The Politics of Genetically Modified Organisms: Global Rules, Local Needs

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To my dearest Switzerland:
A new love that will last a lifetime…

I'M OUT! BUT I WILL BE BACK!!! ☺

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The challenge is to strike a balance between lasting traditions and visionary changes.

Prologue:

If there is one issue that everyone can agree on, is the fact that there are serious flaws in the global food system that leaves more than 850 million people undernourished and over 1 billion overweight in which 300 million of these are obese. Some 2 billion people also suffer from vitamin and micronutrient shortages. Under nutrition in pregnant women and young babies can have irreversible affects for life, while obese people's lives are threatened by diet-related non-curable diseases such as diabetes and heart attacks. [1]

The disagreement lies in the causes for the flaws of the global food system. Many argue that the solution is found in distribution, trade laws, climate change, biotechnology, intellectual property etc. Whether it is one of the previously mentioned, all of them, or a random combination, there is a tremendous unbalance that needs to be addressed.

For the past two decades, many governments and organizations view the creation of biotechnology as the answer to their prayers. Political activists view biotechnology as a totalitarian solution where the interests of developed countries are taken first into consideration and leave least developed countries with limited choices. Environmentalists worry that biotechnology will have long-term negative affects on agricultural land and the benefits are not worth its eventual drawbacks.

Controversies surrounding GM foods and crops commonly focus on human and environmental safety, labeling, consumer choice, intellectual property rights, ethics, food security, poverty education, and environmental conservation. Specifically, potential

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[1] Tansey, Geoff. "Farming, Food and Global Rules." The Future Control of Food: A Guide to International Negotiations and Rules on Intellectual Property, Biodiveristy, and Food Security . By Geoff Tansey and Tasmin Rajotte. Ottawa, Canada: Earthscan, 2008. 3-25.

human health impacts include allergens, transfer of antibiotics resistance markers, and other unknown long-term effects. As for environmental impacts their may be unintended transgenic mix through cross pollination, unknown effects on other organisms, and loss of flora and biodiversity. In regards to intellectual property, there is a domination of world food production by a few companies and an increasing dependence on industrialized nations by developing countries, biopiracy, and foreign exploitation of natural resources. In addition there is an ethics aspect that claims a violation of natural organisms' intrinsic values. As for labeling, there is cross-law problem due to mandatory labeling in some countries and not in others.[2]

Introduction:

Modern biotechnology offers promising advances in many fields. Its advocates point to biotechnology's potential to enhance food security, by enhancing both the productivity and quality of food crops, and to alleviate the environmental impacts of agricultural production by reducing the use of pesticides. Medical biotechnology has also made important strides, offering new tools for the diagnosis and treatment of diseases. Industrial biotechnology, while still in its early stages, is promising to provide new industrial applications that use fewer resources and generates less waste.

On the other hand, the rise of modern biotechnology has brought with it verbal and passionate opponents who emphasize environmental, health, ethical, and equity concern. They argue that biotechnology is yet another technological fix for alleviating hunger and poverty that abandons the primary causes of food insecurity, such as highly subsidized agricultural production in developed countries and inequitable distribution of

[2] Stilwell, M. (1996b). *Implications for Developing Countries of Proposals to Consider Trade in Genetically Modified Organisms (GMOs) at the WTO*. Center for International Environmental Law. Geneva. Switzerland.

food. Moreover, they argue that current biotech applications may pose potential long-term risks.

In responding to these opposing viewpoints, governments have taken a multiplicity of different policy and regulatory approaches, with some willingly embracing biotechnology while others seek to prohibit it. International trade is now increasingly bringing these different approaches to conflict. Countries that have moved rapidly in applying the technology would like to see trade in biotech products flow as freely as possible to guarantee returns on their investments and capitalize on the comparative advantage that the technology provides. Other countries, which have taken a more vigilant approach to biotech use and development, have practically closed off their markets through strict import regulations and are opposed to trade liberalization procedures for these technologies and products.

The World Trade Organization's (WTO) ruling against the European Union's application of its approval procedures for biotech products has placed these tensions in focus and heated the debate about countries' regulatory flexibilities in this area. As these conflicts are played out at the multilateral level, many countries, in particular less developed nations, continue to struggle with setting up the necessary policy, legal and institutional frameworks. At the same time, they need to respond to trade pressures from biotech exporters, meet export markets' import regulations, and comply with multilateral rules on trade and biosafety. As a result, these countries are often stuck in the middle of

the biotech debate, while important sustainability issues surrounding these technologies are left largely unaddressed. [3]

Abstract:

Biotechnology in regards to agriculture is complex and cannot be judged by a single factor. Exporters of GM foods have their reasons for exportation, and importing countries have their reasons to accept them. There is not a unified reason for acceptance or rejection. Countries may accept or reject for economic, social, or political reasons. Other countries may accept or reject for environmental and/or health reasons. However, there is the inevitable factor of influence. Some countries like the United States, and supernational powers like the European Union are major elements to the decision making process of developing countries. When it comes to GM foods, the United States and the EU are on opposite sides of the spectrum. The ongoing conflict between the EU and the US has huge implications on weaker nations due to their effect on global trade. On September 26, 2009 the WTO released a final decision in favor of the US, Argentina, and Canada against the EU's Moratorium. Although the majority of EU citizens have a negative stance on GMOs, some countries are skeptical but open, while others remain fundamentally opposed to agricultural biotechnology.

