Food Security and Biotechnology in Africa

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

MODULE 5

ETHICS AND WORLD VIEWS IN RELATION TO BIOTECHNOLOGY

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Course Structure/ Module Content

- Unit 1; Overview of the subject of Ethics
- Unit 2; Diversity of socio-cultural world-views and their impacts on the uptake of biotech
- Unit 3; Ethical issues in the uptake of Biotech
- **Unit 4; Case Studies of the influence of ethical concerns in the use /adoption of biotech**

Total of 20 hours

Final Version; February 2017

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Overview / Background to Module 5

- As an important tool for guaranteeing food security, biotechnology comes with ethical challenges
  - Biotech processes & products elicit considerable ethical questions, arguments & concerns
  - These ethical concerns are numerous because of different socio-cultural & religious world views
- Understanding the subject of ethics related to biotechnology will aid quality decision making
- Understanding the ethical concerns & strategies to manage them are essential for uptake of biotech.

Aim of Module 5

To expose the students to ethical considerations and prevailing world views that influence disposition to, and uptake of biotechnology in different countries of the world

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

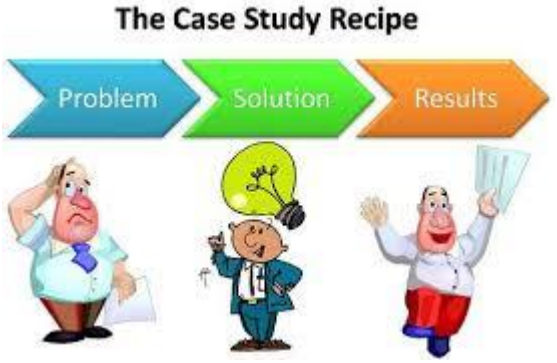
Lecture 1

The meaning and characteristics of case methods of learning (40m).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

Unit 4: Lecture 1; (40 minutes)
The meaning and characteristics of case methods of learning

- Students are expected to understand
  - the meaning of case method or learning
  - the basic concepts of case method of learning
  - the characteristics of case method of learning
    - be in a position to raise cases and examples for case based learning and interrogate such cases in an ethically compliant learning environment
- It also seeks to challenge students to engage the issues being discussed and participate in the deliberative process



Meaning and features….

- The case study method is a way to introduce students to real-life situations that requires them to think about issues from a variety of different viewpoints
- It enables students to challenge their own views.
- It often involves role-playing activities in which students are asked to adopt and defend a view other than the one they personally hold.

- In the classroom setting, students must adapt their position in light of critiques and counter arguments given by other members of the class

……meaning and features….

- A case study activity often ends with an opportunity for students to discuss their own personal views on the issue presented,
  - and how these views may have changed over the course of the activity
- Whereas the lecture method concentrates primarily on conveying information in a one-way format,
  - case studies give students an opportunity to actively take part in the learning process
- Case method, unlike debate, is not intended to be adversarial or combative
  - and does not aim to convince as to bring up as many view points as possible

…..meaning and features

- Helps students to understand controversial issues in their full complexity with appreciation for a variety of different points of view and the reasons supporting them
  - There may not be a single right answer or approach (hence they are dilemmas) but there are some wrong ones (answers that avoid reflection, rely on intuition or rigid inflexible rules or result in deliberate, unjustifiable harm to others)
- Case methods must be based on group discussion
- The discussion must take place among the participants; the instructor providing only guidance
  - There must be a high level of participation; everyone should try to participate
  - Experimentation is accepted. People will not be held to their views and contrarian positions are encouraged to enrich discussion; unpopular views are welcome
  - Everyone is expected to listen to and treat others' views with respect

Skill values of case methods

- Ability to research; to collect and analyse data in order to provide evidence in support of a position
- Ability to evaluate and criticize opposing viewpoints, and to respond to similar criticisms of one's own view
- Ability to fairly consider an issue from different sides
- Ability fairly to consider all sides and understand and synthesize information from different views in order to arrive at a compromise consistent with all contending positions
  - It is important that only ethical and legal viewpoints make it to the compromise final position

Characteristics of case methods

- Real-life scenarios are at the heart of case studies
- Case methods are typically used where complex interactions require professionals to exercise judgment rather than to apply rules /principles in prescriptive ways.
  - It encourages people who are interested in ethical judgement to pursue personal reflection and public discussion about ethics
- Case studies encourage a vibrant connection between theory and practice--often missing in lecture and textbook learning–
  - invites solutions that must be found by an interactive consideration of means and ends
- Because cases are based on practical reality, they lend credibility and relevance to contemporary issues while helping users build problem solving skills.

