



The term “pesticide” is an umbrella that includes several classes of products under it, including insecticides, herbicides, fungicides, etc.

What is a pesticide, really?

By Laurie A. Hurner

Editor’s note: This article grants one continuing education unit (CEU) in the Core category toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license when the accompanying test is submitted and approved.

There is a lot of confusion about the term “pesticide” when you talk to different folks from different walks of life. Some call pesticide a chemical, some call it an herbicide, some call it a fungicide, but is it just a pesticide? People outside of the agriculture realm have a very negative view of pesticides, but pesticides play an important role in modern-day agriculture.

Knowledge about pesticides, their use and the work that has been done to make them safer is very important. Awareness of all that is done to protect consumers of the products pesticides are applied to and the protections given to the people who are actively involved in growing the products is critical. This article addresses the following topics:

- What is and isn’t a pesticide
- Why we use pesticides
- A historical perspective of pesticides

WHAT IS AND ISN’T A PESTICIDE

According to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), a pesticide is defined as “any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.” FIFRA defines a “pest” broadly to include “(1) any insect, rodent, nematode, fungus, weed, or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other animals).” This article discusses pesticides based on this definition.

When labeling a product as a pesticide, one must consider if the product is intended to be used as a pesticide. Products are pesticides if they are used to prevent, destroy, repel or mitigate any pest or are intended to be used as a plant regulator, defoliant or desiccant. When reviewing a product to determine if it is a pesticide, the Environmental Protection Agency (EPA) checks to see if the product is being sold as or claims to be a pesticide, contains active ingredients that are of commercial value due to their pesticidal properties and if the manufacturer has knowledge that the substance will be used, or is intended to be used, as a pesticide.

Agricultural pesticides are regulated by EPA and follow closely the FIFRA definition to meet the criteria set by EPA. That all sounds very cumbersome and regulatory, and it is. Every year, EPA denies many products that are presented to be pesticides.

Some substances are considered pesticides but are not regulated by FIFRA. They are not regulated by FIFRA because they are regulated by another federal agency, such as the Federal Food, Drug, and Cosmetic Act. Some examples are:

- Nitrogen stabilizers
- Products intended for use only for the control of fungi, bacteria, viruses or other micro-organisms in or on living man or animal and labeled accordingly (athlete’s

Table 1. Pesticides Classified by target pests.

Pesticide Class	Primary Target/Action	Example(s)
Acaricide	Mites	Bifenazate
Algaecide	Algae	Copper Sulfate
Attractant	Attracts wide range of pests	Pheromones
Avicide	Birds	Avitrol (aminopyridine)
Bactericide	Bacteria	Copper complexes, streptomycin
Bait	Wide range of organisms	Anticoagulants
Biopesticide	Wide range of organisms	<i>Bacillus thuringiensis</i>
Defoliant	Removes plant foliage	Tribufos
Desiccant	Removes water	Boric Acid
Fumigant	Wide range of organisms	Aluminum phosphide
Fungicide	Fungi	Azoxystrobin, chlorothalonil
Herbicide	Weeds	Atrazine, glyphosate, 2,4-D
Insect Growth Regulator	Insects	Diflubenzuron
Insecticide	Insects	Carbaryl, imidacloprid
Molluscicides	Snails, slugs	Metaldehyde
Nematicide	Nematodes	Ethoprop
Piscicide	Fish	Rotenone
Plant growth regulator	Regulates plant growth	Gibberellic acid, 2,4-D
Predicide	Mammal predators	Strychnine
Repellant	Vertebrates and invertebrates	DEET, methiocarb
Rodenticide	Rodents	Warfarin
Silvicide	Trees	Tebuthiuron
Termiticide	Kills termites	Fipronil

foot cream, for example)
 • Plant or leaf coatings designed to protect from frost or to retard water loss through transpiration
 Agricultural pesticides are generally

classified according to their function. For example, insecticides control insects, miticides control mites, herbicides control weeds and bactericides control bacteria. I like to think of the

word “pesticide” as an umbrella with a lot of classes of pesticides underneath it. In Table 1, Frederick M. Fishel provides an excellent chart [from the University of Florida Institute of Food

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and Agricultural Sciences (UF/IFAS) Electronic Data Information Source (EDIS) document, PI-46, "How are Pesticides Classified?"] that helps the reader understand this umbrella and the classes of pesticides.

WHY WE USE PESTICIDES

Since the beginning of pesticide use, society has been concerned about the associated risks. Pesticide use has been compared to traveling by plane. Many pesticides are used in a beneficial, safe, effective manner without an issue or problem. Many planes fly out of and into airports daily without an issue or problem. It takes only one crash for the entire world to be concerned about flying again. Much the same is true with the use of pesticides.

