

Why do we use pesticides?¹

Frederick M. Fishel²

This guide explains the benefits of pesticide use and why they are important in our society. Examples are provided to illustrate the importance of pesticides and the living conditions that are not possible without their use.

Introduction

Ever since pesticides have been available, society has been concerned about the risks associated with their use. While it is true that there are often environmental and health risks with using pesticides, there are also risks involved in many activities in our daily lives, such as driving an automobile or riding a bicycle on a busy street. On the other hand, there may be grave risks associated with letting certain pests go uncontrolled. For example:

- Mosquitoes vector diseases, such as West Nile Virus, to humans.
- Termites cause serious damage to our structures and are costly to eliminate.
- Fire ants cause painful stings and may result in death to livestock.
- Vegetable producers may have their produce rejected for certain fresh markets because of unsightly blemishes caused from not applying a fungicide to protect their crop.
- Without herbicides, vegetation that is left uncontrolled along our rights-of-way can cause damage to our roads,

limit the line of sight of drivers, and cause power outages in utility line corridors.

- Some potential pests, such as the Mediterranean fruit fly, would devastate Florida's agricultural industry. Because government quarantines employ insecticides in their eradication programs, this pest was not allowed to become established in Florida or the United States.

These are but a few examples where pesticides have played a major role in making our lives safer and protecting our economic well-being.

The Balancing Act of Risk vs. Benefit

Most people would acknowledge that the benefits of pesticides in today's society outweigh the risks associated with their use, especially when the risks are identified and kept under control. To return to the automobile analogy, how many people in today's society would agree that the risks of driving an automobile outweigh the benefits? Moreover, we *can* control certain variables associated with driving an automobile that might reduce our risk, by selecting models that have performed superiorly in consumer safety tests, by staying within the speed limit, by using seat belts, etc. By controlling certain factors associated with risk, we more readily accept a practice.

1. This document is PI-103, one of a series of the Agronomy Department, UF/IFAS Extension. Original publication date February 2006. Revised January 2015 and February 2018. Visit the EDIS website at <http://edis.ifas.ufl.edu>.

2. Frederick M. Fishel, professor, Agronomy Department, and Director, Pesticide Information Office; UF/IFAS Extension, Gainesville, FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. For more information on obtaining other UF/IFAS Extension publications, contact your county's UF/IFAS Extension office.

U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

How is risk controlled with pesticide use? The US Environmental Protection Agency (EPA) (<http://www.epa.gov/>) requires rigorous testing prior to approving the registration of any pesticide in the United States. For a pesticide to receive EPA approval, the active ingredient will undergo approximately 140 various environmental, ecological, and toxicological studies. The process from the chemist's laboratory bench to the market shelf will take an average of 5 to 9 years at a cost up to \$250 million. All EPA-approved pesticides must bear a label telling the consumer how to use the product correctly, legally, and safely. A label is an extremely important (and expensive) document, one that should be read carefully by every end user. For more information on pesticide labels, see UF/IFAS EDIS series on Pesticide Labeling at http://edis.ifas.ufl.edu/TOPIC_Pesticide_Labeling.

Following the introduction of a pesticide to the market, it must undergo scrutiny in the re-registration process on a continual basis. If the EPA determines that there is a problem associated with any given pesticide, several options are at their disposal:

- The product's registration can be revoked--that is, it can be taken off the market. This does not occur frequently, but certainly several past examples stand out. DDT, chlordane, endrin, aldrin, and heptachlor are a few examples of pesticides that had their registrations revoked because of problems associated with their use.
- A product's label directions can be amended. For example, the use rate of a pesticide may be altered, certain application techniques may be changed to improve its safety margin, or its use may be eliminated in certain environmentally-sensitive sites, such as areas of water concerns.
- The EPA may determine that a product should be classified as a restricted use pesticide. Restricted use products (Figure 1) are only for sale and use by applicators that have been certified and those employees who work under a certified applicator's direct supervision. The certification process in Florida involves competency testing and, in some types of work, educational and work experience is required. All legal aspects related to pesticides are mandated by Federal and Florida law and the laws are strictly enforced.



Figure 1. Some pesticide products may be classified as restricted-use because of environmental concerns.

Health Benefits

It wasn't too many years ago that Florida was a horrendous place to live because of mosquitoes. Early in the 20th century, epidemics of diseases vectored by mosquitoes, such as malaria, temporarily prohibited the completion of the Panama Canal and caused massive human suffering. On the more recent forefront with mosquito-vectored diseases has been West Nile Virus and the problems associated with it. In Florida alone, millions of dollars are provided annually to mosquito control districts for their efforts in minimizing mosquito populations. Other insect-vectored diseases have had dramatic impacts on world history, including Bubonic Plague. Vectored by fleas, that disease was responsible for reducing Europe's population by one third during the Middle Ages. Typhus, a disease vectored by lice, is thought to have been a major reason why Napoleon's 1812 invasion of Russia failed. These are but a few examples of vectoring insects at least partially controlled with insecticides today.

