

PESTICIDE TYPE	HERBICIDE
Chemical Class	Chloroacetamide
Common Trade Names	StriCore; F4044-2
Major Degradates	MET-6, MET-42, and MET-102
Application Rate (lbs a.i./acre)	Max Single: 1.5 Max Annual: 1.5
Registration Status	EPA: Registered unconditionally in Aug. 2020; Minnesota: 2024
Toxicity Profile for Applicators	Signal word: WARNING Category III: oral and dermal Category IV: inhalation
Basic Manufacturer	FMC Corporation
MDA Laboratory Capabilities	In discussion
HUMAN HEALTH	
Non-Cancer	Acute PAD: no value* Chronic PAD: 0.17 mg/kg/day
Cancer	Suggestive evidence of carcinogenic potential
<i>Acute and chronic population adjusted doses (PAD) include all relevant uncertainty and safety factors.</i>	
<i>*No acute dietary endpoint selected due to no acute effects relevant to risk assessment observed.</i>	
ENVIRONMENTAL AQUATIC TOXICITY	
Fish	Acute: 975 µg a.i./L Chronic: 722 µg a.i./L
Invertebrate	Acute: 6850 µg a.i./L Chronic: 2,800 µg a.i./L
Aquatic Plants	Vascular: 3.46 µg a.i./L Non-vascular: 1.7 µg a.i./L
POLLINATOR TOXICITY	
Honeybee (adult LD ₅₀)	Acute Contact: >400 µg ai/bee Acute Oral: 93.7 µg ai/bee
<i>Level of Concern (LOC) has been applied to all aquatic toxicity and pollinator values. The most sensitive endpoint may be derived from studies with the technical grade active ingredient or typical end-use product.</i>	

INTRODUCTION

Pethoxamid is a new systemic herbicide for pre-plant, pre-emergence, and early post-emergence weed control. It was first registered by the U.S. Environmental Protection Agency (EPA) in 2020 and is labeled for control of most annual grasses and certain broadleaf weeds. Approved crop use sites for pethoxamid include corn and soybean. It is also registered for use on various turf and ornamental sites, including residential lawns, golf courses, sod farms, roadsides, and industrial areas.

Pethoxamid belongs to the chloroacetamide chemical family and is classified as a Group 15 herbicide by the Weed Science Society of America based on its mode of action. Pethoxamid acts by inhibiting very long chain fatty acid synthesis which inhibits cell division. Because pethoxamid is a seedling shoot growth inhibitor, it will not control emerged weeds. Other notable Group 15 herbicides include acetochlor and s-metolachlor.

The Minnesota Department of Agriculture’s (MDA) extensive review of the EPA pethoxamid labels and risk assessments for issues relevant to Minnesota is summarized below.

PROJECTED USE IN MINNESOTA

Pethoxamid is expected to provide comparable weed control to other Group 15 herbicides such as s-metolachlor, acetochlor, and pyroxasulfone. This new active ingredient provides an additional rotation partner for resistance management and could in turn provide resistance management benefits to growers.

Both the maximum annual and maximum single application rates are 1.5 lbs active ingredient/acre (a.i./A) for all registered uses of pethoxamid. A maximum of two applications per year are permitted for spring weed control in corn and soybean, while multiple applications up to 1.5 lbs a.i./A per year can be made for ornamentals. End-use products can be applied as an aerial or ground spray or as a coating on dry fertilizer granules.

The following three end-use products are currently registered by the EPA. At the time of this review, only StriCore has been registered by the MDA for use in Minnesota. All end-use products are formulated as emulsifiable concentrates.

- **StriCore** (EPA Reg. No. 279-3628-67690) – This product contains 46.88% pethoxamid for use on turf and ornamental sites, including residential, commercial, golf courses, and sod farms, among others.
- **F4044-2 T&O** (EPA Reg. No. 279-3628) – Same as StriCore
- **F4044-2** (EPA Reg. No. 279-3627) – This product contains 46.88% pethoxamid for use on soybean, corn, and cotton.

LABEL ENVIRONMENTAL HAZARDS

Water Quality

- 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 wash water or rinsate.
- Do not apply to non-target areas under conditions which favor runoff or wind erosion of soil containing this product.

