ABSTRACT. The use of genetic engineering in agriculture has been the source of much debate. To date, arguments have focused most strongly on the potential human health risks, the flow of genetic material to related species, and ecological consequences. Little attention appears to have been given to a more fundamental concern, namely, who will be the beneficiaries of this technology?

Given the prevalence of chronic hunger and the stark economics of farming, it is arguable that farmers and the hungry should be the main beneficiaries of agricultural research. However, the application of genetic engineering appears unlikely to benefit either of these two groups. This technology is largely controlled by the private sector, and its continued development hinges on its profitability. Thus, the only likely beneficiaries of the application of genetic engineering in agriculture are companies with the capacity to use it.

KEY WORDS: Agri-biotech companies, agriculture, biotechnology, existing technologies, farmers, farm crisis, genetic engineering, hunger, poverty, productivity

INTRODUCTION

Genetic engineering \(^1\) has become a new “frontier” of agricultural research. Many authors tout the potential benefits of genetic engineering technology (Pimentel et al., 1989; Duvick, 1995; Paoletti and Pimentel, 1996; James, 1997), and some make the claim that it will be a necessary part of boosting food production to meet the needs of the future (James, 1997). Development of this technology has been backed with a substantial amount of money. In 1994, alone, the US federal government spent $234 million

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\(^1\) Genetic engineering is a broad term and definitions come in both very general and highly technical forms. The following is a definition from p. 110 of Walker, J. M. and M. Cox. *The Language of Biotechnology: A dictionary of terms*. American Chemical Society: Washington, DC, 1988. “Genetic engineering: A very broad term, also referred to as gene manipulation or recombinant DNA technology. Defined by the 1978 Genetic Manipulations Regulations as ‘the formation of new combinations of heritable material by the isolation of nucleic acid molecules, produced by whatever means outside the cell, into any virus, bacterial plasmid or other vector system so as to allow their incorporation into a host organism in which they do not naturally occur, but in which they are capable of continued propagation.’ ”

on biotechnology research compared with $165 million on all other pest management techniques combined (Winston, 1997, p. 141–142). There is little doubt that biotechnological research is now a high priority.

In spite of this dominance in research, genetic engineering has been the subject of much controversy. Articles discussing or debating the risks of genetic engineering in agriculture abound in the literature (Winston, 1997; Poaletti and Pimentel 1996; Pimentel et al., 1989; Crouch, 1995; Snow and Palma, 1997), and opinions vary widely. Some authors claim that most genetic engineering applications are low-risk, while others claim that current field tests are insufficient for assessing long-term impacts. Furthermore, genetic engineering has not been only a matter of academic debate; it has been a public controversy as well. The issue has been particularly incendiary in Europe where protesters have destroyed dozens of transgenic crop field trials (Pollan, 1998).

Concerns regarding genetic engineering have centered around several major issues: human health risks, insect resistance, increased herbicide use, gene flow to wild relatives, unforeseen ecological consequences, and socioeconomic implications (Winston, 1997; Poaletti and Pimentel 1996; Pimentel et al., 1989; Snow and Palma, 1997). Of these issues, the fiercest debate has been concentrated on human health, gene flow, and ecological impacts, and the information to make long-term predictions on these issues is limited. Unfortunately, such debate may be taking attention away from a more basic question for which a wealth of information exists, namely, who will benefit from the use of genetically engineered crops?

This should be a central question to agricultural research. In a world where 800 million people suffer from chronic malnutrition (James, 1997; Cohen and Reeves, 1995; Foster and Leathers, 1999) and many farmers are either going out of business or being forced to survive on smaller plots of land, it seems logical that farmers and the hungry should be the main beneficiaries of agricultural research. However, it cannot be assumed that this will be the case. This paper will investigate whether or not these two critical groups are likely to profit from the use of genetic engineering and will examine what other interests this technology is likely to serve.

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2 Biotechnology is an even broader term than genetic engineering, and, again, definitions come in both very general and highly technical forms. The following is an excerpt from a definition provided on pp. 18–19 of Flescher, M. H. and Kimball R. Nill. Glossary of Biotechnology Terms. Technomic Publishing Company, Inc.: Lancaster, Pennsylvania, 1993. “[U]sage of the word biotechnology in the United States has come to mean all parts of an industry that knowingly create, develop, and market a variety of products through the willful manipulation, on a molecular level, of life forms or utilization of knowledge pertaining to living systems.”