



Pesticide
Fact Sheet

Name of Chemical: Cyhalofop-butyl
Reason for Issuance: Registration
Date Issued: May 23, 2002

1. Description of Chemical

Generic Name: 2-[4-(4-cyano-2-fluorophenoxy)phenoxy]propanoic acid, butylester (R)

Common Name: Cyhalofop-butyl

Trade Name: Clincher (Technical)
Clincher (CA)
Clincher (SF)

EPA Shaughnessy Code: 082583

Chemical Abstracts
Service (CAS) Number: 122008-85-9

Year of Initial
Registration: 2002

Pesticide Type: Herbicide

Chemical Family: Aryloxyphenoxy propionate

U.S. Producer: Dow AgroSciences LLC

2. Use Patterns and Formulations

Application Sites: Cyhalofop-butyl is registered for use on rice.

Types of Formulations: 96.5% technical product
29.6% emulsifiable concentrate end-use product

Types and Methods

of Application: Aerial and ground application using standard commercial sprayers

Application Rates: Application rates 0.28 ozs of formulated product (0.19-0.28 pounds active ingredient acid equivalent) per acre. Two applications are allowed per season, with a ten-day interval for a maximum application rate of 0.46 ozs of formulated product per acre.

Carrier: Water

3. Science Findings

Summary Science Statements

Based upon a battery of acute toxicity studies, Clincher (CA) and Clincher (SF) are classified as Toxicity Category IV. There are no risks of concern from the use of cyhalofop-butyl. An appropriate endpoint attributable to a single dose was not identified. Therefore, cyhalofop-butyl is not expected to pose an acute risk. The carcinogenic potential of cyhalofop-butyl has not been characterized because the doses tested in the rat and mouse carcinogenicity studies were too low.

No dermal sensitivity was detected with cyhalofop-butyl. It does not demonstrate developmental or reproductive toxicity. There is no evidence of neurotoxicity. None of the animal studies provided any evidence that cyhalofop-butyl is an endocrine disrupter.

Chemical Characteristics

PROPERTY	TECHNICAL	END-USE
Physical State	Waxy Solid	Liquid
Color	Off White/Buff	Amber, clear
Odor	Faint almond odor	Mild aromatic odor
Melting Point	45.5 °C to 49.5 ° C	N/A
Density	1.172 g/mL @20°C	0.9662 g/ml, 0.9615g/ml

Solubility (Water)	0.44 mg/l @20°C (pH 7)	N/A
Vapor Pressure	5.3 x 10 ⁻⁸ kPa (4.0 x 10 ⁻⁷ mm Hg or Torr)	N/A
Octanol/Water Partition Coefficient	Log ₁₀ P _{ow} = 3.3158 @ 25C °	N/A
pH	P = 2069; Log P = 3.3158	6.73 at 23 °C

Toxicology Characteristics

Acute Toxicity (Clincher Technical)

- ! Acute Oral Toxicity in Rats - LD₅₀ > 5000 mg/kg in males and females; Toxicity Category IV
- ! Acute Oral Toxicity in Mice - 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 Dermal Toxicity in Rats - LD₅₀ > 5000 mg/kg in males and females; Toxicity Category IV
- ! Acute Inhalation Toxicity in Rats - LC₅₀ > 5.63 mg/L in males and females; Toxicity Category IV
- ! Primary Eye Irritation in Rabbits - Minimally irritating, Toxicity Category IV
- ! Primary Skin Irritation in Rabbits - Non-irritating; Toxicity Category IV
- ! Primary Dermal Sensitization in Guinea-Pigs - Not a dermal sensitizer

Acute Toxicity (Clincher CA and Clincher SF)

- ! Acute Oral Toxicity in Rats - LD₅₀ = 1611.7 mg/kg in males and LD₅₀ > 2000, <5000 mg/kg in females; Toxicity Category III
- ! Acute Dermal Toxicity in Rats - LD₅₀ > 5000 mg/kg in males and females; Toxicity Category IV
- ! Acute Inhalation Toxicity in Rats - LC₅₀ > 5.19 mg/L for males and females; Toxicity Category IV
- ! Primary Eye Irritation in Rabbits - Irritation based on findings of corneal opacity in all three

rabbits tested with the corneal opacity persisting through day 7 but clearing by day 10. All eyes were positive for conjunctival redness through 3 days. Presence of corneal opacity in 3/3 eyes on day 7, which was resolved by day 21.