Making a good case…..

- A good case must elicit excitement & controversy.
- Cases with a sense of immediacy and touches on current events or issues that personally affect the lives of students, it will elicit participation.
- A good case is also one capable of provoking conflict and controversy- reasonable people could disagree on the facts and outcome of case.
- A good case will force the different sides to make a decision
  - a reasoned judgement (even if final resolution is not possible), preferably incorporating the good reasons that different groups bring to the table.

…….making a good case

- It is more important to develop a deep understanding of issues involved in a case than to arrive at a judgement or conclusion.
- A good case will force participants away from complacency
- The object of a good case is to learn the different sides of an issue rather than to win one's case
- It is not important that a case is popular, obvious or well received-
  - it is very important that the case is backed by solid evidence.

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

Lecture 2

Recap of framework for analysing ethical issues (20m).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

Unit 4: Lecture 2; Recap of framework for analysing ethical issues (20m)

- Framework for analysing ethical issues has been explored in UNIT 3 / Lecture 3 (for 2 hours).
- This lecture is intended to refresh output from that activity as it relates to
  - Consequentialism;
  - Deontology;
  - Virtue & African Moral Theory;

  as bases for analysing ethical issues raised in crop, animal and environmental biotechnology

The issues at stake…

In **respect plant biotech** the issues relate to the technology being:

- **Blasphemous**
- **Unnatural**
- **Disrespectful**
- **Unsafe** and having
- Negative **Socio-economic** consequences

Similarly, in respect **animal biotech** the issues relate to the technology being:

- **Blasphemous**
- **Unnatural**
- **Disrespectful**
- **Unsafe** and having
- Negative **Socio-economic** consequences

…..and in the environment

…the issues relate to:

- Escape of transgene to Wild-type plants/ horizontal gene transfer
- GM Plants with selective advantage --leading to super-weeds
- Crossing of species boundaries
- Herbicide /pesticide damage to dependent wildlife and non-target organisms
- Development of resistance in insect pests
- Increased use of herbicides and pesticides
- Loss of biodiversity (crop and wildlife) and genetic diversity
- Unpredictable gene expression and flow (‘genetic pollution’)
- Alteration in evolutionary pattern
- Loss of ecosystem in marginal lands/ conversion of lands to agriculture
- Agricultural Intensification
- Contamination of soil and water

Response / approaches to handling bioethical issues

Effective discussion of the issues raised above can be best achieved by keeping eye on predominant concerns:

- Uncertainty/ precautionary principles
- Consent, labels and choices

These may then be discussed on the bases of methods in ethics as developed in unit 1c (approached as below)

Guide to analysing ethical issues related to animal biotech

Ethical Issues	Ethical Framework			
	Consequentialism (Mill's Utilitarianism)	Deontology (Kantian ethics)	Virtue ethics (Aristotle's moral theory)	African moral theory
Blasphemous				
Unnatural				
Disrespectful				
Unsafe				
Unfair				

Guide to analysing ethical issues related to crop biotech

Ethical Issues	Ethical Framework			
	Consequentialism (Mill's Utilitarianism)	Deontology (Kantian ethics)	Virtue ethics (Aristotle's moral theory)	African moral theory
Blasphemous				
Unnatural				
Disrespectful				
Unsafe				
Unfair				

Guide to analysing ethical issues related to environmental biotechnology

Ethical Issues	Ethical Framework			
	Consequentialism (Mill's Utilitarianism)	Deontology (Kantian ethics)	Virtue ethics (Aristotle's moral theory)	African moral theory
Escape of gene to wild type				
Super-weed				
Super-pests				
Greater use of chemicals				
Loss of biodiversity				
Loss of gene diversity				
Genetic pollution				
Other consequences				

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

Lecture 3

Evolution of Ethical Debate associated with the emergence of genetic engineering (1h).

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Unit 4: Lecture 3; Case Study 1: Evolution of Ethical Debate associated with the emergence of genetic engineering (bioethics) (1h)

- What was the state of bioethics debate prior to the emergence of genetic engineering?
- How has the emergence of genetic engineering influenced the evolution of bioethical debate?
- How has emergence of genetic engineering impacted the diversity of bioethical considerations?

