

PESTICIDE TYPE	FUNGICIDE/NEMATACIDE
Chemical Class	Pyridine-3-carboxamide
Common Trade Names	Victrato, Trefinti, Trefinti Flora, Trefinti TL, A23156 Crop, A22011 Crop
Major Degradates	None identified
Application Rate – Soil and Foliar (lb ai/A)	Max Single: 0.089-0.22 Max Annual: 0.089-0.45
Registration Status	EPA: November 2025 Minnesota: 2026
Toxicity Profile for Applicators	Signal word: CAUTION Category III (dermal) Category IV (oral, inhalation)
Basic Manufacturer	Syngenta Crop Protection
MDA Laboratory Capabilities	In discussion
HUMAN HEALTH	
Non-Cancer	Acute PAD = no value* Chronic PAD = 0.37 mg/kg/day
Cancer	Not likely to be carcinogenic to humans
<i>Acute and chronic population adjusted doses (PAD) are doses that include all relevant uncertainty and safety factors.</i>	
<i>* A toxicological endpoint attributable to a single dose was not identified.</i>	
ENVIRONMENTAL AQUATIC TOXICITY	
Fish	Acute: 5,500 ppb Chronic: 1,900 ppb
Invertebrate	Acute: >13,500 ppb Chronic: 660 ppb
Aquatic Plants	Vascular: 11,000 ppb Non-vascular: 7,000 ppb
POLLINATOR TOXICITY	
Honey Bee Adult	Acute Contact: >80 µg ai/bee Acute Oral: >29 µg ai/bee
<i>Level of Concern (LOC) has been applied to all values.</i>	

INTRODUCTION

Cyclobutrifluram (TYRIUM® Technology) is a new pesticide for the control of nematodes and select soil and seedling diseases on turfgrass, ornamentals, romaine lettuce, and cotton and soybean seeds. It has broad-spectrum activity against several nematode species and soil-borne and foliar plant fungal pathogens.

Cyclobutrifluram is a Group 7 fungicide and a Group N-3 nematicide. It is systemic and disrupts cellular respiration by inhibiting the succinate dehydrogenase (SDH) enzyme, a key component of the mitochondrial electron transport chain (complex II) in both nematodes and fungi. This disruption prevents energy production, leading to the inhibition of growth and eventually death of the target organisms.

The maximum annual application rate for soybean seed treatment is 0.075 mg active ingredient (ai)/seed. For turf, application rate is 0.22 lb ai/acre (A) and the maximum annual rate is 0.45 lb ai/A. For ornamental plants and non-bearing fruit and nut trees, vines, and berries, the maximum single application rate is 0.187 lb ai/A, and the maximum annual application rate is 0.375 lb ai/A. For romaine lettuce, the maximum single and annual application rate is 0.089 lb ai/A.

The Minnesota Department of Agriculture's (MDA) extensive review of the EPA cyclobutrifluram labels and risk assessments for issues relevant to Minnesota is summarized below. Cyclobutrifluram is a per-/polyfluoroalkyl substance (PFAS) based on Minnesota's PFAS definition (MINN. STAT. 18B.01, subd. 15c); therefore, products containing the active ingredient will be subject to additional regulations under the Pesticide Control law.

PROJECTED USE IN MINNESOTA

Cyclobutrifluram is expected to be a valuable tool for growers to manage fungal and nematode pests in Minnesota crops, turf, and ornamentals. In particular, cyclobutrifluram is expected to provide a treatment option for soybean cyst nematode and sudden death syndrome in soybeans. It can be used in rotation with other active ingredients to reduce resistance selection.

There are currently four end-use products containing cyclobutrifluram registered by the EPA. Select products are listed below. Check the [Kelly Solutions registered pesticide product database](#) for a full list of cyclobutrifluram products registered for use in Minnesota.

- **Victrato (A22417 ST)** (EPA Reg. No. 100-1724) – Flowable concentrate containing 41.7% cyclobutrifluram for commercial seed treatment use on soybeans and cotton.
- **Trefinti, Trefinti Flora, Trefinti TL (A22011 T&O)** (EPA Reg. No. 100-1722) – Suspension concentrate containing 38.5% cyclobutrifluram for use on commercial and residential turf grass, sod farms, athletic fields, ornamentals including outdoor landscapes, greenhouses, and nurseries.