This is an interdependent and globalized world where decisions taken on one side of the world have severe affects on other sides of the world. Balance between the economic, social, and political branches of nations is necessary for peace and prosperity and all that it implies. Therefore whether developing nations decide to side with the US or the EU will have significant affects on their importation and exportation; hence on

[3] Melendez-Ortiz, Ricardo. "Biotechnology: Addressing Key Trade and Sustainability Issues." International Center for Trade and Sustainable Development Feb. 2007: 1-48.

their stability and balance. The direction they are headed is yet to be known. This research will analyze the current situation of GM trade and their implications.

For Starters what is a Biotechnology:

Biotechnology is any technology that uses biological systems or living organisms to make or modify products or processes for a specific use. Biotechnology in this general sense had been in use for thousands of years, starting with the domestication and selection of plants and animals as early as 10,000 BC. More recently, the term has become associated with a scientific process that involves the handling of the DNA. This so-called 'modern' biotechnology includes a variety of different techniques, such as genomics, boinformatics, cloning, embryo transfer and other technologies, which are widely used in the medical, industrial and agricultural segments. Biotechnology also includes the intentional change of the genetic make-up of plants or animals by adding, adjusting or removing one or more of the thousands of genes that control the characteristics of the plant or animal. This process, which is known as 'genetic modification' or 'genetic engineering' takes a useful gene from one plant or animal and inplants it into the genome of another plant or animal. The final altered plant or animal is known as 'transgenic' or genetically modified or engineered, and is often described as a 'genetically modified organism (GMO) or 'living modified organism' (LMO).[4]

A Brief History:

Agricultural biotechnology dates back to 10,000 BC when farmers began to select the most suitable plants and animals for breeding. Soon thereafter, Sumerians used yeast, a type of fungus, to make beer and wine in Mesopotamia. As the plant breeding process

[4] Genetically, Modified. "20 Questions on Genetically Modifed (GM) Foods." World Health Organization Aug.-Sept. 2002: 2-3.

became better known, farmers and early plant breeders would look for varieties with useful characteristics that could be crossed with other varieties to produce offspring that combined the characteristics of both. In the 1860s, Gregor Mendel methodically recorded the passing of traits from one generation to the next by crossing different pea plants to produce offspring with red or white flowers, and wrinkled or smooth peas. He identified the principles of inheritance and marked the beginning of conventional agricultural biotechnology. Major advances in plant breeding followed the revelation of Mendel's discovery. Breeders brought their new understanding of genetics to the traditional techniques of self-pollinating and cross-pollinating plants. [5]

Identifying desirable traits and integrating them into future generations is very central in plant breeding. A few of these traits can occur instinctively through mutation, but the expected rate of mutation is very slow and undependable to produce all plants that breeders are looking for. In the late 1920s it was discovered that exposing plants to x-rays and chemicals would boost the rate of genetic distinction, thereby increasing the variety of characteristics available that breeders and farmers could choose from when looking for useful characteristics for crop breeding. 'Mutation breeding' accelerated after World War II, when the nuclear age's techniques became widely available. Examples of plants that were produced via mutation breeding include varieties of wheat, barley, rice, potatoes, soybeans and onions.

However, the new varieties that result from conventional breeding have many restrictions. The characteristics may not be steady from generation to generation, as in the

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[5] Olby, Robert C., *The Origins of Mendelism*. 2d ed. 1985. Hugo Iltis.

case of hybrid crops. Hybrid seeds are developed by crossing parent lines that are 'pure lines' produced through inbreeding. Pure lines are plants that produce sexual offspring that closely resemble their parents. By crossing pure lines, a homogeneous population of first generation hybrid seed can be produced with unsurprising characteristics. However, if the seeds of the first generation hybrids are used for growing the next crops, the resulting plants do not carry out as well as the first generation material, resulting in substandard results and strength. Also, in conventional breeding, only varieties able to sexually reproduce with one another can share genes. Additionally, it can be difficult to select the characteristics that are of interests from two plants during the reproduction process. While the offspring that results will have characteristics from each parent, a key problem of hybrid breeding- is that genes are transferred randomly from the parents to the offspring. [6]

Modern biotechnology is the most recent stage in the progress of plant breeding technology. Crick and Watson's discovery of DNA's double helix structure in the 1950s held the answer to breaking the genetic code that determines the characteristics of all living organisms.[7] As a result, methods such as genetic modification enabled plant breeders to shift exclusively the gene of interest and allowed them to select genes not only from related varieties but from any organism. Conclusively, desired genes can be transferred more rapidly than through the time-consuming variety-crossing process

[6] Kasinadhuni, S. and Sandall, L. (2005) *Traditional Breeding vs. Biotechnology*, University of Nebraska Institute of Agriculture and Natural Sciences

[7] Wright, Robert. "James Watson & Francis Crick ." TIME Mar. 1999: 17.

required in ‘conventional biotechnology’, while at the same time evading the acquirement of unnecessary characteristics. [8]

Statistics of GM use around the World

Transgenic crops were first commercialized in 1944. Since then, the global area of transgenic crops has increased from 2.8 million hectares to 90 million hectares. The annual growth rate of the global area of approved biotech crops was high in 1977 and 1988. [9] In recent years, growth rates have fluctuated around 15 percent. In 2005, 8.5 million farmers in 21 countries planted biotech crops, approximately 75 percent of which were grown in industrialized countries. The countries include the US, Argentina, Brazil, Canada, China, Paraguay, India, South Africa, Uruguay, Australia, Mexico, Romania, the Philippines, Spain, Columbia, Iran, Honduras, Portugal, Germany, France, and the Czech Republic. [10]

The Science behind Genetic Engineering:

The difference that makes a distinction from one organism to another is programmed in its genetic material. All of the organism’s genes together make up its genome. Some genes determine the length of time it takes for a crop to come to harvest or the extent to which an animal is resistant to disease. Modern genetic modification involves DNA extraction, gene cloning, gene design, transformation, and backcross breeding.