Students are expected to appreciate the evolution of bioethical debate (from medical ethics to bioethics) in the light of developments in biotechnology

Concept & Scope

Defined “as the systematic study of human conduct in the area of life sciences and healthcare, insofar as this conduct is examined in the light of moral values and principles”

- the concept of bioethics as a field of applied ethics encompasses
  - Medical ethics
  - Animal Ethics
  - Environmental ethics

These also correspond to the main areas of concerns related to the practice of biotechnology

- They are complexly interwoven in the context of biological commonality

- Bioethics provides a disciplinary framework for the whole array of moral questions and issues surrounding the life sciences (human beings, animals, and nature).

Early History

- History of bioethics & bioethical debates are rooted in Hippocratic writings (500BC)
- Centred around doctor-patience relationships (beneficence/ non- maleficence /confidentiality/ non exploitation of patient).
  - Early bioethics was synonymous with medical ethics; centred around the physician who made the decisions in the patient's best interest,
  - The medical knowledge of the physician needed to be guided by ethical principles
  - In some cultures he was also a priest who offered sacrifices

Evolution of bioethical debates…

- Issues around Nazi medical experiments in WW II
- Other unethical medical researches/ experimentation & matters related to (lack of) informed consent of participants introduced new challenges in bioethics.
  - Nuremberg trial & the Nuremberg code followed the discovery of Nazi human experimentations-
    - advent of informed consent in matters of medical experimentation
  - Information related to medical research in which subjects did not know they had been recruited emerged- early bioethics debate; the Belmont Report in US & Helsinki Declaration
  - Early sustained writings in bioethics and the influx of other disciplines into this new field; rapid expansion leading to the emergence of bioethics as a distinct field
  - Establishment of the earliest centres of bioethics

….evolution of bioethical debates….

Advances in medical sciences – ICU, life support facilities, dialysis, definition of life & death, organ transplantation etc.

- Medical decision making & ethical debate gets more intense and complex.
- Earliest medical selection committees emerged to decide who received what (dialysis, transplant or other limited resource) in parts of US.
- Life support, end of life / beginning of life debate increased the complexity of the dilemma
- Contraception /abortion debate; euthanasia / assisted suicide weighed in and religion became very important in the debate
- Economics of health care access also became important in bioethics debate
- Non medically qualified / the general public became interested & involved in making decisions that impacted medical practice, medical research and ethics.

…..evolution of bioethical debates

Discovery of the double helix, advances in molecular biology and genetic engineering, advent / rapid growth in biotech raised the challenges further.

- The discovery of the code of life increased potential and power of biology
- Human genome project & its implications; stem cell research; control of life at basic or genetic level, “playing God” confidentiality and medical/ gender selections, etc.
- Genetic diagnosis and the possibility of genetic discrimination; what level of disclosure can be accepted?
- What about prenatal diagnosis and possibility of genetic selection and custom made children?
  - The ethical challenges related mostly to medical biotechnology

Evolution…..the GM revolution

- Genetically modified organisms and foods; new pesticides, herbicides, species, long term consequences, loss of bio- and genetic diversity, gene pollution, transgenesis etc.
- Increased agricultural productivity, profits and patenting of life forms; big biotech industries and profit motives; subsistence agriculture and under developed nations, etc.
- Animal and environmental ethics
  - Genetic altering of foods and living products may have long term harmful consequences for animals and organism concerned, for the environment as a whole and for humans who consume or are exposed to these products-
    - suppose these potential consequences manifest over a time-scale beyond regulatory monitoring? What are the implications?
- There is a debate relating to the level of disclosure necessary both in medical and food application of this new technology

GENETIC ENGINEERING: EVOLUTION OR REVOLUTION?

Situating Bioethics

"…systematic study of human conduct in the area of life sciences and healthcare, insofar as this conduct is examined in the light of moral values and principles"

- field of applied ethics dealing with the ethical implications of biological & medical practice, research and technology
  - **biology**, the science of living things, including human and non-human life and the environment that sustains it
  - **ethics**, the study dealing with moral values, what is good or bad; right or wrong, and with moral duty and obligation

- Bioethics has evolved as effort to apply ethical thinking or wisdom & moral values to addressing the dilemmas raised by developments in biology & medicine.

The Genetic Revolution

- The DNA structure and function
- Gene mapping and sequencing
- Microorganism as genetic tools- implications for health of humans, animals & the environment
- Applications of the Technology:
  - Medicine
    - Diagnosis
    - Treatment
    - Forensics
    - cloning
  - Pharmaceuticals
  - Food and Environment; ethical issues and controversies relate to:
    - Animal rights
    - Environmental rights and sustainability
    - Human health
    - Labelling and degree of disclosure
    - Patenting and ownership of life forms and gene sequences

Key Ethical Principles in Bioethics

- Autonomy
- Justice
- Equality
- Beneficence
- Non-maleficence
- Respect for human life
- Accountability

Irrespective of the ethical theory used as basis for addressing bioethical dilemmas, these principles will play key roles in the decisions that will be made

Ethical theories as applied to bioethics

In the twentieth century it was shown that traditional ethical theories have difficulty in solving new contemporary problems such biotechnologies.