! Primary Dermal Irritation in Rabbits - Irritation based on the effects of the 3 rabbits at 1, 24, 48 and 72 hour scores for erythema which ranged from 1 to 2 and scores for edema which ranged from 1 to 2. On day 7 all 3 rabbits scored 2 for erythema, and 1 or 2 for edema. At 21 days irritation had cleared in 2/3 rabbits, while the remaining rabbit scored 1 for erythema and 1 for edema; Toxicity Category III

! Primary Dermal Sensitization in Guinea-Pigs - The test animals did not exhibit any sensitization potential.

Subchronic Toxicity

! In a 90-day feeding study in rats, the NOAEL (male) is ≥ 400 mg/kg/day and the NOAEL (female) is 400 mg/kg/day. In females the LOAEL for this study is 800 mg/kg/day based on perineal soiling and reduced body weights and body weight gain.

! In a 90-day feeding study in rats, the NOAEL is 60.5/65.3 mg/kg/day (males/females) and the LOAEL is 189.5/199.6 mg/kg/day based on kidney toxicity (males/female) and possible liver toxicity in males. No short-term effects were observed which could be used for a short-term endpoint.

! In a 90-day feeding study in mice, the NOAEL for males is ≥ 30 mg/kg/day and in females at ≥ 100 mg/kg/day.

! In a 90-day feeding study in mice, no significant effects were observed at any dose level. The NOAEL in males is ≥ 37.5 mg/kg/day and in females is 4.3 mg/kg/day. In females the LOAEL is 14.1 mg/kg/day based on enlarged kidneys accompanied by swelling of the proximal tubule cells.

! In a feeding study in dogs, the NOAEL is 14.7/15.6 mg/kg/day (males/females) and the LOAEL is 75.2/79.4 mg/kg/day (males/females) based on brown and/or atrophied thymuses, and decreased thymus weight.

! In a 21-day dermal study in rats, no dermal or systemic toxicity was observed at any dose level. The systemic and dermal NOAELs are ≥ 1000 mg/kg.day (limit dose).

Chronic Toxicity/Carcinogenicity

! In the combined chronic toxicity/carcinogenicity study in rats, there were no treatment-related increases

in tumor incidence, compared to controls. The NOAEL in males is 0.823 mg/kg/day and 2.475 mg/kg/day in females. The LOAEL in males is 3.44 mg/kg/day and 24.97 mg/kg/day in females. Dosing was too low to elicit carcinogenic potential.

! In the carcinogenicity study in mice, in males the NOAEL is 0.99 mg/kg/day and the LOAEL is 10.06 mg/kg/day in males and 10.28 mg/kg/day in females. There was no evidence of carcinogenic potential under the conditions of this study. Dosing was too low to elicit frank toxicity and inadequate to assess carcinogenic potential. No short-term effects were observed which could be used for a short-term endpoint.

! In a one-year chronic feeding study in dogs, no adverse effects were observed at any dose level. The NOAEL for this study in males is ≥ 46.7 mg/kg/day and 45.9 mg/kg/day in females.

Developmental Toxicity

! In a developmental toxicity study in rats, the maternal NOAEL is 1000 mg/kg/day and the developmental NOAEL is ≥ 1000 mg/kg/day

! In a developmental toxicity study in rabbits, the maternal NOAEL is 40 mg/kg/day and the maternal LOAEL is 200 mg/kg/day based on maternal death. The developmental NOAEL for this study is ≥ 1000 mg/kg/day.

Reproductive Toxicity

! In a 2-generation reproduction study in rats, in males the systemic NOAEL is 4.85-13.75 mg/kg/day and the systemic LOAEL is 50.0-138.7 mg/kg/day based on kidney lesions. In females the systemic NOAEL is 69.2-147.7 mg/kg/day. The reproductive NOAEL in males is 50.1-138.7 mg/kg/day and in females is 69.2-147.7 mg/kg/day. The offspring NOAEL is 50-147.7 mg/kg/day.

Mutagenicity

! Five studies were available for review and all tested negative in the data submitted.

Neurotoxicity

! In a gavage acute neurotoxicity study in rats, the NOAEL is ≥ 2000 mg/kg based on the absence of clinical signs, a lack of effects on FOB parameters and motor activity, and the absence of neuropathologic lesions. There is no evidence of neurotoxicity.