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[8] Petriccione, Barbara Bordogna. "Introduction to GMO: technique and safety." RUIG-GIAN Mar. 2004: 1-19. Swiss Agency for Development and Cooperation

[9] Clive, James. report — *Global Status of Commercialized Biotech/GM* Crops: 2005

[10] Melendez-Ortiz, Ricardo. "Biotechnology: Addressing Key Trade and Sustainability Issues." International Center for Trade and Sustainable Development Feb. 2007: 1-48.

The two main biotechnology traits are herbicide tolerance and pest resistance. Herbicide-tolerant plants have been genetically modified to survive the spraying of a particular herbicide, usually by inserting a gene from the soil bacterium *Agrobacterium tumefaciens* that allows them to survive treatment from glyphosate, a pesticide that can eliminate most weeds in one application. By allowing farmers to apply a single treatment of glysophate to control weeds, herbicide resistance intends to decrease the regularity of use and quantities of chemicals, and allow for the use of chemicals with minor toxicity in the soil.[11] Roundup Ready soybeans, developed by Monsanto, are by far the most popular herbicide-tolerant crop. Grown in the US, Argentina, Brazil, Paraguay, Canada, Uruguay, Romania, South Africa, and Mexico, they represent 60 percent of the global biotech crop area of 81 million hectares of all crops.

Commodity crops, such as maize, cotton, soybeans, and canola, have also been genetically engineered for resistance to pests. When introduced into plants, a gene from the common soil bacterium *Bacillus thuringiensis* (Bt) generates a protein that, when eaten by target species, kills insect larvae and particularly caterpillar pests. Bt is harmless to humans, pets and most beneficial insects such as bees, and has been used for many years in insecticide sprays. [12] Bt maize is the most popular insect-resistant crop, occupying 11.3 million hectares, equivalent to 14 percent of global biotech areas in fields in nine countries: the US, Argentina, Canada, South Africa, the Philippines, Spain, Uruguay, Honduras, Portugal, Germany, France, and the Czech Republic. Bt cotton is also widely used, covering 4.9 million hectares, equivalent to five percent of global

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[11] Food and Agricultural Organization 2004

[12] Hain, P. and Ehly, J. (2005) *Overview of Crop Genetic Engineering*. University of Nebraska Institute of Agriculture and Natural Resources.

biotech area, in China, India, Australia, the US, Mexico, Argentina, South Africa and Colombia. [13]

GM Food and Trade Agreements

No explicit international regulatory structure is currently in place. However, several international organizations are involved in developing protocols for GMOs. The Codex Alimentarius Commission (Codex) is the joining FAO/WHO body responsible for compelling the standards, codes of practice, guidelines and recommendations that constitute the Codex Alimenatirus: the international food code. Codex is developing principles for the human health risk analysis of GM foods. The basis of these principles states a premarket assessment, performed on a case-by-case basis and includes an evaluation of both direct effects (from the inserted gene) and unintended effects (that may arise as a consequence of insertion of the new gene). Codex principles do not have an obligatory effect on national legislation, but are referred to specifically in the Sanitary and Phytosanitary Agreement of the World Trade Organization (SPS Agreement), and can be used as a reference in case of trade disputes.[14]

The Cartagena Protocol on Biosafety (CPB), an environmental treaty legally binding for its Parties, regulates transboundary movements of living modified organisms (LMOs). GM foods are within the scope of the Protocol only if they contain LMOs that are capable of transferring or replicating genetic material. The foundation of

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[13] Dhlamini, Z. (2006) *The Role of Non-GM Biotechnology in Developing World Agriculture*, Policy Briefs, Sci Dev Net.

[14] Genetically, Modified. "20 Questions on Genetically Modifed (GM) Foods." World Health Organization Aug.-Sept. 2002: 2-3.

the CPB is a requirement that exporters seek consent from importers before the first shipment of LMOs intended for release into the environment.[15]

After the WTO's verdict on the EU Moratorium, the agreement on Trade Related Aspects of Intellectual Property Rights was administered by the WTO that sets down minimum standards for many forms of intellectual property regulation. The TRIPS Agreement introduced intellectual property law into the international trading system for the first time and remains the most comprehensive international agreement on intellectual property to date. In 2001, developing countries, concerned that developed countries were insisting on an overly narrow reading of TRIPS, initiated conferences that led to the Doha Declaration that clarifies that TRIPS is meant to "promote access to all."[16]

