Online Ethics Center
FOR ENGINEERING AND SCIENCE

Selected Issues in Depth - Genomics and Crops

Description

Part of unit 3 of the Course on Genomics Ethics and Society, this section provides video clips from the presentations of three scholars discussing issues of GM crops, how genetically modified crops might help contribute to global nutritional security, and potential social implications of the growing use of these crops.

Body

The background section to this module raised a number of social and environmental questions - about both benefits and costs - of GM crops. In this "in depth" section, we'll look a little more closely at some of these arguments, drawing on video discussions from three speakers, Dr Ron Phillips, Dr Molly Jahn and Dr Wendy Jepson. These speakers talk about the expected benefits of developments in GM crop technology, and some of the concerns of implementing them in particular locations.

1. In Depth: Arguments for the benefits of the use of GM crops internationally

Dr. Ron Phillips, emeritus Regents' Professor of Agronomy at the University of Minnesota (for more details, follow this link: http://agronomy.cfans.umn.edu/People/RetiredFaculty/PhillipsRonald/index.htm) is an advocate for the expansion of the use of GM crops both in the US and internationally. He points out that these crop biotechnologies are already widely used, and makes a number of specific claims as to why the use of particular GM

crops might be beneficial to human societies: crops can be designed to enhance food safety, to reduce pesticide use (and human exposure to poisioning from pesticides), to increase drought tolerance, to reduce allergic reactions, to reduce fuel use and to improve wildlife habitat. In addition, he argues, researchers and regulators can take account of the concerns people still have about food safety, the development of resistant plants and insects, and worries about pollen flow beyond the GM crop itself.

Dr Phillips is clearly highly positive about what GM crops already offer us, and what they can offer people across the world in the near future. Our second contributor to this debate, Dr Molly Jahn, is Professor of Agronomy, working on plant breeding and biology at the University of Wisconsin-Madison. (For more details on her career, follow this link: http://agronomy.wisc.edu/molly-jahn/) She, too, argues that GM crops offer considerable benefits to farmers and consumers, both in the US and beyond. One key benefit these crops can provide is food security, in particular in the context of climate change and other kinds of risk, as the two clips that follow illustrate:

In fact, Professor Jahn is extremely positive about the way in which GM vegetables as well as crops like corn might contribute to global nutritional security:

However, one of the issues that Jahn raises about the development of GM crops is that it's important to be aware of the context in which the crops will ultimately be used. In particular, a goal of maximizing production doesn't always produce the best *human* outcomes; and the existence of a 'yield gap' means that potential production is not always achieved in practice.

Such positive arguments about the benefits of GM crops for food security and the environment form one very important group of views about the future of agricultural biotechnology. However, others argue that we need to approach the use of these crops with much more caution, and even a willingness to pull back from the implementation of GM crops in particular contexts.

2. Cautions and concerns about the development and use of GM crops internationally

While there are strong advocates for the use of GM crops internationally, other experts in the field, looking at the history of research, development and use of GM crops in particular countries, express concerns about the social implications of these crops in particular regions and nations, for instance where local people in rural areas formerly engaged in small scale, highly-labor intensive farming of diverse crops, often for local consumption. There are also significant disputes in particular places about the environmental impact of specific crops.

Dr Wendy Jepson, Professor in Geography at Texas A&M University, discusses some of these issues in the clips below. She discussed social, economic and environmental issues raised by the planting of GM soybeans in the rather different contexts of Argentina and Brazil, and by growing GM maize in Mexico. (These clips include slides. Note that you're able to stop the clip and read the slide carefully before continuing with the clip). Before moving on to these specific cases, though, this seems to be a good place to remind you of the core concerns of environmental justice, which is relevant to some of Jepson's arguments here. Here's her introduction to environmental justice that we first included in Unit 1 of this course:

Jepson moves on to consider the establishment of GM soybeans, first in Argentina (clip 1 below) and then in Brazil (clip 2 below). She emphasizes the importance of considering the social, economic, political and environmental contexts in which GM soybean production began and developed - which were rather different in Argentina and Brazil. Her emphasis is on the ways in which large scale soybean production can change the "socio-ecological" system of the rural environment, although not in the same way in each country. In Argentina, for instance, she discusses the increase in land prices and decrease in labor demand that resulted from GM soy production, leading to rural depopulation and 'land grabs' from indigenous peoples, as well as changing the rural environment:

Jepson then moves on to discuss a rather different set of social, economic and ethical debates in Brazil. Here the debate about the introduction of GM soy focused much less on the social and environmental transformation of the countryside. There were debates about the consumer eating GM soy, and also concerns about how the

introduction of GM soybeans produced by Monsanto might impact on Brazil's own biotech industry. In addition, there were worries about the export market, since the European market, at least, wanted "GM-free" soybeans. As GM soy became increasingly established, questions were raised about what GM soy meant for the whole practice of farming, since farmers were no longer saving seeds. In many ways, Jepson suggests, these debates in Brazil parallel similar debates in North America.

The final country Jepson considers as a further contrast both to Argentina and Brazil is Mexico, and rather than GM soy, here she considers GM maize. The social, cultural and environmental questions raised with respect to maize in Mexico are different from both Argentina and Brazil; the key issue here is agrobiodiversity. Maize originated in Mexico, and farmers there have developed many landraces of maize; maize crops in Mexico have high biodiversity. The introduction of GM maize led to controversy over the possibility that GM maize might introduce transgenic DNA into native maize landraces in Mexico, and risk reducing their biodiversity. Jepson discusses the scientific debate around GM maize in Mexico, and places this debate into the broader socio-environmental and agricultural context in Mexico, and more broadly, in the context of international trade.

The final clip here is a brief overview of some of the key points made in the three clips above, reviewing Professor Jepson's key points about the impacts of the introduction of GM technology in different national contexts, on farming livelihoods, on landscapes, on economies, on farming livelihoods and on biodiversity.

3. In Conclusion

All of the experts featured in this section discuss the consequences, both desirable and less so, of growing particular GM crops (there are no objections voiced here to growing GM crops *in principle)*. It's argued that GM crops may help human societies to cope with the difficulties inevitably lying ahead, in particular a growing human population needing access to adequate nutrition in the context of a changing climate - points made by both Professors Phillips and Jahn. But as Professor Jepson argues, GM crops should not be regarded as "technologial fixes", isolated from the environments in which they are planted, the farmers who plant them, the consumers who eat them and the political and economic context that permits them to be planted, marketed and bought. Since these circumstances vary immensely by

nation, we should expect to see very different social, political, environmental and, relatedly, ethical issues arising in different places as crops may have impacts on wealth, equality and inequality, social justice, environmental values such as biodiversity, migration of rural populations, and so on.

Additional resources related to these issues can be found in our "Additional Resources" section.

Continue to Readings

Resource Type

Instructor Materials

Topics

Human Rights
Environmental Justice
Emerging Technologies
Controversies

Discipline(s)

Genetics and Genomics
Life and Environmental Sciences