

DISCUSSION: GENETICALLY MODIFIED ORGANISMS AND FOOD SECURITY

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I. GENERAL INFORMATION

Duration:	31. 03 - 25. 04. 2008
Number of participants:	11
Number of Contributions:	13

II. INTRODUCTION OF THE TOPIC

My name is Kathryn James, I have recently started a PhD at Lancaster University (UK). My working background is rural and agricultural based having worked in both Europe and the UK in arable and dairy farming. Academically I completed a Masters at Manchester University in Development Management looking at the issues of **food security and genetic crops**. I have returned to this issue for my current research **I am looking at biotechnology, regulation and the role of the multinational companies with a specific focus on developing countries**.

I have been following the debates on the forum over the last six months and the complexities of people's lives are clear. The role of food within people's lives is also complex; it has many aspects from basic principles of livelihood strategies, to community cohesiveness, wider cultural roles and economic importance. Adding to these, the layers of international organisations and the influence of multinational companies, the role of future needs for peoples and countries becomes even less clear. Increasingly the **role of biotechnology has been placed at the centre of any discussion of future food security**, more recently added to this is **its role in alleviation of climate change in relation to higher yields on less land**. However, **this rhetoric is not proven**, in addition the majority of the research and development for genetic crops has been based in developed countries and on commercial cash crops with **little discussion on smallholder/ local community needs and production**.

For this part of my PhD I am researching the **reach and rhetoric of multinational companies in relation to the slow spread of genetic crops**. These are powerful organisations that have influence on all our lives, however, my research at present centres on **how multinationals think they will reach the poorest farmers with high technology products and what discourses are used to persuade small-scale farmers of the benefits to them and their community**. There has been a lot of discussion on the forum on the voice of the smallholder farmer, how their voices are sometimes not heard and their needs are often ignored. I would like to know **how much information small-scale farmers have access to with regard to biotechnology in general, who provides with information and what form of discourses it takes and ultimately are they given a choice of what they produce?**

Therefore, I would like to request the Forum to:

1. **Share examples** of where smallholder farmers use genetically modified crops and the advantages and disadvantages they have noticed in relation to conventional crops
2. **Share examples** of where multinational companies/ governments and others have promoted their genetic crops to small-scale farmers, specifically thinking of promises of higher yields and greater access to new markets
3. **Provide contact details** of NGOs other organisations or people who are aware or engaged in similar studies to contact and share information

Many thanks for your time and support, I am happy to answer any questions on the Forum or individually. I look forward to the debate and hope to engage in future debates related to the area of biotechnology, food sovereignty, regulation and multinational influence.

Kathryn James

Lancaster University (UK)

III. LIST OF CONTRIBUTIONS;

Contribution by Kevin Gallagher Senior Food Security Development Officer, FAO

I would like to stress one point. The **questions posed relate to genetic modification and not all of biotechnology.**

Biotechnology includes extremely useful tools such as ELISA diagnostics, tissue culture, vaccine production and many others. One area of biotechnology is genetic modification which includes cross species (even cross kingdom) movement of genetic material and goes far beyond classical breeding. It is unfortunate that extremely useful biotechnologies become tainted by being under the same biotechnology umbrella together with the more controversial genetic technologies and patents.

Therefore, **I would suggest to rename the topic Genetically Modified Organisms and Food Security** rather than referring to Biotechnology.

Best regards,

Kevin Gallagher

Contribution by Kathryn James, Lancaster University (UK)

Yes, I think Kevin is right and it **[the proposed topic name] is more precise**, so yes **I agree** this is my first very useful lesson learnt...

Many thanks

Kathryn

Contribution by John Ruane, Agricultural Officer FAO Working Group on Biotechnology

For people interested in the topic of biotechnology and food security, FAO held a moderated e-mail conference entitled "Can agricultural biotechnology help to reduce hunger and increase food security in developing countries?" at the end of 2000. A Background Document was published before the conference began and a Summary Document was published after the conference, based on the 118 e-mail messages that were posted. These documents plus all the messages are available at <http://www.fao.org/biotech/conf5.htm>.