Many WTO Agreements encourage governments to complement regulatory policies, for example by referencing principles from international organizations, so as to diminish unnecessary trade misunderstandings and reduce the potential for conflict. However, WTO Members do not always agree on the way WTO Agreements should be interpreted in the contexts of the diverse characteristics of GM products and divergent regulatory goals. Individual regulations in the food and animal and plant health area may be written so that they have multiple purposes, not all of which are covered by a single agreement. [17]

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[15] Ricci, Ezra. "Biosafety regulation: the Cartagena Protocol ." RUIG-GIAN Mar. 2004: 1-8. Les Cashiers du Ribiosok

[16] Westkamp, 'TRIPS Principles, Reciprocity and the Creation of Sui-Generis-Type Intellectual Property Rights for New Forms of Technology' [2003] 6(6) The Journal of World Intellectual Property 827-859, ISSN: 1422-2213

[17] Stilwell, Matthew. *Codex, Substantial Equivalence and WTO Threats to National GMO Labeling Schemes.* Center for International Environmental Law. CH

The European Union's Rejection of GMOs

Since the first introduction on the market in the mid 1990s of a major GM food (herbicide resistant soybeans), there has been increasing concern about such food among politicians, activists and consumers, especially in Europe.

In the late 1980s-early 1990s, the results of decades of molecular research reached the public domain. Until that time, consumers were generally not very aware of the potential of this research. In the case of food, consumers started to wonder about safety because they assumed that modern biotechnology is leading to the creation of new species.

In the case of the first GM foods introduced onto the European market, the products were of no apparent direct benefit to consumers. They were not cheaper, nor did they have an increased shelf life, nor did they taste better. The potential for GM seeds to result in bigger yields per cultivated area should lead to lower prices. However, public interest has focused on the hazardous side of the risk-benefit question.

Consumer confidence in the safety of food supplies in Europe has decreased significantly as a result of a number of food scares that took place in the second half of the 1990s that are unrelated to GM foods. This has also had an impact on discussions about the acceptability of GM foods. Consumers have questioned the legitimacy of risk assessments, both with regard to consumer health and environmental risks, focusing in particular on long-term effects. Other topics for debate by consumer organizations have included allergenicity and antimicrobial resistance. Consumer concerns have triggered a discussion on the demand of labeling GM foods, allowing an informed choice. However,

it has proved difficult to detect traces of GMOs in foods: this means that very low concentrations often cannot be detected. [18]

The interests of EU farmers, on the other hand, are less clear cut. While they could benefit directly from more productive technologies, other things constant, the first available GM food crops (maize and soybean) are of minor importance to them.[19] Also, EU agriculture particularly stays in the EU and in the US more than a quarter is exported to other nations. Meaning, the Europeans are more conscious of their consumption. In general, Europeans and others care more about the natural environment than do people in North and South America.

As a result of the WTO's verdict on the EU Moratorium, the EU settled for strict labeling laws from all of their imports that contained higher that .9% of biotech material by saying "this product is produced by GMOs." That way EU consumers have the liberty to pick and choose their nutritional consumption.[20]

What's behind GM food Trade Disputes?

In the US, many GM varieties have been commercially produced and marketed, while in the EU few varieties have been approved: a *de facto* moratorium limited EU production, import and domestic sale of most GM crops from late 1998 to April 2004, and since then strict labeling regulations and a slow approval process had a similar effect. The EU Moratorium was a direct challenge to the WTO's process towards trade liberalization. The EU's policies have substantially altered trade flows and led in

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[18] Stilwell, Matthew, and Brennan Van Dyke. "An Activist's Handbook on Genetically Modified Organisms and the WTO." Center for International Environmental Law: 1-16.

[19] Bernauer, T (2003), *Genes, Trade, and Regulation: The Seeds of Conflict in Food Biotechnology*, Princeton, NJ: Princeton University Press.

[20] Biotechnology Industry Organization 2002

September 2003 to the WTO establishing a WTO Dispute Settlement panel to test the legality of European policy towards imports of GM foods.

The trade impact of the EU's 1998 moratorium was pressing and dramatic. The US share of the EU maize imports fell from around two-thirds in the mid 1990s to virtually zero, as has Canada's share of EU canola imports. The GM-adopting countries lost market share to GM-free suppliers, particularly Brazil for maize and soybean and Australia and Central Europe in the case of canola. This strengthened fears that EU members or other food-importing countries would discount or deny market access to products of food-exporting countries if any GM crops are grown in or even imported into those exporting countries. [21]

The EU Moratorium and Developing Countries

To discover in what direction developing countries were headed, I interviewed Lee Ann Jackson from the World Trade Organization who specializes in Agriculture. According to Jackson, when the EU moratorium was imposed on imports from GM-adopting countries, the international prices of GM foods fell, so much as to cause GM-adopting countries to reduce their output of these crops slightly. In Europe, the moratorium caused the opposite to occur because the import ban rose up domestic prices. If instead the EU were to hypothetically adopt GM varieties, EU production and net exports are higher instead of lower. Additionally, increases in production and exports by the first GM-adopters are slightly less, and decreases in production and net exporters by the rest of the world are slightly more expensive because international prices of GM

[21] Brooks, G. and P. Barefoot (2003), *GM Crops in Europe: Planning for the End of the Moratorium*, Corchester: PG Economics, February.

foods fall more. Jackson believes that the EU moratorium delayed the rest of the world from adopting GMOs.[22]

