

Pesticides



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Overview

Pesticide: A substance used for destroying insects or other organisms harmful to cultivated plants or to animals.

The Categories of Pesticides

- **Herbicides:** Plants
- **Insecticides:** Insects
- **Rodenticides:** Rodents
- **Bactericides:** Bacteria
- **Fungicides:** Fungi
- **Larvicides:** Larvae



Herbicides

Herbicide: A substance that is toxic to plants, used to destroy unwanted vegetation.



Herbicides are used to kill plants.

This may be by:

- Killing the part of the plant which they touch
- Killing the plant when they are absorbed through the leaves, stems, or roots



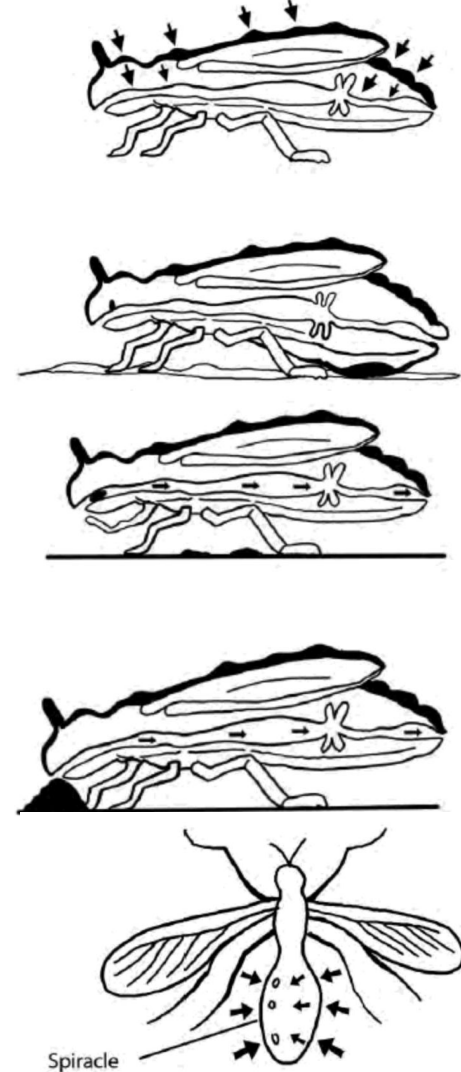
Insecticides

Insecticide: A substance used for killing insects.

Insecticides kill insects by getting inside their bodies where they then act as poison.

There are three different ways insecticides can get into an insect body.

- 1) **Dermal Entry:** The insecticide enters the body through the skin. (Aerosole, Powder, or Granular)
- 2) **Oral Entry:** The insecticide enters the body through the mouth when the insect eats it. (Poisonous Bait or Grooming Post Contact)
- 3) **Respiratory Entry:** The insecticide is breathed in by the insect. (Aerosoles and Gasses)



Fungicides

Fungicide: A chemical that destroys fungus.

Fungicides work in a variety of ways, but most of them damage fungal cell membranes or interfere with energy production within fungal cells.

They can be used to control fungi that damage plants, including rusts, mildews and blights. They might also be used to control mold and mildew in other settings.



Reading A Pesticide Label

- Ingredients
- Directions for Use
- Agricultural Use Requirements
- Non-Agricultural Use Requirements
- Environmental Hazards
- Physical & Chemical Hazards
- First Aid
- Personal Protective Equipment
- Important Phone Numbers (In Case of Emergency/Product Information)
- Hazardous to Humans & Animals
- Keep Out of Reach of Children
- Domestic Animal Recommendations
- Other Safety Recommendations

ATTENTION: This specimen label is provided for general information only.

- This pesticide product may not yet be available or approved for sale in your area.
- It is your responsibility to follow all Federal, state and local laws and regulations regarding the use of pesticides.
- Before using any pesticide, be sure the intended use is approved in your state or locality.
- Your state or locality may require additional precautions and instructions for use of this product that are not included here.
- Monsanto does not guarantee the completeness or accuracy of this specimen label. The information found in this label may differ from the information found on the product label. You must have the EPA approved labeling with you at the time of use and must read and follow all label directions.
- You should not base any use of a similar product on the precautions, instructions for use or other information you find here.
- Always follow the precautions and instructions for use on the label of the pesticide you are using.



