

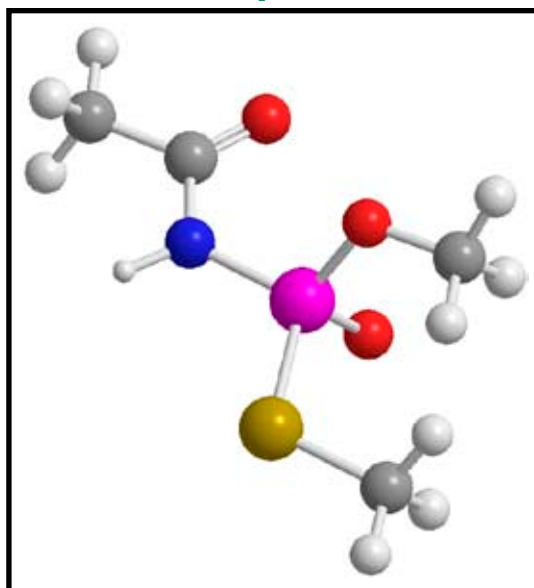
Thank you for visiting the National Pesticide Information Center's fact sheets.

Some of the information in the following fact sheet (scroll down) is out-of-date. NPIC has started a *NEW* set of fact sheets, and acephate is high on our list of priorities. If you would like to be notified when NPIC releases new publications, send an email to npicupdates@ace.orst.edu with "subscribe" in the subject line.

Check out our new technical fact sheet on [resmethrin](#)!

Please call NPIC with any questions you have about pesticides at **1-800-858-PEST (7378)**.

Molecular Structure - Acephate



NPIC General Fact Sheets are designed to answer questions that are commonly asked by the general public about pesticides that are regulated by the U.S. Environmental Protection Agency (U.S. EPA). This document is intended to be helpful to professionals and to the general public for making decisions about pesticide use.

National
Pesticide
Information
Center

Acephate

(General Fact Sheet)

Please refer to the **Technical Fact Sheet** for more technical information.

The Pesticide Label: Labels provide directions for the proper use of a pesticide product. *Be sure to read the entire label before using any product.* A signal word, on each product label, indicates the product's potential hazard.

CAUTION- low toxicity

WARNING- moderate toxicity

DANGER- high toxicity

What is acephate?

- Acephate is an insecticide (kills or controls insects) that was first registered in the United States Environmental Protection Agency (EPA) in 1974 (1).
- Acephate belongs to a class of insecticides known as organophosphates.

How does acephate work?

- Acephate can kill insects by direct contact or ingestion (2). Acephate kills insects by disrupting their normal nervous system functions.
- Acephate disrupts the nervous system by interfering with acetylcholinesterase enzymes. These enzymes are necessary for normal functioning of the nervous system (3, 4).

What types of products contain acephate?

- Lawn and garden granules, dusts, sprays, pellets, and wettable powders
- Household sprays
- Agricultural sprays, pellets, and granules

What are some products that contain acephate ?

- Orthene™
- Lancer™
- Pinpoint™
- Payload™

How toxic is acephate?

Animals

- Acephate is low in toxicity to both male and female rats (5). See boxes on **Laboratory Testing, LD/LC50, and Toxicity Category**.
- Inhaled acephate has very low toxicity to rats (5).
- A female chicken given a high dose of acephate did not have any delayed nervous system effects (5). A single dose high enough to cause delayed nervous system effects would probably kill the test animal, even with atropine protection (6).
- Skin-applied acephate has very low toxicity to rabbits. Acephate did not cause dermal sensitization in guinea pigs (5).
- Acephate caused mild eye irritation in rabbits (5).
- The signs of acephate poisoning include behavioral changes, muscle tremors, twitching, diarrhea, salivation, breathing difficulties, and in more severe cases, paralysis and death (7).

Exposure: Effects of acephate on human health and the environment depend on how much acephate is present and the length and frequency of exposure. Effects also depend on the health of a person and/or certain environmental factors.

Laboratory Testing: Before pesticides are registered by the U.S. EPA, they must undergo laboratory testing for short-term (acute) and long-term (chronic) health effects. Laboratory animals are purposely fed high enough doses to cause toxic effects. These tests help scientists judge how these chemicals might affect humans, domestic animals, and wildlife in cases of overexposure. When pesticide products are used according to the label directions, toxic effects are not likely to occur because the amount of pesticide that people and pets may be exposed to is low compared to the doses fed to laboratory animals.

Humans

- Acephate products may have signal words on the label of Danger, Warning, or Caution signal word (8). The signal word is determined by the toxicity criteria in the **Toxicity Category** box (9).
- The symptoms associated with acephate poisoning include headache, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, difficulty breathing, and chest pain (10).
- The signs associated with acephate poisoning include sweating, pin-point pupils, tearing, salivation, clear nasal discharge and sputum, vomiting, muscle twitching, muscle weakness, and in severe poisonings convulsions, coma, and death (10).