The documents were also published in an FAO publication, which is freely available on the web in Chinese, English and Spanish at <http://www.fao.org/DOCREP/004/Y2729E/Y2729E00.HTM>

(or contact sandra.tardioli@fao.org to request a free copy of the book, in English or Spanish). The conference was hosted by the FAO Biotechnology Forum, which was launched in 2000 and which has hosted 14 moderated e-mail conferences to date (<http://www.fao.org/biotech/forum.asp>).

More information on agricultural biotechnologies can be viewed on the FAO Biotechnology website (www.fao.org/biotech), which is available in Arabic, Chinese, English, French, Russian and Spanish.

John Ruane, PhD

Contribution by Dominic Glover, post doctoral fellow Technology and Agrarian Development Group, Wageningen University, NL

I am Dominic Glover, post-doctoral fellow in the Technology and Agrarian Development Group at

Wageningen University, NL. I was very interested to read Kathryn's post and I'd like to thank the moderators for drawing this discussion to my attention.

I recently completed my PhD at the Institute of Development Studies (IDS) at the University of Sussex, UK. My **PhD thesis was on 'The Role of the Private Sector in Modern Biotechnology and Rural Development: The Case of the Monsanto Smallholder Programme'**, in which I examined the activities of the Monsanto Company in promoting modern agricultural technologies, including hybrid seeds, herbicides and GM crops, to smallholder farmers in India.

In that research, I sought to understand the ways in which **Monsanto** as an organisation (through the decisions and actions of its managers and employees) conceptualised **its relationship with smallholders and its role in promoting and supplying modern agricultural technologies** to that segment of the market in the global South. I traced the **historical evolution of Monsanto's engagement with farmers in developing countries** and examined how the perceptions and attitudes of employees at different levels and locations of the company (e.g. the global HQ in St Louis, Missouri; the Monsanto India HQ in Mumbai; field-level sales and technical officers in Andhra Pradesh, etc.) differed and helped to shape the company's activities at different times. To a very limited degree, I also shed some light on farmers' access to information about, and attitudes towards, the technologies and crop varieties which Monsanto and other agribusiness firms were encouraging them to adopt.

Clearly, I cannot hope to summarise the whole PhD in this message but, shortly, I plan to finish writing a short summary of the thesis, which I will circulate to interested parties.

[Moderator's note: This summary can be uploaded to the resources section of the FSN Forum's website (at http://km.fao.org/fsn/resources/contribute_resources.html?no_cache=1) and will be accessible to all Forum members].

You may also be interested in the following recent publications, dealing with specific aspects of my case-study, which are listed below. I would welcome comments and reflections on this work.

During my post-doc at Wageningen, I will continue to explore the political economy of agricultural biotechnology in development, focusing on the role of big transnational enterprises and their interactions with poor smallholder farmers in the global South. I hope that we may have opportunities to discuss these issues further.

With best wishes,

Dominic Glover.

Selected recent publications:

(1) Glover, D. (2007) 'Farmer participation in private sector agricultural extension', IDS Bulletin 38(5), November: 61-73. [Unfortunately I do not have off-prints of this article, but the IDS Bulletin is circulated internationally to libraries and institutions worldwide]

(2) _____ (2007) 'Monsanto and smallholder farmers: a case study in corporate social responsibility', Third World Quarterly 28(4): 851-867. [I can supply a limited number of offprints of this article to interested parties]

(3) _____ (2007) 'Monsanto and smallholder farmers: a case-study on corporate accountability', IDS Working Paper 277, Brighton: Institute of Development Studies:
http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=392&nocache=1

Contribution by FSN-Forum Moderator

1. Applied economics literature about the impact of Genetically Engineered Crop Varieties

in Developing Economies:

A vast literature has accumulated since crop varieties with transgenic resistance to insects and herbicide tolerance were released to farmers in 1996 and 1997. A comparatively minor segment of this literature consists of studies conducted by agricultural economists to measure the farm-level impact of transgenic crop varieties, the size and distribution of the economic benefits from adopting them, consumer attitudes toward GE products, and implications for international trade. This paper focuses only on the applied economics literature about the impact of transgenic crop varieties in non-industrialized agricultural systems, with an emphasis on methods.