In order to further analyze the welfare of developing countries in regards to GM trade, two hypothetical and one up-to-date scenario provided by Lee Ann Jackson will be reviewed. 1) When the EU imposed its moratorium, this is similar to an increase in farm protection there and causes the EU to be worst off by $3.1 billion per year, as well as reducing by one-third the gain to GM-adopting North America, while improving welfare for Brazil considerably but for food-importing regions of the rest of the world only very slightly. 2) If instead the EU left it for individual EU consumers to respond and one-quarter of them simply avoided these products because they may contain GMOs, the welfare effects are almost the same as in the first case, because even though there is less EU consumption there is also less production in high-cost Europe and so less wastage of resources there. 3) If the EU were to take the opposite view and allow GM adoption, it would gain more because of its own productivity gains and so too would net importers of these products elsewhere in the world, while net exporters of other agricultural products would be slightly worst off.

In Jackson's concluding remarks, she stated that the EU's moratorium induced other countries to also impose one as well. Second, these are comparative statistic simulations ignore the fact that GM food Research and Development is on-going and that investment in this area has been reduced considerably because of the EU's extreme policy stance. In her opinion, developing countries are at a great loss because there is no

[22] Jackson, Lee Ann. Personal Interview. 4/3/09: 11:00. World Trade Organization

spillover of technology advancement that in her view is necessary for the 'welfare' of developing countries.[23]

What impact do the results of an EU moratorium have on farm household incomes?

The effects on real farm household incomes show Argentinean farmers are slightly better off and farmers in the US and Canada are only slightly worse off as a result of their adoption of GM varieties. If any one sub-group of them did not adopt they would be even worse off by suffering the price decline but not enjoying the productivity growth. Farmers in the EU, on the other hand, while only slightly worse off if there is GM adoption in the Americas, are made better off if the EU moratorium on American imports is imposed. However, the advantage disappeared when EU consumers were allowed to choose for themselves or when EU farmers were allowed to adopt these GM varieties. [24]

Statistical results show that the EU moratorium benefited food-importing developing countries, because of an improvement in their terms of trade. However, Jackson stated that this analysis does not take into account that moratoria will slow the investment in agricultural biotechnology. Furthermore, future generations of GM products are likely to provide health and nutritional benefits to consumers, as in GM rice enhanced with pro-vitamin A. The costs of delaying investments in those GM technologies will fall heavily on the world's poorest consumers. More importantly from the viewpoint of poverty reduction in poor countries, unskilled non-farm laborers-who

[23] Jackson, Lee Ann. Personal Interview. 4/3/09: 11:00. World Trade Organization

[24] Anderson, K., L.A Jackson, and C.P. Nielson (2005), '*GM Adoption: Implications for Welfare and Poverty Alleviation'*, Journal of Economic Integration.

have gained little from the current limited adoption of GM food varieties-would gain much more as adoption spreads. [25]

The Issue with Developing Countries

Developing countries are in the middle of the debate between the acceptance of GM Foods and the rejection of GM foods in regards to consumption, import and export. Inventors and creators of GM foods claim that biotechnology contributes to the world's problem with world hunger. Can agricultural biotechnology contribute to food security, poverty alleviation and rural development in developing countries?

Depending on the simulation, the United States and Canada are understood to be the major adopters of GM crops. Not all other countries are expected to adopt GM crops in every scenario but, in exploring what would happen if they did adopt, we assume they would do so to a smaller extent than the first GM-adopting countries. None of these countries is as rigorous in the use of maize, soybean, and canola as the first GM adopters, and few have the same degree of broad-acre agriculture. Therefore they are more likely to be controlled by government in how they plant GM varieties. In addition, unlike the first GM-adopters, some may have segregation and identity preservation costs imposed on them, which further reduces the profitability for them of GM adoption.

A Closer to Look at Sub-Saharan Africa

On a more general basis, given their strong ties with the EU, African countries would benefit more from less competition in EU markets for GM-free food than they would gain from adopting GM varieties. On the contrary, Jackson believes that farm productivity gains in Africa would swamp the gains through improved terms of trade as a result of the EU ban on imports from GM-adopting countries.

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[25] Jackson, Lee Ann. Personal Interview. 4/3/09: 11:00. World Trade Organization

In order to gain a closer look at the general affects of GM agricultural products on developing countries I interviewed Mirko Saam, a biologist from the University of Geneva, and one of the founders of the Swiss Biosafety Interdisciplinary Network (BIN). BIN offers bi-annual courses on GM products to ministers of trade, researchers, decision makers, and other government officials of developing countries in Western Africa. It is a six week intensive course that grants all conference participants a certificate of advanced studies. Although they try to integrate journalists and other media related sources, it is difficult due to the longevity of the course, and the lack of interest from the media. In Saam's opinion, West Africa looks to the EU, and follows by example in regards to trade and development. The course taught by BIN goes beyond scientific and health aspects of GMOs, but tries to touch base on all issues that could pose a potential threat such as control, institutional law, ethics, culture, and economic problems. According to Saam, they try to present the most neutral case possible and not influence participating nations in their decision toward the adoption or rejection of GMOs. Saam shared that the primary problem in regards to GMOs in West Africa is the lack of public investigation in the respective governments. In his perspective USAID, who claims to be neutral, is nothing more than a political strategic hand that carries out US interests. According to Saam, the problem with USAID is that they invest money in public investigation development of West African countries. USAID provides the facilities and training of West African public investigation that is the backbone of the decision-making process in regards to GMOs. [26] Therefore, USAID points West African decision-making in the direction of US interests.

