

Overview of the Fluazifop-P-butyl Risk Assessments

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Introduction

This document summarizes EPA's human health risk findings and conclusions for the herbicide fluazifop-P-butyl, as presented fully in the document, "Fluazifop-P-butyl: Revised HED Chapter of the Tolerance Reassessment Eligibility Document (TRED)," dated December 10, 2004. The purpose of this summary is to assist the reader by identifying the key features and findings of this risk assessment and conclusions reached in the assessment. This overview was developed in response to comments and requests from the public which indicated that the risk assessments were difficult to understand, that they were too lengthy, and that it was not easy to compare the assessments for different chemicals due to the use of different formats.

This fluazifop-P-butyl risk assessment and technical support documents are available to the public through EPA's electronic public docket and comment system, EPA Dockets, at <http://www.epa.gov/edockets>, under docket identification (ID) number **OPP-2004-0347**. In addition, these documents may be downloaded or viewed through the Agency's website at <http://www.epa.gov/pesticides/reregistration/status.htm>. Public comment will be used to complete the Tolerance Reassessment Eligibility Decision (TRED) document, which will include the resulting risk management decisions.

Risks summarized in this document are those that result only from the use of fluazifop-P-butyl. The Food Quality Protection Act (FQPA) requires that the Agency consider "available information" concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity." The reason for consideration of other substances is due to the possibility that low-level exposures to multiple chemical substances that cause a common toxic effect by a common toxic mechanism could lead to the same adverse health effect as would a higher level of exposure to any of the substances individually. Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding for fluazifop-P-butyl and any other substances and fluazifop-P-butyl does not appear to produce a toxic metabolite produced by other substances. For the purposes of this action, therefore, EPA has not assumed that fluazifop-P-butyl has a common mechanism of toxicity with other substances. For information regarding EPA's efforts to determine which chemicals have a common mechanism of toxicity and to evaluate the cumulative effects of such chemicals, see the policy statements released by EPA's Office of Pesticide Programs concerning common mechanism determinations and procedures for cumulating effects from substances found to have a common mechanism at <http://www.epa.gov/pesticides/cumulative/>.

Use Profile

- **Herbicide:** Fluazifop-P-butyl is a selective, post-emergent herbicide registered for the control of perennial and annual grass weeds. Fluazifop-P-butyl is the resolved isomer of fluazifop-butyl. All products containing fluazifop-butyl (PC Code 122805) have been canceled and only fluazifop-P-butyl (PC Code 122809) is being supported for reregistration. The estimate for total domestic use (annual average) is approximately 250,000 lbs. a.i. More than 90% of fluazifop-P-butyl's total usage is on cotton and soybeans.
- **Tolerances:** There are tolerances for fluazifop-P-butyl in or on cotton commodities (oil and seed), soybean commodities (oil and seed), tabasco pepper, animal commodities, asparagus, carrots, coffee, endive, stone fruit, macadamia nuts, onion, pecans, rhubarb, spinach, and sweet potatoes.
- **Formulations:** Emulsifiable concentrate, liquid concentrate, and ready-to-use liquid.
- **Method of Application:** Fluazifop-P-butyl is typically applied as a broadcast, banded, directed or spot treatment with groundboom sprayers and aerial equipment. Applications are made as post-emergence foliar or soil applications, pre-plant, at-planting, and/or post-harvest applications (to the plant).
- **Use Rates:** The maximum single application rate is 0.375 lb. active ingredient (a.i.) per acre, and the maximum annual (seasonal) use rate is 1.125 lbs. a.i./acre for both agricultural and non-agricultural uses. The major crop single maximum use rates (for soybean and cotton) are the same at 0.375 lb. a.i./acre, with annual maximum rates of 0.5 and 0.75 lb. a.i. per acre, respectively. In addition, there is a maximum application rate of 0.075 lb. a.i./acre for turf and 0.375 lb. a.i./acre for non-crops (roadsides, industrial, and other areas) and ornamentals.
- **Use Sites:** Registered for use on asparagus, carrot, coffee, cotton, endive (escarole), garlic, macadamia nut, onion, pecan, pepper, rhubarb, soybeans, stone fruits, sweet potato, and yam, as well as registered for use on lawns/turf.
- **Registrants:** Syngenta Crop Protection, Inc. (technical), Chemsico, Enforcer Products, Loveland Products, Inc., The Ortho Business Group, PBI/Gordon Corporation, and Zeneca Ag Products, Inc.