http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=400&nocache=1

2.Genetically Modified Food and International Trade: The Case of India, Bangladesh, Indonesia, and the Philippines:

Genetically modified (GM) food crops have the potential to raise agricultural productivity in Asian countries, but they are also associated with the risk of market access losses in sensitive importing countries. This study highlights the potential effects of introducing GM food crops in Bangladesh, India, Indonesia, and the Philippines in the presence of trade-related regulations of GM food in major importers. The paper focus on GM field crops (rice, wheat, maize, soybeans, and cotton) resistant to biotic and abiotic stresses, such as drought-resistant rice, and use a multi-country, multi-sector computable general equilibrium model.

http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=399&nocache=1

3.An Analysis of Trade Related International Regulations of Genetically Modified Food and their Effects on Developing Countries:

This paper reviews current trade-related regulations of genetically modified (GM) food and discusses their effects on developing countries. There is a large heterogeneity in current import approval and marketing policies of GM food worldwide. At the international level, the harmonization efforts are led by the Codex Alimentarius Commission, the Cartagena Protocol on Biosafety and the World Trade Organization. While internationally harmonized guidelines for safety approval have been finalized, there is no clear consensus on labeling regulations for GM food, and there is an increasing risk of conflicts among international agreements. The work analyzes the GM food regulations of two large rich importers, Japan and the European Union (EU) and discuss their differences and their potential impact on international trade. It also shows that the effects of international and domestic trade related regulations critically depend on the type of traded products and their intended use: food and unprocessed products are subject to more stringent regulations than animal feed and processed products. Finally, the paper identifies the main spill over effects of national and international regulations on developing countries' policy making, and suggest four policy arrangements on GM food to enable developing countries to satisfy production, consumption, international trade, and risk management objectives simultaneously while complying with their international obligations.

http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=398&nocache=1

We hope the above resources are useful.

Regards,

FSN Forum Moderation Team

Contribution by Irma Nuñez:

Talking about GMOs, I would like to make a contribution to the Forum, with this article that I received recently, because **I think is very important, as scientists, to have as many different**

point of view as we could, on this subject, and also **review the scientific studies** to make decision based on evidence and seen the advantages and disadvantages of it.

Best regards,
Irma Nuñez

Let the World Learn from North American Farmers' Experience with GMOs

Prof. E. Ann Clark reviews the real scientific surveys that contradict every claim made by British academics regarding the benefits of GM crops in their government-funded 'study'

I cannot fathom how British academics can still be quoted as saying that GM crops allow farmers to grow "high-quality food profitably", in an "environmentally sensitive way", and to attain "high yields while using less herbicide". Roughly 99 percent of GM land on the planet is sown to just two traits - herbicide tolerance (HT) and Bt, which causes plants to synthesize their own insecticide. Nothing about quality.

Objective evidence of profitability is equally sparse, particularly if one factors in the lemon effect of lost markets due to the global rejection of GM. British growers might want to look for an article by Ian Mauro and Stef McLachlan at the University of Manitoba, Canada, due to appear in the journal Risk Analysis. This is the first ever publicly available survey in a peer reviewed journal of how Canadian farmers have been impacted by GM technology. It includes a quote by a Canadian farmer who said: "The loss of [European] markets due to GM had a huge financial impact. This was likely larger than the cost of controlling volunteers or benefit of easy weed control."

This same 2003 survey of 370 farmers found that the greatest cited benefit among technology users was operational, including timing and efficacy of weed control, facilitating farming of a larger land base. Among 10 ranked benefits, increased yield was 6th and increased revenue ranked last. Among 10 cited risks, of greatest concern were loss of markets, loss of farmer rights under the Technology Use Agreement, higher seed costs, and lawsuits...

Please follow the below link to read the whole article:

http://km.fao.org/fsn/resources/fsn_viewresdet.html?no_cache=1&r=401&nocache=1

Contribution by Paul von Hartmann

Dear friends,

"Those who are optimistic about [genetically modified organisms] argue for the need to increase food production and point to the possibility of addressing the problems of marginalised farmers."