Spray Drift

- Use high flow rate nozzles that produce medium droplets to apply the highest practical spray volume.
- Applications must be avoided if wind speed is below 2 mph due to variable wind direction and high inversion potential. Do not apply when wind speed exceeds 15 mph.

TOXICOLOGY AND EXPOSURE

EPA's screening models generate high-end, conservative exposure estimates for active ingredients and toxicologically significant degradates. Model inputs include annual usage at maximum use rates, maximum treated acres, maximum food residues, peak runoff, and drift scenarios, etc. Some proposed products, application rates, and use scenarios are not relevant to Minnesota. The EPA's estimates, therefore, may not reflect future use and impacts in Minnesota.

Human Health

- **Carcinogenic Effects** – EPA classified pethoxamid as having “suggestive evidence of carcinogenic potential.”
- **Drinking Water Guidance** – The EPA drinking water risk assessment identified the parent compound, pethoxamid, as the only residue of concern. The estimated drinking water concentrations (EDWCs) for pethoxamid in surface water were 121 µg/L and 7.45 µg/L for acute and chronic exposure, respectively. The cancer 30-year average EDWC in surface water was 2.71 µg/L. Based on the EDWCs, the chronic dietary (food and drinking water) risk estimate was below the EPA's level of concern. An acute dietary assessment was not conducted because no relevant acute effects were observed for pethoxamid.
- **Occupational and Residential Exposure** – Occupational handling and post-application exposures as well as residential post-application exposures are possible; however, the EPA found that risk estimates were not of concern with baseline attire, appropriate personal protective equipment, and following the label restricted-entry interval of 12 hours. Turf and ornamental products are intended for use by professional applicators in residential areas.

Non-target Species

- **Aquatic Life Exposure** – Pethoxamid is moderately toxic to freshwater fish and slightly toxic to aquatic invertebrates on an acute exposure basis. There is potential for direct adverse effects to vascular and non-vascular aquatic plants. Bioaccumulation is not expected in aquatic life.
- **Terrestrial Life Exposure** – Pethoxamid is slightly toxic to birds and mammals on an acute oral/dietary basis. As expected for an herbicide, there is a risk for adverse effects on non-target terrestrial plants.
- **Pollinators** – Pethoxamid is classified as practically non-toxic to adult honeybees on an acute oral and acute contact basis; however, the EPA's levels of concern were exceeded for adult chronic exposure and larval acute and chronic exposure. Use instructions include measures to minimize exposure such as restricting applications to corn once it reaches 40 inches and flowering is more likely.

ENVIRONMENTAL FATE

Pethoxamid is highly soluble and moderately mobile. It is relatively non-persistent in soil, and its main route of degradation is aerobic metabolism. It is not expected to bioaccumulate in aquatic food chains.

Soil

- **Half-life** (20°C) – Aerobic: 5.63 to 8.02 days
Anaerobic: no data
- **Mobility** – Koc values range from 171 to 228 L/kg^{oc}
Solubility in water (20°C) is 400 mg/L
- **Photolysis Half-life** (20°C) – 79.6 days
- **Persistence** – DT₅₀ values range from 4 to 13 days

Aquatic

- **Half-life** (20°C) – Aerobic: 6.96 to 13.0 days
Anaerobic: 7.85 to 12.1 days
- **Photolysis Half-life** (25°C) – 13.9 days
- **Hydrolysis Half-life** (50°C) – Stable at pH 5, 7, and 9

Air

- **Volatilization** – Vapor pressure (25°C) = 2.1 x 10⁻⁵ torr;
Henry's law constant (25°C) = 8.35 x 10⁻⁷ atm·m³ mol⁻¹;
may volatilize from moist soil and water surfaces

Degradates

Pethoxamid has three major degradates: MET-6, MET-42, and MET-102. Of the major degradates, MET-42 was found to be more mobile and more persistent than the parent (pethoxamid) in some soils. Select minor degradates were also found to be more mobile and persistent than the parent.

Residues of concern for EPA's ecological risk assessment include only the pethoxamid parent compound. Toxicity of degradates to aquatic plants is expected to be less than the parent, and environmental concentrations of degradates are expected to be far below toxicity levels for other taxa.