Agricultural Benefits

American agricultural producers are producing more food and fiber on less land than ever in history and pesticides are partly responsible. Never has American agriculture been so efficient. When catastrophic natural disasters strike suddenly, such as the 2004 Asian Tsunami or the 2005 Kashmir Earthquake, the US is a first responder in relief efforts. Why? A major reason is that our agricultural producers are so efficient and our country has an abundant and safe food supply. Furthermore, controlling pests in feed and forage has encouraged a more efficient means of livestock production. Some pests, particularly insects, cause direct loss from feeding activities on feed and forage, while others, such as poisonous plants, cause sickness or even death if consumed by livestock. Florida's honey production had an estimated value of more than \$30 million dollars in 2014 (Florida Department of Agriculture and Consumer Services <https://www.freshfromflorida.com/>). Furthermore, the value of bees as pollinators is reflected in the billion-dollar vegetable production industry yearly (USDA National Agricultural Statistics Service <https://www.nass.usda.gov/>). These pollinators are important in other agricultural industries as well, such as citrus. Protecting bee hives with miticides for control of the devastating parasitic Varroa mite is vital to the industry.

Environmental Benefits

The use of herbicides for the control of excessive growth and non-native exotic plant species is important to the protection of Florida's waterways and natural areas. Over eight million acres of Florida's land area are publicly-owned

conservation lands. These lands provide recreation, protect biological diversity, buffer the harmful effects of storms, protect fresh water supplies, and significantly contribute to the economic well-being of the state. Nearly one-third of Florida's plant species are exotic species and some have altered natural communities by competing with native plants, changing hydrology and fire ecology, or hybridizing with native species. These invasive plant species must be controlled in order to maintain, or in some cases, restore natural communities in conservation lands.

Structural Benefits

Florida's environment is conducive to supporting several species of termites, and they all feed on structures, causing widespread damage. Other structure-damaging insects, such as carpenter ants and bees, make their presence noticed as well. The preservation of wood from damaging insects and rot microorganisms is critical to the construction industry in building homes, decks, fences, and docks.

Rights-of-Way Benefits

Functionally, rights-of-way provide a major conduit for the flow of goods and services. They are vital to our economy and constitute 20 million acres in the United States. Generally, the more populated the area, the greater the number of rights-of-way lands—certainly a fact in Florida. Management of nearly all rights-of-way involves many objectives, including motorist and worker safety, reduced fire hazards, road surface preservation, and the ability to perform inspections. The use of herbicides makes obtaining all of these objectives realistic. There are many issues unique to each type of right-of-way. Many people may think that rights-of-way consist only of roadways, but utility and pipe lines are also rights-of-way and must be kept free of trees and weeds.

Trade Commodity Benefits

Cargo ships and aircraft, rail cars, and trucks cross our state borders on a daily basis. The vigilance of our federal and state inspectors must ensure that these transporters do not serve as conduits for exotic pests to enter Florida and the US. The legal powers of quarantine allow these government agencies to use pesticides in their regulatory activities to prevent exotic pests from becoming established. Likewise, pesticides protect our commodities prior to and while being imported and provide for favorable trade relationships with foreign markets.

Recreational Benefits

Florida is well-known for golfing, and pesticides enable that industry to appeal to tourism which results in their flourishing success. Golf course turfgrass which is free of disease-blighted areas, insect damage, and unsightly weeds attract golfers from all over the world, again contributing to the economy of Florida. The dollar value of aesthetics can't be estimated, but to many Florida yard and garden enthusiasts, pesticides can help preserve the aesthetic appearance of our landscapes. Aquatic weed control by the judicious use of herbicides allows our fishing waters to be used by those who enjoy fishing and boating, while still supporting a healthy fish population.

Summary

Pesticides are a powerful tool, but they should be considered as only one in a box of tools available for pest control. That is the philosophy of using integrated pest management (IPM) programs in controlling pests in a variety of settings. IPM involves combining appropriate pest control tactics into a single plan to reduce pests and their damage to an acceptable level. Using many different tactics to control a pest problem tends to cause the least disruption to the living organisms and nonliving surroundings at the treatment site. Relying only on pesticides for pest control can cause shifts to resistant populations, outbreaks of other pests, and cause harm to nontarget organisms. With some types of pests, use of pesticides as the only tactic will achieve very poor control. Pesticides are not the answer to all pest problems that society faces, but when coupled with other proven management tools, they can greatly improve the quality of life and economic well-being.

Additional Information

Fishel, F. M. 2005. *Interpreting Pesticide Label Wording*. PI-34. Gainesville: University of Florida Institute of Food and Agricultural Sciences. <http://edis.ifas.ufl.edu/PI071>

Florida Agriculture by the Numbers 2014. Florida Department of Agriculture and Consumer Services. http://freshfromflorida.s3.amazonaws.com/Media%2FFiles%2FMarketing-Development-Files%2FFlorida_Agriculture_by_the_Numbers_2014_Statistical_Report.pdf

USDA National Agriculture Statistics Service. <https://www.nass.usda.gov/index.php>