made on allowing use in Wisconsin.

DATCP is proposing a supplemental label for the use of Balance Pro in Wisconsin under s. ATCP 29.72 and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), section 24(c). This label contains additional restrictions (as compared to the federal label) that are designed to reduce the potential for adverse effects to the environment, human health, and sensitive crops.

Under the 24 (c) label, use of isoxaflutole is not allowed in certain areas of Wisconsin that have been identified as susceptible to groundwater contamination from agricultural herbicides. Use is prohibited in the lower Wisconsin River valley and eight counties (Portage, Langlade, Juneau, Marathon, Adams, Waushara, Waupaca, and Wood) in the Central Sands region of the state. These areas have many coarse-textured soils with low organic matter and shallow depths to groundwater. Other coarse textured-soils with similar characteristics outside of these prohibited areas were identified and are listed in Table 1 of the 24 (c) label. Use on these soils may be prohibited depending on soil organic matter, depth to groundwater, and the texture of the subsoil. The 24(c) label limits timing of isoxaflutole applications to between April 15 and July 31. Irrigation of fields treated with isoxaflutole is only allowed if an irrigation management plan is followed.

As part of the proposal to allow the use of isoxaflutole in Wisconsin, DATCP will require the manufacturer to install groundwater monitor wells at 15 fields where isoxaflutole will be used. DATCP believes this is an important part of allowing the use of isoxaflutole Wisconsin given its potential to adversely impact groundwater. Based on any significant detections in the monitoring wells, DATCP will be able to modify or discontinue the use of isoxaflutole and limit further groundwater contamination.

This Environmental Impact Statement (EIS) contains a description and discussion of the proposed action; background information on isoxaflutole including sections on its weed control profile, chemistry, environmental fate, toxicology, and ecological effects; a discussion of the persons and environment affected by the proposed action; and significant economic and social effects of the proposed action. The EIS also compares possible alternative actions.

This EIS finds that the proposed action may cause adverse environmental effects on water resources in Wisconsin. The proposed use restrictions contained in the proposed 24(c) label for the

use of Balance Pro would significantly mitigate adverse effects, but even under the proposed use restrictions impacts on groundwater and surface would likely occur. It is uncertain if the resulting contamination would be at concentrations high enough to cause significant impacts on the environment, human health or sensitive crops. The concentration of concern for most non-target plant species has not been established. Any adverse impacts on groundwater are likely to be detected in the monitoring well network required in this proposal, but even with monitoring, impacts on groundwater and potentially on drinking water supplies may occur before additional mitigation measures could be implemented.

The EIS also finds that Balance Pro controls a broad spectrum of weeds in Wisconsin. It is comparable to other currently available broadleaf herbicides in terms of weeds controlled, but two different analyses show cost savings ranging from minimal to significant. Balance Pro also controls a number of grass weeds that are problems in Wisconsin, especially when used in combination with other grass herbicides. Balance Pro may have the advantage of providing a one-pass herbicide program on fields that have woolly cupgrass infestations. Overall, Balance Pro would provide another useful weed-control tool for Wisconsin corn growers, but its advantages over existing herbicides are inconclusive.

The proposed 24(c) label is a bonafide attempt to allow beneficial use of Balance Pro while providing an increased level of protection of water resources over the federal label. But it should be recognized that the department received widely differing opinions about both the relative benefits of Balance Pro use as well as the relative risks to the environment. Where credible differences of opinion exist, an evaluation of the adequacy of this label is difficult. In addition, the label is quite complicated, and will require considerable effort on the part of the user to gather all the information needed to fully comply with the use restrictions. For these reasons, enforcement and education activities by DATCP will be resource intensive. For the label to be successful, the manufacturer will have to provide intensive education and stewardship to users and dealers.

Several alternative options for use of Balance Pro have been evaluated by DATCP staff. These include allowing use under the federal label, prohibiting use on all coarse-textured soils in Wisconsin, allowing use only every other year, allowing only reduced rates of Balance Pro, not allowing any use of Balance Pro in Wisconsin, only allowing Balance Pro use on fields with certain problem weeds, requiring setbacks from surface water bodies, and not allowing Balance Pro use on fields with tile drainage. Several of these options would provide greater protection of Wisconsin's water resources but would reduce the ability of corn growers to use this weed-control option.

State of Wisconsin
Department of Agriculture, Trade and Consumer Protection

By 
Nicholas J. Neher
Administrator, Agricultural Resource Management Division

Dated: 8/5/2002

**APPENDIX I - DRAFT 24(C) SUPPLEMENTAL LABEL FOR
BALANCE PRO USE IN WISCONSIN**



Aventis CropScience USA LP
P.O. Box 12014, 2 T.W. Alexander Drive
Research Triangle Park, NC 27709
(919) 549-2000

BALANCE® PRO Herbicide
EPA Reg. No. 264-600

For Control of Broadleaf Weeds and Grasses
in Corn.

EPA SLN: WI-XXXXXX

24(c) Supplemental Label
DRAFT

FOR DISTRIBUTION AND USE ONLY IN THE STATE OF WISCONSIN

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. This label must be in the possession of the user at the time of pesticide application. Follow all applicable directions, restrictions, Worker Protection Standard requirements and precautions on the EPA registered label. Do not apply this product through any type of irrigation system.

RESTRICTED USE PESTICIDE

May injure (phytotoxic) susceptible non-target plants.

For retail sale to and use only by certified applicators and only for those uses covered by the Certified Applicator's certification. Commercial and certified applicators must ensure that all persons involved in these activities are informed of the precautionary statements.

State of Wisconsin

REFER TO THE CONTAINER LABEL FOR ADDITIONAL USE PRECAUTIONS AND DIRECTIONS

ENVIRONMENTAL PRECAUTIONS

THE FOLLOWING RESTRICTIONS HAVE BEEN DEVELOPED TO PROTECT DRINKING WATER SUPPLIES.

Do not wash, load, or empty application equipment near any well, as this practice is a potential source of ground water contamination. In fields having soils with less than 15% field moisture holding capacity, special care must be taken not to over-irrigate, since substantial over-irrigation promotes the leaching of chemicals.

SOIL TYPE RESTRICTIONS

WISCONSIN

Do not apply BALANCE® PRO Herbicide in the following counties: Portage, Langlade, Juneau, Marathon, Adams, Waushara, Waupaca and Wood.

Do not apply BALANCE® PRO Herbicide to the river terraces and the flood plain on either side of the Wisconsin River, downstream of the highway 60 bridge at Prairie du Sac and upstream of the confluence of the Wisconsin and Mississippi Rivers, except that BALANCE may be applied to medium- and fine-textured soils (unless prohibited by the soil type conditions found below) in Township 9 North Range 1 West, Sections 27, 28, 29, 30, 31, 32, 33, and 34 and Township 9 North Range 2 West Sections 25, 26, 27, 28, 32, 33, 34, 35 and 36.

Do not apply BALANCE® PRO Herbicide to the vulnerable sandy loam, loamy sand or sand soils listed in Table 1, unless allowed by the conditions listed in the legend of the table. If the depth of the water table or the % organic matter of the soil as required by the conditions in Table 1 is unknown, do not apply BALANCE® PRO Herbicide to a restricted soil. If a field contains several soil types, one of which is a vulnerable soil listed below, do not apply BALANCE® PRO Herbicide unless allowed by the conditions listed in the table.