LD50/LC50: A common measure of acute toxicity is the lethal dose (LD50) or lethal concentration (LC50) that causes death (resulting from a single or limited exposure) in 50 percent of the treated animals. LD50 is generally expressed as the dose in milligrams (mg) of chemical per kilogram (kg) of body weight. LC50 is often expressed as mg of chemical per volume (e.g., liter (L)) of medium (i.e., air or water) the organism is exposed to. Chemicals are considered highly toxic when the LD50/LC50 is small and practically non-toxic when the value is large. However, the LD50/LC50 does not reflect any effects from long-term exposure (i.e., cancer, birth defects, or reproductive toxicity) that may occur at levels below those that cause death.

Does acephate break down and leave the body?

- In a rat study, acephate was rapidly taken up from the stomach and excreted in the urine. In a separate metabolism study in rats, acephate did not concentrate in blood, liver, muscle, fat, heart and brain (5).
- In another rat study, a small portion of the acephate broke down to the organophosphate insecticide methamidophos. The methamidophos was excreted quickly and did not accumulate in the rat (5)

Does acephate cause reproductive or birth defects?

Animals

- In a reproductive study, researchers fed rats acephate for three generations. Researchers observed effects only in the highest dose tested. Effects included decreased body weights and/or weight gains for adult and offspring rats, decreased litter sizes, and a decreased mating performance (5).

- Pregnant rats fed mid to high doses of acephate had pups with decreased body weights and appetites. At the highest dose, rat offspring had a decrease in harden in some bones (5).
- In a rabbit study, 2 rabbits out of 16 were aborted. Researchers observed no other effects (5, 11).

Humans

- There is no evidence that human exposure to acephate interferes with pregnancy or causes birth defects (1, 5, 11).

Does acephate cause cancer?

Animals

- Researchers fed rats acephate over their lifetime and noted an increase in cancer in male rats. The U.S. EPA reevaluated the study and concluded that acephate was not carcinogenic in the study (5).
- Female mice fed acephate over their lifetime had an increase in liver cancer (5).
- Researchers often test chemicals for their ability to change the genetic material of an organism as an indication of the chemical's potential to cause cancer. Acephate has tested positive in some tests. Negative test results in animals lessens the concern for the potential hazard of acephate (5).

Humans

- The EPA has classified acephate as a possible (group C) human carcinogen (11). This classification means that acephate has been shown to cause cancer in one strain or sex of a laboratory animal, but there is inadequate or no evidence that it may cause cancer in humans. See **Cancer** box.

| Toxicity Category (<i>Signal Word</i>) | | | | |
|--|---------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|
| | High Toxicity (<i>Danger</i>) | Moderate Toxicity (<i>Warning</i>) | Low Toxicity (<i>Caution</i>) | Very Low Toxicity (<i>Caution</i>) |
| Oral LD50 | Less than 50 mg/kg | 50 - 500 mg/kg | 500 - 5000 mg/kg | Greater than 5000 mg/kg |
| Dermal LD50 | Less than 200 mg/kg | 200 - 2000 mg/kg | 2000 - 5000 mg/kg | Greater than 5000 mg/kg |
| Inhalation LC50 - 4hr | Less than 0.05 mg/l | 0.05 - 0.5 mg/l | 0.5 - 2 mg/l | Greater than 2 mg/l |
| Eye Effects | Corrosive | Irritation persisting for 7 days | Irritation reversible within 7 days | Minimal effects, gone within 24 hrs |
| Skin Effects | Corrosive | Severe irritation at 72 hours | Moderate irritation at 72 hours | Mild or slight irritation |

U.S. Environmental Protection Agency, Office of Pesticide Programs, Label Review Manual, Chapter 7: Precautionary Labeling
<http://www.epa.gov/oppfod01/labeling/lrm/chap-07.htm>

Cancer: The U.S. EPA has strict guidelines that require testing of pesticides for their potential to cause cancer. These studies involve feeding laboratory animals large daily doses of the pesticide over most of the lifetime of the animal. Based on these tests, and any other available information, EPA gives the pesticide a rating for its potential to cause cancer in humans. For example, if a pesticide does not cause cancer in animal tests, then the EPA considers it unlikely the pesticide will cause cancer in humans. Testing for cancer is not done on human subjects.

What happens to acephate in the environment?

- Acephate is not persistent in soil. Acephate has an average soil half-life of 3 days or less (2, 12). See **Half-life** box.
- Approximately 5-10% of applied acephate degrades to the insecticide methamidophos. Methamidophos degrades quickly with a soil half-life of 2 to 6 days (13).
- Acephate has a low potential to contaminate ground water (12).
- Acephate sprayed on forest leaves had a 2-day half-life (13). Acephate has an average half-life of 2.5 days on plants (14).

Half-life is the time required for half of the compound to degrade or be eliminated from the body.

| | | |
|---------------------|---|---------------------|
| 1 half-life | = | 50% degraded |
| 2 half-lives | = | 75% degraded |
| 3 half-lives | = | 88% degraded |
| 4 half-lives | = | 94% degraded |
| 5 half-lives | = | 97% degraded |

Remember that the amount of chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

What effect does acephate have on wildlife?

- Acephate is highly toxic to honey bees (*I*).
- Acephate is low to moderately toxic to birds (*I3*).
- Acephate is practically non-toxic to freshwater fish (*I, I3*).

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NPIC at <http://npic.orst.edu/> EXTTOXNET at <http://ace.orst.edu/info/exttoxnet/>

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