! In a feeding subchronic neurotoxicity study in rats the NOAEL is ≥ 75 mg/kg/day in males and ≥ 250 mg/kg/day in females based on the absence of clinical signs, lack of effects on FOB parameters and motor activity, and absence of neuropathologic lesions. There is no evidence of neurotoxicity.

Metabolism

! Cyhalofop-butyl (labeled and nonlabeled in rats) demonstrated that absorption of gavaged test article was 93-1000% with urinary excretion being the major route of elimination regardless of dose, label position, or gender. Over 168-hours, 84-100% of the radioactivity was eliminated via the urine, with 86-90% eliminated within 24 hours. Due to rapid excretion, tissue/organ levels declined to near detection limits by 24 hours in all dose groups. There was a biphasic pattern for both labels with no substantial differences in pharmacokinetic indices. Cyhalofop-butyl was absorbed and rapidly eliminated.

Exposures and Risks

An acute RfD was not established because an appropriate endpoint attributable to a single dose was not identified. The chronic Reference Dose (RfD) is 0.01 mg/kg/day. Based on the supporting data, there are no risks of concern from the use of cyhalofop-butyl. An appropriate endpoint attributable to a single dose was not identified. Therefore, cyhalofop-butyl is not expected to pose an acute risk. No dermal sensitivity was detected. The risk due to exposure to residues in food and water was calculated to be below the Agency's level of concern for all population subgroups, including infants and children. The FQPA safety factor for cyhalofop-butyl has been reduced to 1x when assessing acute and chronic dietary exposures for all population subgroups for all exposure durations (acute and chronic). There are no residential uses registered (or pending) for this chemical. Therefore a residential risk assessment was not performed.

Environmental Characteristics

STUDY TYPE	HALF LIFE/OTHER
Hydrolysis	88 days at pH 7, 2.1 days at pH 9
Photolysis in Water	27.9 - 159.3 days, not a significant process
Photolysis on Soil	0.5 days, not a significant process
Aerobic Soil Metabolism	3-11 hours, microbial metabolism is very rapid
Aerobic Aquatic Metabolism	Ranged from 2.4 to 4.4 hours
Anaerobic Aquatic Metabolism	0.2 days
Aquatic Field Dissipation	Less than a day

Mechanism of Pesticidal Action

Cyhalofop-butyl is an inhibitor of acetyl coenzyme -A carboxylase, a pivotal enzyme in plant fatty acid biosynthesis.

Potential to Contaminate Groundwater

Cyhalofop-butyl demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of cyhalofop-butyl in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Ecological Characteristics

Terrestrial

Cyhalofop-butyl is practically non-toxic to birds on an acute exposure basis (LD50>2,250 mg/kg) and on a subacute dietary exposure basis (LC50>5620 ppm). Cyhalofop-butyl is practically non-toxic to small mammals on an acute exposure basis (LC50>5000 mg/kg). In addition, a rat developmental toxicity study indicated that there were no treatment related effects up to the highest dose tested (1,000 mg/kg/day). Therefore the potential for chronic effects appears to be low. Cyhalofop-butyl is non-toxic to adult bees (LD50>100 ug/bee).

Aquatic - Freshwater and Estuarine/Marine

Cyhalofop-butyl is highly toxic to both freshwater and estuarine/marine animals on an acute exposure basis. However, data indicate that the major degradation products for cyhalofop-butyl are practically non-toxic to aquatic organisms. The endangered species level of concern is exceeded for estuarine/marine fish, estuarine/marine invertebrates, and freshwater fish. The minimal exceedance for threatened and/or endangered aquatic species levels of concern will be mitigated by holding rice paddy water for a minimum of 7 days to facilitate degradation of cyhalofop-butyl and by dilution of the discharge by the receiving waters.

Plants

Cyhalofop-butyl is highly toxic to terrestrial plants. The minimal exceedance for threatened and/or endangered aquatic species levels of concern will be mitigated by holding rice paddy water for a minimum of 7 days to facilitate degradation of cyhalofop-butyl and by dilution of the discharge by the receiving waters.

4. Summary of Regulatory Position and Rationale

Available data provide adequate information to support the registrations of Clincher Technical, Clincher CA and Clincher SF use on drill-seeded and water-seeded rice.