TABLE 1: Restricted Soils List For Wisconsin

Abbaye ⁴	Croswell ⁴	Hortonville ²	Mecosta ¹	Orion ²	St. Charles ²
Abscota ⁴	Cunard ⁴	Hubbard ⁴	Meehan ⁴	Oshkosh ²	Stambaugh ²
Aftad ²	Cushing ²	Humbird ⁴	Menahga ⁴	Oshtemo ⁴	Sturgeon ³
Ahmeek ²	Cutaway ²	Impact ⁴	Moneominee ¹	Padus ⁴	Summerville ⁴
Alban ²	Dalbo ²	Ingalls ⁴	Merrillan ⁴	Pardeeville ²	Superior ²
Alcona ⁴	Dancy ²	Insula ⁴	Metea ²	Partridge ¹	Symco ²
Alganssee ³	Deerton ⁴	Ionia ⁴	Miami ²	Pearl ⁴	Tarr ⁴
Allouez ⁴	Delton ¹	Ishpeming ⁴	Michigamme ²	Pelkie ⁴	Taylor ²
Alpena ³	Demontreville ¹	Jasper ²	Mifflin ²	Pemene ⁴	Tedrow ⁴
Alstad ²	Dickinson ⁴	Kalamazoo ²	Milaca ²	Pence ⁴	Tilleda ²
Amery ⁴	Dorerton ²	Kalkaska ⁴	Military ⁴	Pequaming ⁴	Tonkey ²
Anoka ¹	Dresden ²	Karlin ⁴	Minneiska ²	Peshekee ⁴	Trempe ⁴
Arland ²	Duel ⁴	Kaukauna ²	Monico ⁴	Plainbo ⁴	Trempealeau ²
Au Gres ³	Duluth ²	Kennan ³	Mora ²	Plainfield ⁴	Trenary ²
Banat ⁴	Dunnville ⁴	Kewaunee ⁴	Morley ²	Plover ³	Tuscola ²
Bellevue ²	Elderon ⁴	Keweenaw ⁴	Morocco ⁴	Point ²	Tustin ²
Billett ⁴	Eleva ⁴	Kickapoo ³	Mosinee ³	Puchyan ¹	Urne ¹
Blomford ²	Elk mound ⁴	Kingsville ³	Moundville ⁴	Richford ¹	Vilas ⁴
Bohemian ²	Emmert ¹	Kiva ⁴	Munising ²	Richter ³	Wabeno ²
Boone ¹	Emmet ²	Kolberg ²	Nadeau ⁴	Roby ⁴	Wasepi ⁴
Borth ⁴	Ewart ⁴	Korobago ²	Nebago ²	Rockers ²	Watab ²
Boyer ⁴	Fairchild ⁴	Kost ⁴	Nemadji ⁴	Rodman ³	Watska ⁴
Braham ²	Fairport ²	Kranski ¹	Nester ²	Roscommon ³	Waupaca ³
Brems ⁴	Fallcreek ²	Kratka ²	Newood ²	Rosholt ⁴	Wawina ⁴
Brickton ²	Fence ²	Lamont ¹	Newot ²	Rousseau ⁴	Waymor ²
Brimley ²	Fisk ⁴	Lapeer ²	Newton ³	Rubicon ⁴	Westville ²
Burkhardt ³	Fox ²	Leola ⁴	Norden ²	Salter ⁴	Whalan ²
Caryville ⁴	Friendship ⁴	Lino ⁴	Norgo ⁴	Sarana ⁴	Winneshiek ²
Casco ⁴	Gogebic ²	Longrie ²	Northfield ⁴	Sayner ⁴	Winterfield ³
Champion ²	Gotham ⁴	Lorenzo ³	Nymore ⁴	Scott Lake ²	Worchester ²
Channing ⁴	Granby ³	Lows ³	Oakville ⁴	Seward ²	Wyeville ²
Chelsea ¹	Graycalm ⁴	Ludington ⁴	Ockley ²	Shawano ¹	Wyocena ¹
Chetek ⁴	Grayling ⁴	Lutzke ⁴	Oconto ⁴	Shiffer ²	Zeba ³
Cloquet ⁴	Guenther ¹	Mahtomedi ¹	Oesterle ³	Sisson ⁴	Zumbro ⁴
Coloma ⁴	Halder ²	Mancelona ⁴	Okee ²	Skanee ²	
Cormant ³	Hebron ²	Manitowish ⁴	Omena ²	Soderville ¹	
Council ²	Hennepin ²	Matherton ³	Omega ⁴	Solona ²	
Cowhorn ⁴	Hixton ²	Maumee ³	Onaway ²	Sparta ⁴	
Cromwell ⁴	Hoopston ³	Mecan ²	Onota ⁴	Spinks ⁴	

CONDITIONS

1. Do not apply BALANCE® PRO Herbicide to this soil.
2. Do not apply BALANCE® PRO Herbicide unless the soil organic matter is greater than 1.5%.
3. Do not apply BALANCE® PRO Herbicide unless the water table is deeper than 25 feet from the soil surface.
4. Do not apply BALANCE® PRO Herbicide unless the soil organic matter is greater than 1.5% and the water table is deeper than 25 feet from the soil surface

APPLICATION PROCEDURES**SPECIFIC USE DIRECTIONS**

The recommended use rates of BALANCE® PRO Herbicide vary with soil texture. Refer to the following tables to select the recommended broadcast treatment rates. The specified rates will provide control of the weeds listed on the container label and minimize adverse crop response. **The use of BALANCE® PRO Herbicide on irrigated fields is not authorized unless an irrigation management plan is followed.**

In any given year DO NOT apply BALANCE® PRO Herbicide prior to April 15th or after July 31st.

**BALANCE® PRO HERBICIDE APPLIED ALONE
AS PART OF A PLANNED SEQUENTIAL WEED CONTROL PROGRAM**

Application Timing	Amount of BALANCE® PRO Herbicide per Acre					
	Soil Texture					
	Coarse Soils Sand, Loamy sand, Sandy loam		Medium Soils* Loam, Silt loam, Silt Sandy clay loam		Fine Soils Silty clay loam, Clay loam, Sandy clay, Silty clay, Clay	
	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.
Early Preplant (Surface Applied or Incorporated) 8 to 30 days prior to planting	DO NOT USE	2.25 to 3.0 fluid ounces	3.0 to 3.75 fluid ounces	3.0 to 3.75 fluid ounces	3.75 to 4.5 fluid ounces	3.75 to 4.5 fluid ounces
Preplant (Surface Applied or Incorporated) 0 to 7 days prior to planting or preemergence	DO NOT USE	1.5 to 1.88 fluid ounces	1.88 to 2.6 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.75 fluid ounces

O.M. = Organic Matter by weight

Within rate ranges in the rate tables, use the lower rate on soils that are relatively coarse-textured or low in organic matter. Use the higher rate on soils that are relatively fine-textured or high in organic matter or when the preplant application is made further from planting.

*When BALANCE® PRO Herbicide is applied preemergence to **medium soils** with a pH greater than 7.5, reduce the rate by 0.25 fluid ounce from the recommended rate.

When using BALANCE® PRO Herbicide on fields with variable soils, optimum weed control will result when overall application rate is based on the predominant soil type(s) within a field. Use on clay knolls, eroded hill sides, terracing with scraped exposed subsoil, or other areas of coarse soils with organic matter of less than 1.5% by weight, rate should be reduced to one half the rate used on the predominant soil type in the field, not to exceed one fluid ounce per acre.

TANK MIX COMBINATIONS

BALANCE® PRO Herbicide is recommended as the foundation herbicide in an integrated weed control program.

Tank mix combinations may be used in either conventional, conservation tillage, or no-till cropping systems and be applied at the same timings as BALANCE® PRO Herbicide unless otherwise specified in the tank mix label. Multiple tank mixtures are allowed unless otherwise specified by the respective product labels. Check all tank mix product labels for proper rates and compatibilities for multiple tank mixes.

BALANCE® PRO HERBICIDE TANK MIX USE DIRECTIONS

Application Timing	Amount of BALANCE® PRO Herbicide per Acre					
	Soil Texture					
	Coarse Soils Sand, Loamy sand, Sandy loam		Medium Soils** Loam, Silt loam, Silt, Sandy clay loam		Fine Soils Silty clay loam, Clay loam, Sandy clay, Silty clay, Clay	
	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.
Early Preplant (Surface Applied or Incorporated) 8 to 21* days prior to planting	DO NOT USE	1.5 to 3.0 fluid ounces	2.25 to 3.75 fluid ounces	3.0 to 3.75 fluid ounces	3.75 to 4.5 fluid ounces	3.75 to 4.5 fluid ounces
Preplant (Surface Applied or Incorporated) 0 to 7 days prior to planting or preemergence	DO NOT USE	1.5 to 1.88 fluid ounces	1.88 to 2.76 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces

O.M. = Organic Matter by weight

Within rate ranges in the rate tables, use the lower rate on soils that are relatively coarse-textured or low in organic matter. Use the higher rate on soils that are relatively fine-textured or high in organic matter or when the preplant application is made further from planting.

* BALANCE® PRO Herbicide may be applied up to 30 days prior to planting when used in a planned sequential application program such as Balance followed by Liberty, Buctril, or other post applied herbicides.

** When BALANCE® PRO Herbicide is applied preemergence to medium soils with a pH greater than 7.5, reduce the rate by 0.25 fluid ounce from the recommended rate.

When using BALANCE® PRO Herbicide on fields with variable soils, optimum weed control will result when overall application rate is based on the predominant soil type(s) within a field. Use on clay knolls, eroded hill sides, terracing with scraped exposed subsoil, or other areas of coarse soils with organic matter of less than 1.5% by weight, rate should be reduced to one half the rate used on the predominant soil type in the field, not to exceed one fluid ounce per acre.

For MEDICAL And TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577

For PRODUCT USE Information Call 1-888-AVENTIS (1-888-283-6847)

or

Visit our worldwide web site at www.aventis.com

BALANCE is a registered trademark of the Aventis Group.

APPENDIX II - FEDERAL LABEL FOR BALANCE PRO

264-600

06/10/2002

1/10

RESTRICTED USE PESTICIDE

May injure (phytotoxic) susceptible non-target plants.

For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification. Commercial and certified applicators must ensure that all persons involved in these activities are informed of the precautionary statements.

BALANCE® PRO Herbicide

For weed control in field corn in the states of: Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Montana, Nebraska, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas and Wyoming. In the states of Colorado, Kansas, Missouri and South Dakota, a section 24(c) has been established that has more restrictive conditions on the use of this product. You should check with your state regulatory authority prior to use.

ACTIVE INGREDIENT:

Isoxaflutole* [5-cyclopropyl-4-(2-methylsulfonyl-4-trifluoromethylbenzoyl) isoxazole]..... 40.5%

INERT INGREDIENTS: 59.5%

*Product contains 4.0 pounds of isoxaflutole per gallon.

E.P.A. Reg. No. 264-600

E.P.A. Est. No. 11773-IA-1

KEEP OUT OF REACH OF CHILDREN CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

For **MEDICAL** And **TRANSPORTATION** Emergencies **ONLY** Call 24 Hours A Day 1-800-334-7577
For **PRODUCT USE** Information Call 1-888-AVENTIS (1-888-283-6847)

FIRST AID

IF SWALLOWED:	<ul style="list-style-type: none"> • Immediately call a poison control center or doctor for treatment advice. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Have person sip a glass of water if able to swallow. • Do not give anything by mouth to an unconscious person. 	<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>ACCEPTED</p> <p>JUN 10 2002</p> <p><small>Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 264-600</small></p> </div>
IF ON SKIN OR CLOTHING:	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice. 	
IF IN EYES:	<ul style="list-style-type: none"> • Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. • Call a poison control center or doctor for treatment advice. 	
IF INHALED:	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice. 	
<p>For MEDICAL Emergencies Call 24 Hours A Day 1-800-334-7577.</p> <p>Have the product container or label with you when calling a poison control center or doctor or going for treatment.</p>		

NOTE TO PHYSICIAN: No specific antidote is available. All treatments should be based on observed signs and symptoms of distress in the patient. Overexposure to materials other than this product may have occurred.

