Food for All:
Including GM Food Crops?

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Preface

We live in a world of abundance and high technological advancements. However, almost a fifth of the world population have to make a living with the purchasing power of 1 US $ or less per day only, and 852 million people are chronically undernourished, of them 815 million in developing countries.

In such a situation scientists and governments look into possibilities for improvement, including new technologies, especially in agriculture where the positive effects of the Green Revolution seem to be exhausted or never have arrived in some parts of the world. Looking for technologies does not mean automatically to ignore the wisdom that hunger and poverty have complex and interrelated causes and cannot be tackled in a sustainable way by means of technology alone. Hunger and poverty have a social, political, economic, cultural and ecological dimension. Leave one out and even the best-intended efforts to reduce hunger and poverty will fail. Complex underdevelopment needs complex and holistic development strategies and cooperation. Therefore an open debate is necessary about the potential and risks of a new technology like agricultural biotechnology, including GM crops.

Deutsche Welthungerhilfe contributes to a meaningful and rational dialogue between protagonists and antagonists of Green Biotechnology, between relevant actors. We invited scientists and practitioners, as well as representatives of industries, the media, international organisations, government institutions and NGOs to discuss these questions.

We did not expect conclusions in form of an overall consensus between the protagonists and antagonists of the ongoing debate, but an intensive and reason-based discussion and a certain level of common ground for further consideration and action. Some results are:

- GM crops are on the way to be established in quite a number of developing countries, therefore one has to take this fact into account in development cooperation.
- Much is still uncertain and unknown on nutritional, health, socio-economic, ecological and even technical aspects, therefore more public research on risks and potentials of Green Biotechnology especially in developing countries is needed.
- It was suggested to create a participatory process for interdisciplinary research and development with scientists, development institutions including NGOs of the North and the South. Precondition would be a societal consensus on the use of Green Biotechnology in the given country.
- Priority for research should be given to the development and test of locally relevant crop varieties for small farmers which are safe for humans and the environment, scale neutral, have low chemical input and capital requirements, and are simple enough to be adaptable.
- There is a need to offer official development assistance on request of governments in developing countries for establishing their regulatory capacity and legal frameworks concerning Green Biotechnology and especially GMOs.
- Patent regimes play a key role for the benefit of small farmers in developing countries, therefore they should be of a nature which favours small farmers (example of China).

The overall principle for participatory development and action in the area of Green Biotechnolgy should be a contribution to stopping the ongoing marginalisation of small farmers in developing and food deficit countries.

Dr. Jochen Donner, Deutsche Welthungerhilfe

Executive Summary

The Deutsche Welthungerhilfe e.V. (German Agro Action) held a one-day symposium on December 10th, 2004 in Bonn to discuss the potential role of genetic engineering (GE) in providing "food for all", in particular in the context of developing countries.[1] The international symposium was attended by over 40 participants, including scientists, government officials, representatives of non-governmental organisations, industry representatives and reporters.

In the morning the symposium focused on the **potential of GM plants** to improve the production and living conditions of **small-scale farmers in developing countries** and on the related risks and opportunities. In the introduction the requirements for a technology to be pro-poor and a typology of risks of biotechnology were outlined.

In the first panel speakers differentiated between **technological and social aspects** of hunger, highlighting that GE is a technological approach only. Other speakers stressed the importance of **differentiating between different GM plants** themselves, pointing in particular at the difference between herbicide-tolerant and insect-resistant crops and at the different impacts they would bring about. Concerning the **risks and benefits** of GMOs in general, speakers addressed environmental and health issues but underlined that more research is needed for a conclusive evaluation. Speakers also noted that because of too restrictive laws there would be no first-hand experience with GM crops in Germany on which to base recommendations for developing countries. The nature of these laws – if not their exact implementation – was in part explained by the **legal framework** given by the European Union. Speakers described other international stakeholders like the UN and, in particular, the FAO as being more supportive of employing green biotechnology to help the poor in developing countries. Speakers also stated the **readiness of private companies to co-operate** with local organisations in developing countries to help them embrace green biotechnology for the future. Referring to academic studies, speakers saw a **potential of GM crops** in increasing effective yields or, in the case of cash-crops, in increasing incomes and, hence, food security. Speakers also explained a negative correlation between adoption rates of GM crops and the **level of intellectual property protection** in a country and dismissed the idea of equalling adoption with exploitation. Referring to other examples, speakers saw the **risk of a decrease in biodiversity** where GM crops are grown – or the risk of GM crops becoming weeds themselves. Given all the differences, the speakers called for more research, both regarding biotechnology and regarding other aspects like economic, social, environmental, health and nutrition questions.

