



Food Security and Biotechnology in Africa



This project is financed by the European Union and implemented by the ACP Secretariat

MODULE 3

PUBLIC RESPONSE TO THE RISE OF BIOTECHNOLOGY

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Final version, February 2017

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UNIT 2:

Public; Who constitutes the public and how do they respond to the rise in biotechnology?

(03 Hours; 2 hours lecture & 1 hour discussion)

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Objective.

The objectives of this unit are to:

- Trace the development of genetic engineering with specific interest on how stakeholders and interest groups with varying opinions on the risks and benefits of the technology were created.
- Determine who constitutes these interest groups the 'The Public ' whose voices and actions have helped shape the fate of the technology.
- Explain how the activities of these groups have helped in shaping the fate (adoption/resistance to) of biotechnology.



Introduction: Evolution of the controversy.

- Due to the fact that the quantity and quality of food supply is closely connected with political and regulatory decisions, new innovations in food systems usually attract the attention of a multiplicity of interest groups.
- The controversy surrounding biotechnology first arose from the firm suspicion by the scientists themselves that the innovations could be associated with some intrinsic risks.



The controversy contd.

- Due to the potential health hazards involved in the DNA technology, researches involving this technology were initially halted (Berg, et., 1974).
- Meeting of experts convened to deliberate on means of taking the technology forward invited the press and public thus, bringing (this) science into the public eye for the first time.



The controversy contd.

- The meeting also marked the beginning of an exceptional era for both science and public discussion of science policy.
- Due to the practical applications of the technology, funding for research poured in from the private sector and led to the development of biotechnology industry.
- Public debate on the hazards of biotech continued.
- Measures as physical containment by use of hoods and biological barriers in addition to good microbiological practices were advocated by scientists.
- The media became very active in reporting biotech and the controversy increased



The controversy contd.

- Risks were categorized into low, medium and high depending on the potential levels of hazards expected from the experiments.
- Potential ecological disruption was noted for the innovation second to toxicity.
- Interest groups such as the scientists themselves, media personnel, ecologists/environmentalists and organizations that promote human health were first drawn in.



The controversy contd.

- The public knowledge of the processes of the technology brought in the religious groups with sentiments regarding their faiths like use of swine cells for Moslem faithful.
- That the technology was seen as an economically viable innovation attracted private sector funding and their eventual take over.
- This scenario created two additional camps in the GM controversy;
 - the research funding multinational companies with economic interest and
 - the public who feel they are being exploited.



The controversy contd.

- These interests groups including governments of various countries and non governmental organizations have responded / reacted in one way or the other in the biotech controversy
- In March 1998, the US Patent Office granted the USDA and the cottonseed company Delta Pine Land a patent for a system that could protect intellectual property contained in each genetically modified seed.
- The USDA was interested in the technology, which would produce sterile seeds, as a way to offer U.S. crops and biotech traits to other countries without concern that the technology would be pirated.



The controversy contd.

- Anti-biotech groups dubbed the innovation ‘terminator’ technology and implied that farmers in the developing world, who save seed from year to year, would be forced to buy new seeds every year.
- Each group approaches the argument from self preservation stand and philosophical stand points of the organizations they represent.
- Below is a treatise on the public and what they stand for in relation to crop biotechnology



Overview of the major controversy surrounding GM crops

- The ecological effects of releasing GM seeds into the environment
- The impacts of GM crops on the global seed markets
- Ethno religious consideration in biotech application
- Public Health considerations and the role of risk assessment in evaluating the safety of transgenic products



Overview of the major controversy.

- Farmer and consumer preferences in the adoption of GM products
- The impact of global use of GM crops on biodiversity.
 - In all the above there is are group(s) representing the opposition constituted by the public on one hand and of course the proponents, the biotechnology companies , their promoters and scientists on the other.



The public

- Microbiologists at the Asilomar conference were the first to raise the issue of risk to scientists and staff involved in biotechnology research .
- The ecologists and environmental campaign groups like the green peace were concerned with environmental effects of the release of biotech crop in the environment.



The public

- The food and feed industry, represented by organizations such as the Grocery Manufacturers of America (GMA, 2001) and the International Food Information Council (IFIC, 2000), came out in support of biotech foods.
- Processors and traders, such as Cargill, ADM, and Conagra expressed vocal support for biotech crops, while not engaging in discounting GM crops relative to non-GM.



The public

- The government (US EPA, 2001) and scientific communities (AgBioWorld, 2002) have also lent their support to biotech crops.
- Monsanto, one of the major global players in the industry expressed her determination to play by the rules of science and accommodate any moral implications of their activities.
- They had the following as their cardinal operational guidelines;



The public

Mosanto-

- Impeccable science and grower demand are only the first steps in selling our products.
- Information about biotech products must be clear and delivered by credible authorities.
- There are many stakeholders with strong interests in the issue of agricultural biotechnology. Hence, a 'go-it-alone' strategy is not always advisable.
- Carefully listening and responding to legitimate issues and concerns of consumers and other societal groups is paramount to the effective introduction of biotech products.



The Public-Multinational Biotech Company

- These principles have been put to work as Monsanto continues its efforts to improve public acceptance of agricultural biotechnology.
- The company also created a forum for interaction with and education of the public on matters relating to biotech with the following mandates;
 - Creation of advocacy programmes.
 - Engagement of credible messengers through scientific outreach efforts to objectively discuss the risks and benefits of biotechnology



The Public-Multinational Biotech Company

- Lack of public funding of biotech research led to the shift from public to private sector currently dominated by five multinationals; Monsanto, Dupont, Sygenta, Bayer and Dow.
- In 2001, Monsanto products were used on 91% of the total world area devoted to GM crops (Meijer & Stewart, 2004).
- The trend has been a reduction in dominance of one company but mergers are strengthening same



The Public and Their Activities.