PRECAUTIONARY STATEMENTS

CAUTION HAZARD TO HUMANS AND DOMESTIC ANIMALS

Harmful if swallowed or absorbed through the skin. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing vapor or spray mist.

EPA REC'D 3/21/2002

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear: Long-sleeved shirt and long pants, waterproof gloves, shoes plus socks and protective eye wear. When mixing/loading or cleaning equipment, wear a chemical resistant apron in addition to the other required PPE. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

ENGINEERING CONTROL STATEMENT

When handlers use closed systems, enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS

Users should: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove Personal Protective Equipment immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Drift or runoff may adversely affect non-target plants. Drift and runoff may be hazardous to aquatic organism in neighboring areas. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters or rinsate.

Do not apply when weather conditions favor drift from treated areas. Do not use the same spray equipment for other purposes unless thoroughly cleaned. Do not contaminate water used for irrigation or domestic purposes.

This chemical is known to leach through soil into shallow ground water under certain conditions as a result of agricultural use. Thus, use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination.

Isoxaflutole residues can contaminate surface water through spray drift. Under some conditions, isoxaflutole residues may also have a high potential for runoff into surface water (primarily via dissolution in runoff water), for several weeks after application. These include poorly draining or wet soils with readily visible slopes toward adjacent surface waters, frequently flooded areas, areas over-laying extremely shallow ground water, areas with in-field canals or ditches that drain to surface water, areas not separated from adjacent surface waters with vegetated filter strips and areas over-laying tile drainage systems that drain to surface water.

In fields having sands, loamy sands and sandy loam soils, special care should be taken not to over-irrigate since substantial over-irrigation promotes the leaching of chemicals.

This pesticide is toxic to some plants at very low concentrations. Non-target plants may be adversely affected if the pesticide is allowed to drift from areas of application. Exposure to isoxaflutole residues may injure or kill susceptible plants. Symptoms of phytotoxicity as a result of exposure to isoxaflutole include whitening or chlorosis of the foliage of affected plants. Cotton is particularly susceptible to isoxaflutole; therefore, exposure of cotton to isoxaflutole residues may affect cotton yield. To prevent damage to crops and other desirable plants, read and follow all directions and precautions on this label before using.

This product may not be mixed or loaded within 50 feet of any wells (including abandoned wells and drainage wells), sink holes, perennial or intermittent streams and rivers, and natural or impounded lakes and reservoirs. This setback does not apply to properly capped or plugged abandoned wells and does not apply to impervious pad or properly diked mixing/loading areas.

Operations that involve mixing, loading, rinsing or washing of this product into or from pesticide handling or application equipment or containers within 50 feet of any well are prohibited unless conducted on an impervious pad constructed to withstand the weight of the heaviest load that may be positioned on or moved across the pad. Such a pad shall be designed and maintained to contain any product spills or equipment leaks, container or equipment rinse or washwater and rainwater that may fall on the pad. Surface water shall not be allowed to either flow over or from the pad, which means the pad must be self-contained. The pad shall be sloped to facilitate material removal. An unroofed pad shall be of sufficient capacity to contain at a minimum 110% of the capacity of the largest pesticide container or application equipment on the pad. A pad that is covered by a roof of sufficient size to exclude completely precipitation from contact shall be of sufficient capacity to contain at a minimum of 100% of the capacity of the largest pesticide container or application equipment on the pad. Containment capacities as described above shall be maintained at all times. The above specific minimum containment capacities do not apply to vehicles when delivering pesticide shipments to the mixing/loading site. States may have in effect additional requirements regarding wellhead setbacks and operational containment.

Product must be used in a manner which will prevent back siphoning in wells, spills or improper disposal of excess pesticide, spray mixtures or rinsates.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read entire label before using this product.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the same area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticides.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted entry intervals. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated such as plants, soil or water, is coveralls over long-sleeved shirt and long pants, waterproof gloves, socks plus chemical resistant footwear and protective eye wear.

STORAGE AND DISPOSAL

STORAGE

Do not contaminate water, food or feed by storage or disposal. Store in a cool, dry secured storage area.

PESTICIDE DISPOSAL

Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL

Triple rinse or equivalent. Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

RETURNABLE – REFILLABLE CONTAINERS AND BULK CONTAINERS

BALANCE® PRO Herbicide may be repackaged for use in custom application operations by Aventis CropScience or a registered establishment in accordance with a valid Aventis CropScience *BALANCE® PRO Field Load System and Micro Weigh System Use Agreement*. After use, return the container to the authorized repackaging facility for refilling or rededication according to the use agreement. **DO NOT REUSE THE CONTAINER FOR ANY OTHER PURPOSE.** Prior to refilling, inspect thoroughly for damage such as cracks, punctures, abrasions and damaged or worn out threads on closure devices. Do not refill or transport damaged or leaking containers. Check for leaks after refilling and before transportation. If the container is not being refilled or returned to the authorized repackaging facility, triple rinse the emptied container and offer for recycling or reconditioning, or dispose of in a manner approved by state and local authorities.

GENERAL INFORMATION

BALANCE® PRO Herbicide is formulated as a soluble concentrate of isoxaflutole at a concentration of 4 pounds of active ingredient, isoxaflutole, per gallon.

BALANCE® PRO is a selective herbicide for control of important broadleaf and grass weeds infesting field corn when used as a preplant (surface-applied or incorporated) or preemergence herbicide.

BALANCE® PRO is effective in controlling triazine or ALS resistant populations of weed species which are listed in the "Weed Species Control" tables below on this label.

Seed corn inbreds and male pollenators within certain corn varieties, vary in their response to BALANCE® PRO Herbicide. Consult your seed company for advice BEFORE using BALANCE® PRO on seed corn inbreds

Adverse crop response may increase and crop recovery may be slowed when corn is grown under conditions that inhibit crop growth. Such conditions include extremely wet, cold, or dry soils; high pH, or low fertility.

Do not irrigate BALANCE® PRO Herbicide into coarse soils at planting time when soils are saturated.

Do not apply this product through any type of irrigation system.

Do not apply this product using aerial application equipment.

Do not use flood or furrow irrigation to apply, activate or incorporate this product.

MIXING INSTRUCTIONS

Application with water or liquid fertilizer as a carrier: Fill the spray tank $\frac{1}{4}$ to $\frac{1}{2}$ of the required volume of water or liquid fertilizer prior to the addition of BALANCE® PRO. Add the proper amount of BALANCE® PRO, then add the rest of the water or liquid fertilizer to the desired level. Maintain sufficient agitation to ensure a uniform spray mixture during application. If BALANCE® PRO is applied in a tank mixture with other pesticides, add BALANCE® PRO to the spray tank first and ensure it is thoroughly dispersed before adding other pesticides. Continue to fill the tank with carrier to the desired volume while agitating. **CONTINUE AGITATION DURING APPLICATION TO ENSURE A UNIFORM SPRAY MIXTURE.**

Re-suspending SC Products in Spray Solution: Like other suspension concentrates (SC's), BALANCE® PRO will settle if left standing without agitation. If the spray solution is allowed to settle for one hour or more, reagitrate the spray solution for a minimum of 10 minutes before application.

Sprayer Cleanup: To avoid injury or exposure to non-target crops, thoroughly clean all mixing and spray equipment, including pumps, nozzles, lines and screens with a good quality tank cleaner, on approved rinse pad or on the field site where an approved crop is to be grown.

TANK MIXTURES

BALANCE® PRO Herbicide can be applied in tank mixture with many other pesticides registered for use on approved crops. Refer to "Tank Mix Combination" section for rate recommendations and other restrictions.

COMPATIBILITY

If BALANCE[®] PRO Herbicide is to be tank mixed with liquid fertilizers or other pesticides, compatibility should be tested prior to mixing. To test for compatibility, use a small container and mix a small amount (0.5 to 1 qt) of spray, combining all ingredients in the same ratio as the anticipated use. If any indications of physical incompatibility develop, do not use this mixture for spraying. Indications of incompatibility usually will appear within 5-15 minutes after mixing. Read and follow the label of each tank-mix product used for precautionary statements, directions for use, geographic and other restrictions.

APPLICATION PROCEDURES

APPLICATION TIMING

BALANCE[®] PRO Herbicide may be used in either conventional, conservation tillage, or no-till crop management systems and may be applied either preplant, preplant incorporated (less than 2" deep) or preemergence for use in field corn production. Do not apply after corn emerges or crop injury may occur.

BALANCE[®] PRO treatments are most effective in controlling weeds when adequate rainfall is received within 14 days after application. If cultivation is necessary because of soil crusting, soil compaction or weed germination before rain occurs, use shallow tillage such as rotary hoe to lightly incorporate BALANCE[®] PRO and make certain corn seeds are below the tilled area. If treated soil is moved during tillage practices in such a way that the herbicide barrier is no longer intact, weeds may emerge from areas where treated soil has been removed. Do not incorporate with a drag harrow after planting.