In one "Round Table" the discussion turned around the issue to what extent **GMOs**, their traits and their risks are comparable to **conventional crops** and general problems of agriculture. This group also discussed the potential role of "Golden Rice" and conditions for its introduction. In the context of GMOs in developing countries this group focused furthermore on the issue of **patents and regulations**, which would centralise the knowledge to carry out this kind of research, drive up the **price of GM seeds**, decrease agricultural biodiversity and limit the affordability of GM seeds for the poor. Other views were that just because GE exists there is no obligation to use it, or that **other issues of importance** for poor farmers like governance, infrastructure, market access and internal security are not

[1] Note of the rapporteur: A current article on the status of R&D related to GM food crops in developing countries is: Cohen, J.I. (2005). Poorer nations turn to publicly developed crops. Nature Biotechnology, Vol. 23, No. 1, pp. 27-33. Online at http://www.nature.com/nbt/. Another current article, which focuses on agricultural biotechnology and research for tropical agriculture more generally – the need for more research was also repeatedly mentioned during the symposium – is: Kremer, M. and A.P. Zwane (2005). Encouraging private sector research for tropical agriculture. World Development, Vol. 33, No. 1, pp. 87-105. Online at http://www.sciencedirect.com/.

solved through biotechnology. To the contrary, the focus on biotechnology would divert energy and limited resources from other aims and interventions. This was contrasted by the statement that both the World Bank and the CGIAR only spend a fraction of their budgets on GE. In this context a different line of reasoning was that uncertainty about the future requires looking into **multiple options**; given the right regulatory framework, farmers could then decide for themselves. This view was countered with the argument that **poor farmers are not really free** in their decisions and that information and markets would be imperfect. While one view was that using GE to solve one problem might create others, another view was that in some cases (avoiding spraying with DDT) using GE might be the better alternative. All agreed that **biotechnology without GE**, in particular marker-assisted breeding, is very helpful for helping poor farmers in developing countries.

The afternoon panel focused on the impact of the **legal framework for GM products** on the **socio-economic livelihoods** of small-scale farmers in developing countries. Speakers provided an overview both of relevant international agreements and organisations and of legal arrangements and mechanisms in the private sector, giving an assessment of their respective backgrounds, objectives and shortcomings. Speakers also provided a specific example of the situation in Central America, where the difficult political and economic environment, in particular poverty and inequality, as well as lack of knowledge and human capital would make it difficult to negotiate international agreements and implement necessary legislation properly and on time. More generally speakers underlined that not just technicalities of regulatory frameworks matter but that regulations need to consider the **needs of marginalised farmers** because in many countries hunger could be found amidst plenty. This need of a re-orientation would also be true for countries in the North that use negotiations to promote their own interests. Speakers argued that the question of GMOs in a situation of marginalised small farmers requires two sets of legal regulations, one to ease marginalisation itself and one to specifically address GMOs. Easing marginalisation would involve addressing **farmers' rights**, access rights (to seeds, markets and productive resources), water rights, land rights, tenancy protection, intellectual property rights and trade policies. In this context new seeds and the access to seeds would be just one issue, albeit an important one. A comment from the audience that there can also be too much regulation was countered with the argument that having no laws is also a form of regulation. Yet, speakers also pointed out that any legislation needs prior enlightenment to be initiated and subsequent enforcement to be put into effect.

In the closing remarks satisfaction was expressed that the preceding discussions could make a rational contribution to a sometimes emotional and ideological debate – even if the individual positions did not come closer together. Nevertheless, scientists should accept the fact that consumers and producers have a different perception of innovation and are more cautious of unknown consequences; this would require more information of the latter. Because on the other hand GMOs are reality and societies would need to take decisions about them, based on a balancing of risks and chances.

Welcome address

The Secretary General of the Deutsche Welthungerhilfe (German Agro Action), **Dr. Hans Joachim Preuß**, welcomed the participants and thanked them for coming to Bonn to participate in the conference on potentials, chances and risks of genetically modified organisms (GMOs). He underlined that the Welthungerhilfe was happy to bring together scientists, practitioners and representatives of development organisations, private firms and the media, to discuss a topic of particular interest for development organisations. According to him, the topic is so interesting because GMOs are being introduced in developing countries while there is a feeling that some of these countries are not yet ready to implement this new technology.