Human Health Risk Assessment

Acute Dietary (Food and Water) Risk:

Acute dietary risk is calculated considering what is eaten in one day and maximum, or high-end residue values in food. A risk estimate that is less than 100% of the acute Population Adjusted Dose (aPAD), the dose at which an individual could be exposed on any given day and no adverse health effects would be expected, does not exceed the Agency's risk concern. The aPAD is the acute reference dose (aRfD) adjusted for the FQPA Safety Factor.

For fluazifop-P-butyl an appropriate endpoint attributable to a single dose was not identified in the available studies including the developmental toxicity studies for the general population (including infants and children). However, an acute dose and endpoint was established for the population subgroup of females 13-49 years of age.

- The toxicological endpoint is based on increased incidence of diaphragmatic hernia seen at the lowest observed adverse effect level (LOAEL) of 200 mg/kg/day. The no observed adverse effect level (NOAEL) is 50 mg/kg/day.
- The NOAEL and LOAEL are based on the combined results of two rat developmental toxicity studies. The studies were conducted in the same strain of rat and with an identical dosing regimen.
- The 10X FQPA safety factor was reduced to 1X based on no residual uncertainties for pre- and/or post-natal toxicity.
- The acute PAD is calculated to be 0.50 mg/kg/day derived from a NOAEL of 50 mg/kg/day and an Uncertainty Factor of 100 that includes 10X for interspecies extrapolation, 10X for intraspecies variation, and 1X for FQPA.
- The acute dietary assessment was conducted with tolerance level residue values, a ratio adjustment for additional metabolites of concern, 100% crop treated, and default processing factors.

The acute dietary assessment concluded that for all supported registered commodities, the acute dietary risk estimate is less than 2% of the aPAD, which is below the Agency's level of concern for females 13-49 years of age. No refinements were included for the acute dietary exposure analysis; therefore this is considered to be a conservative analysis.

Chronic Dietary (Food and Water) Risk:

Chronic dietary risk is calculated by using the average consumption values for food and average residue values for those foods over a 70-year lifetime. A risk estimate that is less than 100% of the chronic Population Adjusted Dose (cPAD), the dose at which an individual could be exposed over the course of a lifetime and not expect an adverse health effect, does not exceed the Agency's level of concern. The cPAD is the chronic reference dose (cRfD) adjusted for the FQPA Safety Factor.

The chronic dietary risk (food) for fluazifop-p-butyl does not exceed the Agency's level of concern (i.e., less than 100% of the chronic PAD is utilized).

- The toxicological endpoint is based on decreases in absolute and relative testes and epididymal

weights in males seen at the lowest observed adverse effect level (LOAEL) of 5.8 mg/kg/day in the two-generation reproduction study. The no observed adverse effect level (NOAEL) is 0.74 mg/kg/day.

- The 10X FQPA safety factor was reduced to 1X based on no residual uncertainties for pre- and/or post-natal toxicity.
- The chronic PAD is calculated to be 0.0074 mg/kg/day derived from a NOAEL of 0.74 mg/kg/day and an Uncertainty Factor of 100 that includes 10X for interspecies extrapolation, 10X for intraspecies variation, and 1X for FQPA.
- The chronic dietary assessment was conducted with tolerance level residue values, a ratio adjustment for additional metabolites of concern, and default processing factors. Percent crop treated estimates were used in this assessment.

The chronic dietary assessment concluded that for all commodities, the chronic dietary risk estimates are below the Agency's level of concern for the U.S. population (30% cPAD) and all population subgroups. The most highly exposed population subgroup in the chronic dietary exposure analysis is infants less than 1 year of age (93% cPAD). The crop that appears to make the most significant contribution (dietary "driver") to the risk is soybeans. This assessment is still considered to be conservative since tolerance and screening level estimates were used.