Preplant Surface-Applied: BALANCE[®] PRO may be applied up to 21 days before planting field corn; up to 30 days prior to planting when used in a planned sequential application program such as BALANCE[®] PRO followed by Liberty[®], Buctril[®], or other post applied herbicides. Refer to the label of the respective sequential partner for specific use directions. Split applications can be made with 60 percent of the recommended broadcast rate applied 15 to 30 days prior to planting and the remaining 40 percent applied at planting. Total BALANCE[®] PRO applied should equal the rate recommended (See Rate Tables below) for a preplant treatment on the predominate soil type in the field. Moving treated soil out of the row or moving untreated soil to the surface during planting may result in reduced weed control.

Preplant Incorporated: BALANCE[®] PRO Herbicide may be applied up to 21 days before planting field corn; up to 30 days prior to planting when used in a planned sequential application program such as BALANCE[®] PRO followed by Liberty[®], Buctril[®], or other post applied herbicides. Refer to the label of the respective sequential partner for specific use directions. Apply to the soil and uniformly incorporate in the top two inches of soil before planting using a finishing disc harrow, field cultivator or similar implement capable of providing uniform two inch incorporation. Do not incorporate BALANCE[®] PRO deeper than 2" or weed control may be reduced.

Preplant/Preemergence Burndown: When weeds are present at the time of treatment, a tank mixture of BALANCE[®] PRO Herbicide with crop oil concentrate or methylated seed oil is recommended for burndown of labeled weeds less than 3" in height. When weeds are greater than 3" in height or weeds not controlled by BALANCE[®] PRO Herbicide are present, the addition of a burndown herbicide (e.g., Gramoxone[®] Extra, Roundup[®] ULTRA[™], or 2,4-D) is recommended. If Giant Ragweed or Pennsylvania Smartweed are present at the time of application, the addition of atrazine will improve control. Observe directions for use and precautions and restrictions on the label of the burndown herbicide. When mixing with liquid nitrogen fertilizer or Roundup[®] ULTRA[™], substitute a non-ionic surfactant for crop oil concentrate.

Preemergence: Apply BALANCE[®] PRO Herbicide during planting (behind the planter after furrow closure) or after planting, but before weeds or crop emerge. Failure to thoroughly close and firm the seed furrow may allow herbicide to directly contact the seed which can cause injury.

GROUND APPLICATION

AVOID SPRAY OVERLAPS AS EXCESSIVE RATES MAY RESULT IN ADVERSE CROP RESPONSE.

Apply BALANCE[®] PRO Herbicide alone or in tank mixtures by ground equipment in a minimum of 10 gallons of spray mixture per acre. Uniform, thorough spray coverage is important to achieve consistent weed control. To minimize spray drift to non-target areas, apply this product using nozzles which deliver a coarse or larger spray droplet as defined by ASAE standard S-572 and as shown in nozzle manufacturer's catalogues. Keep the spray boom at the lowest possible spray height above the target surface. Refer to nozzle manufacturer's recommendations for proper nozzle, pressure setting and sprayer speed for optimum product performance and minimal spray drift. Use sprayers that provide accurate and uniform application.

Uneven application, sprayers not properly calibrated, or improper incorporation may decrease the level of weed control and/or increase the level of adverse crop response. Over applications or boom overlapping may result in stand loss.

Maintain constant ground speed while applying product to ensure proper distribution. **MAINTAIN ADEQUATE AGITATION AT ALL TIMES, INCLUDING MOMENTARY STOPS.**

BANDED APPLICATION

Banding herbicide application equipment must be carefully calibrated to prevent crop exposure to concentrations of BALANCE[®] PRO that exceed the labeled rate for the soil type. It is critical to insure that the calibrated band width equates to actual band width realized in field applications. Bands actually delivered at a width narrower than targeted will concentrate the product and increase the risk for crop response.

EVEN FLAT SPRAY TIP NOZZLES AND A BAND WIDTH OF NO LESS THAN 12" MUST BE USED.

Band Treatment- Apply a broadcast equivalent rate and volume per acre. To determine these:

<u>Band width in inches</u>	x Broadcast RATE per acre	= Amount product needed per acre.
Row width in inches		
<u>Band width in inches</u>	x Broadcast spray VOLUME per acre	= Amount Band spray VOLUME needed per acre
Row width in inches		

RESTRICTIONS AND PRECAUTIONS FOR USE ON FIELD CORN

In the States of CO, KS, KY, MO, and TN, if the water table (i.e. level of saturation) is less than 25 feet below the ground surface, do not use on loamy sand or sand surface soil and subsoils with an average organic matter (in the upper 12 inches) of less than 2% by weight.

In the States of IA, IL, IN, MT, ND, NE, OH, PA, SD and WY, if the water table (i.e level of saturation) is less than 25 feet below the ground surface, do not use on sandy loam, loamy sand or sand surface soils and subsoils with an average organic matter (in the upper 12 inches) of less than 2% by weight.

PLANT CORN AT LEAST 1 1/2 INCHES DEEP. CORN SEED MUST BE COMPLETELY COVERED WITH SOIL AND FURROW FIRMED.

Do not apply more than 4.5 fluid ounces of BALANCE® PRO Herbicide per acre in one season or exceed the maximum labeled rate for any given soil type.

Application of BALANCE® PRO Herbicide at less than recommended rates for the appropriate soil will only provide suppression of sensitive weeds.

BALANCE® PRO Herbicide applications to coarse soils with organic matter of less than 1.5% by weight or pH greater than 7.5 may cause adverse crop response.

The use of BALANCE® PRO Herbicide is not recommended on soils that have organic matter of less than 1.5% and a pH greater than 7.5.

Use on clay knolls, eroded hill sides, terracing with scraped exposed subsoil, or other areas of coarser and/or lower organic matter soils, may cause adverse crop response.

To prevent off-site movement of soil containing this product to non-target areas, do not apply BALANCE® PRO Herbicide to areas receiving less than 15 inches of average annual precipitation unless supplemented to at least the equivalent of 15 inches of annual precipitation with irrigation water.

Carryover from Command® herbicide use can increase the potential for adverse crop response.

ROTATIONAL CROP RESTRICTIONS

Rotational crops vary in their crop response to low concentrations of BALANCE® PRO remaining in the soil. The amount of BALANCE® PRO that may be present in the soil depends on soil moisture, soil temp, application rate, elapsed time since application and other environmental factors. When BALANCE® PRO is used in combination with other products, always follow the most restrictive rotational crop requirements.

The following rotational crops may be planted after applying BALANCE® PRO in Corn:

Rotational Interval	Crop	Geography	Precipitation Requirement ¹
0 Months	Corn (Field)	All	None
4 Months	Wheat	All	None
6 Months	Soybeans, Barley, Sweetcorn, Popcorn, Potato, Grain Sorghum, and Sunflower	All	None
10 Months	Alfalfa	All	15 inches of cumulative precipitation from application to planting of rotational crop.
10 Months	Dry Beans and Sugarbeets	East of the Mississippi River	15 inches of cumulative precipitation from application to planting of rotational crop.*
18 Months	Dry Beans and Sugarbeets	West of the Mississippi River	15 inches of cumulative precipitation from application to planting of rotational crop.*
18 Months	All other crops	ALL	15 inches of cumulative precipitation from application to planting of rotational crop.*
			*Furrow or Flood irrigation not to be included in total. No more than 7 inches of overhead irrigation included in total.

1. The amount of cumulative precipitation required before planting a rotational crop is in addition to the required rotational interval given in months.

SPECIFIC USE DIRECTIONS
BALANCE® PRO HERBICIDE APPLIED ALONE
AS PART OF A PLANNED SEQUENTIAL WEED CONTROL PROGRAM

Application Timing	Amount of BALANCE® PRO Herbicide per Acre					
	Soil Texture					
	Coarse Soils Sand, Loamy sand, Sandy loam		Medium Soils** Loam, Silt loam, Silt Sandy clay loam		Fine Soils Silty clay loam, Clay loam, Sandy clay, Silty clay, Clay	
	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.
Early Preplant (Surface Applied or Incorporated) 8 to 30 days prior to planting	Not Recommended (See Below)*	2.25 to 3.0 fluid ounces	3.0 to 3.75 fluid ounces	3.0 to 3.75 fluid ounces	3.75 to 4.5 fluid ounces	3.75 to 4.5 fluid ounces
Preplant (Surface Applied or Incorporated) 0 to 7 days prior to planting or preemergence	Not Recommended (See Below)*	1.5 to 1.88 fluid ounces	1.88 to 2.6 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.75 fluid ounces

O.M. = Organic Matter by weight

Within rate ranges in the rate tables, use the lower rate on soils that are relatively coarse-textured or low in organic matter. Use the higher rate on soils that are relatively fine-textured or high in organic matter or when the preplant application is made further from planting.

*Use on coarse soils of less than 1.5% organic matter by weight or pH greater than 7.5 may result in adverse crop response.

**When BALANCE® PRO Herbicide is applied preemergence to medium soils with a pH greater than 7.5, reduce the rate by 0.25 fluid ounce from the recommended rate.

When using BALANCE® PRO Herbicide on fields with variable soils, optimum weed control will result when overall application rate is based on the predominant soil type(s) within a field. Use on clay knolls, eroded hill sides, terracing with scraped exposed subsoil, or other areas of coarse soils with organic matter of less than 1.5% by weight, rate should be reduced to one half the rate used on the predominant soil type in the field, not to exceed one fluid ounce per acre.

TANK MIX COMBINATIONS

BALANCE® PRO Herbicide is recommended as the foundation herbicide in an integrated weed control program.

Tank mix combinations may be used in either conventional, conservation tillage, or no-till cropping systems and be applied at the same timings as BALANCE® PRO Herbicide unless otherwise specified in the tank mix label. Multiple tank mixtures are allowed unless otherwise specified by the respective product labels. Check all tank mix product labels for proper rates and compatibilities for multiple tank mixes.

