

# Book Reviews

**Biological Confinement of Genetically Engineered Organisms.** By the National Research Council of the National Academies. 2004. The National Academies Press, Washington, DC. 255 p. US\$42.95 hardcover. ISBN 0-309-52778-3.

In recent years, genetically modified organisms (GMOs), or, as they are referred to in this book, genetically engineered organisms (GEOs), have become the subject of many debates. Two of the questions raised in some debates are, "How much control do we have over genetically engineered organisms escaping into the wild?" and "How easily can genetically engineered organisms crossbreed with native or natural species?" To address these questions, the US Department of Agriculture, in 2001, requested that a committee on biological confinement of GEOs be assembled. This document is the resulting report. The committee's focus was on bioconfinement methods and how they are applied to transgenic plants, grasses, trees, fish, shellfish, and other organisms. The report is written to address these questions:

1. What is the status of scientific understanding about various bioconfinement methods for genetically engineered organisms?
2. What methods are available, and how feasible, effective, and costly are these methods?
3. What do we know about when and why methods fail, and what can be done to mitigate those failures?
4. When these methods are used in large-scale applications, what procedures can be used to detect and cull individuals for which the bioconfinement methods have failed?
5. What is the cost effectiveness of these mitigation, detection, and culling procedures?
6. What are the probable ecological consequences of large-scale use of bioconfinement methods (e.g., deployment of sterile organisms) on wild populations, biological communities, and landscapes?
7. What new data and knowledge are required for addressing any of these important questions?

The report consists of 6 chapters. It begins with a brief summary of the problem and why the committee was formed. It also includes several tables that list GEOs, control methods, etc.

In the introductory first chapter, the report defines the terms *genetically engineered organism* and *bioconfinement*. It also gives a brief history of bioconfinement starting in 1972, with the first GEO, which was a hybrid virus that could be used to deliver genes to bacteria. At the end of the chapter, the authors review the social acceptance of GEOs. One issue raised was: "Is it ethical to create seed crops that, after their first year produce sterile seeds, then sell them to subsistence farmers so they have to come back and buy seed year after year?" While the question was not out and out asked, it was suggested, by example, through a case study in terminator technology.

The second chapter, titled "When and Why to Consider Bioconfinement," examines risk analyses and how transgenes disperse among populations. It gives a large table of GMOs with their applications, among other topics. One of the more interesting parts of this chapter is an insert that contains information on Starlink corn. In this case, bioconfinement had failed and Starlink genetically modified corn had crossbred with

corn that was used for human consumption and made its way into the food chain.

The third, fourth, and fifth chapters are on bioconfinement of plants, animals, and viruses, with the majority in the book in the chapter on plants. These chapters describe most of the kinds of confinement known at the time of the report and give their strengths and weaknesses. As the report was being written, new types of confinement were being created, so the report's authors were not able to fully address them. Many of the methods described are related to sterility or an inability to breed with natural or native species so that no gene transfer is possible.

The sixth and final chapter examines "biological and operational considerations for bioconfinement." This chapter lists the conclusions drawn from researching the topic of bioconfinement. It lists the ways that bioconfinement could fail and calls for much more research in the area of bioconfinement of GEOs.

The title of this report sounds technical, but the report is a fairly easy read. The reader doesn't have to be an expert in genetics to understand the book. The material is explained in a way that anyone who has passed a 100-level college biology course can understand.

Most of us hear about the potential for a super weed (basically a genetically modified plant that cross breeds with an already weedy plant, increases its ability to be competitive with other plants, and further reduces native plant populations), a super virus, etc., but we don't really have sufficient depth of understanding of how one of these organisms could arise or of methods for keeping them from entering ecosystems. This report explains the problem of GEOs and bioconfinement and, in doing so, effectively addresses ways to prevent such organisms from threatening ecosystems.—*Brett Larsen*, Washington State University, Pullman, WA.

**Against the Grain: How Agriculture Has Hijacked Our Civilization.** By Richard Manning, 2004, North Point Press, New York. 232 p. US\$13.00 paper. ISBN # 0-86547-713-2.

Richard Manning introduces his book, *Against the Grain: How Agriculture has Hijacked Our Civilization*, with a history of agriculture and its effect on both humans and the natural landscape over the past 10 000 years. Throughout this timeline, Manning tries to give a sense of how and why agriculture has grown, and what effects it has had on both the environment and the people of the world. Also, Manning examines the phenomenon of modern agriculture, including the concept of the Green Revolution and the economics of the agricultural industry. Along with the benefits of increased yield and surplus, Manning discusses the wealth of problems associated with modern farming. Finally, he expresses hope for change with his proposition of organic farming as a partial solution. Although Manning's ideas and assumptions are not mainstream, he raises many important points that are worth consideration.

Manning begins by asserting that humans are essentially hunter-gatherers by nature. Therefore, he suggests, the expansion of agriculture was often violent and almost always led to the displacement or outright murder of the native hunter-gatherers. The early manifestation of social division centered around the establishment of a stationary lifestyle and the subsequent ability of landowners to store crops and accrue wealth. Disparity developed as a result of certain individuals controlling the farmed land itself and, therefore, the products of that land, while the rest of the