A complete broad-spectrum postemergence herbicide for industrial, turf, environmental, forestry, roadside, utility rights-of-way, and other listed terrestrial weed control.

(For a complete list of terrestrial use sites, see the Directions for Use section of this label.)

Read the entire label before using this product.

Use only according to label directions.

AVOID CONTACT OF THIS HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY BUDDS OR FRUIT OF CROPS, CULTIVABLE PLANTS AND TREES, AND SOYBEAN PLANT MATERIAL ON RESTRICTION CODES BECAUSE THIS IS AN END-USE PRODUCT. MONSANTO COMPANY DOES NOT INTEND AND HAS NOT REGISTERED IT FOR FORNICATION. (SEE INDIVIDUAL CONTAINER LABEL FOR RESTRICTIONS.)

Read the "LIMIT OF WARRANTY AND LIABILITY" statement at the end of the label before buying or using, if terms are not acceptable, return it unopened.

Not all products listed on this label are registered for use in California. Check the registration status of each product in California before using.

EPA Reg. No. 524-475

Product by MONSANTO COMPANY AND A LINDBERGH BLVD., ST. LOUIS, MISSOURI, 63167 USA

1.0 INGREDIENTS

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine, in the form of its triisopropylamine salt..... 41.0%
OTHER INGREDIENTS (including surfactants)..... 59.0%
100.0%

*Contains 400 grams of the active ingredient glyphosate, in the form of its triisopropylamine salt, per liter or 4 pounds per U.S. gallon, which is equivalent to 336 grams of the acid, glyphosate, per liter or 3 pounds per U.S. gallon (21.4% by weight).

This product is produced by U.S. Patent Nos. 5,003,968, 5,700,015, 6,263,773, 6,121,189, 6,121,200. No claims granted under any non-U.S. patents.

2.0 IMPORTANT PHONE NUMBERS

1. FOR PRODUCT INFORMATION OR ASSISTANCE USING THIS PRODUCT,
CALL TOLL-FREE, (800) 392-3111.
2. IN CASE OF AN EMERGENCY INVOLVING THIS PRODUCT,
OR FOR MEDICAL ASSISTANCE, CALL COLLECT, DAY OR NIGHT, (314) 694-4000

3.0 PRECAUTIONARY STATEMENTS

3.1 Hazards to Humans and Domestic Animals

Keep out of reach of children

CAUTION

Causes eye irritation

Avoid contact with eyes or clothing

FIRST AID

EYES

- Flush eyes open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes then continue rinsing eyes.
- Call a poison control center or doctor for treatment advice.

• Rinse the product container or labeling with you when calling a poison control center or doctor, or going to treatment.

• You can also call (314) 694-4000, collect, day or night, for emergency medical information.

• This product is identified as Roundup PRO Herbicide, EPA Registration No. 524-475.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation could result in temporary gastrointestinal irritation (vomiting, diarrhea, etc.). Such symptoms are common, progress the same way, and usually of brief duration. Call a veterinarian if symptoms persist for more than 24 hours.

Personal Protective Equipment (PPE):
Applicators and other handlers must wear: long-sleeved shirt and long pants, socks and shoes.
Follow manufacturer's instructions for cleaning/maintaining PPE (Personal Protective Equipment). If there are no instructions for washing, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations:
Users should:
• Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
• Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

3.2 Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to terrestrial areas below the mean high-water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters and sludges.

3.3 Physical or Chemical Hazards

Spray solutions of this product may be flammable, stored and applied using stainless steel, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNPAINTED STEEL, COLORED (STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and can produce hydrogen gas, which can form a highly combustible gas mixture. This gas mixture could flash or explode if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source and cause serious personal injury.

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in any manner inconsistent with its labeling. This product may only be used in accordance with the Directions for Use on this label or as separately published supplemental labeling. Supplemental labeling can be obtained from your Authorized Monsanto Reseller or Monsanto Company representative.