BALANCE® PRO HERBICIDE TANK MIX USE DIRECTIONS

Application Timing	Amount of BALANCE® PRO Herbicide per Acre					
	Soil Texture					
	Coarse Soils Sand, Loamy sand, Sandy loam		Medium Soils*** Loam, Silt loam, Silt, Sandy clay loam		Fine Soils Silty clay loam, Clay loam, Sandy clay, Silty clay, Clay	
	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.	< 1.5% O.M.	> 1.5% O.M.
Early Preplant (Surface Applied or Incorporated) 8 to 21* days prior to planting	Not Recommended (See Below)**	1.5 to 3.0 fluid ounces	2.25 to 3.75 fluid ounces	3.0 to 3.75 fluid ounces	3.75 to 4.5 fluid ounces	3.75 to 4.5 fluid ounces
Preplant (Surface Applied or Incorporated) 0 to 7 days prior to planting or preemergence	Not Recommended (See Below)**	1.5 to 1.88 fluid ounces	1.88 to 2.76 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces	2.25 to 3.0 fluid ounces

O.M. = Organic Matter by weight

Within rate ranges in the rate tables, use the lower rate on soils that are relatively coarse-textured or low in organic matter. Use the higher rate on soils that are relatively fine-textured or high in organic matter or when the preplant application is made further from planting.

* BALANCE® PRO Herbicide may be applied up to 30 days prior to planting when used in a planned sequential application program such as Balance followed by Liberty, Buctril, or other post applied herbicides.

** Use on coarse soils of less than 1.5% Organic Matter by weight or pH greater than 7.5 may result in adverse crop response.

*** When BALANCE® PRO Herbicide is applied preemergence to medium soils with a pH greater than 7.5, reduce the rate by 0.25 fluid ounce from the recommended rate.

When using BALANCE® PRO Herbicide on fields with variable soils, optimum weed control will result when overall application rate is based on the predominant soil type(s) within a field. Use on clay knolls, eroded hill sides, terracing with scraped exposed subsoil, or other areas of coarse soils with organic matter of less than 1.5% by weight, rate should be reduced to one half the rate used on the predominant soil type in the field, not to exceed one fluid ounce per acre.

BALANCE MAY BE TANK-MIXED WITH THESE HERBICIDES FOR CONTROL OF CERTAIN BROADLEAF AND GRASS WEEDS IN CORN.

Tank mixes with BALANCE® PRO Herbicide are not limited to the tank mix partners mentioned in below lists. Refer and follow the label of each tank mix partner used for precautionary statements, directions for use, geographic and other restrictions.

TANK MIX PARTNERS NOT CONTAINING A TRIAZINE HERBICIDE:

Apply the following tank mix partners at one half to full rate based on the product's allowable use rate for specific soil types and/or organic matter content.

DUAL®/DUAL® II/ DUAL® II MAGNUM

FRONTIER®

HARNESS®

LASSO® / MICRO-TECH®/ PARTNER®

SURPASS®

TOPNOTCH®

DEFINE™ DF Herbicide

Degree™

Outlook™

TANK MIX PARTNERS CONTAINING A TRIAZINE HERBICIDE

Apply the following tank mix partners at one half to full rate but not to exceed 1.5 pounds total triazine when used preemergence to 7 days prior to planting. Do not exceed 2.0 pounds total triazine when used early preplant 8-21 days prior to planting. Do not exceed 1 pound total active ingredient per acre of Simazine/Princep.

Atrazine 4L

Atrazine 90 WG

AXIOM® (Limit to one half of the lowest labeled rate for the predominant soil type)

BICEP® II / BICEP® Lite II / BICEP® II Magnum/ BICEP® Lite II Magnum

FULTIME®

GUARDSMAN®

GUARDSMAN® Max

HARNESS® Xtra

LEADOFF®

SIMAZINE/PRINCEP (1 pound a.i. maximum use rate on fine and medium soils; 0.5 pound a.i. maximum use rate on coarse soils)

SURPASS® 100

Degree Xtra™

**BROADLEAF AND GRASS WEEDS
CONTROLLED BY BALANCE* PRO HERBICIDE ALONE AND IN TANKMIXTURES FOR FIELD CORN**

Broadleaf Weeds (C = Weeds Controlled, S= Suppression)	BALANCE* PRO Alone	BALANCE* PRO plus Atrazine or Premixes containing Atrazine	BALANCE* PRO plus pre-emerge grass herbicide	Grassy Weeds (C = Weeds Controlled, S= Suppression)	BALANCE* PRO Alone	BALANCE* PRO plus Atrazine or Premixes containing Atrazine	BALANCE* PRO plus pre-emerge grass herbicide
Amaranth, Palmer	C	C	C	Barnyardgrass	C	C	C
Buffalobur	C	C	C	Crabgrass, large	C	C	C
Burcucumber	S	S	S	Crabgrass, smooth	C	C	C
Carpetweed			C				
Chamomile spp.	C	C	C	Cupgrass, woolly **	C	C	C
Chickweed, common	C	C	C	Foxtail, bristly	C	C	C
Cocklebur*		C		Foxtail, giant	C	C	C
Dandelion (seedling)	C	C	C	Foxtail, green	C	C	C
Galinsoga	C	C	C	Foxtail, robust purple	C	C	C
Henbit	S	C	S	Foxtail, robust white	C	C	C
Jimsonweed	C	C	C	Foxtail, yellow**	C	C	C
Kochia	C	C	C	Goosegrass	C	C	C
Lambsquarters, common	C	C	C	Johnsongrass, seedling	C	C	C
Mallow, Venice	C	C	C	Panicum, fall	C	C	C
Marestail	C	C	C	Panicum, Texas	C	C	C
Morningglory, annual*		C		Proso millet, wild**	C	C	C
Wild mustard	C	C	C	Sandbur, field**	S	S	S
Nightshade, black	C	C	C	Shattercane **	S	S	S
Nightshade, eastern black	C	C	C	Signalgrass, broadleaf **	C	C	C
Nightshade, hairy			C	Witchgrass			C
Pennycress, field	C	C	C				
Plantain, broadleaf	C	C	C				
Pigweed, prostrate	C	C	C				
Pigweed, redroot	C	C	C				
Pigweed, smooth	C	C	C				
Purslane, common	C	C	C				
Radish, wild	C	C	C				
Ragweed, common	C	C	C				
Ragweed, giant*	S	C	S				
Russian Thistle	C	C	C				
Shepherds-purse	C	C	C				
Smartweed, Pennsylvania	C	C	C				
Spurge, toothed	C	C	C				
Sunflower, wild*		S					
Velvetleaf	C	C	C				
Waterhemp, common	C	C	C				
Waterhemp, tall	C	C	C				

* These weeds may require a postemergence application of BUCTRIL* or other appropriate postemergence herbicides.

** These weeds may require the addition of a pre-emerge grass herbicide tank-mix partner, or an appropriate post-emergence herbicide application for control of late season escapes.

IMPORTANT: READ BEFORE USE

Read the entire Directions for Use, Conditions, Disclaimer of Warranties and Limitations of Liability before using this product. If terms are not acceptable, return the unopened product container at once.

By using this product, user or buyer accepts the following Conditions, Disclaimer of Warranties and Limitations of Liability.

CONDITIONS: The directions for use of this product are believed to be adequate and should be followed carefully. However, it is impossible to eliminate all risks associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Aventis CropScience. All such risks shall be assumed by the user or buyer.

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NET CONTENTS: 45 fluid ounces and 100 gallons

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BALANCE PRO Herbicide (PENDING) Submitted 2/13/02.

APPENDIX III – WEEDSOFT SCENARIOS

INTRODUCTION

Weed populations used in the following scenarios can be characterized as light to moderate, reflecting well managed fields. This is more typical than fields with runaway populations. For the sake of comparison, scenarios were made with both preemergence and postemergence treatments. The Illinois version of WeedSOFT 2002 was used because the Wisconsin version does not have Balance in the herbicide list. From the scenarios run, it appears that Balance may provide some benefit to Wisconsin farmers that have woolly cupgrass problems. Please note that the atrazine rates suggested in the comparisons are higher than Wisconsin rules allow and as such, the weed control provide by those rates are higher than you could expect with the Wisconsin atrazine rates. Notice that the names of the weeds have colors associated with them. The color indicates whether the weed population could go up or down based on the treatment selected. Green means the weed populations would decline with that treatment, yellow means they will stay about the same and red means weed populations will increase.