- The main classical theories in ethics-deontology and utilitarianism (and to some degree Virtue ethics) have been modified in order to deal more properly with bioethics situations-
  - Consistently and
  - Applicable to variety of situations

Deontological approach to bioethics

Applies strict moral rules such as those of the Catholic Church- very influential in medical ethics

- Places strong emphasis on sanctity of human (life)
- Moral status is assigned on the basis of rationality- respect for persons and human dignity
- Human capacity for autonomy- truth telling
- The Categorical Imperative- Act in such a way that you treat humanity, never merely as a means to an end, but always at the same time as an end
- Applicable in animal and environmental ethics

Consequentialist approach to bioethics

- *The consequence principle*: The consequences of a given action are the measure of its moral quality.
- *The utility principle*: The moral rightness and wrongness of actions are determined by the greatest possible utility for the greatest possible number of all sentient beings.
- *The hedonistic principle*: The consequences of a given action are evaluated with reference to a particular value as follows:
  - Promoting pleasure, or
  - avoiding pain, or
  - satisfaction of interests or considered preferences, or
  - satisfaction of some objective criteria of well-being.
- *The universal principle*: Maximize the total utility for all sentient beings affected (animal ethics)
  - Preservation of nature (environmental ethics)

Moral judgements, according to utilitarians, should always be impartial and universal

Principlism or the four principle approach

- Not part of discuss from outset but may be read for its utility is dealing with moral dilemmas in biotechnology

Virtue (moral) ethics approach to bioethics

The general idea of virtue ethical approaches in bioethics is that one should act in accordance with what the virtuous agent would have chosen

- An action is morally right if it is done by adhering to the ethical virtues in order to promote human flourishing and well-being;
- The action is morally good if the person in question acts on the basis of the right motive as well as his or her action is based on a firm and good character or disposition.
- An action that is morally right (for instance, to help the needy) but performed according to the wrong motive (such as to gain honour and reputation) is not morally good.
  - this can be important in discussing commercial biotech.
- The right action and the right motive must both come together in virtue ethics.

African Moral theology

This evolving field of ethical discuss may be taken on case specific bases based on the environment of application.

Examples may be drawn from

- traditional agriculture and
- traditional medicine

to engage with students on how African moral theology can be deployed to solve moral dilemmas that arise from the applications of biotechnology in securing African food security

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

Lecture 4

Case Study 1: Uptake of Biotechnology in America (1h).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

Unit 4: Lecture 4;
Case Study 1: Uptake of Biotechnology in America (1h)

- Evolution of agro-biotechnology in America
- Uptake of agro-biotechnology in America and the impact of regulatory framework
- State of agro-biotechnology in America

Students are expected to appreciate the evolution of biotechnology related to food production in United States of America; and how the regulatory framework has influenced uptake of the technology by farmers and consumers

GM crops in the America

- Engineering of recombinant DNA molecules- 1973
- 1995-96, GM crop revolution starts with development of pest and herbicide tolerant corn, cotton & soybean in US;
- 1999- roughly half of soybean and a third of corn in US were GM
- Reduced management /tillage; less pesticide /herbicide use (leading to improved income) attracted farmers
- Growth of GM dominated by US, Canada & Argentina; planting 99% of all GM in 1999

- Technology developers targeted wealthy seed buying farmers in developed countries and not subsistence farmers (hence crops of poor countries were not modified)
- Today, over 70% of processed food in US contain GM & over 90% of corn, soya and cotton grown in US are GM