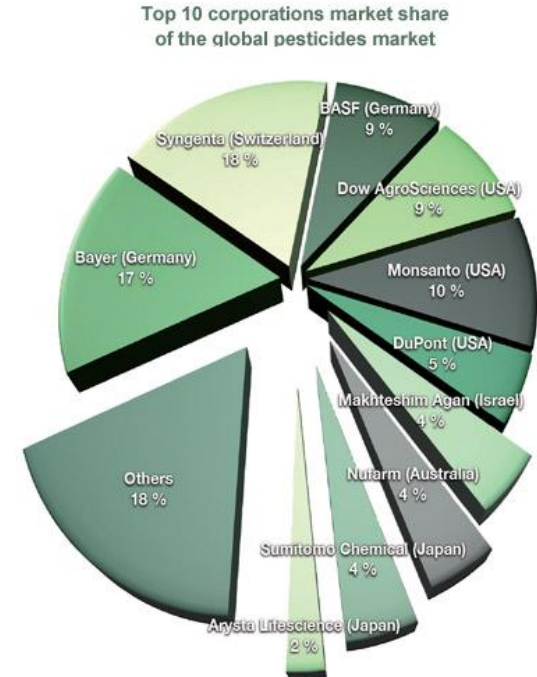
Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Use proper handling practices to be in the area during application. For any requirements specific to your state or site, contact the agency responsible for pesticide regulations.

Agricultural Use Requirements
This label only is in accordance with labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency procedures. It also contains specific instructions and employers pertaining to the statements on this label about Personal Protective Equipment (PPE) and restricted-entry intervals. The requirements in this label only apply to uses of this product that are covered by the Worker Protection Standard.
Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 4 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water, is: coveralls, long pants and socks, and closed-toe shoes made of a nonabsorbent material.

Non-Agricultural Use Requirements
The requirements in this label apply to uses of this product that are NOT within the scope of the Worker Protection Standard (40 CFR Part 170) for agricultural pesticides. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.
Keep people and pets off treated areas until spray solution has dried.

Companies that produce Pesticides (Big-6)

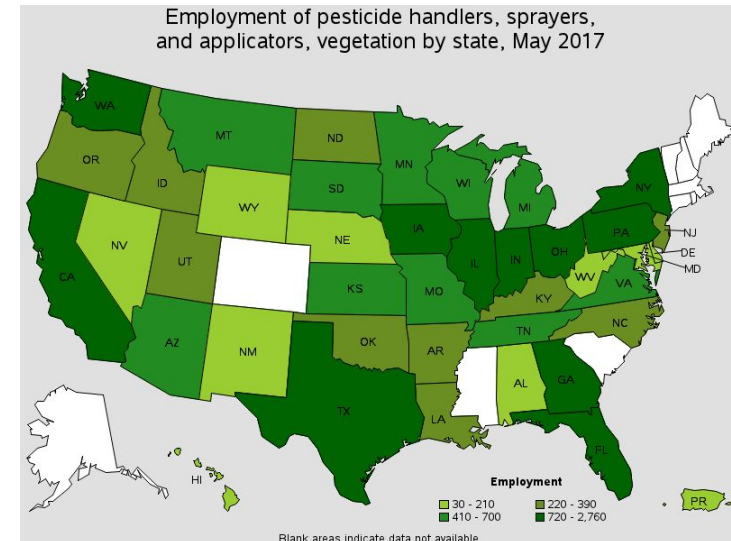
- Six companies currently dominate the marketplace for agricultural seeds and farm chemicals.
 - Bayer
 - Dupont
 - Dow
 - BASF
 - Monsanto
 - Syngenta
- **The two have now combined**



Source: Exploring the Global Food Supply Chain, 3D

Economics of the Industry

- Pesticide production is an \$50 billion dollar business, 40% of production is exported.
- Estimated \$10 billion in environmental and societal damages
- There was a large increase in 2013 when pesticide costs increased from \$49 per acre to \$66 per acre in 2013 and are continuing to rise.
- Pesticide use in the United States amounts to about 1 billion pounds per year.
- Pesticides help farmers to produce more with less land.
- Pesticides ensure bountiful harvests.