[26] Saam, Mirko. Personal Interview. 4/4/09. The University of Geneva. Biotechnology Interdisciplinary Network.

In regards to agriculture, Saam shared that each region of Western Africa has a diverse Agricultural profile, and not all GMOs can be applied to all regions. In his perspective GMOs have not been successful in places like Western Africa due to a lack of education. For example, people who cultivate Bt cotton in Africa, are some of the poorest in the world, and most of the time they are not aware that the particular Bt cotton that they planted has a special need for a certain pesticide or an excess amount of water that they do not have access too. Therefore, the Bt seed, that they purchased for almost triple the amount of a regular seed, does not make a difference in growth, and it simply will not work because of the lack of access to certain pesticides and water. Furthermore, GMOs are a globalized product, and the intellectual property rights are not paid domestically, therefore the farmers have no control over the prices of the seed. Monsanto, like many other corporations, control the price of the seed. [27] As demonstrated, in many aspects of GMOs in Western Africa, GMOs are a failure.

A problem with Monsanto is there lack of clarity. There is an African Union, similar but not as powerful or cohesive to the European Union that controls many agricultural aspects of some West African Regions. Monsanto, invites the leaders of this Union to the United States with all paid expenses to witness first hand the 'miracles' of GMO crops. The leaders are impressed by their growth and sustainability and therefore return with GMO seeds believing that they are the solution to African hunger. However,

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[27] Saam, Mirko. Personal Interview. 4/4/09. The University of Geneva. Biotechnology Interdisciplinary Network.

they return unaware of the implications that come along with it due to the difference in soil, climate, mosquitoes, water, and pesticides. [28]

In many parts of Africa, unlike the United States, cotton is the seed of all livelihoods. Failure in the agricultural region sector of Africa is one of the main contributors of world hunger and instability in the world. In Mali alone, 3 million people live directly from the cultivation of cotton. Because of the complications with Bt adoption, the economy of Western Africa has not improved as much as it was expected to. In Africa, cotton is known as the "white gold" to represent the importance it has on the people of the region. Corporations like Monsanto, claim to improve the situation by providing them with a "stronger" seed and pride themselves in alleviating world hunger. However, it is illegitimate to claim that you are helping, when the seed is not trans-adaptable to the rest of the world.

Furthermore, Monsanto together with farmer unions lobby the US Government to subsidize farmers which in turn lowers prices of cotton globally. On a side note, it is hypocritical for the United States to call for a dispute settlement at the WTO against the EU for their impediment of trade liberalization if the US is practicing protectionism. They are taking away any comparative advantage that West African cotton growers had. Therefore, not only are they charging them more for the seeds, but they are decreasing the price of their product, and corrupting their land.

As a social sciences student, I do not understand the science behind Bt cotton in Western Africa, and why it was unsuccessful. Saam, a biologist by trade, explained in the simplest terms for my comprehension. Saam explained that the resistance in the Bt seed

[28] Saam, Mirko. Personal Interview. 4/4/09. The University of Geneva. Biotechnology Interdisciplinary Network.

is a recessive trait. However, if two recessive traits are combined and eaten by a mosquito, the mosquito itself becomes resistant. Therefore, the power that the plant that is supposed to have to protect itself from the mosquito is cancelled out by the newly-bred-resistant mosquito. Most farmers are unaware that the Bt cotton seed should be used sporadically throughout the field. In that way, mosquitoes eat part Bt and the other part non-Bt and therefore the recessive trait of resistance remains dormant and recessive. In Saam's point of view, technology is complex, and there is no 'yes' or 'no' answer to GMOs. It is a complex world where strategies that work in one side of the world, do not necessarily work on the other side of the world. In his opinion, African farmers need water and organic forms of pesticides, not GMOs.

Intellectual Property:

In the case of GMOs, Intellectual Property (IP) is a controversial subject. The fact that GMOs are Intellectual Property politicizes the situation. Many believe that countries that refuse to adopt GMOs are rejecting as a method of stalling to give their biotechnicians enough time to create their own GMOs. That way, the payment of intellectual property remains domestic.

When the WTO was set up, it brought agriculture fully under the trade regime for the first time, as well as introducing rules on Intellectual Property. The rules were introduced into the WTO against the wishes of developing countries. Geoff Tansey claims that Intellectual Property in agriculture is creating a mono-cultural, industrial, corporate-dominated and dependent world on IP.

Intellectual Property is creating further dependence of developing countries on exporters of GMOs , because some WTO trade laws require open markets that allows the

passage of GMOs through countries where they are not wanted. However, the exporters of GMOs only modify the crops that are for their own economic interest. If Monsanto claimed to be alleviating world hunger, they should be genetically modifying crops that are consumed in developing countries and not ones that are for exportation and selfish economic reasons. Contrary to my views, when I asked this question to Lee Ann Jackson, she stated that the first crops targeted by biofirms were not genetically enhanced for selfish reasons but because they were the easiest to genetically modify. According to Ahmed Latif, program manager at the International Center for Trade and Sustainable Development (ICTSD), claimed that even though the first genetically modified crops are indeed the easiest to genetically modify, they are also the easiest to capture payments for the intellectual property involved, but more likely or at least supplementary reasoning has to do with where those crops are grown and sold.[29]

In an interview with Colum Murphy, from the Geneva School of Diplomacy, his thoughts were different in reference to intellectual property. In his view, developing countries will get more protection from the World Intellectual Property Organization because they actually make a large profit and therefore have more power that they can exert.[30]

Conclusion

Food security was defined at the 1996 World Food Summit as a "situation in which all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy

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[29] Latif, Ahmed. Personal Interview. 4/2/09. International Center for Trade and Sustainable Development.

