

PESTICIDE TYPE	Insecticide
CHEMICAL CLASS	Pyrazole
IRAC Code	21A (Mitochondrial complex I electron transport inhibitor)
COMMON TRADE NAMES	Apta Torac
APPLICATION RATE (lbs a.i./A)	Single: 0.141-0.275 Max Annual: 0.550
REGISTRATION STATUS	EPA: Registered July 2013 Minnesota: February 2014
TOXICITY PROFILE FOR APPLICATORS	Signal word- Caution Toxicity III or IV
BASIC MANUFACTURER	Nichino America
MDA LABORATORY CAPABILITIES	In discussion
HUMAN HEALTH	
NON-CANCER	Acute PAD = 0.1 mg/kg/day Chronic PAD = 0.006 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: 0.0815 ppb Chronic: 0.244 ppb
INVERTEBRATE	Acute: 0.5 ppb Chronic: 0.03 ppb
AQUATIC PLANTS	Vascular: >30 ppb Non-vascular: 1.0 ppb
POLLINATOR TOXICITY	
HONEY BEE	Acute Contact: 0.188 µg a.i./bee Acute Oral: 0.252 µg a.i./bee
<i>Level of Concern (LOC) has been applied to all values</i>	

Introduction

Tolfenpyrad is a contact insecticide that inhibits an organism's energy metabolism and can also act as a contact fungicide. It was first registered by U.S. Environmental Protection Agency (EPA) for greenhouse use in 2010. In 2013 tolfenpyrad was approved by EPA for outdoor use in vegetable, fruit, and row crops. Tolfenpyrad has two formulations an emulsifiable concentrate (ES) and a suspension-concentrate (SC). Approved formulations are intended to control all life stages of thrips, aphids, and scales but are also active towards Lepidoptera, Coleoptera, Diptera, Orthoptera and some species of mites. Broadcast applications can be made via air, ground, air blast, air curtain, or chemigation equipment. Minnesota Department of Agriculture (MDA) extensive review of the EPA tolfenpyrad labels and risk assessments for issues relevant to Minnesota is summarized below.

Projected New Use in Minnesota

The new approved outdoor uses of tolfenpyrad include some leafy vegetables, potato, and stone fruits. According to UMN extension, tolfenpyrad may be useful in managing Colorado Potato Beetle. Tolfenpyrad has a different mode of action compared to neonicotinoids and may provide an effective tool in managing neonicotinoid resistant Colorado Potato Beetle in central Minnesota.

This insecticide is found in 2 outdoor unconditionally registered end-use products:

- **Apta™** (EPA Reg. No. 71711-36) – a suspension-concentrate product comprising of 15.0% a.i. for foliar applications to approved crops.
- **Torac™** (EPA Reg. No. 71711-31) – a emulsifiable concentrate product comprising of 15.0% a.i. for foliar applications to approved crops.

Label Environmental Hazards

Water Quality:

Labels for outdoor crop applications carry advisories for surface water including: This product may impact surface water quality due to runoff. Do not apply to areas where surface water is present, and this pesticide is very highly toxic to fish and aquatic invertebrates.

All crops require a 15 foot vegetative buffer strip around lakes, reservoirs, rivers, streams, marshes and natural ponds. Aerial applications require use of a 150 foot buffer zone.

Other:

This product is highly toxic to bees and other pollinating insects exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area.



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**- Classified as "Not Likely to be Carcinogenic to Humans"
- **Drinking Water Guidance**- High-end, screening exposure estimates for drinking water suggest that applications of tolfenpyrad may result in the parent compound reaching surface water and degradates reaching groundwater requiring a Minnesota-specific risk assessment by the Minnesota Department of Health; however, EPA concludes that conservative exposure estimates are below levels of concern for the general population and all population subgroups. Residues in groundwater will primarily be made up of degradates PCA and PT-CA. For more information on degradate toxicity see "Degradates" section.
- **Occupational Exposure**- The proposed uses of tolfenpyrad do not pose any dermal or inhalation toxicity concern for handlers when used in accordance with label.

Environment- Non-target Species

- **Aquatic Life Exposure** – High-end, screening exposure estimates for risks to fish and invertebrates generated some concern for tolfenpyrad. Tolfenpyrad is classified as very highly toxic to fish and invertebrates; however, EPA concludes risks are mitigated by labeling requirements. Nevertheless, estimates suggest that surface water concentrations could exceed 50% of the acute freshwater fish and aquatic invertebrate toxicity benchmark.
- **New Use Exposure** - The proposed new outdoor uses of tolfenpyrad do not generate unacceptable risks to organisms of concern when used in accordance with label.

Environmental Fate

Soil

- **Half-life**- Aerobic = 14 - 15 days
Anaerobic = 216.6 days
- **Adsorption**- K_d : 123 - 1,101 mg/L
- **Persistence**- Tolfenpyrad is expected to be persistent in soils.

Water

- **Half-life via hydrolysis**- $t_{1/2}$ = 693.1 days at pH 7
- **Surface water**- Tolfenpyrad is expected to reach surface water and/or adjacent terrestrial environments through spray drift, and runoff of sediment bound residue.
- **Groundwater**- The parent compound tolfenpyrad is not likely to reach ground water, while degradates PCA and PT-CA have a higher mobility, K_{oc} = 12.5 – 19 mg/L, and may leach to groundwater.

Air

- **Volatilization**- Tolfenpyrad is not expected to be significantly volatile. Vapor pressure (3×10^{-7} mm Hg); Henry's Law constant = 1.7×10^{-6} atm m^3 mole $^{-1}$.

Degradates

Tolfenpyrad degrades into 6 major degradates PCA, PAM, PT-CA, PT-CHO, PT-OH, and PT(A)-4OH. Studies indicate degradates have a lower acute toxicity to fish in aquatic habitats than parent chemical. In addition, ECOSAR estimates suggest degradates are substantially less toxic to aquatic invertebrates and algae. No studies were available on degradate toxicity for terrestrial vertebrates, aquatic invertebrates, and aquatic or semi aquatic plants. Of these 6 major degradates, PCA, PAM, PT-CA, and PT(A)-4OH are of more concern due to their high residue level, and only PCA and PT-CA are highly mobile.