Chapter 41
Agbiotech, Sustainability, and Food Security Connection to Public Health

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ABSTRACT

Supporters of agricultural biotechnology have maintained a high enthusiasm for its role in improving agricultural yields and enhancing sustainability, for instance, in Africa. However, critics are deeply skeptical. This chapter sketches some of the main arguments on both sides to provide a summary analysis. The discussion includes multiple climatic, socioeconomic, and public policy drivers that have collided with the ability of the average person to achieve food security. If food security is to be understood as a matter of human health, then its definitions and designs must recognize food's many roles in creating positive public health outcomes. Hence, the discussion expands to include an integrative model of food security linking sociocultural, public policy, and ecological aspects to public health. The chapter concludes that extensive work must be done to steer policy initiatives toward common sense sustainability paths to achieve food security and/or sovereignty.

INTRODUCTION

Food—how it is produced, stored, processed, distributed, and consumed—has posed challenges throughout human history. After air, water and food are next in importance for human existence. In a world split between resource-rich and resource-poor nations, it is difficult to ensure a sufficient, safe, and nutritious food supply. The polarity of impact only gets more pronounced when the focus shifts to considerations for income and wealth inequality and with social exclusion and disadvantages (Burns, 2004). While many rich nations experience their version of food (in)security (rather than food's availability), poor nations are inundated with a host of unmet targets from production to consumption. Either way, public health is compromised when food is not served right.

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This chapter provides a brief description of the food security concept. This chapter discusses factors related to the switch from traditional to mechanized industrial methods, including agricultural biotechnology (or agbiotech). This analysis includes a review of the consequences attending these methods. An attempt is made to illustrate the main arguments between supporters and doubters of agbiotech. This is followed with an analysis of how both sides differ in their understanding and grounding of sustainability (i.e., risks and capabilities of biotechnology).

Because eating is an ethical act, this chapter also examines the ethical implication of food production and consumption. This includes multiple climatic and socioeconomic or public policy drivers that have collided with the ability of the average person to achieve food security. Definitions and designs for food security must recognize food's many roles in creating positive public health outcomes. The chapter concludes that a significant amount of work is needed to steer policy initiatives toward common sense sustainability paths in its aim for plentiful, accessible, and nutritious food across the globe.

BACKGROUND ON AGBIOTECH

Agricultural biotechnology is the ability to translate and apply genomic knowledge using technological and scientific techniques to accelerate breeding of complex plant, animal, and microorganism traits leading to finished products. Central to this process is the scientist's understanding of DNA, the main constituent of chromosomes of organisms, which are manipulated to increase agricultural productivity. "By identifying genes that may confer advantages on certain crops, biotechnology enhances breeders' ability to make improvements in crops and livestock (BRIEF #1, 2004)."

It is a marked departure from about 10,000 years ago since traditional farmers have improved wild plants and animals through the selection and breeding of desirable characteristics using basic methods. This practice led to the domestication of plants and animals commonly used in crop and livestock agriculture. But advancements in the twentieth century and beyond, brought forth sophisticated methods which enable breeders to select traits resulting in increased yield, disease and pest resistance, drought resistance and enhanced flavor ("What is Agricultural Biotechnology?," 2004).

Methods commonly used in agbiotech are:

- **Genetic Engineering:** Which transfers useful characteristics (such as resistance to a disease) into a plant, animal or microorganism by inserting genes (DNA) from another organism
- **Molecular Marking:** Which examines the DNA of an organism to precisely select plants or animals that possess a desirable gene, even in the absence of a visible trait.
- **Molecular Diagnostics:** Which detects genes or gene products that are very precise and specific to more accurately diagnose crop and livestock diseases.
- **Vaccination:** For protection against some infectious illnesses in for example, chickens and cattle.
- **Tissue Culturing:** The regeneration of plants in the laboratory from disease-free planting materials for crops such as citrus, pineapples, avocados, mangoes, bananas, coffee and papaya ("What is Agricultural Biotechnology?," 2004).