Drinking Water Estimates

(For a complete discussion, see section 6.2 of the Human Health Risk Assessment)

Drinking water exposure to pesticides can occur through ground and surface water contamination. EPA considers both acute (one day) and chronic (lifetime) drinking water risks and uses either modeling or actual monitoring data, if available, to estimate those risks. The chronic drinking water estimated concentration is then incorporated directly into the acute and chronic dietary exposure assessment model (DEEM-FCID™). The drinking water exposure assessment is based on maximum application rates and use patterns.

Limited monitoring data are available for fluazifop-P-butyl; therefore, drinking water expected concentrations (DWEC) were calculated from models for risk assessment purposes. At present, all tolerances for fluazifop-P-butyl are expressed as the acid; therefore, EPA modeled the combined residue of fluazifop-P-butyl plus fluazifop acid for the drinking water assessment.

The Screening Concentration in Ground Water (SCI-GROW) model was used to estimate ground water concentrations. The SCI-GROW screening model is a Tier I assessment that provides a high-end estimate. SCI-GROW model generates a single EEC value of pesticide concentration in ground water used for drinking water and provides a ground water screening concentration for use in determining potential risk to human health from drinking water contaminated with a pesticide. EPA

used the Tier 1 SCI-GROW model and a total application rate of 1.125 lbs. a.i./acre per year (maximum rate), a mean soil half-life of 18 days and a K_{oc} of 8.3 mL/g for fluazifop acid, to predict a concentration of 0.58 ppb in ground water.

The Tier II screening models, PRZM and EXAMS, with the Index Reservoir and Percent Crop Area adjustment (IR-PCA PRZM/EXAMS) were used to estimate residues in surface water used for drinking water. Input parameters are based on default PCA 0.87 and a total application rate of 1.125 lbs. a.i./acre/year incorporating 3 applications at 21-day intervals for GA peaches.

Summary of Estimated Surface and Ground Water Concentrations for the Combined Residues of Fluazifop-P-butyl and Fluazifop Acid.		
Exposure Duration	Fluazifop-P-butyl	
	Surface Water Concentrations (ppb)	Ground Water Concentrations (ppb)
Acute	8.7	0.58
Chronic (non-cancer)	3.1	0.58

Cancer Risk

Fluazifop-P-butyl is classified as “not likely to be a carcinogen to humans,” therefore, no assessments were performed for cancer.

Dermal and Inhalation Toxicity

- Since oral NOAELs were selected for dermal endpoints, dermal absorption factors were calculated from a dermal absorption and pharmacokinetic study in which humans were dosed at 2 mg or 200 mg of fluazifop-butyl. The dermal absorption factors, which appear to be lower for higher dermal exposure levels, were calculated to be 2% for high exposures (high contact lawn activities) and 9% for low exposures (golfing or mowing lawns).
- Absorption via the inhalation route is assumed to be equivalent to oral absorption.
- The following endpoints were used to determine residential, aggregate, and occupational risk.
 - Short-term dermal and inhalation exposure: Developmental NOAEL is 2.0 mg/kg/day based on fetal weight decrement, increased incidence of hydronephrosis and delayed ossification at 5.0 mg/kg/day (LOAEL) in a developmental toxicity study.
 - Intermediate- and long-term dermal and inhalation exposure: NOAEL is 0.74 mg/kg/day based on decreases in absolute and relative testes and epididymal weights in males at 5.8 mg/kg/day (LOAEL) in a 2 generation reproductive study in rats.

Residential Risk

(For a complete discussion, see section 6.3 of the Human Health Risk Assessment)

- In residential settings, fluazifop-P-butyl is used on residential turfgrass, broadleaf ornamentals and for total grass weed control for lawn renovations, around driveways, fence lines, sidewalks and similar areas.
- The maximum application rate for homeowner and lawn care operator application to residential turfgrass and golf courses is 0.09 lbs. a.i./acre for selective weed control.
- The maximum application rate for lawn renovation is 0.98 lbs. a.i./acre for homeowners and 0.73 lbs. a.i./acre for lawn care operators.
- The maximum application rate for application to residential ornamentals is 0.44 lbs. a.i./acre (0.01 lbs. a.i./1,000 square feet).
- The maximum application rate for turf is 0.075 lbs. a.i./acre and 0.375 lbs. a.i./acre for non-crops (roadsides, industrial, and other areas), and ornamentals.