GM crops in the America

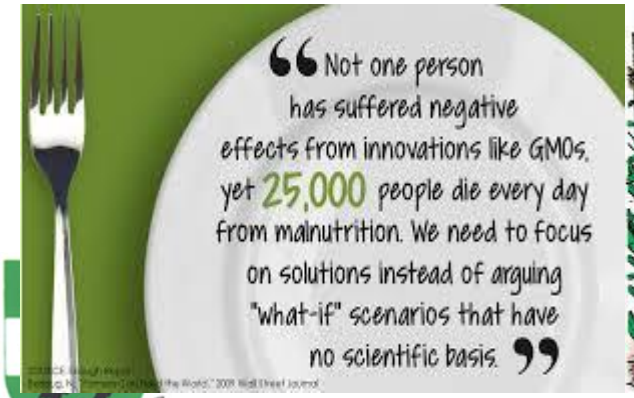
- Policy choice in America aided the growth of GM
  - US adopted clearly permissive regulatory approach to GM
    - GM crops are screened for food safety and biosafety using the same methods & agencies employed for conventional crops
    - Market for GM crops were allowed without new labelling or segregation restriction
    - Development was clearly market driven / profit oriented; government provided incentives & research funds as well; companies funded development of crops that will be bought by farmers

Regulatory Regimes governing GM crops

Five major policy issues drive regulatory regimes that govern GM and influence adoption.

These relate to

- intellectual property rights policy,
- Biosafety policy,
- food safety and consumer choice policy,
- Trade policy,
- public research policy and investment policy.



Gradation of policy towards GM

These policies may influence GM adoption in any of four ways

- Promotional- policies that accelerate the adoption/ spread of GM
- Permissive- policies that neither promote nor impede the adoption of GM; neutral policies
- Precautionary- policies that intend to slow the adoption/ spread of GM
- Preventive- policies that tend to ban or block the spread of GM

The nature of policies adopted by nations have impacted the adoption/spread of GM food and technology

Policy options towards GM (America)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights	**Full patent protection + plant breeders' rights (UPOV 1991)**	PBRs un der UPOV 1991	PBRs un der UPOV 1978, preserves farmers' privilege	No IPRs for plants or animals / IPRs on paper–not enforced
Biosafety	No careful screening, only token screening, or approval based on approvals in other countries	**Case- by- case screen for demonstrated risk, depending on intended use of Product**	Case- by- case screen for scientific uncertainties owing to novelty of GM process	No careful case – by case screening; risk assumed be cause of GM process
Trade	**GM crops promoted to lower commodity production costs & boost exports; no Restrictions on imports of GM seeds / plant Materials**	GM crops neither promoted /prevented; imports of GM limited in same way as non-GM in accordance with science based WTO Standards	Imports of GM seeds & materials screened/ restrained separately & more tightly than non-GM labelling requirements imposed on import of GM	GM seed and plant imports blocked; GM- free status maintained in hopes of capturing ex port mar ket pre mi ums
Food safety & Consumer choice	**No regulatory distinction drawn b/w GM and non-GM foods when either testing or labelling for food safety**	Distinction b/w GM & non-GM foods on existing food labels but not segregation of market Channels	Comprehensive labelling of all GM foods required and enforced /segregated market channels	GM food sales banned or warning labels that stigmatize GM foods as unsafe to consumers required
Public Research Investment	Treasury resources spent on both development and local adaptations of GM crop technologies	Treasury resources spent on local adaptations of GM crop technologies but not on development of new Transgenes	No significant treasury resources spent on GM crop research or adaptation; Donors allowed to finance local adaptation of GM	Neither treasury nor do nor funds spent on any adaptation or development of GM crop technology

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

Lecture 5

Case Study 2: Uptake of Biotechnology in Europe (1h).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

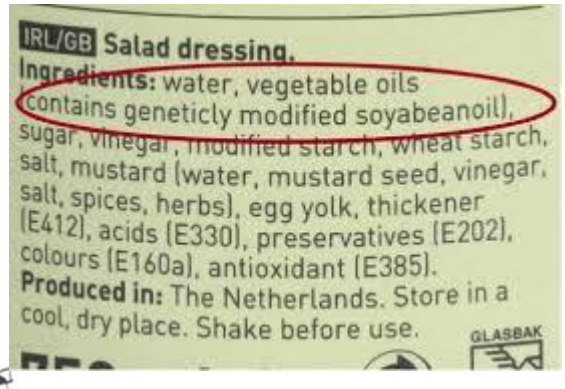
Unit 4: Lecture 5; Case Study 2: Uptake of Biotechnology in Europe (1h)

- Uptake of agro-biotechnology in Europe and the impact of regulatory framework

Students are expected to appreciate how the regulatory framework has influenced uptake of the technology by farmers and consumers in Europe

Regulating GM in Europe

- Regulatory approach used in Europe requires new and separate laws that are specific to GM foods and crops
- Europe also requires the creation of new institutions (e.g., national biosafety committees); separate screening and approval process for GMOs
- Europe can decline to approve a new technology on grounds of "uncertainty" alone, without any evidence of risk; a hypothetical risk that has not been tested for is sufficient reason for blockage- precautionary


IRL/GB **Salad dressing.**
Ingredients: water, vegetable oils contains geneticly modified soyabeanoil), sugar, vinegar, modified starch, wheat starch, salt, mustard (water, mustard seed, vinegar, salt, spices, herbs), egg yolk, thickener (E412), acids (E330), preservatives (E202), colours (E160a), antioxidant (E385).
Produced in: The Netherlands. Store in a cool, dry place. Shake before use.
GLASBAK

- In Europe products in the marketplace with some (greater than 0.9%) GMO content must carry identifying labels

Bases for European position…..