Preemergence Scenario 1

50 acre field, corn selling price = \$2.00/bu, Weed free yield = 155 bu/a, preemergence, broadcast, application cost is \$5.00/a, cultivation cost is \$5.00/a, soil pH 6.5, medium textured soil 1.5-2.9% o.m., soybean is the rotational crop
 Velvetleaf => 19.4/100ft²
 Pigweed => 34.2/100ft²
 Common lambsquarters => 106.7/100ft²
 Giant foxtail, high 213.3/100ft²
 Total Yield reduction before treatment => 52.4 bu/acre
 Price of Balance Pro herbicide => \$6.47/oz

1) Atrazine 90DF 2.2lb/acre pre, Net gain per acre \$93.10

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	2.4	3.7	0.1	\$7.40	\$0.20	87.6 %
Pigweed	34.2	0	8.1	0	\$16.20	\$0.00	100 %
Lambsquarters	106.7	0	20.3	0	\$40.60	\$0.00	100 %
Giant foxtail	213.3	29	20.3	0.5	\$40.60	\$1.00	86.4 %
Totals	373.6	31.4	52.4	0.6	\$104.80	\$1.20	

2) Princep Caliber 90 2.6lb/acre pre, Net gain per acre \$89.66

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	1.5	3.7	0	\$7.40	\$0.00	92.4 %
Pigweed	34.2	0	8.1	0	\$16.20	\$0.00	100 %
Lambsquarters	106.7	0	20.3	0	\$40.60	\$0.00	100 %
Giant foxtail	213.3	3.4	20.3	0	\$40.60	\$0.00	98.4 %
Totals	373.6	4.9	52.4	0.0	\$104.80	\$0.00	

3) Balance Pro 2.25 oz/acre pre, Net gain per acre \$85.24

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	0	3.7	0	\$7.40	\$0.00	100 %
Pigweed	34.2	0	8.1	0	\$16.20	\$0.00	100 %
Lambsquarters	106.7	0	20.3	0	\$40.60	\$0.00	100 %
Giant foxtail	213.3	8.5	20.3	0	\$40.60	\$0.00	96.0 %
Totals	373.6	8.5	52.4	0.0	\$104.80	\$0.00	

4) Axiom + Atrazine 90DF, 13 oz + 1.5 lb/a pre, Net gain per acre \$80.90

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	2.4	3.7	0.1	\$7.40	\$0.20	87.6 %
Pigweed	34.2	0	8.1	0	\$16.20	\$0.00	100 %
Lambsquarters	106.7	0	20.3	0	\$40.60	\$0.00	100 %
Giant foxtail	213.3	0	20.3	0	\$40.60	\$0.00	100 %
Totals	373.6	2.4	52.4	0.1	\$104.80	\$0.20	

5) Fultime 3qt/a pre, Net gain per acre \$78.63

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	3.1	3.7	0.1	\$7.40	\$0.20	84 %
Pigweed	34.2	0	8.1	0	\$16.20	\$0.00	100 %
Lambsquarters	106.7	0	20.3	0	\$40.60	\$0.00	100 %
Giant foxtail	213.3	3.4	20.3	0	\$40.60	\$0.00	100 %
Totals	373.6	3.1	52.4	0.1	\$104.80	\$0.20	

Preemergence Scenario 2

50 acre field, corn selling price = \$2.00/bu, Weed free yield = 155 bu/a, preemergence, broadcast, application cost is \$5.00/a, cultivation cost is \$5.00/a, soil pH 6.5, medium textured soil 1.5-2.9% o.m., soybean is the rotational crop

Velvetleaf => 19.4/100 ft²

Waterhemp => 13.0/100ft²

Common lambsquarters => 19.4/100ft²

Black nightshade => 77.6/100ft²

Smooth crabgrass =>106.7/100ft²

Woolly cupgrass 38.8/100ft²

Total Yield reduction before treatment => 36.7 bu/a

Price of Balance Pro herbicide => \$6.47/oz

1) Balance Pro 2.25 oz/acre pre, Net gain per acre \$53.24

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Tall waterhemp	13.0	0	5.1	0	\$10.20	\$0.00	100 %
Lambsquarters	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Black nightshade	77.6	0	5.1	0	\$10.20	\$0.00	100 %
Crabgrass	106.7	17.1	11.2	0.3	\$22.40	\$0.60	84 %
Woolly cupgrass	38.8	0.6	5.1	0	\$10.20	\$0.00	98.4 %
Totals	274.98	17.7	36.7	0.3	\$73.40	\$0.60	

2) Bullet 3qt/acre pre, Net gain per acre \$53.21

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	3.1	5.1	0.1	\$10.20	\$0.20	84 %
Tall waterhemp	13.0	0	5.1	0	\$10.20	\$0.00	100 %
Lambsquarters	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Black nightshade	77.6	0	5.1	0	\$10.20	\$0.00	100 %
Crabgrass	106.7	17.1	11.2	0	\$22.40	\$0.00	100 %
Woolly cupgrass	38.8	6.2	5.1	0.1	\$10.20	\$0.20	84 %
Totals	274.98	9.3	36.7	0.2	\$73.40	\$0.40	

3) Prowl 3.3 EC + Atrazine 90DF, 3.6pt + 2.2lb/acre pre, Net gain per acre \$52.91

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	2.4	5.1	0.1	\$10.20	\$0.20	87.6 %
Tall waterhemp	13.0	0	5.1	0	\$10.20	\$0.00	100 %
Lambsquarters	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Black nightshade	77.6	0	5.1	0	\$10.20	\$0.00	100 %
Crabgrass	106.7	0	11.2	0	\$22.40	\$0.00	100 %
Woolly cupgrass	38.8	1.6	5.1	0	\$10.20	\$0.20	96 %
Totals	274.98	4.0	36.7	0.1	\$73.40	\$0.20	

4) Axiom + Atrazine 90DF, 13 oz + 1.5 lb/a, Net gain per acre \$49.30

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	2.4	5.1	0.1	\$10.20	\$0.20	87.6 %
Tall waterhemp	13.0	0	5.1	0	\$10.20	\$0.00	100 %
Lambsquarters	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Black nightshade	77.6	0	5.1	0	\$10.20	\$0.00	100 %
Crabgrass	106.7		11.2	0	\$22.40	\$0.00	100 %
Woolly cupgrass	38.8	6.2	5.1	0.1	\$10.20	\$0.20	84 %
Totals	274.98	8.6	36.7	0.2	\$73.40	\$0.40	

5) Fultime, 3 qt/a, Net gain per acre \$47.23

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	19.4	3.1	5.1	0.1	\$10.20	\$0.20	84 %
Tall waterhemp	13.0	0	5.1	0	\$10.20	\$0.00	100 %
Lambsquarters	19.4	0	5.1	0	\$10.20	\$0.00	100 %
Black nightshade	77.6	0	5.1	0	\$10.20	\$0.00	100 %
Crabgrass	106.7	0	11.2	0	\$22.40	\$0.00	100 %
Woolly cupgrass	38.8	2.9	5.1	0	\$10.20	\$0.00	92.4 %
Totals	274.98	6.0	36.7	0.1	\$73.40	\$0.20	

Postemergence Scenario 1

50 acre field, corn selling price = \$2.00/bu, Weed free yield = 155 bu/a, postemergence, broadcast, corn height 6-12, application cost is \$5.00/a, cultivation cost is \$5.00/a, soil pH 6.5, medium textured soil 1.5-2.9% O.M., soybean is the rotational crop

Velvetleaf, 2-4" => 25.9/100 ft²

Pigweed, 2-4" => 45.6/100ft²

Common lambsquarters, 2-4" => 142.2/100ft²

Giant foxtail, 2-4" => 284.4/100ft²

Total Yield reduction before treatment => 52.4 bu/acre

Price of Balance Pro herbicide => \$6.47/oz

1) Atrazine 90DF + COC, 1.4 lb + 1 qt/a, Net gain per acre \$88.64

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	5.2	3.7	0.2	\$7.40	\$0.40	80 %
Pigweed	45.6	3.6	8.1	0.1	\$16.20	\$0.20	92 %
Lambsquarters	142.2	11.4	20.3	0.1	\$40.60	\$0.20	92 %
Giant foxtail	284.4	85.3	20.3	2.9	\$40.60	\$5.80	70 %
Totals	498.1	105.5	52.4	3.3	\$104.80	\$6.60	

2) Aim + Atrazine 90DF + COC, 0.33 oz + 1.4 lb + 1 qt/a, Net gain per acre \$88.23

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	0.8	3.7	0.0	\$7.40	\$0.00	97 %
Pigweed	45.6	3.6	8.1	0.1	\$16.20	\$0.20	92 %
Lambsquarters	142.2	11.4	20.3	0.1	\$40.60	\$0.20	92 %
Giant foxtail	284.4	85.3	20.3	3.0	\$40.60	\$6.00	70 %
Totals	498.1	101.1	52.4	3.2	\$104.80	\$6.40	

3) Basis Gold + COC + 28% UAN, 14 oz + 1 qt + 2 qt/a, Net gain per acre \$76.58

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	5.2	3.7	0.2	\$7.40	\$0.40	80 %
Pigweed	45.6	3.6	8.1	0.1	\$16.20	\$0.20	92 %
Lambsquarters	142.2	25.6	20.3	0.8	\$40.60	\$1.60	82 %
Giant foxtail	284.4	37.0	20.3	0.4	\$40.60	\$0.80	87 %
Totals	498.1	71.4	52.4	1.5	\$104.80	\$3.00	

4) NorthSTAR + COC, 5 oz + 1 qt/a, Net gain per acre \$74.44

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	3.1	3.7	0.1	\$7.40	\$0.20	88 %
Pigweed	45.6	4.6	8.1	0.1	\$16.20	\$0.20	90 %
Lambsquarters	142.2	17.1	20.3	0.3	\$40.60	\$0.60	88 %
Giant foxtail	284.4	113.8	20.3	6.2	\$40.60	\$12.40	60 %
Totals	498.1	138.6	52.4	6.7	\$104.80	\$13.40	

**5) Accent + Atrazine 90DF + COC + 28% UAN, 0.67 oz + 1.1 lb + 1 qt + 2 qt/a,
Net gain per acre \$70.29**

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	2.1	3.7	0.0	\$7.40	\$0.00	92 %
Pigweed	45.6	3.6	8.1	0.1	\$16.20	\$0.20	92 %
Lambsquarters	142.2	11.4	20.3	0.2	\$40.60	\$0.40	92 %
Giant foxtail	284.4	28.4	20.3	0.2	\$40.60	\$0.40	90 %
Totals	498.1	45.5	52.4	0.5	\$104.80	\$1.00	