LABEL ENVIRONMENTAL HAZARDS

Water Quality

- **Groundwater Advisory:** This chemical has properties and characteristics associated with chemicals detected in groundwater. The chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow.
- **Surface Water Advisory:** This product is classified as having high potential for reaching aquatic sediment via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas where this product is applied and surface water features, such as ponds, streams, and springs, will reduce the potential loading of this active ingredient or its degradates from runoff water and sediment.

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. EPA's estimates, therefore, may not reflect future use and impacts in Minnesota.

Human Health

- **Carcinogenic Effects** – Cyclobutifluram is classified by the EPA as "not likely to be carcinogenic in humans."
- **Drinking Water Guidance** – Parent cyclobutifluram is the only residue of concern in drinking water in the EPA's dietary (food + water) risk assessment. The maximum estimated drinking water concentrations were 108.1 µg/L and 94.0 µg/L for acute and chronic exposure, respectively. Acute and chronic drinking water exposure estimates are below the EPA level of concern.
- **Occupational and Residential Exposure** – No occupational or residential risks of concern were identified. There is a 12-hour restricted entry interval for cyclobutifluram products.

Non-target Species

- **Stressor** – The EPA considers the parent, cyclobutifluram, to be the only residue of concern.
- **Aquatic Life Exposure** – Cyclobutifluram is slightly toxic to fish and aquatic invertebrates on an acute exposure basis. None of the proposed uses of cyclobutifluram posed acute or chronic risks to aquatic animals or plants.
- **Terrestrial Life Exposure** – Cyclobutifluram is practically non-toxic to birds and mammals on an acute oral basis. Risks from the consumption of treated seed by mammals and birds were considered a potential concern by the EPA; however, these risks were based on a large portion of the

diet being from treated seed. The label specifies to cover or collect spilled seeds. No risks to terrestrial plants were identified.

- **Pollinators** – Cyclobutifluram is considered practically non-toxic to honey bees on an acute oral and contact exposure basis. The potential risk to honey bees is expected to be low, and label language restricts application when flowering/blooming plants and weeds are present.
- **Threatened and Endangered Species** – The EPA made "no effect" or "not likely to adversely affect" determinations for all listed species and critical habitats in its biological evaluation.

ENVIRONMENTAL FATE

Cyclobutifluram is persistent in both terrestrial and aquatic environments and has the potential to accumulate in soil with successive applications. It is moderately mobile to mobile in soil and has potential to leach to groundwater. Runoff and erosion also are expected to contribute to movement from the application site.

Soil

- **Half-life** – Aerobic: 150 to 1,097 days (calculated)
Aerobic: 288 to 884 days (calculated)
- **Mobility** – K_{OC} values range from 301 to 643 L/kg_{OC}
Solubility in water (20°C) is 18 mg/L
- **Photolysis Half-life** – 29.6 days (calculated)
- **Persistence** – DT_{50} values range from 14 to 271 days

Aquatic

- **Half-life** – Aerobic: 713 to 776 days (calculated)
Anaerobic: 676 to 1,230 days (calculated)
- **Photolysis Half-life** – 23.4 days (calculated)
- **Hydrolysis Half-life** – Stable (pH 4, 7, 9)

Air

- **Volatilization** – Not a major route of dissipation.
Vapor pressure < 4.65×10^{-8} torr; Henry's law constant 3.12×10^{-8}

Degradates

No single degradate was consistently found above 10% of applied rates. According to the EPA, many of the theoretical degradates of cyclobutifluram were not analyzed or detected in many studies. It is possible that the degradates SYN510275 and SYN510260 may form at >10% of applied; however, this was not directly observed. Degradation of cyclobutifluram also is expected to form trifluoroacetic acid. The parent, cyclobutifluram, was the only residue of concern identified in the EPA's drinking water and ecological risk assessments.