



Pesticide Ingredient: Acetic Acid/Vinegar

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS161E

WSU Extension *Pesticide Ingredient* fact sheets describe basic traits of active ingredients found in WSDA-registered pesticides.

Introduction

Acetic acid is one of the simplest organic acids. Here, “organic” means a compound having carbon molecules. It is a naturally occurring substance found in all plants, animals, and humans in tiny amounts.

Acetic acid is one of the few chemicals with two common names. Both depend upon its concentration. “Vinegar” means concentrations up to 8%. “Acetic acid” means concentrations higher than 8%. When the concentration is low enough to be called vinegar, it is a food product. Most household (food) vinegar is sold at a 5% concentration. The U.S. Food and Drug Agency (FDA) regulates food products.

When the concentration is high enough to be called acetic acid, and it is used to kill weeds, it is a pesticide. The U.S. Environmental Protection Agency (EPA) regulates pesticides. When the concentration is low enough to be called vinegar, but is sold as an herbicide, the Washington State Dept. of Agriculture regulates it as a pesticide.

This chemical is made through bacterial fermentation (for example, turning apple cider into vinegar) or industrial reactions (for example, turning methanol into acetic acid). If you are looking for a product that is “certified organic,” things get a bit more complicated. Here, “certified organic” means a substance or product that has been certified through the USDA National Organic Program’s (NOP) third-party agents. Examples of nearby agents include: the Organic Materials Review Institute (OMRI), Oregon Tilth Certified Organic (OTCO), and the WSDA Organic Food Program (OFP). Organic certification rules are partly built on the source of starting material. Take organically pro-

duced apple cider for example. If it is made into vinegar using natural processes, then it is acceptable under organic standards. If it is made into vinegar using synthetic processes, it is not acceptable. If methanol is used to make acetic acid, which is then diluted to 8%, that vinegar is not acceptable under organic standards.

How it works as a pesticide

Acetic acid is applied as a liquid spray or drench to weeds after they emerge from the soil. It is a contact herbicide, meaning it only affects plant tissue it touches. The acid breaks up cell membranes and makes them leak, causing the plant to dry out and die. Depending on plant age, air temperature, humidity, and direct sunlight levels, this may take from a few hours to several days. The drying effect is not limited to just certain plants; any new plant tissue can be affected. Avoid getting drops of spray onto plants you do not want damaged.

Young seedlings and new growth have a thinner leaf cuticle than older plants or woody parts, making it easier for acetic acid to break down cell membranes. For example, in one study acetic acid sprayed at 5%–20% concentration killed 80%–100% of weed seedlings that were from 3 inches–9 inches tall. However, when 10% acetic acid was sprayed on mature blackberry plants, only 5% of leaves were burned back. Thick, waxy cuticles and woody plant tissue are more resistant to liquid entering, thus harder to kill. To overcome this, trim perennial weeds so they regrow tender new growth. Follow this with a spray application to the new growth to deplete the weed’s energy stores. Many cycles of trim-and-spray are likely needed to effectively treat stubborn perennial weeds such as Canada thistle (Figure 1).

Acetic acid is sometimes mixed with citric or other acids. It can also be listed as an inert ingredient on some herbicide labels. The point to remember with acetic acid is that high concentrations are more effective on woody perennial weeds, while low concentrations will work effectively only on very young weed seedlings.

This fact sheet is part of the WSU Extension Home Garden Series.



Figure 1. Treated Canada thistle in raspberry bed. Treated area (below the red line) shows inconsistent death of thistle leaves. (Photo by Timothy Miller, WSU)

Only apply pesticides to crops or sites listed on the label. Always store pesticides out of the reach of children and pets, preferably in locked cabinets. Keep pesticides in their original containers so instructions on personal protective gear and other precautions are easy to find. Dispose of pesticides by contacting your local Hazardous Waste facility.

Potential drawbacks

Eye damage or irritation is possible, so it is important to wear goggles or face masks when applying products containing acetic acid. Sprayers with tin, aluminum, or iron parts exposed to the acetic acid solution will be damaged. So will any lawn furniture touched by the spray.



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Header image: Molecular structure of acetic acid. Chemical Abstract Service (CAS) Number 64-19-7.

Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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Further Reading

General

The Pesticide Information Center Online (PICOL) database lists all of the registered pesticides in Washington and Oregon. This source is free and can be used to identify products with specific active ingredients. The PICOL database can be accessed at <http://cru66.cahe.wsu.edu/LabelTolerance.html>.

The National Pesticide Information Center (NPIC) (through an agreement with the EPA) provides objective, science-based information on pesticides. The fact sheets provided have information on ingredient toxicity and known environmental effects. The NPIC site can be found at <http://npic.orst.edu/ingred/aifact.html>.

The EPA has a wide range of technical information about pesticides, including fact sheets, which can be accessed at <http://www.epa.gov/pesticides/factsheets/index.htm>.

The USDA National Organic Program (NOP). <http://www.ams.usda.gov/AMSv1.0/NOP>.

Specific

The U.S. Environmental Protection Agency (EPA) regulations.gov website. Acetic Acid and Salts Summary Document Registration Review: Initial Docket March 27, 2007 (see ID: 2008-0016-0003). <http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;dct=SR;D=EPA-HQ-OPP-2008-0016>.

The Government Publishing Company Code of Federal Regulations. Crop Pest, Weed and Disease Management Practice Standard 7CFR1.205.206(e). http://www.ecfr.gov/cgi-bin/text-idx?SID=266c991cad1f10bbd0e579ac1e5ace0b&node=se7.3.205_1206&rgn=div8.

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