GMOs AND NGOS: BIOTECHNOLOGY, THE POLICY PROCESS, AND THE PRESENTATION OF EVIDENCE

http://km.fao.org/fsn/resources/fsn_viewresdet.html?r=406

The first question ought to be,

"Are GMOs the most effective way to increase food production and address the problems of farmers?"

As an ecologist and biodynamic agriculturist, I think not. Apparently there is reason to believe that GMOs are in fact a problem, not a solution. The uncontrollability of GMO technology alone ought to obviate it from reasonable consideration. It is important to be conscious of the effect of economic inertia, favoring development and distribution of GMOs, that has gained political influence. What has been called "conventional" agriculture (rather than being identified as

chemical/GMO dependent farming) has more to do with selling expensive inputs than helping people. Chemical ag has had decades to become institutionalized, making viable, more effective alternatives and agricultural methods either unavailable or otherwise discouraged.

Over the long term, it has been proven that effective pest suppression and increased crop yields are a function of proper farming methods, not increased agronomic input.

So, if not GMOs, more pesticides & increasing application of chemical fertilizers, then what is the best alternative for increasing production and reducing pest infestation? I submit that reintroduction of hemp, a critical "strategic" food resource removed from the agricultural mix in many parts of the world, is the most effective way to address not only problems of food security, but also addresses problems of nutrition, climate change and expansion of the arable base.

GMOs are a "*loose canon on the deck*" of our already battered ecosystems. Better to reconsider an historically proven, naturally evolved tool for repairing the Natural Order and creating sustainable abundance.

Thank you sincerely for your consideration.

Paul von Hartmann

Contribution by M Yusuf Ali, Bangladesh Agricultural Research Institute (BARI)

Dear Paul,

Wonderful thinking, but I request you for more information on Hemp.

As an unknown person in this world my question is: Would we get it easily (food) either by exploiting nature friendly way? or by applying artificial means? like GMO?. How much a man need? Who is destroying natural balance and bringing disaster?. I hope through this exchange of thinking we would find an escape road.

M Yusuf Ali

BARI, Gazipur

Bangladesh

Contribution by Michel Ferry, Researcher of INRA France and Scientific Director of the Research Station on Date Palm and Oasis Farming Systems

How is it possible that someone writes that 3rd generation GM crop to an opportunity for Africa? We know the seriousness of the **various risks presenting by growing the first generation GM crops** (especially for the control of agriculture and food by few, powerful and uncontrollable companies). We know that **these risks are considerably increased especially when transformation events are for pharmaceutical products**. We know how high are the **difficulties to evaluate and control these risks** in rich countries that dispose of much more facilities and means.

The **fascination** that too many scientists have of their **GM technology** to which must be **added the propaganda and hypes** regarding real results and perspectives **leads to irresponsible and no scientific based declaration** because of incredibly simplistic approach of the issue of development, because of narrowness of their competence to evaluate the effective interest of this technology.

Regards.

Michel Ferry

[This message refers to the article "Third generation GM crops: an opportunity for Africa", which can be found in resources section of the FSN Forum: <http://www.scidev.net/en/opinions/third-generation-gm-crops-an-opportunity-for-afri.html>]

Contribution by Guillaume Gruere, Researcher of International Food Policy Research Institute (IFPRI)

Dear Kathryn,

I am a researcher at the International Food Policy Research Institute (IFPRI), working on different issues related to the use and regulation of transgenic crops in developing countries. Here is my take on your three requests.

1) This is a good question, and it happens that I am part of a team that just completed a comprehensive review of the literature on the economic impact of GE crops in developing countries. Coincidentally, these last three days I have also been attending a workshop with economic and social experts that have conducted case studies on the impact of particular GE crops on small-scale farmers in developing countries (Bt cotton in China, India, South Africa, Colombia, Bt corn in Honduras and the Philippines, HT soybeans in Bolivia).

Although I definitely agree that there are not enough studies, and that more should be done, you should note that many studies are available. By selecting only applied economic studies on GE crop impact in developing countries that have been peer-reviewed, we found 126 studies in the last 10 years. I would invite you to get into this literature before anything. Our review of studies was focused on methods, to try to see what could be the best methods to use in future studies, but by so doing we have also reviewed the findings of these studies.