[30] Murphy, Collum. Personal Interview. 3/25/09. Geneva School of Diplomacy.

life. This ability to access nutritious food directly determines people's ability to meet their basic material and social needs."[31] As the incapability to meet these needs is an indication of poverty, it is obvious that food security is closely linked to the diminution of poverty. While lack of food security can be determined by low income levels, which are themselves signs of poverty, the access of poor rural people to nutritious food is also related to productivity, prices, and distribution in the agriculture sector.[32]

The sustainability of many developing countries can be measured in the methods of agriculture practiced and the type of technology and harvesting methods used. For example, how the land is owned and shared; how food is distributed at the farm, region and country levels, and whether food is imported or exported. The factors of food security and poverty differ greatly amongst regions and countries. The governmental and organizational relationship between the agricultural sector and metropolitan trade will also play an important role in shaping local circumstances.

Hunger and poverty can be rooted in bureaucratic and systematic problems. These include twisted systems of land ownership, unfair commodity markets and fluctuating prices, poor access to capital, lack of a balanced diet leading to malnutrition, dislocation of the poor onto marginal lands and degradation of productive land through export-oriented practices. Given that more than enough food is currently being produced to feed the world, the problem of food insecurity is seen as a problem of distribution and inequality that makes itself felt in rural areas through the means described above. It is argued that GMOs could in fact heighten food insecurity in cases where GM crops are not customized to local economic and nutritional needs. Critics suggest that resources

[31] Food and Agricultural Organization. World Food Summit. 2002.
[32] Bookes, G. (2004). *Co-existance of GM and non GM Crops: current experience and key principles*. PG Economics LTD. UK

should instead be used to support socio-economic changes and farmer-led participatory research networks. [33]

Public investigation is a huge problem in developing countries. In order to justify the way things are, developing countries need information. They need proper information to make their own decision to what is best for their people and their country. One of the primary problems in developing countries is that they do not have the capacity or the knowledge to make their own decisions. When it comes to GMOs and trade, many officials in developing countries are unaware of the thousands of binding agreements and laws of the WTO. Even though BIN is a helpful organization in this subject, it only caters to a region of Western Africa. In a search for possible existent solutions I came across the Advisory Council for WTO Law (ACWL). I interviewed a Hunter Nottage, a lawyer who has been working for ACWL for the past 4 years. Nottage explained that they do not give policy advice, they are not an NGO, nor are they a think tank. The ACWL consists of eight lawyers that represent least developed countries (LDC) in legal disputes at the WTO. Once the LDC knows what they want, they represent them. The ACWL is completely independent of the WTO and they are experts in trade law. Nottage described it as a much larger version of Legal Aid. Nottage described that they are funded by developed countries separately and do not ask for funding on a year to year basis. Therefore the initial investment they received in their inauguration eight years was invested and they work off of their yearly interest returns. Nottage insisted that their trust fund does not play a role in how they function. It was interesting to know that each lawyer is not required to be an expert in their respective region. That way they are not

[33] APCoAB, 2006; Bennett al., 2004; Quaim and Zilberman, 2003; Qayam and Sakkhari, 2005.

opinionated. The ACWL is the complementary counterpart to the BIN. BIN provides the information, and the ACWL provides the legal representation before the WTO. [34]

Analysis:

In the case of GM products it is unlikely to be solved by spontaneous policy harmonization among trading partners. In the absence of incentives to seek harmonized positions, countries will continue to respond to their own internal political economy. In many cases it is only natural. The idea of GMOs are not particularly bad, it is the application that has been a failure.

However, I have several reservations in regards to previous arguments presented by various sources. In response to all the new modern biotechnology: medical, industrial, and agricultural, they are all complex. Biotechnology- in regards to GMOs are not as widely accepted as the other forms of biotechnology. Biotechnology in regards to industrial applications is welcomed due to the use of fewer resources and generates less waste. Many activists call for uniformity, however science is complex and the world is diverse. When it comes to human health and the environment minor mistakes carry heavy consequences and therefore each case has to be weighed individually without pretense or precedent, but on a case-by-case basis to find the best solution.

In regards to IP, there is a need to nurture and sustain the position of local innovation systems, such as varietal assortment and soil fertility and risk supervision methods, of many farming communities, that are ignored by the present approach and to identify the knowledge, skills, and experience of local communities. As Joseph Gari from the FAO put it:

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[34] Nottage, Hunter. Personal Interview. 4/15/09. Advisory Council for WTO Law.

