dicamba diglycoamine salt

Review Date: 5/15/2009

Type	Selective post-emergent control of certain terrestrial broadleaf weeds and woody plants.
Controls	Herbicide for weed control in conservation reserve programs, turf, fallow croplands, grass grown for seed, non-cropland, corn, asparagus, cotton, sorghum, hay proso millet, pasture, rangeland, small grains, soybean and sugarcane (Reference 2).
Mode of Action	Dicamba diglycoamine salt works as a plant growth regulator that causes rapid and uncontrolled growth which destroys the vascular tissue and kills the plant in about a week (Reference 1).

Thurston County Review Summary:

Dicamba diglycoamine salt (dicamba) is considered high in mobility hazard and moderately persistent in terrestrial environments. Dicamba is rated as low in hazard for bioaccumulation.

Dicamba is considered too high in hazard for acute toxicity to birds and too high in hazard for chronic toxicity to small mammals when applied at rates greater than 0.75 pounds of active ingredient per acre. Therefore, dicamba diglycoamine salt containing herbicides are rated as conditional and use of these products at a rate below 0.75 pounds of active ingredient per acre is recommended to reduce potential hazards.

MOBILITY

Property	Value	Reference	Rating
Solubility (mg/L)	6,500	5	High
Soil Sorption (Kd=mL/g)	2	5	High
Organic Sorption (Koc=mL/g)	<21	6	High

Mobility Summary:

Dicamba is very water soluble, adheres poorly to all soil types, and is rated high hazard for the potential to move off the site of application.

PERSISTENCE

Property	Value	Reference	Rating
Vapor Pressure (mm Hg)	0.000012	6	Moderate
Biotic or Aerobic Half-life (days)	(4-31)	6	Moderate
Abiotic Half-life (days)	Not found		
Terrestrial Field Test Half-life (days)	(8-25)	6	Moderate
Hydrolysis Half-life (days)	Stable	1	High
Anaerobic Half-life (days)	141	1	High
Aquatic Field Test Half-life (days)	Not found		

Persistence Summary:

Dicamba may volatilize slightly from plants and ground surface but is not considered the major route of chemical dissipation or breakdown. Microbial activity is the primary route of degradation from soil. Laboratory and field studies show that dicamba is likely to break down in soil to half of its application concentration between one and 5 weeks. Dicamba is expected to degrade in aquatic systems even faster (Reference 8). The persistence hazard of dicamba is considered moderate.

BIOACCUMULATION

Property	Value	Reference	Rating
Bioaccumulation Factor	Not found		
Bioconcentration Factor	0.66	1	Low
Octanol/Water Partition Coefficient	log Kow = 0.54	5	Low

Bioaccumulation Summary:

Dicamba has a low affinity to bind to organic matter and a very low calculated bioconcentration factor. The potential for bioaccumulation of dicamba is rated as low in hazard.

ACUTE TOXICITY

Test Subject	Value	Reference	Rating
Mammalian (LD50)	566 mg/kg	5	Moderate
Avian (LD50)	2,009 mg/kg	5	Low
Honey bee or insect (LD50)	>100 ug/bee	2	Low
Annelida -worms (LC50)	Not found		
Fish (LC50)	135 mg/L	2	Low
Crustacean (LC50)	>100 mg/L	5	Low
Mollusk (LC50)	Not found		
Amphibian (LD50 or LC50)	Not found		

Acute Toxicity Summary:

Single-dose toxicity testing of dicamba indicates that it is moderately toxic to mammals and low in toxicity to birds, insects, fish and other aquatic organisms.

ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Adult (mixer) wearing chem. resistent gloves	0.45 mg/kg/day	0.11 mg/kg/day	4.1	Dermal, inhalation +	1	Moderate
Adult performing yardwork in treated grass	0.45 mg/kg/day	0.0038 mg/kg/day	120	Dermal (skin)	1	Low
Toddler playing in treated turf grass	1 mg/kg/day	0.049 mg/kg/day	20.3	Dermal, incidental	1	Low
Toddler ingesting herbicide granules	1 mg/kg/day	< 0.067 mg/kg/day	>15	Ingesting herbicide granules	1	Low

Acute Toxicity Risk Assessment Summary

Neurotoxicity was elicited at the lowest dose tested resulting in the EPA placing an additional safety factor (x3) on the acute exposure risk assessments.