It turns out that, as expected for any technology, the effects of GM crops on smallholder farmers largely vary depending on the particular cases, and that no generalization should be done. But the overall overview is relatively positive.

First, there is strong and very well supported evidence (using 10 years of panel data and the most advanced econometric techniques) of a clear success of Bt cotton in East China in reducing pesticide use, therefore leading to health benefits, larger incomes for small farmers.

In India, the story of Bt cotton is more complicated. Overall it is clear that Bt cotton is largely responsible for the observed doubling of the average yield level in less than 5 years- the acceleration of yields in India has been just phenomenal.

My own meta analysis (unpublished) also shows that by averaging results over 36 farm level studies in India, Bt cotton is in average an expensive yet profitable technology for Indian farmers overall, reducing pesticide (by about 30-40%), increasing yields (by about 30-40%), increasing overall costs (by about 15%), but also resulting in net income increases (by over 50%). But at the same time, these are averages of averages, so to interpret carefully, since there has been a lot of variability in results: farmers in some States have been more benefiting than those in others, irrigated versus rainfed farmers have had different experience, and the first few seasons were not successful everywhere for a number of reasons (institutional, varietal, etc). So the outlook is positive but many farmers gained, while some farmers actually lost.

In South Africa, the story is very different. The leading experts in the effects of Bt cotton for small holder farmers have concluded that its story could be resumed as a "technological success but an institutional failure". A number of studies were conducted in Kwazulu Natal, a region with small holder farmers, each study had its own methodological and data limitations, but basically showing positive average productivity and income effects for smallholder farmers with important variations by season. Bt yellow maize and white maize have also been studied there, with good results on commercial farmers, less proven results on small farmers (as far as I know).

In the Philippines, the three studies conducted on Bt corn so far have also been rather positive (in

terms of productivity, income and potentially poverty reduction and quality of life), even if the last one is still unfinished, and each of the method used may have some estimation problems.

I am less knowledgeable about the other case studies in South and Central America. The case studies presented at my workshop (Honduras, Bolivia, Colombia) were still not finished. Some good studies have been published on Bt cotton in Argentina and Mexico , but they were done a long time ago. There is much less information on HT soybeans in Argentina, Brazil and other countries.

To sum up, so far, the results have shown that GE crops could deliver benefits to small scale farmers, but that there was a large variance across cases, including exceptions where they were not effective. Many factors seem to determine success or failures, but it is clear that some seem to stand out, including the level of seed prices (as expected), the use of adequate varieties for the transgene, information available to farmers, and the institutional context.

2)I know less about that. Most of these technologies were not designed for small-scale farmers. There are a number of current projects that do focus on them, but they have all faced challenges, notably because of the difficulty of setting up strong public private partnership and because of both the lack of functional biosafety systems in developing countries, and/or the high cost of these regulations for any public developer.

The only public or partially public technologies I know of are the Chinese Bt cotton, an event of Bt cotton in India (a variety using a public sector gene), and the U.S. GM papaya developed with Cornell univ. Some may come out in the next few years, including the GM brinjal (eggplant) in India, and the Bt potato (developed in a PP partnership with USAID) in South Africa. Many others are still at the developing stage including pulses (sorghum, cowpea, millets), corn (drought resistant both private and public initiatives), rice (Golden rice, other types of slat tolerant or drought resistant rice in India, China).

The story of Bt cotton in South Africa seems to be a good example of companies trying to sell their products to small scale farmers intentionally. However, because of a change in the industry, the system later failed and now cotton is declining all over SA, so there are not many small Bt cotton farmers left.

I have a problem with the end of your second question: you talk about promises of "greater access to new markets". I am not sure what you mean by that, but it is clear to me that in the current situation no company or govt would promote a transgenic crop to access new markets. In fact one issue faced by the developers of these products is lack of market access in developed countries (Europe, Japan, South Korea, Australia, New Zealand) due to regulations and their indirect effects on purchaser of GM products.