- The first generation (95-96) of commercial GM crops - cotton, maize, & soybeans provided benefits mostly to farmers in the form of lower costs for the control of insects and weeds.
- Europe does not have many cotton, maize, and soybean farmers, so the new technology had few champions.

- For the 99 per cent of Europeans (consumers) who were not maize, cotton, or soybean farmers, the new technology offered almost no direct benefit at all.
- For consumers in Europe, the new GM products did not taste, look, smell or prepare any better, or deliver any improved nutrition.

……Bases for European position

- The vast majority of Europeans who saw little or no direct benefit from the technology, felt they had nothing to lose by keeping it out of farm and of their food supply.
- They welcomed a highly precautionary regulatory approach as one way to ensure that outcome.
- Crises in food system and regulation occasioned by mad cow and other disease incidents in the mid 90s damaged consumer confidence in regulation and food safety and negatively impacted acceptability of GM in Europe

efsa
European Food Safety Authority

- This is different from the European approach to biotech medicines where stakeholders have roundly accepted biotech without hesitation

Policy options towards GM (Europe)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights		**PBRs under UPOV 1991**		
Biosafety		Case- by- case screen for demonstrated risk, depending on intended use of Product	**Case- by- case screen for scientific uncertainties owing to novelty of GM process**	
Trade		GM crops neither promoted /prevented; imports of GM limited in same way as non-GM in accordance with WTO Standards	**Imports of GM seeds & materials screened/ restrained separately & more tightly than non-GM labelling requirement imposed on import of GM**	
Food safety & Consumer choice		Distinction b/w GM & non-GM foods on existing food labels but not segregation of market Channels; label above 0.9% GM content.		
Public Research Investment	Treasury resources spent on both development and local adaptations of GM crop technologies			

Uptake Drivers in Europe… Farmers

Farmers attitude to Biotech crops will be driven primarily by economic benefits/ loss from adoption

- Reduction in losses caused by pest/ weed; control cost reduction
- Technical recommendation and extension opinion
- Benefit of direct sowing and lesser tillage
- Greater yield/ better quality of harvest
- Improved overall income from various benefits of adoption
  - A bit of psychological benefit of being part of technological growth/ Ease of farm process management
- Loss / impact of implementation of coexistence measures, insurance and related costs if any
- Concerns for long term environmental impact of growing GM/ benefits derived from less / flexibility in the use of herbicide
- Farm size and impact of seed procurement
- Marketing concerns and consumer attitude
- Etc.

Uptake Drivers in Europe… consumers

- Mistrust of GMO- not being obviously better / cheaper than conventional foods
- Food security based on conventional agriculture makes biotech contribution non- outstanding
- Mistrust of source- being developed by mostly large for profit organisations
- Confidence issues arising from the mad cow disease and other food safety concerns of the early 1990s

- Uncertainty about future consequences of consuming GM foods
- Concerns for environment driven by vocal green parties /environmentalists

There is clear conflict between the attitude of European farmers and consumers making progress in adoption slow and not urgent