Fishel explains it well in his "Why do we use pesticides?" UF/IFAS EDIS document PI-103. The use of pesticides is a balancing act between risk and benefit. There are sometimes health and environmental risks with using pesticides. However, there are at times grave risks in not using pesticides.

One example is the use of ant

bait around livestock. Fire ants cause painful stings and may result in death in some livestock. Therefore, bait use, in this situation, is necessary and beneficial. There are other situations in agriculture and outside of agriculture where pesticides are the only ammunition in the arsenal. In these cases, pesticides are safely used, and the problem is eliminated.

Pesticides are only one of the tools used to control pests. In the late 1950s, the concept of integrated pest management was introduced. Scientists discovered that if we built a plan to control pests using different types of actions and products, we would be more successful, and it would be economically beneficial to the current crop and future crops that may be planted in the same area. They identified these actions as: 1) biological control (use of beneficial organisms), 2) habitat control (maintaining some natural habitat to provide beneficial insect reservoirs), 3) use of resistant varieties and 4) pesticides. For best control, these methods and others should be rotated.

In the United States, pesticides are

highly regulated so that the public can rest easy feeding their families farm-fresh products. To assure human safety, every farm, harvesting, packing and distribution practice has been considered before using a pesticide.

HISTORICAL PERSPECTIVE OF PESTICIDES

There are many examples of civilization battling pests throughout history. One historic pest infestation in the 19th century was the destruction of Ireland's potato crop. This pest infestation directly affected the United States. A plant disease called late blight eliminated the potato crop in Ireland which, at the time, was the main food staple there. This led to the Great Irish Famine of 1845–1847. It is reported that a million Europeans starved to death, and the largest United States migration on record occurred.

At the time, the pest-control measures used were pulling weeds by hand, clubbing rats and plucking beetles. Due to the large amount of potatoes produced today, these crude pest management measures would

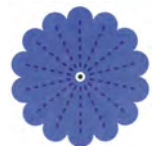
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not work. Late blight continues to be an issue today but is now managed using resistant potato cultivars, proper sanitation practices and fungicides. Scientists are continually looking for new resistant potato cultivars, safe and effective fungicides and ways to make the disease less of an issue.

Early research brought chemicals to the table that had pesticidal activity. Early plant-derived insecticides included hellebore to control body lice, nicotine to control aphids and pyrethrins to control a wide variety of insects. The discovery of Bordeaux mixture, a combination of copper and lime, was first used in the late 19th century to fight downy mildew. This first fungicide is still used today and is credited with beginning the modern fungicide era.

It wasn't until World War II and the post-war era that pesticides were developed from ingredients other than plants and inorganic compounds. DDT, a synthetic chemical, protected soldiers from insect-transmitted diseases. The success of DDT was the push-off point of the introduction of many other synthetic organic

Sources

The information referenced in this article comes from the following University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Electronic Data Information Source (EDIS) documents, authored by Frederick M. Fishel, professor, Agronomy Department, and director, Pesticide Information Office:

- UF/IFAS EDIS Document PI-46, How Are Pesticides Classified?
- UF/IFAS EDIS Document PI-96, What Is and Isn't a Pesticide?
- UF/IFAS EDIS Document PI-103, Why Do We Use Pesticides?
- UF/IFAS EDIS Document PI-219, Pest Management and Pesticides: A Historical Perspective

pesticides. These pesticides represent the beginning of the modern-day chemical industry and introduced a new era for pest control.

In more recent years, we have become aware of the strength and far-reaching effects of many of these first synthetic organic pesticides. In 1970, the EPA was formed by Congress with one task assigned: "To implement by regulation the laws passed by Congress to protect the environment and the health of humans and other animals." This remains EPA's mandate to this day. The EPA changed the way that many industries, not just agriculture, looked at pesticides, and mandated manufacturers to consider

health, safety and environmental protection in the creation of pesticide materials.

Today, pesticides play a large role in the production of many products that feed and cloth the world. As good stewards of the land, we must remain diligent in our preparation of, use of and cleanup of pesticides and pesticide-application clothing and equipment. Many of the pesticides used in the past have been removed from the market due to misuse or consequences of use that were never imagined when they were introduced. This is very frustrating as many of these materials worked well and met a need not met otherwise. However, chemical companies around the world are continually creating effective pesticides and pesticide alternatives that make their way through the EPA process and become labeled.

As growers, we must be diligent in rotating pesticide mode of action and using other types of pest management activities. We must always keep at the forefront the importance of American agriculture to feeding the world. The future is bright, and it is apparent that pesticides will always play a beneficial role in agricultural production. 🍊

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