Use, Formulation, Manufacturing Process or Geographic Restrictions

Environmental Hazards

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark except when treating rice fields as specified in this product

label. Drift and runoff may be hazardous to aquatic organisms and non-target plants in neighboring areas. Do not contaminate water when disposing of equipment washwaters.

Do not discharge water from treated area for a period of four weeks post-treatment.

The endangered species level of concern is exceeded for estuarine/marine fish, estuarine/marine invertebrates, freshwater water fish and terrestrial plants. The minimal exceedance for threatened and/or endangered aquatic species levels of concern will be mitigated by holding rice paddy water for a minimum of 7 days to facilitate degradation of cyhalofop-butyl and by dilution of the discharge by the receiving waters. It is believed that the rapid degradation of the parent to less toxic degradates will greatly reduce the likelihood of risk to non-target aquatic organisms.

Ground Water Advisory

Cyhalofop-butyl has properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination.

Surface Water Advisory

Cyhalofop-butyl can contaminate surface water through spray drift. Under some conditions, cyhalofop-butyl and/or its degradates may also have a high potential for runoff surface water (primarily via dissolution in runoff water). These include poorly drained or wet soils with readily visible slopes toward adjacent surface waters, frequently flooded areas, areas over-laying extremely shallow ground water, area with in-field canals or ditches that drain to surface water, areas not separated from adjacent surface waters with vegetated filter strips and areas overlaying tile drainage systems that drain to surface water. Cyhalofop-butyl may contaminate surface water by overflow of rice paddies, or by accidental or deliberate release of paddy water during the growing season or at harvest.

Physical or Chemical Hazards

Do not use or store near heat or open flame.

Drift Reduction

In general, ground sprays are considered safer than aerial applications because there is a lower potential for direct application to water, there is usually less drift, and typically smaller areas are treated at any one time. However, drift from ground applications still occur. Therefore the following drift precaution statement should be incorporated on the label.

Drift from aerial and/or ground applications of this pesticide is likely to result in damage to sensitive aquatic organisms in water bodies adjacent to the treatment area. In addition, drift from aerial and ground applications may damage non-target terrestrial plants or crops.

Cyhalofop-butyl cannot be applied aerially unless the nearest peach or nectarine orchard is at least 2 miles upwind or 4 miles downwind of the application site. Aerial applications may only be made when the wind speed is ten miles per hour or less. A maximum boom width of 2/3 for fixed-wing aircraft and less than 3/4 for helicopters is required. Buffer zone for non-target cereal and grass crops is 50 feet for ground application and 450 feet for aerial application. Buffer zone for peaches and nectarines is 660 feet. These restrictions were developed because of damage to peaches, nectarines, non-target cereal and grass crops in California from use of cyhalofop-butyl on rice under a section 18 in 2001.

Use Directions - General Precautions and Restrictions

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 area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

Do not apply within 60 days of rice harvest.

Do not apply more than 15 fl oz/acre in a single application. Do not make more than two applications or apply more than 25 fl oz per acre during the growing season. Sequential applications must be at least 10 days apart.

Do not allow discharge of paddy water from treated areas for a minimum of 7 days following the most recent application of Clincher CA and Clincher SF.

Do not rotate treated land to crops other than rice for 3 months following application.

Do not apply where runoff or irrigation water may flow directly onto agricultural land other than

rice fields.

Do not fish or commercially grow fish, shellfish or crustaceans on treated acres during the year of treatment.

Use Directions - Rice

Mixers and loaders for aerial applications are limited to handling no more than the amount of product sufficient to treat 800 acres.

Do not apply this product where drift may be a problem due to proximity to susceptible crops or other desirable plants.

Buffer Zones- (distance between application and sensitive crop) for wind speeds between 2 and 10 miles per hour.

Sensitive crops (non-target cereal and grass crops such as corn, sugar cane, sudangrass, sorghum, grass grown for seed, millet, and sod farm have a 50 feet ground restriction and 450 feet aerial restriction. Peaches and nectarines have a 660 feet ground restriction and 2 miles if wind blowing from treatment area away from sensitive crop, and 4 miles if wind is blowing from treatment area toward sensitive crop.

5. Summary of Terms of Registration - Data Required

Subacute (28 day) inhalation toxicity study
Repeat Carcinogenicity study in rats (Maximum Tolerance Dose Met (MTD) Not Met
Repeat Carcinogenicity study in mice (MTD Not Met)

6. Contact Person at EPA

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