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

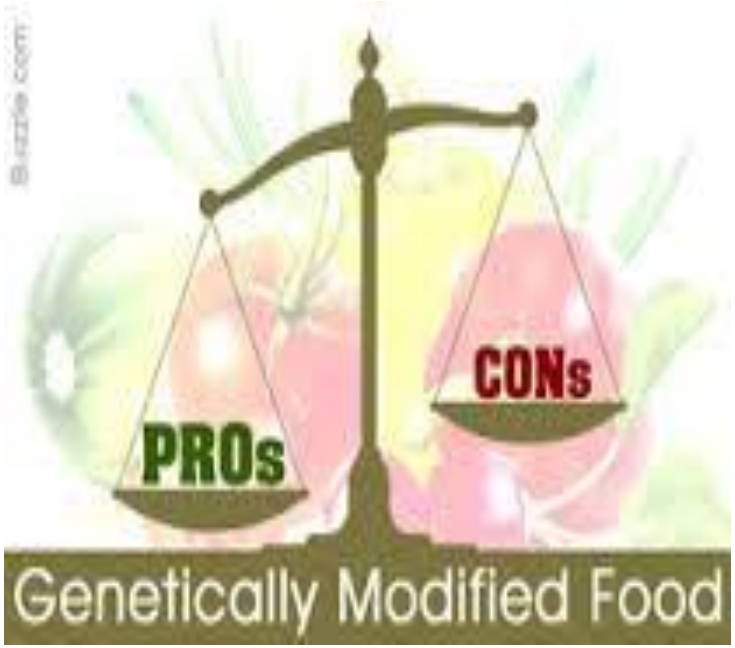
Lecture 6

Case Study 3: Uptake of Biotechnology in Asia (1h).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

Unit 4: Lecture 6; Case Study 3: Uptake of Biotechnology in Asia (1h)

- Uptake of agro-biotechnology in Asia and the impact of regulatory framework



Students are expected to appreciate how the regulatory framework has influenced uptake of the technology by farmers and consumers in Asia. Examples should be drawn from countries with different regulatory environments: China, India, Philippines to illustrate

Policy options towards GM (India)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights				India has its own variety protection law
Biosafety			**RCGM and GEAC approve GM for research and release. Process is slow due to fear of anti-GM backlash. GM cotton approved and released in 2002**	
Trade				GM commodity import not yet approved. Commodity export promoted GM free
Food safety & Consumer choice		RCGM and GEAC require same testing of GM and non- GM foods; no separate GM food labelling require		
Public Research Investment	Treasury resources spent development & local adaptations of GM technologies. Donor funds support GM			

Policy options towards GM (China)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights			UPOV 1978, acceded to in 1998. Weak protection of IPR. Enforcement of IPR is weak	
Biosafety		GM crops screened for demonstrated risks on a case-by-case basis. GM planted and consumed		
Trade		No formal distinction is drawn between GM and non-GM commodity imports		
Food safety & Consumer choice	No distinction between GM and non-GM foods when testing or labelling for food safety			
Public Research Investment	Significant treasury resources spent on both development and local adaptations of GM crop technologies.			

Unit 4

Case Studies of the Influence of Ethical Concerns in the use / adoption of Biotechnology(6h).

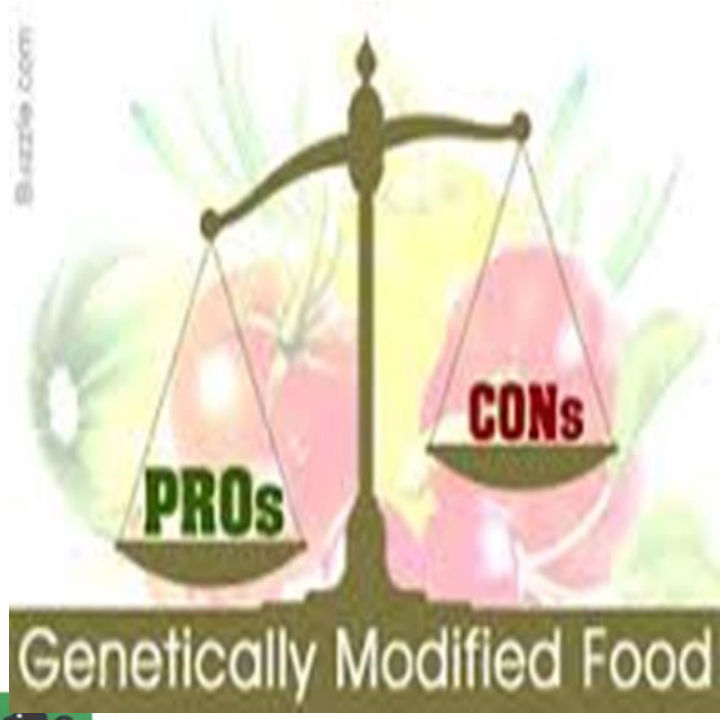
Lecture 7

Case Study 4: Uptake of Biotechnology in selected African countries (1h).