3. I have several colleagues at IFPRI who could help you. The workshop I mentioned is part of a project lead by Oxfam America and IDRC Canada, that has multiple partners, including one from ODI in the UK. Just let me know by email if you need more information on these contacts.

Guillaume Gruere

Contribution by George Kent, Department of Political Science, University of Hawaii, USA

I appreciate the discussion of Kathryn James and Guillaume Gruere on genetically modified organisms and food security. However, I wonder why both of them **focus on developing countries**. Doing this has **two distinct disadvantages**. First, focusing on developing **countries makes it more difficult to see that there are similar issues in developed countries**. Second, that focus makes it **more difficult to see that the problem is really global in scope and structure**. Any study that focuses on the national level will have difficult seeing the global relationships at work.

One of the **major global phenomena is the displacement of decision-making**. GMOs are just one more step in the long-range pattern of the **industrialization of agriculture**. One major feature of that process is the **removal of decision-making from the farm level to more distant sites**. It begins with the consolidation of small holdings into large holdings, but goes on from there until it spans the globe. There is a centralization of power and, correlated with that, a steady concentration of the profits in fewer hands. The **primary producers are increasingly marginalized**.

There is simple and direct evidence for this in the fact that **their share of the overall benefits is steadily reduced**. Guillaume talks about doubling the average yield of cotton in India. Have the growers doubled their quality of life? **Small holders often have many landowners, lenders, middlemen, seed sellers, etc. around them who demand substantial shares of the benefits of any increases in productivity**. For the farmers themselves, in the end the benefits may be illusory.

Aloha, George

Contribution by Michel Ferry, Researcher of INRA France and Scientific Director of the Research Station on Date Palm and Oasis Farming Systems

Some of the **affirmations formulated** with so little precaution by **Guillaume Gruere** are so totally far or in **contradiction with numerous data published in scientific reviews** (see for example the recent review on that issue published by Smale (also from IFPRI) et al , AgBioForum 9(3), 2006. See also the recent results on more fundamental aspects of that issue presented by Quaim 2003, Fernandez.Cornejo, 2006; Gordon, 2007) that, unfortunately, they must be interpreted as propaganda:

- **High decrease of pesticides use in China**. It is true but **China farmers were overusing pesticides** and we must not forget that **Bt Cotton is producing a pesticide permanently and at high level**.

- The assertion that India has doubled its yield in cotton within 5 years because of the genetically modified cotton is totally absurd and false. Data concerning **comparisons of yield in India between Bt and traditional cotton are very variable and contradictory**. The **high increase of yield is much more based on Mahyco-Monsanto company propaganda than on reality**.

Gruere forget also to report **one essential point concerning the genetically modified plant and especially the Bt Cotton: the apparition of resistant insects and the substitution of targeted pests by secondary pests** that become serious pests.

Without speaking of economy, health or environment issues, like so many biotechnologists, he does not seem to understand that **GM technology has on the short or medium term the same disadvantage** as the other techniques used by the industrial industry that consist to solve a complex biological problem (pest control management) by a miraculous bullet solution. **It has been largely demonstrated that this simplistic race behind is lost on the long term and leads to bigger and bigger problems with a lot of bad environmental and economic consequences**.

Michel Ferry

Contribution by Kathryn James, Lancaster University (UK)

Many thanks to all for taking the time to reply to the discussion. In response to George Kent's wider concern regarding decision making and the industrialisation of agriculture, I also think these two points are extremely important and I will address them in my wider research as central themes. I feel there are two important considerations' regarding the centralisation of the food system as a whole. Firstly is the **dependence for farmers** (and thus ultimately people in general)

on fewer companies who control inputs as 'packages' that are generalised and may not be appropriate. Your point regarding standard of living is valid and is backed up with a capabilities approach to human development. Secondly are the **predominating discourses of industrial agricultural that 'drown out' alternatives as somehow not able to tackle the issues**, with increasingly large amounts of private research the control is still further concentrated and has implications for us all in terms of who controls what we eat.

I hope there is merit in looking at the smaller picture as a means to throw light on the unintended consequences (as well as intended) of the large and the relationships between the layers.

Best wishes on a lovely May day in the UK

Kathryn James