Postemergence Scenario 2

50 acre field, corn selling price = \$2.00/bu, Weed free yield = 155 bu/a, preemergence, broadcast, corn height 6-12, application cost is \$5.00/a, cultivation cost is \$5.00/a, soil pH 6.5, medium textured soil 1.5-2.9% O.M., soybean is the rotational crop

Velvetleaf, 2-4", => 25.9/100 ft²

Waterhemp, 2-4", => 17.3/100ft²

Common lambsquarters, 2-4", => 25.9/100ft²

Black nightshade, 2-4", => 103.5/100ft²

Smooth crabgrass, 2-4", =>142.2/100ft²

Woolly cupgrass, 2-4", 51.8/100ft²

Total Yield reduction before treatment => 36.7 bu/acre

Price of Balance Pro herbicide => \$6.47/oz

1) Atrazine 90DF + COC, + 1.4 lb + 1 qt/a, Net gain per acre \$51.24

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	5.2	5.1	0.2	\$10.20	\$0.40	80 %
Tall waterhemp	17.3	1.4	5.1	0	\$10.20	\$0.00	92 %
Black nightshade	103.5	8.3	5.1	0	\$10.20	\$0.00	92 %
Lambsquarters	25.9	2.1	5.1	0	\$10.20	\$0.00	92 %
Crabgrass	142.2	71.1	11.2	4.9	\$22.40	\$9.80	50 %
Woolly cupgrass	51.8	20.7	5.1	1.2	\$10.20	\$2.40	60 %
Totals	366.6	108.8	36.7	6.3	\$73.40	\$12.60	

2) Aim + Atrazine 90DF + COC, 0.33 oz + 0.6 lb + 1 qt/a, Net gain per acre \$50.63

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	0.8	5.1	0	\$10.20	\$0.00	97 %
Tall waterhemp	17.3	1.4	5.1	0	\$10.20	\$0.00	92 %
Black nightshade	103.5	8.3	5.1	0	\$10.20	\$0.00	92 %
Lambsquarters	25.9	2.1	5.1	0	\$10.20	\$0.00	92 %
Crabgrass	142.2	71.1	11.2	5.0	\$22.40	\$10.00	50 %
Woolly cupgrass	51.8	20.7	5.1	1.3	\$10.20	\$2.60	60 %
Totals	366.6	104.4	36.7	6.3	\$73.40	\$12.60	

3) Glyphomax Plus + AMS, 32 oz + 2 lb/a, Net gain per acre \$49.26

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	4.4	5.1	0.1	\$10.20	\$0.20	83 %
Tall waterhemp	17.3	0.9	5.1	0	\$10.20	\$0.00	95 %
Black nightshade	103.5	17.6	5.1	0.1	\$10.20	\$0.20	83 %
Lambsquarters	25.9	3.4	5.1	0.1	\$10.20	\$0.20	87 %
Crabgrass	142.2	7.1	11.2	0	\$22.40	\$0.00	95 %
Woolly cupgrass	51.8	4.1	5.1	0	\$10.20	\$0.00	92 %
Totals	366.6	37.5	36.7	0.3	\$73.40	\$0.60	

4) Liberty + COC, 0.33 oz + 0.6 lb + 1 qt/a, Net gain per acre \$40.59

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	4.4	5.1	0.1	\$10.20	\$0.20	83 %
Tall waterhemp	17.3	2.9	5.1	0.1	\$10.20	\$0.20	83 %
Black nightshade	103.5	13.5	5.1	0.1	\$10.20	\$0.20	87%
Lambsquarters	25.9	4.4	5.1	0.1	\$10.20	\$0.20	83 %
Crabgrass	142.2	31.3	11.2	0.6	\$22.40	\$1.20	78 %
Woolly cupgrass	51.8	6.7	5.1	0.1	\$10.20	\$0.20	87 %
Totals	366.6	63.2	36.7	1.1	\$73.40	\$2.20	

5) Basis Gold + COC + 28% UAN, 14 oz + 1 qt + 2 qt/a, Net gain per acre \$39.58

Weed name	Weed Population/100ft ²		Bushels lost/a		Dollars lost/a		Control
	Before	After	Before	After	Before	After	
Velvetleaf	25.9	5.2	5.1	0.2	\$10.20	\$0.40	80 %
Tall waterhemp	17.3	2.1	5.1	0.1	\$10.20	\$0.20	88 %
Black nightshade	103.5	31.1	5.1	0.6	\$10.20	\$1.20	70 %
Lambsquarters	25.9	4.7	5.1	0.1	\$10.20	\$0.20	82 %
Crabgrass	142.2	56.9	11.2	2.7	\$22.40	\$5.40	60 %
Woolly cupgrass	51.8	15.5	5.1	0.6	\$10.20	\$1.20	70 %
Totals	366.6	115.5	36.7	4.3	\$73.40	\$8.60	

**APPENDIX IV– BAYERCROPSCIENCE PRESENTATION OF
THE ECONOMIC BENEFITS OF BALANCE PRO**

**Economic Benefits of BALANCE[®] PRO Herbicide
Use to Wisconsin Corn Growers**

Introduction

The following paragraph (page 6, para. 3) was included in the response by Aventis CropScience to the draft WI EIS prepared by WI DATCP.

The grower survey provides information from which to estimate the economic benefits that isoxaflutole will bring to Wisconsin corn growers. In Wisconsin a one-pass, preemergence application with BALANCE[®] included in the spray mixture will cost 22% to 34% less per acre (depending on soil type) than a typical sequential program. In those situations where a single preemergence application will control the weed spectrum, the use of BALANCE[®] will still save the grower 6 to 20 % compared to a standard preemergence only program. On acres infested with woolly cupgrass or wild proso-millet, a BALANCE[®]-based preemergence program will cost about 33%-43% less than the sequential program required to control these weeds. This information reveals that the availability of BALANCE[®] to Wisconsin corn growers will not only provide a much needed tool for the management of difficult weeds, but also to provide that control with an significant economic savings to the grower. Since its introduction in 17 states in 1999, BALANCE[®] PRO herbicide has proven its efficacy in controlling weeds that infest field corn production acres. Even more importantly, BALANCE[®] PRO has provided its users with significant economic advantages as compared to competitive herbicide programs.

Included herein is the additional detail to support the information provided above.

Performance – BALANCE[®] PRO

Key benefits of BALANCE[®] PRO include its ability to control key weed species that are difficult to control with other herbicides, such as large-seeded grasses including woolly cupgrass, and its consistent herbicidal performance with flexible application timing.

These two factors – consistency and control of difficult species – contribute to economic benefits in several ways.

First, by providing more consistent control from a pre-emerge application, BALANCE[®] PRO reduces the need for post-emerge applications, which are commonly used to control weeds that ‘escape’ the pre-emerge application. The chart below illustrates BALANCE[®] PRO’s ability to reduce post applications (Doane Marketing Research, Inc.).

Herbicide Program	No Post Appln Followed by Post Appln	
PRE acetochlor alone or in combination	53.60%	32.40%
Burndown + PRE acetochlor alone or in combination	10.70%	3.30%
TOTAL	64.30%	35.70%
PRE metolachlor alone or in combination	47.60%	38.50%
Burndown + PRE metolachlor alone or in combination	9.70%	4.20%
TOTAL	57.30%	42.70%
PRE Isoxaflutole alone or in combination	66.80%	21.20%
Burndown + PRE Isoxaflutole alone or in combination	8.90%	3.10%
TOTAL	75.70%	24.30%

BALANCE[®]PRO can reduce overall herbicide costs by offering better control of key weed species. These savings are due to reduction of overall herbicide use – for example, by eliminating post-emerge treatments – or by allowing use of lower rates of other herbicides applied in a program with BALANCE[®]PRO.

Weed Species	Mean Percent Control ⁴				
	Isoxaflutole Alone	Isoxaflutole + Atrazine	Isoxaflutole + Chlor	Metolachlor + Atrazine	Acetochlor + Atrazine
BROADLEAF WEEDS					
Cocklebur ²	62.0	81.0	67.0	74.0	78.0
Kochia	87.0	97.0	97.0	74.0	94.0
Lambsquarters	93.0	97.0	93.0	93.0	95.0
Morningglory ²	49.0	86.0	47.0	77.0	87.0
Nightshade	100.0		100.0	100.0	100.0
Pigweed, redroot	88.0	96.0	93.0	96.0	96.0
Ragweed, common	96.0	98.0	96.0	94.0	97.0
Ragweed, giant ²	78.0	91.0	83.0	73.0	85.0
Smartweed	96.0	98.0	97.0	97.0	98.0
Sunflower, Wild ²	64.0	83.0	71.0	77.0	71.0
Velvetleaf	93.0	96.0	91.0	74.0	78.0
Waterhemp	92.0	96.0	91.0	93.0	95.0
Weed Species	Mean Percent Control ⁴				
	Isoxaflutole Alone	Isoxaflutole + Atrazine	Isoxaflutole + Chlor	Metolachlor + Atrazine	Acetochlor + Atrazine
GRASS WEEDS					
Barnyardgrass	87.0	88.0	97.0	93.0	98.0
Crabgrass, large	85.0	87.0	97.0	92.0	89.0
Cupgrass, woolly ³	83.0	89.0	88.0	64.0	83.0
Foxtail, giant	82.0	90.0	87.0	85.0	90.0
Foxtail, green	79.0	91.0	90.0	89.0	97.0
Foxtail, yellow ³	75.0	92.0	87.0	92.0	93.0
Johnsongrass	72.0	88.0	89.0	65.0	86.0
Panicum, fall	88.0	94.0	94.0	96.0	93.0
Proso-millet, wild ³	87.0	88.0	87.0	66.0	
Sandbur, field ³	77.0	91.0	90.0	73.0	89.0
Shattercane ³	57.0	72.0	52.0	49.0	83.0

¹Data taken from Effertz *et al.*, 2001.