Residential Applicator (Handler) Risk

Risk to the residential applicator (handler) does not exceed the Agency's level of concern in that all MOEs are above the target MOE of 100. The quantitative exposure/risk assessment developed for residential handlers is based on the scenarios below.

Exposure Scenario	Mixer/Loader/Applicators	Data Source	MOEs¹
1	Liquid Concentrate: Low Pressure Handwand	(ORETF data)	850
2	Liquid Concentrate: Hose-end Sprayer	(ORETF data)	240
3	Liquid Concentrate: Watering Can	(ORETF hose-end sprayer data)	4,300
4	RTU Formulations: Sprinkling Application	(ORETF hose-end sprayer data)	3,000
5	RTU Formulations: Trigger-pump Sprayer	(proprietary data)	2,200

¹ Level of Concern = 100

Residential Postapplication

The Agency uses the term "post-application" to describe exposures to individuals that occur as a result of being in an environment that has been previously treated with a pesticide. Fluazifop-P-butyl can be used in many areas that can be frequented by the general population including residential areas (e.g., home lawns). The populations considered in the assessment were residential adults and children.

- Residential exposures were estimated based on EPA's 1997 draft SOPs for Residential

Exposure Assessments and the 2001 Recommended Revisions by the Science Advisory Council for Exposure (Policy #12).

- Two separate dermal absorption values are used – 9% is used for assessing dermal exposures while golfing or while mowing a lawn, since these are representative of low exposure activities, whereas 2% is used for assessing dermal exposures from high contact lawn activities (e.g., playing or rolling on a lawn), since these are representative of high exposure activities.
- Short-term risks (MOEs) estimated for postapplication exposure are greater than the Agency’s level of concern for all of the assessed scenarios and are therefore not of concern.
- The MOEs for the combined short-term dermal (high-contact) and oral (incidental) postapplication exposures to toddlers are greater than the Agency’s level of concern for all assessed scenarios and are therefore not of concern.

Aggregate Risk

(For a complete discussion, see section 7.0 of the Human Health Risk Assessment)

Acute, short-term, and long-term aggregate risk assessments were performed using high-end exposures, the most conservative endpoints, and worst-case assumptions concerning potential concurrent exposure scenarios.

- The acute aggregate risk estimate includes the contribution of risk from dietary (food + drinking water) sources only. Acute risk estimates from exposures to food and water, associated with the use of fluzifop-P-butyl do not exceed the Agency’s level of concern.
- Aggregate short-term risk estimates include the contribution of risk from chronic dietary sources (food + water) and short-term residential sources. Taking into account the supported uses, the Agency can conclude with reasonable certainty that combined residues of fluzifop-P-butyl from food, drinking water, and residential exposures would not likely result in a short-term aggregate risk of concern to any population subgroup. All residential/recreational exposures are expected to be short-term in duration.
- Aggregate long-term (noncancer) risk estimates include the contribution of risk from chronic dietary sources (food + water) and residential sources. However, based on the labeled uses, no long-term or chronic residential exposures are expected.

Taking into account the supported uses, the Agency can conclude with reasonable certainty that combined residues of fluzifop-P-butyl from all sources would not likely result in an aggregate risk of concern for any population subgroup.

Occupational Risk

The risk assessment supports the Tolerance Reassessment Eligibility Decision (TRED) document for fluzifop-p-butyl and addresses risks resulting from dietary and non-occupational (residential/recreational) exposures only. Occupational exposures/risks have not been addressed in this assessment.

Summary of Pending Data

Residue chemistry data gaps have been identified and are expected to be required as confirmatory information in the TRED for fluazifop-P-butyl as follows:

- (1) plant metabolism studies, with a root crop and a leafy vegetable;
- (2) the tolerance enforcement methods must be radio validated in conjunction with the required plant and animal metabolism studies;
- (3) the registrant must submit a regulatory method for poultry eggs;
- (4) additional crop field trial data are required for asparagus, carrot, cotton seed, cotton gin byproducts and dry bulb onion;
- (5) a coffee processing study; and
- (6) since the available analytical reference standard for the resolved isomer of fluazifop expired in February 2003, an updated certificate of analysis or a new lot of standard must be submitted.