Imports & Exports

- U.S. manufacturers recently exported 58 million pounds of pesticides to more than twelve countries.
- A small number of international corporations dominate the international pesticide market. The six largest companies, all of which are based in Europe or the U.S., control 73% percent of the market.
- Brazil, Canada and Mexico were the main destinations of pesticide and agricultural chemical “exports” from the U.S., with a combined 41% share of total exports.
- China, Mexico and France were the main suppliers of pesticide and agricultural chemical “imports” to the U.S., together comprising 61% of total imports.



Current Events

- **February 26th, 2020:** Bayer Chairman Steps Down in Midst of Roundup Legal Battle
(<https://www.wsj.com/articles/bayer-chairman-steps-down-in-midst-of-roundup-legal-battle-11582714274?mod=searchresults&page=1&pos=1>)
- **February 24th, 2020:** Africa's Locust Plague Shows the Danger of Green Colonialism
(<https://www.wsj.com/articles/africas-locust-plague-shows-the-danger-of-green-colonialism-11582586979?mod=searchresults&page=1&pos=2>)
- **January 6th, 2020:** Roundup Ruled the Farm, Now Its Maker Has a Challenger
(<https://www.wsj.com/articles/roundup-ruled-the-farm-now-its-maker-has-a-challenger-11578328409?mod=searchresults&page=1&pos=10>)

SWOT Market Analysis

- S- Pesticides have been estimated to have saved millions of lives due to the control of pest and insects that carry diseases, such as malaria which is transmitted from mosquito.
- W- The side-effect of pesticide use is the resistance in pests costing nearly \$1.5 billion and with crop losses caused by pesticides are \$1.4 billion in the US.
- O- The use of pesticides can increase a farmers yield by nearly 20%
- T- Studies show that pesticides have been linked to cancer, Alzheimer's Disease, ADHD, and even birth defects.



Future Markets



“The global pesticides market size reached a value of nearly \$84.5 billion in 2019, having grown at a compound annual growth rate (CAGR) of 4.2% since 2015, and is expected to grow at a CAGR of 11.5% to nearly \$130.7 billion by 2023.”

- Growth in the historic period resulted from strong economic growth in emerging markets and intensive farming techniques in the pesticide market
- The only factors that negatively affected growth in the historic period were high research and development (R&D) costs and alternative techniques.
- “Growing populations will drive growth.”
- The herbicides market was the largest segment of the pesticide market, accounting for \$43.8 billion or 51.9% of the total in 2019 and this market is expected to be the fastest-growing segment going forward at a compound annual growth rate (CAGR) of 12.8%.

Sources

- <https://www1.health.gov.au/internet/publications/publishing.nsf/Content/ohp-enhealth-manual-atsi-cnt-l~ohp-enhealth-manual-atsi-cnt-l-ch5~ohp-enhealth-manual-atsi-cnt-l-ch5.7>
- <http://npic.orst.edu/ingred/ptype/fungicide.html>
- <https://www.wsj.com/articles/bayer-chairman-steps-down-in-midst-of-roundup-legal-battle-11582714274?mod=searchresults&page=1&pos=1>
- <https://www.wsj.com/articles/africas-locust-plague-shows-the-danger-of-green-colonialism-11582586979?mod=searchresults&page=1&pos=2>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2984095/>
- <https://farmdocdaily.illinois.edu/2018/06/historic-fertilizer-seed-and-chemical-costs.html>
- <https://www.globaltrademag.com/pesticide-imports-into-the-u-s-expand-rapidly-against-large-but-stagnating-domestic-output/>
- <https://www.wsj.com/articles/roundup-ruled-the-farm-now-its-maker-has-a-challenger-11578328409?mod=searchresults&page=1&pos=10>
- <https://finance.yahoo.com/news/global-pesticides-market-opportunities-strategies-120900830.html>

CNH  syngenta



Questions & Discussion

 **BASF**

Cargill



We create chemistry



 **Nutrien**

JOHN DEERE

MONSANTO