- Effectively communicating the benefits of biotech to different stakeholders.
 - Through initiatives such as the Council on Biotechnology Information, they are building critical coalitions and improving public awareness (Kruger, 20001)



Farmers' position and factors enhancing biotechnology adoption globally

- Among the major stakeholders in the biotech debate and controversy are the farmers.
- A pertinent observation is the acclaimed growth of adoption in spite of the potential limitations of the technology.
- Farmers especially in the USA, need new weed control strategy due to the increasing weed resistance to the available herbicide
 - This is an attraction for herbicide tolerant crops



Farmers' position

- Also, in USA, due to declining global grain prices, farmers were looking for a technology that would reduce production cost and increase yield.
- The US already has in place a regulatory framework via the Department of Agriculture (USDA), Environmental Protection Agency (EPA) and Food and drug Administration (FDA).
 - This obviated the need for tedium of new regulatory frameworks for GM crops and food
 - The result is that GM foods are basically regulated as conventional foods in the US (based on substantial equivalence)



Farmers' position contd.

- Altogether, there was a strong belief within the biotech industry that sound science would drive consumer acceptance of products that provided benefits to farmers and the environment.
 - Consume benefit did not seem critical in all these
- However, the potential flow of terminator genes (if it were to be adopted) into and between food crops such as wheat, corn, rice, barley and sorghum raised concerns.



Farmers' position contd.

- This is because although terminator gene would not spread any further, it also means that an unpredictable number of seeds could be dead.
- There is also the concern that patenting of GE products would raise the cost of farmers input as the intellectual property right conferred on the inventor will be transferred to the users of the technology.
- To the farmer, biotechnology is just a tool and would be accepted if it makes an economic sense.



Farmers' concern: the seed system

- There is a strong apprehension over the global control of agricultural seed system by the biotechnology companies.
 - How will the scenario affect farmers choice of seeds?
 - What effect would this have on the cost of input?
- How would these affect consumer preferences, and costs?



Environmental Activists' and their Concerns

- Some potential risks are associated with the cultivation of GM crops as considered by ecologists, microbiologists and population geneticists
- These form some of the basis for the agitation against the technology.
- They include but not limited to;



Environmental activists' and concerns.

- What is the environmental impact of GM crops?
- Is there any possibility of gene flow from GM crops to nearby non-GM plants?
- Are there risks that herbicide tolerant genes released in the field may flow to weeds and thus create super-weeds?
- Do herbicide –resistant transgenic plants contain higher quantities of herbicides?



Environmental activists' and concerns.

- How likely is it that transgenes such as antibiotic resistant genes will move into natural microbial populations?
- What is the impact of toxins produced by pathogen resistant transgenic crops on non target organisms, such as beneficial insects and microbes?
- And if some of the above do occur, is there any cause for concern? (Giovannetti, 2003)



Health activists' concerns

- Some key issues have been raised with respect to the potential health risks associated with GM foods including the inherent toxicity of the transgenes and their products:
 - The unintended pleiotropic or mutagenic effects of the process of transgenesis.
 - Also of concern is the fear of the transgene expressing allergenic proteins.
 - Does the possible transfer of antibiotic resistance marker gene from ingested GM food pose health hazards?



Health activists' concerns

- Does genetic modification affect the nutritional quality of the GM food?
 - Proponents of the technology aver that foods produced via genetic modification is substantially equivalent in quality to those produced using non GM methods.
- Does the transgene product affect non-target organisms?
- There is a consensus among FDA scientists that GM foods could lead to unexpected, hard to detect side effects that may manifest over long time



Health activists' concerns

- Allergens, toxins, new diseases and nutritional problems.
- Transgenes for insect resistance that establish in wild populations could have negative effects on native herbivores as well as species with which the native herbivores interact.



Potential increases in pesticide usage- health concerns.

- Environmental and health concern groups point out that GM crops that are herbicide tolerant use more herbicides thereby heightening the exposure of personnel and the environments (Benbrooks, 2012)
- Other concerns expressed by those opposed to biotechnology development include the unnaturalness of the processes of biotechnology and the products.
- And from a religious point of view: That the biotech process amounts to playing God.
 - This is perhaps one of the earliest voiced reasons for the opposition to biotech (particularly, genetic manipulation)



Other concerns

- Globalization of food system where choices of food will be limited.
- Denial/ deprivation of cultural food preferences or food sovereignty.
- The unnaturalness of the process of transgenesis.
- Insult on God for transgressing natural processes.



Reactions and responses to the public outcry to biotechnology development.

- The public outcry to rise in biotechnology has resulted in introduction of measures to address the issues raised either as risks potentials or for safety assurance
- Such measures include;
 - Risk analysis procedures for GM food and food products.
 - Development of regulatory procedures.
 - Review of position on IPR and Terminator gene policy for the interest of developing countries.



Regulatory issues- Labelling.

- Issues regarding the rights of individuals to choose or decide what to eat or not to eat has resulted in the proposal to identify GM food and food products by labeling them accordingly.
- Dearth of regulatory infrastructure in most developing countries constraining adoption in developing countries.
 - Most developing countries are developing biotech regulatory frameworks based on biosafety bills and policies
- Ambivalence in regulatory regimes between USA and the European Union.
 - This has impacted the adoption of the technology between different countries torn between European and American approaches



Class Discussion (1 hour)

- This will centre around examples of measures that have evolved as response to the controversy generated by the technology and how these have benefited biotechnology development.
 - Examples should preferably be taken from local scenarios
 - Members of the class should be encouraged to think outside textbook situation to interrogate how local communities may react

