



Smarter Pest Control

INTRODUCTION

The Pesticide Paradox

PESTICIDES—A VAST RANGE OF CHEMICALS THAT KILL INSECTS, WEEDS, FUNGI, AND other organisms humans would rather do without—bring some great benefits to society. They have made it possible to feed a growing human population, and they protect millions from malaria and other insect-borne diseases. They also support important economic sectors such as the cotton and flower industries and help make our lives easier and more enjoyable; for instance, by reducing mosquito, ant, and cockroach populations. Yet the potentially serious threats they pose to human health and the environment have led to a series of bans on the most dangerous chemicals and to calls to go much further. This spring, the European Union took a new step by issuing a partial ban on three neonicotinoids, a widely used group of insecticides suspected of harming bees, butterflies, and other nontarget species.

Although science is guiding some policy changes, there is still room for major improvement when it comes to pesticides, by more carefully tracking their effects, using them more judiciously, reducing their negative impacts, and finding alternatives. Scientists are making strides in precisely understanding the effects of the chemicals now in our arsenal, including the myriad ways in which they are broken down in the environment and the harm they cause to wildlife. Meanwhile, cohort studies in the United States are beginning to map out their troubling effects on the young developing brain.

Reducing the negative fallout from pesticides is possible in many ways. Australia's wheat farmers are tackling one of the worst weed problems in the world (a crisis that, ironically, partly arose from overreliance on herbicides) by using a more diverse set of tools. Pesticide overuse is a big problem in Asia, too; although cheap, they hurt the farmer's bottom line in the long run. Vietnam has developed a pioneering program that is paying dividends to farmers who spray less. Also in Asia, scientists are tackling one of the biggest problems: More than 300,000 people are believed to commit suicide every year by swallowing pesticides.

Others, meanwhile, are looking ahead. New synthetic chemicals to protect crops hold the promise of stronger and more specific protection with less collateral damage. And some crops won't need pesticides at all: Scientists are developing plants whose immune systems can ward off fungal, bacterial, or viral diseases, and they are using RNA interference to help plants fight insects—a new technology that could hit the market before the decade ends.

We may never be able to abandon pesticides altogether, but as this collection of Reviews, News stories, and research papers shows, pest control can become much smarter, and science has a major role to play.

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