The potential exposure to an adult using a backpack sprayer to apply herbicide to 4 acres, at a rate of one pound of active ingredient per acre, would be four times less than the EPA's calculated exposure of concern. These potential exposures are rated as moderate in hazard.

Other human exposure scenarios that were evaluated include; ingestion from hand-to-mouth activities, object-to-mouth activities, soil ingestion, eating granular herbicide, and skin contact with treated turf grass. All of these exposures were at least 15 times less than the EPA's calculated dose of concern and rated as low in hazard.

To evaluate ecological risk after an application, the EPA developed a dose of concern that was 50% of the concentration that was shown to be a lethal dose (to a specific organism). The dose of concern to small birds (20 gram bird weight) was exceeded at application rates equal or greater than 0.75 pounds of active ingredient per acre, when they eat treated short grass. The level of concern was also exceeded for small mammals (35 grams or less) consuming residual chemical on short grasses at application rates greater or equal to 0.75 pounds of active ingredient per acre.

Due to the potential risk for toxicity to adults applying dicamba herbicides, dicamba is rated as moderate in hazard. Applications at rates greater than 0.75 pounds of active ingredient are considered high in hazard to birds and small mammals.

CHRONIC TOXICITY

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	D	Not classifiable to human carcinogenicity	3	Pass
Mutagenicity	No evidence	No evidence	5	Pass
Neurotoxicity - (NOAEL)	300 mg/kg/day (LOAEL)	Impaired gait and reflex	1	Check risk
Endocrine Disruption	Not listed		4	Pass
Developmental Toxicity (NOAEL)	45 mg/kg/day	decreased pup weight	1	Check risk
Reproductive Toxicity (NOAEL)	45 mg/kg/day	decreased pup weight	1	Check risk
Chronic Toxicity (NOAEL)	45 mg/kg/day	Decreased pup weight	1	Check risk

Chronic Toxicity Summary:

Dicamba is listed in EPA's Group D for carcinogenicity "not classifiable as to human carcinogenicity," it is not considered mutagenic, and is not listed as a known endocrine disruptor. Multi-generation toxicity testing resulted in decreased pup weights, but there was no evidence of increased susceptibility to the fetus. The hazard for toxicity from long-term exposures to dicamba is evaluated in the chronic risk assessment section.

CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Long-term contact exposures are not expected						
Child eating treated food and drinking water	0.45 mg/kg/day	0.03 mg/kg/day	15	Dietary + drinking water	1	Low
Drinking water exposure alone was not evaluated						
Dietary exposure alone was not evaluated						

Chronic Toxicity Risk Assessment Summary:

The worst-case scenario for long-term dietary and drinking water exposures looked at applications to sugarcane, (which is not a Washington State crop), and the resulting exposure is calculated to be 15 times below the dose of concern. All other exposures are smaller and are also considered low in hazard for toxicity. Long-term exposures to dicamba through contact with treated vegetation are not expected and were not evaluated. The risk of toxicity from a long-term exposure to dicamba is considered low in hazard.

DegradationProducts:

In soil, dicamba dimethylamine salt breaks down to very simple substances like carbon dioxide and water. Some intermediates structurally related to dicamba are formed during this process. One of the intermediates, 3,6- dichlorosalicylic acid (3,6-DCSA), is adsorbed to soil much more strongly than is dicamba. Very little information is available on the toxicity of these intermediates (Reference 7).

Comments:

Severe eye irritant, skin irritant, and was initially considered a skin sensitizer but the EPA re-evaluated the decision and now does not consider dicamba a skin sensitizer (References 2 and 7).

References

1. USEPA. Reregistration Eligibility Decision for Dicamba and Associated Salts. Case Number 0065. June 8, 2006.
2. Albaugh, Inc. Agri Star Vision, Specimen label. AD 060305.
3. USEPA. Science Information Management Branch, Health Effects Division, Office of Pesticide Programs. Chemicals Evaluated for Carcinogenic Potential. July 19, 2004.
4. http://www.scorecard.org/health-effects/chemicals-2.tcl?short_hazard_name=endo&all_p=t
5. EXTOXNET PIP - DICAMBA. http://extoxnet.orst.edu/pips/DICAMBA.htm. Revised June 1996.
6. ARS PESTICIDE PROPERTIES. Dicamba, CASRN: 1918-00-9. Last update May 1995. Http://www.ars.usda.gov
7. WSDA. www.fs.fed.us/r6/nr/fid/pubsweb/dicamba_99.pdf
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