> *IP rights over life convey an asymmetric system of conserving, using, transforming, managing and controlling biodiversity. This asymmetry is detrimental to many indigenous and peasant people, who are precisely amongst those most in need of biological innovation and who can best carry it out.*

Analyzing information on Sub-Saharan Africa provided by Saam and the lack of public investigation; there must be adequate national research competence to recognize where new research and goods are needed, assess their practicability, expand new seeds and methods, and adjust them to local circumstances. This will entail greater investments in developing countries' public-sector agricultural research programs in which biotech-related research and development would play an important part. Stabilized national intellectual property laws will need to ensure that seeds are reasonably priced while providing sufficient incentives to support research and improvement.

As a nutrition student, I do not buy the argument that GMOs should be adopted by all developing countries because of the nutrition benefits. Innovators of GMOs argue that those developing countries are at a loss for nutritional enhancement. For example, there is this 'golden rice' that is pro-vitamin A. Since so many people, particularly in developing countries are Vitamin A deficient; there is a campaign to adopt the golden rice. However, there is a vital difference between modification and fortification. The majority of foods can be fortified with vitamins and minerals without being genetically modified. For example, there is calcium fortified orange juice, iron fortified bread, and iodized salt.

I am not one sided when it comes to GMOs. I am against the structure and the way it is applied. Furthermore, genetic engineering is rooted in history. The fact is that humanity has always been able to modify organisms through cross breeding. It is rooted

in humanity's culture and tradition; however, I do agree that it is presented in a totalitarian way. Cross breeding is not natural, but time has brought its acceptance. GMOs have not been around long enough to bring forth its acceptance, and it is a giant leap for humankind in general. For example, sending a dog to the moon was unnatural and it was protested, and in time it was accepted. Years later a man was walking on the moon. Again, it is not natural but it was a giant leap for humanity and it was accepted although it was not natural. Therefore, not everything that occurs in the world is natural. The challenge is to strike a balance between lasting traditions and visionary changes.

Bibliography

Anderson, K., L.A Jackson, and C.P. Nielson (2005), '*GM Adoption: Implications for Welfare and Poverty Alleviation'*, Journal of Economic Integration.

APCoAB, 2006; Bennett al., 2004; Quaim and Zilberman, 2003; Qayam and Sakkhari, 2005.

Bernauer, T (2003), *Genes, Trade, and Regulation: The Seeds of Conflict in Food Biotechnology*, Princeton, NJ: Princeton University Press.

Bookes, G. (2004). *Co-existance of GM and non GM Crops: current experience and key principles*. PG Economics LTD. UK

Brooks, G. and P. Barefoot (2003), *GM Crops in Europe: Planning for the End of the Moratorium*, Corchester: PG Economics, February.

Clive, James. report — *Global Status of Commercialized Biotech/GM* Crops: 2005

Dhlamini, Z. (2006) *The Role of Non-GM Biotechnology in Developing World Agriculture*, Policy Briefs, Sci Dev Net.

Food and Agricultural Organization 2004

Food and Agricultural Organization. World Food Summit. 2002.

Genetically, Modified. "20 Questions on Genetically Modifed (GM) Foods." World Health Organization Aug.-Sept. 2002: 2-3.

Hain, P. and Ehly, J. (2005) *Overview of Crop Genetic Engineering*. University of Nebraska Institute of Agriculture and Natural Resources.

Jackson, Lee Ann. Personal Interview. 4/3/09: 11:00. World Trade Organization

Kasinadhuni, S. and Sandall, L. (2005) *Traditional Breeding vs. Biotechnology*, University of Nebraska Institute of Agriculture and Natural Sciences

Latif, Ahmed. Personal Interview. 4/2/09. International Center for Trade and Sustainable Development.

Melendez-Ortiz, Ricardo. "Biotechnology: Addressing Key Trade and Sustainability Issues." International Center for Trade and Sustainable Development Feb. 2007: 1-48.

Murphy, Collum. Personal Interview. 3/25/09. Geneva School of Diplomacy.

Nottage, Hunter. Personal Interview. 4/15/09. Advisory Council for WTO Law.

Olby, Robert C., *The Origins of Mendelism*. 2d ed. 1985. Hugo Iltis.

Petriccione, Barbara Bordogna. "Introduction to GMO: technique and safety." RUIG-GIAN Mar. 2004: 1-19. Swiss Agency for Development and Cooperation

Ricci, Ezra. "Biosafety regulation: the Cartagena Protocol ." RUIG-GIAN Mar. 2004: 1-8. Les Cashiers du Ribiosok

Saam, Mirko. Personal Interview. 4/4/09. The University of Geneva. Biotechnology Interdisciplinary Network.

Stilwell, M. (1996b). *Implications for Developing Countries of Proposals to Consider Trade in Genetically Modified Organisms (GMOs) at the WTO*. Center for International Environmental Law. Geneva. Switzerland.

Stilwell, Matthew, and Brennan Van Dyke. "An Activist's Handbook on Genetically Modified Organisms and the WTO." Center for International Environmental Law: 1-16.

Stilwell, Matthew. *Codex, Substantial Equivalence and WTO Threats to National GMO Labeling Schemes.* Center for International Environmental Law. CH

Tansey, Geoff. "Farming, Food and Global Rules." The Future Control of Food: A Guide to International Negotiations and Rules on Intellectual Property, Biodiveristy, and Food Security . By Geoff Tansey and Tasmin Rajotte. Ottawa, Canada: Earthscan, 2008. 3-25.

Wright, Robert. "James Watson & Francis Crick ." TIME Mar. 1999: 17.