



[Sci-Tech Dictionary:](#)

## 2,4-dichlorophenoxyacetic acid

(ˈtuː ˌfɔːr dɪˈklɔːr-ə-foʊˈnæːk-sɪ-ə-sɪd-ɪk ˈæs-ɪd)

(*organic chemistry*)  $\text{Cl}_2\text{C}_6\text{H}_3\text{OCH}_2\text{COOH}$  Yellow crystals, melting at 142°C; used as a herbicide and pesticide. Abbreviated 2,4-D.

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[Veterinary Dictionary:](#) 2,4-dichlorophenoxyacetic acid

A herbicide not known to be toxic at normal use rates in agriculture. Spraying may increase nitrate content of sprayed plants to toxic levels. Called also 2,4-D.

[Wikipedia:](#) 2,4-Dichlorophenoxyacetic acid

**2,4-Dichlorophenoxyacetic acid** (2,4-D) is a common systemic [herbicide](#) used in the control of broadleaf weeds. It is the third-most widely used herbicide in [North America](#) and the most widely used herbicide in the world.

2,4-D was developed during World War II by a British team at [Rothamsted Experimental Station](#), under the leadership of [Judah Hirsch Quastel](#), aiming to increase crop yields for a nation at war. When it was commercially released in 1946, it became the first successful selective herbicide and allowed for greatly enhanced weed control in [wheat](#), [maize](#) (corn), [rice](#), and similar [cereal](#) grass crop, because it only kills [dicots](#), leaving behind [monocots](#).

2,4-D is sold in various formulations under a wide variety of brand names. It continues to be used for its low cost, despite the availability of more selective, more effective, and less toxic products.

2,4-D is a synthetic [auxin](#), which is a class of plant growth regulators. It is absorbed through the leaves and is translocated to the [meristems](#) of the plant. Uncontrolled, unsustainable growth ensues causing stem curl-over, leaf withering, and eventual plant death. 2,4-D is typically applied as an [amine](#) salt, but more potent [ester](#) versions exist as well.

### Major uses

2,4-D is most commonly used for:

- Weed control in lawns and other turf
- No-till burndown
- Control of weeds and brush along fences and highway and railroad rights of way
- Conifer release (control of broad-leaf trees in conifer plantings)
- Grass hayfields and pastures
- Cereal grains
- Corn and sorghum (occasionally)
- As a synthetic auxin analogue

Over 1,500 herbicide products contain 2,4-D as an active ingredient

### Toxicity

The [LD<sub>50</sub>](#) (The acute toxicity, rats study) according to US EPA 2,4-D Reregistration Eligibility Decision, 2006, is 639 mg/kg. Single oral doses of 5 and 30 mg/kg body weight did not cause any acute toxic effects in human volunteers.

The amine salt formulations can cause irreversible eye damage, ester formulations are considered non-irritating to the eyes.

On August 8, 2007, the United States Environmental Protection Agency issued a ruling which stated existing data do not support a conclusion that links human cancer to 2,4-D exposure.<sup>[1]</sup>

### Manufacture

2,4-D is a member of the phenoxy family of herbicides, which include:

- [2,4,5-Trichlorophenoxyacetic acid](#) (2,4,5-T)
- 2-methyl-4-chlorophenoxyacetic acid (MCPA)
- 2-(2-methyl-4-chlorophenoxy)propionic acids (mecoprop, MCPP)
- 2-(2,4-dichlorophenoxy)propionic acid (dichloroprop, 2,4-DP)
- (2,4-dichlorophenoxy)butyric acid (2,4-DB)

2,4-D is manufactured from [chloroacetic acid](#) and 2,4-dichlorophenol, which is itself produced by [chlorination](#) of [phenol](#). The production process creates several contaminants including [isomers](#), monochlorophenol, and other polychlorophenols and their acids.

The powerful defoliant and herbicide [Agent Orange](#), used extensively throughout the [Vietnam War](#), contained 2,4-D. The controversies associated with the use of Agent Orange were associated with a contaminant ([dioxin](#)) in the [2,4,5-T](#) component.

2,4-D has been evaluated by the European Union and included on its list of approved pesticides.<sup>[2]</sup>

However, concern over 2,4-D is such that it is currently not approved for use on lawns and gardens in Sweden, Denmark, Norway, Kuwait and the Canadian province of Québec. 2,4-D use is severely restricted in the country of Belize. In Canada, well over 130 municipalities have placed bylaws that restrict the cosmetic use of pesticides, including the use of herbicides containing 2,4-D.<sup>[3]</sup>

2,4-Dichlorophenoxyacetic acid	
<b>IUPAC name</b>	2-(2,4-dichlorophenoxy)acetic acid
<b>Other names</b>	2,4-D hedonal trinoxol
<b>Identifiers</b>	
<b>CAS number</b>	<a href="#">94-75-7</a>
<b>SMILES</b>	<chem>OC(COC1=CC=C(C)C=C1Cl)O</chem>
<b>Properties</b>	
<b>Molecular formula</b>	$\text{C}_8\text{H}_6\text{Cl}_2\text{O}_3$
<b>Molar mass</b>	221.04 g/mol
<b>Appearance</b>	white to yellow powder
<b>Melting point</b>	140.5 °C (413.5 K)
<b>Boiling point</b>	160 °C (0.4 mm Hg)
<b>Solubility in water</b>	900 mg/L (25 °C)
<b>Related Compounds</b>	
<b>Related compounds</b>	<a href="#">2,4,5-T</a>
Except where noted otherwise, data are given for materials in their <a href="#">standard state</a> (at 25 °C, 100 kPa) Infobox disclaimer and references	

In 2005, the United States Environmental Protection Agency approved the continued use of 2,4-D. <sup>[1]</sup>

In Canada, the Pest Management Regulatory Agency (PMRA) has placed a condition of registration on 2,4-D such that the 2,4-D registrant(s) must provide the PMRA with a required developmental neurotoxicity study by September 20, 2009. <sup>[2]</sup>

## References

- <sup>1</sup> <http://www.epa.gov/fedrgstr/EPA-PEST/2007/August/Day-08/p15109.htm>
- <sup>2</sup> [http://europa.eu.int/comm/food/plant/protection/evaluation/exist\\_subs\\_rep\\_en.htm](http://europa.eu.int/comm/food/plant/protection/evaluation/exist_subs_rep_en.htm)
- <sup>3</sup> <http://www.flora.org/healthyotawa/BylawList.pdf>
- <sup>4</sup> <http://www.epa.gov/oppsrrd1/reregistration/24d/>
- <sup>5</sup> <http://www.pmra-aria.gc.ca/english/pdf/pacr/pacr2007-06-e.pdf>

## External links

- [2,4-D Fact Sheet - National Pesticide Information Center](#)
- [2,4-D Pesticide Information Profile - Extension Toxicology Network](#)
- [EPA 2,4-D Reregistration Eligibility Decision](#)
- [2,4-D RED Facts](#)

The industry's web site

- <http://www.24d.org>

Health and Environmental References:

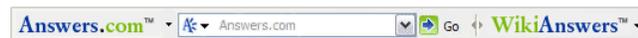
- <http://www.beyondpesticides.org/pesticides/factsheets/2,4-D.pdf>
- <http://www.flora.org/healthyotawa/fs-5.htm>
- <http://www.sierraclub.ca/national/programs/health-environment/pesticides/2-4-D-overview.pdf>

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