

Controlled Release of Pesticides for Sustainable Agriculture

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Editors

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Preface

The rapidly increasing demand for food presents a major challenge to the scientific community. More efficient developments in agricultural and industrial sector are needed to face this issue. Novel techniques which result in high-quality products with high yield and reduced adverse effects are required. In ancient times, a major problem which scientists faced was the inefficiency of the pest control agents due to the inability of these products to reach the target and deliver optimum quantity within a short span of time. Mostly, the conventional mode of pesticide application resulted in wastage of 80% of applied pesticides through leaching, degradation, and evaporation. This in turn resulted in reduced performance and environment pollution. This led the scientists to think about delivering chemicals to the target in a controlled manner. With the use of novel technologies such as nanotechnology and polymer technology, scientists could develop controlled release pesticides.

In this book, we discuss different aspects of controlled release pesticides. Chapter 1 of this book gives a general introduction about the conventional pesticide application and its adverse effects on health and environment. Chapter 2 discusses the methods for pesticide analysis and their role in the agriculture fields. Chapter 3 deals with the chemical nature and toxicology behind different chemical pesticides and insecticides of today's use. In Chap. 4, we give an overview of controlled release pesticides and their bioengineering aspects for the sustainable crop production. In Chap. 5, we explain different methods for synthesizing controlled release pesticides.

Types of slow and controlled release pesticides and their characteristics are discussed in Chap. 6. Types of pesticides based on different parameters and their physical as well as chemical characteristics are included in this chapter. Nanotechnology has played a major role in the field of controlled release technology. Nanotechnological aspects in pest control are included in Chap. 7. To release pesticides in a controlled manner, encapsulation in a porous carrier is needed. Polymers play a major role as pesticide carrier. Polymer technology for pesticide release is incorporated in Chap. 8. To detect the release of pesticides from

carriers, novel sensors were developed by many scientists. Chapter 9 provides a detailed data on fabrication and working of such sensors. Chapters 10 and 11 are dealing with controlled release of herbicides and plant hormones to tune the crop production.

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