²These weeds may require a postemergence application of BUCTRIL[®] or other appropriate postemergence herbicides.

³These weeds may require the addition of a pre-emerge grass herbicide tankmix partner, or an appropriate postemergence herbicide application for control of late season escapes.

⁴Shading denotes greater than 85% control of specific weed species.

Wisconsin – Use and Benefits

A comparison of the most commonly used herbicide programs in Wisconsin with those in Illinois (where BALANCE[®]PRO is registered) illustrates the economic benefits BALANCE[®]PRO registration will provide Wisconsin corn growers.

Program 1 represents typical applications and cost expenditures for corn fields infested with multiple flushing grasses such as wild proso millet and woolly cupgrass.

Program 1			BalancePro Treatment			BalancePro on light soils		
Harness Xtra	2qt./acre	\$23.25	BalancePro	2.25 fl. oz./acre	\$14.65	BalancePro	1.5 fl. oz./acre	\$ 9.77
Application		\$5.50	Define	10 oz./acre	\$11.50	Define	14 oz./acre	\$ 16.10
			Atrazine	1 lb./acre	\$1.18	Atrazine	1 lb./acre	\$ 1.18
			Application		\$5.50	Application		\$ 5.50
Total Pre		\$28.75	Total Pre		\$27.33	Total Pre		\$ 32.55
Accent	.67 oz./acre	\$ 11.42						
COC	1% v/v	\$2.00						
28% UAN	2 qt./acre	\$1.00						
Application		\$5.50						
Total Post		\$ 19.92	Total Post		\$ -	Total Post		\$ -
Total Program		\$48.67	Total Program		\$27.33	Total Program		\$ 32.55

Programs 2 and 3 represent typical applications and cost expenditures for common grass and broadleaf infestations.

Program 2			BalancePro Treatment			BalancePro on light soils		
Dual II Magnum	1.67 pt./acre	\$18.82	BalancePro	2.25 fl. oz./acre	\$14.65	BalancePro	1.5 fl. oz./acre	\$ 9.77
Application		\$5.50	Define	10 oz./acre	\$11.50	Define	14 oz./acre	\$ 16.10
			Atrazine	1 lb./acre	\$1.18	Atrazine	1 lb./acre	\$ 1.18
			Application		\$5.50	Application		\$ 5.50
Total Pre		\$24.32	Total Pre		\$27.33	Total Pre		\$ 32.55
NorthStar	5 oz./acre	\$ 9.00						
COC	1% v/v	\$2.00						
28% UAN	2 qt./acre	\$1.00						
Application Fee		\$5.50						
Total Post		\$ 17.50	Total Post		\$ -	Total Post		\$ -
Total Program		\$41.82	Total Program		\$27.33	Total Program		\$ 32.55
Program 3			BalancePro Treatment			BalancePro on light soils		
Harness 20 G	5 lb./acre	\$9.50	BalancePro	2.25 fl. oz./acre	\$14.65	BalancePro	1.5 fl. oz./acre	\$9.77
Application with fertilizer		\$2.00	Define	10 oz./acre	\$11.50	Define	14 oz./acre	\$16.10
			Atrazine	1 lb./acre	\$1.18	Atrazine	1 lb./acre	\$1.18
			Application		\$5.50	Application		\$5.50
Total Pre		\$11.50	Total Pre		\$27.33	Total Pre		\$32.55
Accent Gold	2.9 oz./acre	\$21.75						
COC	1% v/v	\$2.00						
28% UAN	2 qt./acre	\$1.00						
Application Fee		\$6.50						
Total Post		\$31.25	Total Post		\$-	Total Post		\$-
Total Program		\$42.75	Total Program		\$27.33	Total Program		\$32.55

Program 4 represents typical applications and cost expenditures for a one-pass, pre-emerge program.

Program 4			BalancePro Treatment			BalancePro on light soils		
Harness	2 pt./acre	\$18.14	BalancePro	2.25 fl. oz./acre	\$14.65	BalancePro	1.5 fl. oz./acre	\$9.77
Hornet	3 oz./acre	\$9.74	Define	10 oz./acre	\$11.50	Define	14 oz./acre	\$16.10
Atrazine	1 lb./acre	\$1.18	Atrazine	1 lb./acre	\$1.18	Atrazine	1 lb./acre	\$1.18
Application		\$5.50	Application		\$5.50	Application		\$5.50
Total Pre		\$34.56	Total Pre		\$27.33	Total Pre		\$32.55
Total Program		\$34.56	Total Program		\$27.33	Total Program		\$32.55

Program 5 represents treatments taken from the University of Madison-Wisconsin's Urbana Research Farm as standard treatments and BALANCE[®]PRO comparison treatments.

Program 5					
One-pass Program			BalancePro Treatment		
Supass	2.5 pt./acre	\$21.63	BalancePro	2.25 fl. oz./acre	\$13.96
Hornet WDG	4 oz./acre	\$14.26	Define	10 oz./acre	\$12.62
Application		\$5.50	Atrazine	1 qt./acre	\$2.98
			Application		\$5.50
Total Pre		\$41.39	Total Pre		\$35.06
Total Program		\$41.39	Total Program		\$35.06

Two-pass Program			BalancePro Treatment		
Dual II Magnum	1 pt./acre	\$13.28	BalancePro	1.5 fl. oz./acre	\$9.30
Application		\$5.50	Application		\$5.50
Total Pre		\$18.78	Total Pre		\$14.80
Steadfast	.75 oz./acre	\$15.30	Liberty	24 fl. oz./acre	\$17.13
Callisto	1.5 oz./acre	\$6.08	Atrazine	1 pt./acre	\$1.49
Atrazine	1 pt./acre	\$1.49	AMS	3 lb./acre	\$0.48
Herbimax	1%	\$0.83	Application		\$5.50
AMS	2 lb./acre	\$0.32			
Application		\$5.50			
Total Post		\$29.52	Total Post		\$24.60
Total Program		\$48.30	Total Program		\$39.40

APPENDIX V – EPA INDEX OF CLEARED SCIENCE REVIEWS FOR ISOXAFLUTOLE

The following citations comprise an index of U.S. EPA cleared science reviews for isoxaflutole. EPA staff conduct reviews of data and studies often conducted by the registrant. The science reviews summarize and interpret data and studies of environmental fate and effects as well as human effects related to registration. These science reviews provide the basis for EPA's 1998 Fact Sheet for Isoxaflutole and include reviews cleared subsequent to the release of the Fact Sheet. It is important to note that additional science reviews related to isoxaflutole are being conducted and will be added to this index as they are cleared.

The website for the index is www.epa.gov.opppmsd1/foia/reviews/123000.htm

The reviews and underlying studies are not available directly from this website but may be requested from U.S. EPA by contacting Dan Kenny at 703-305-7546. DATCP has a copy of the science reviews used to develop the EIS and has them available for viewing at the Wisconsin Department of Agriculture, Trade and Consumer Protection offices at 2811 Agriculture Drive, Madison, WI. Copies can be made at a cost of \$0.10/page. Contact Jim Vanden Brook at 608-224-4501 to schedule time to review or copy the documents.

INDEX OF CLEARED SCIENCE REVIEWS

Isoxaflutole (Pc Code 123000)

Undated. Memorandum. 4 Pages.
James Breithaupt. Environmental Risk Branch II.
Drinking Water Assessment for Isoxaflutole.

Undated. Memorandum. 5 Pages.
David Wells. Environmental Risk Branch II.
Study Site Selection for Isoxaflutole Ground Water Studies.

Undated. Memorandum. 7 Pages.
Robert Zendzian. Health Effects Branch.
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Renee Costello. Environmental Risk Characterization Br.
Data review for Isoxaflutole (D219142, Chemical #123000...)
Acute toxicity to the Freshwater Blue-green Algae
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Michael Davy. Environmental Risk Branch 2.
14 Day Acute Oral LD50 Study in Mallard Ducks.
MRID No. 43573232.
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Michael Davy. Environmental Risk Branch 2.
14 Day Acute Oral LD50 Study in Bobwhite Quail.
MRID No. 43573231.
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May 30, 1995. DER. 10 Pages.
Michael Davy. Environmental Risk Branch 2.
8 Day Acute Dietary LC50 Study in Bobwhite Quail.
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S.E. Oonnithan. Registration Support Branch.
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Aged Mobility - Leaching and Adsorption/Desorption
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Data Evaluation Record 5
Metabolism - Anaerobic Aquatic
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Data Evaluation Record 4
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RPA 201772 (Isoxaflutole Herbicide): Request for
Experimental Use Permit to ship RPA 201772 WDG Herbicide to
the Growers for Use on Field Corn.
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Philip Errico. Chemistry Branch I.
[Forwarding Multiresidue Method 9MRM) test information for updating PAM-I].

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Elizabeth Leovey. Environmental Risk Characterization Br.
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for Petition Method Validation. MRID# 435732-51.

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Toxicity to Freshwater Green Alga
MRID 435732-43.

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Data Review for Isoxaflutole (D219140 ...)
Acute toxicity to the marine diatom
MRID 435732-47.

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Renee Costello. Environmental Risk Characterization Br.
Data Review for RPA 201772 - Isoxaflutole (D219143 ...)
Acute toxicity to the freshwater diatom *Navicula pelliculosa*
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in 0.5% methylcellulose.
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