

PESTICIDE TYPE	FUNGICIDE
Chemical Class	Thiazolidine
Common Trade Names	GATTEN®
Major Degradate	OC 53276, OC 56574, OC 56635
Application Rate (lb a.i./A/year)	Max Annual: 0.16 to 0.20
Registration Status	EPA: Registered unconditionally in December 2017 Minnesota: 2018
Toxicity Profile for Applicators	Signal word: Warning IV (oral, dermal, and inhalation), II (eye exposure)
Basic Manufacturer	Otsuka AgriTechno AGRIO Company, LTD
MDA Laboratory Capabilities	In discussion
HUMAN HEALTH	
Non-Cancer	Acute PAD= not required Chronic PAD= ≥1,000 mg/kg/day
Cancer	Not likely to be carcinogenic to humans
<i>Acute and chronic PADs are doses that include all relevant uncertainty and safety factors</i>	
ENVIRONMENTAL AQUATIC TOXICITY	
Fish	Acute: >395 ppb* Chronic: 2,200 ppb
Invertebrate	Acute: 475 ppb Chronic: 7.1 ppb
Aquatic Plants	Vascular (EC <sub>50</sub> ): >214 ppb Non-vascular (EC <sub>50</sub> ): >137 ppb
POLLINATOR TOXICITY	
Honey Bee	Acute Contact (LD <sub>50</sub> ): >40 µg/bee* Acute Oral (LD <sub>50</sub> ): >40 µg/bee*
<i>Level of Concern (LOC) has been applied to all values.</i>	
<i>*Toxicity values of the formulated product were higher than Technical Grade Active Ingredient (TGA).</i>	

## INTRODUCTION

Flutianil is a new active ingredient that belongs to FRAC (Fungicide Resistance Action Committee) Group U13. Flutianil is a thiazolidine fungicide which controls powdery mildew and consequently, inhibits fungal disease infections and spread on host plants. The USEPA has unconditionally registered flutianil for use on apples, cherries, grapes, strawberries, cantaloupes, cucumbers, and squash. Powdery mildew on these crops is a very difficult disease to manage because of the pathogen’s ability to develop resistance to systemic fungicides. According to FRAC Code List 2017, most of the active ingredients that provide control of powdery mildew disease control have medium to high risk of resistance development. Therefore, the availability of new active ingredients with new modes of action helps in the preservation of active ingredients (for example, chlorothalonil, myclobutanil, pyraclostrobin, etc.) currently in use. As per USEPA, flutianil is classified as a reduced risk chemical. Therefore, it can be used as part of an Integrated Pest Control Program for powdery mildew management. The Minnesota Department of Agriculture’s (MDA) extensive review of the USEPA flutianil product labels and risk assessments for issues relevant to Minnesota is summarized below.

## PROJECTED USE IN MINNESOTA

This new active ingredient is approved by USEPA on a broad spectrum of agricultural crops. The maximum single application rate of flutianil is 0.04 lb a.i./A (12.8 fl oz product/A). For apples, cherries, and grapes, the maximum annual application rate is 0.16 lb a.i./A/year with 1 to 4 retreatments. For cantaloupes and strawberries, the maximum annual application rate is 0.20 lb a.i./A/year with 1 to 5 retreatments. For cucumbers and squash, the maximum seasonal application rate is 0.20 lb a.i./A/season with 1 to 10 retreatments. There is a maximum of two growing seasons per year for cucumbers and squash. The retreatments should be applied at a minimum interval of 7 days in all these crops.

The end-use product is formulated as emulsifiable concentrate that can be applied via ground broadcast and airblast applications. In Minnesota this new active ingredient has the potential to help farmers in controlling powdery mildew disease on crops listed on the label. The following product is registered in Minnesota for use:

- **GATTEN® Fungicide** (EPA Reg. No. 11581-6) – The product carries 4.7% of flutianil and is approved on apples, cherries, cantaloupes, cucumbers, grapes, squash, and strawberries for powdery mildew disease control.

## LABEL ENVIRONMENTAL HAZARDS

### Water Quality

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- Do not apply this product directly to water or 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 washwater or rinsate.

### Other Restrictions

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- Do not apply aerially and via chemigation.
- This product is not approved for use in greenhouses.
- Do not enter or allow workers to enter treated areas during the restricted-entry interval (REI) of 12 hours.
- The pre-harvest interval (PHI) is 14 days for apples and grapes, 3 days for cherries, and no PHI for other crops listed on the label.

## 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

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- **Carcinogenic Effects** – Flutianil is classified as “not likely to be carcinogenic to humans.”
- **Drinking Water Guidance** – Flutianil is not likely to reach groundwater because it is classified as hardly mobile; however, three degradates, OC 53276, OC 56574, and OC 56635, have the potential to leach into groundwater. However, in the terrestrial field dissipation studies no degradate was detected below 90 cm. Due to flutianil mobility, the post-breakthrough mean concentrations and time could not be determined. Acute and chronic dietary (food and drinking) exposures were not conducted because no toxicity endpoints were identified at the highest doses tested.
- **Occupational Exposure** – Applicators may be exposed to flutianil while handling or during the application. Therefore, the label requires wearing of Personal Protective Equipment (PPE) including chemical-resistant gloves and protective eyewear during mixing/loading/application of flutianil.

### Non-target Species

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- **Stressor of Concern** – No stressor of concern was identified by the USEPA.
- **Aquatic & Terrestrial Life Exposure** – Flutianil is classified as practically non-toxic to avian and mammalian species, and terrestrial invertebrates and insects, fish and aquatic plants.

## ENVIRONMENTAL FATE

Flutianil is a slightly volatile and is expected to have low mobility in soil. This fungicide is unlikely to move to groundwater via leaching. Flutianil is persistent through most degradation pathways with the exception of photolysis in water.

### Soil

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- **Half-life** (20°C) – Aerobic: 1100 to 2900 days  
Anaerobic: 2100 to  $1.53 \times 10^{11}$  days
- **Mobility** –  $K_{oc}$  is 17,000 to 53,000 L/kg<sub>oc</sub>  
Solubility in water is 0.0079 mg/L
- **Photolysis** (half-life) – 110 days
- **Persistence** – DT<sub>50</sub> value 52.2 to 398 days

### Aquatic

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- **Half-Life** – Aerobic: 360 to 500 days  
Anaerobic: 770 to 2300 days
- **Half-life via hydrolysis** – Stable
- **Photolysis in water** (half-life) – 1.1 days

### Air

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- **Volatilization** – slightly volatile, vapor pressure =  $1.94 \times 10^{-9}$  Torr; Henry's law constant  $1.38 \times 10^{-7}$  atm m<sup>3</sup> mole<sup>-1</sup>

### Degradates

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Flutianil transforms into several degradates, OC 53276, OC 56574, OC 56635, and OC 53279, while OC 56574 and OC 56635 are the major degradates. Out of these degradates, OC 53276, OC 56574, and OC 56635 have the potential to leach into groundwater. All degradates are less toxic than parent compound. Therefore, these degradates are not of toxicological concern.