Prof. Jerry O. Ugwuanyi
University of Nigeria, Nsukka

Unit 4: Lecture 7; Case Study 4: Uptake of Biotechnology in selected African countries (1h)

- Uptake of agro-biotechnology in selected African countries and the impact of regulatory framework



Students are expected to appreciate how the regulatory framework has influenced uptake of the technology by farmers and consumers in some African countries. Examples should be drawn from countries with different regulatory environments: Kenya, Zambia, Burkina-Faso and South Africa to illustrate

Uptake of biotech in Africa: Background…

- Green revolution did not produce as much improvement in African harvest as it did in Asia and Latin America
- Indigenous agricultural research and innovation has been slow in SS-Africa
- Africans remain suspicious of "foreign innovations" particularly being driven by profit motives
- African indigenous contribution to the GM debate has been limited and poor; crowded out by external opinion rather than local need
- African opinion has been very strongly influenced by GM sceptical Europe (market/trade, NGO, donors' opinion, cultural)
- Uptake/ adoption of alternative tech (e.g., hybrid seeds) has been poor across much of SS Africa as has been access to other in puts
  - These would have set the stage for adoption of more divisive tech such as GM

- Early development in GM ignored crops such as cassava, sorghum, millet, cowpeas that are of interest to many Africans.

…uptake of biotech in Africa: Background…

- Resistance to GM have focused on the narrow food habit of African and the impact of GM on consumer health
- Technology developers focused on crops of interest to large scale seed buying western farmers
- Over 60 per cent of Africans are farmers who depend directly on agriculture for income & subsistence making risk high.

- Some GM crop traits commercialized outside of Africa- *(insect resistant crops)* could have wide benefits if planted in Africa.
  - GM technology needs to work with African adapted crop varieties to encourage uptake (this could take some time)
- Climate change may put greater pressure on African agriculture going forward

….uptake of biotech in Africa: Background

- Other GM traits in research pipeline, including abiotic stress tolerance traits, e.g., drought resistance, could provide even wider benefits.
- Concerns exist as to whether available GM techs are suited for African agriculture (there is need for domestication of GM in Africa)
- There is little room for farmers risk and experimentation in African agriculture
- Africans have greater need for increased agricultural productivity than Europe or America
- Africa countries require need driven GM policies rather than Europe or American dependent or derived policies

- The regulatory environment (and effect on traditional farming practices) will determine if farmers will grow GM
- Safety matters, regulatory environment, availability, cost and the state of nutrition will impact consumer acceptance

External factors in African GM regulation

- Bilateral foreign assistance – this is most pronounced from European countries
- Multilateral technical assistance (UNEP / Global Environment Facility (GEF) Global Project for Development of National Biosafety Frameworks)
- Advocacy campaigns against GMOs from international (Europe based) NGOs
- Commercial agricultural trade and need to retain and sustain access to GMO sceptical European market
- Cultural influence due to proximity to Europe and influence of colonial history – African leaders follow European examples

Policy options towards GM (Kenya)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights			UPOV 1978, acceded to in 1999	
Biosafety			**NBC screens GM crops according to separate and higher biosafety standards; delays action when in doubt**	
Trade			NBC is slow to approve imports of GM plant materials, even for research purposes	
Food safety & Consumer choice	Food safety laws and labelling laws make no distinction between GM and non- GM foods			
Public Research Investment	Limited treasury resources spent on both development and local adaptations of GM crop technologies. Donor funds support most GM research			

Policy options towards GM (Zambia)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights			UPOV 1978, acceded to in 1999	
Biosafety				No careful case – by case screening; risk assumed be cause of GM process. Bill tends to prohibit rather than encourage biotech research and adoption.
Trade				GM seed and plant imports blocked; GM- free status maintained in hopes of capturing export market premiums
Food safety & Consumer choice				GM food sales banned or warning labels that stigmatize GM foods as unsafe to consumers required
Public Research Investment				Neither treasury nor donor funds spent on any adaptation or development of GM crop technology

Policy options towards GM (South Africa)

	Promotional	Permissive	Precautionary	Preventive
Intellectual Property Rights		Patent protection; PBRs un der UPOV 1991 Biosafety law passed in 1997/2004/2006/food safety act 1972		
Biosafety		**Case- by- case screen for demonstrated risk, depending on intended use of Product**		
Trade		GM crops neither promoted /prevented; imports of GM limited in same way as non-GM in accordance with science based WTO Standards. Import restriction is geared mostly towards trade protection than based on risk perception		
Food safety & Consumer choice		No Distinction b/w GM & non-GM foods on existing food labels; no segregation of market Channels (labelling requirement is new and based on a demand of new consumer protection law if **substantially different from non GM equivalent and for new products only**)		
Public Research Investment	Treasury resources spent on both development and local adaptations of GM crop technologies