Dr. Preuß pointed out that – as a development organisation – the Welthungerhilfe has to define its position with regard to GMOs, which it has not done yet. One of the objectives of the conference would therefore be to contribute to the decision-making within the Welthungerhilfe. He expressed his hopes that the conference would be characterised by a rational exchange of arguments and by an objective discussion about a topic where otherwise emotions, ideology and vested interests seem to dominate.

Introduction to the symposium

Prof. Dr. Franz Heidhues, Vice Chairperson of the Board of Directors of the Deutsche Welthungerhilfe, started his introduction to the conference by putting forward three reasons why the Welthungerhilfe was organising the symposium and why the topic is of relevance to the Welthungerhilfe.

Reasons why the Welthungerhilfe was organising the conference

1.) The mandate of the Welthungerhilfe includes not only active support of development work, but also raising public awareness of development issues – in particular with regard to poverty issues, small farmers and rural areas. As biotechnology is of relevance in this context, the Welthungerhilfe has to address it.

2.) Among the non-governmental organisations (NGOs), the Welthungerhilfe is a very broadly based organisation, covering practically the whole spectrum of society. Therefore, with biotechnology being a question that is discussed widely in society, the Welthungerhilfe is called on to bring the different views together.

3.) The Welthungerhilfe is also involved in food security, including food-for-work programmes, and in this activity it is directly confronted with the issue if genetically modified (GM) products are delivered for further distribution in the framework of these programmes.

Relevance of the issue and potential of GM crops for small farmers

Prof. Heidhues then proceeded by addressing a number of issues to underline the relevance of the problem. He put forward the question whether biotechnology has the potential to increase food production for small farmers. This question he then differentiated further, by asking (i) if biotechnology can raise productivity and (ii) if it can be accessed by small farmers. He related the first part of his question, the need for productivity increases, to three driving factors of food demand: population growth, rising incomes and urbanisation. With regard to population growth he affirmed that this factor is still pushing food demand, especially in the poorest of the developing countries. Rising incomes on the other hand have the effect that more money is spent on food, thus increasing food demand. And urbanisation, combined with income growth, causes a shift in consumption preferences towards higher value products like vegetables, meat and processed food.

Yet, in particular meat requires larger amounts of grain in its production, which drives up the demand for grain.

Biotechnology – productivity-increasing and pro-poor?

Prof. Heidhues explained that this growing demand for food has to be satisfied in a situation where land and water resources are getting increasingly scarce and overused. According to him, in such a situation productivity increases can only come from innovations and science. Therefore, if biotechnology has the potential to contribute to the much needed productivity increase, it is a technology that has to be taken seriously. Referring to Per Pinstrup-Andersen, he concurred that the need for productivity increases in poor countries' agriculture is so large that the best of science is needed to tackle the task – and if biotechnology is part of it, "we" cannot afford to push it aside.

Concerning the second part of his question, whether biotechnology can be pro-poor, i.e. whether small farmers can access this technology, Prof. Heidhues distinguished three key features of a pro-poor technology:

1.) The technology has to be applicable by small farmers on small parcels, because small-scale farming is a typical characteristic of the Welthungerhilfe's clientele. (In economic terms the technology has to be scale-neutral.)

2.) No big capital investments are needed to use the technology; technologies are too expensive for poor farmers if they have high initial capital requirements or if they require high external inputs on a permanent basis. Such technologies would not be accessible to small farmers.

3.) The technology has to be simple in its application; it has to be adapted to the knowledge of small farmers.

In asking if biotechnology is fulfilling these three minimum requirements he expressed his hope that the symposium would give an answer to these questions. In particular he hoped that the results of research in recent years would be absorbed and integrated in the discussion. However, apart from being interested in the question of suitability of biotechnology for small farmers in general, Prof. Heidhues also asked what the conditions were to make the technology accessible to small farmers and what organisations like the Welthungerhilfe could do to improve this access.

Risks of biotechnology

Prof. Heidhues highlighted that one of the issues that is dominating the discussion of biotechnology is the question of risk. He pointed out that there are two basic kinds of risk, which in the discussion are not always sufficiently separated – even though each of the risks is of a very different nature. He therefore stressed that it is important to differentiate between the risks, because the policy implications to deal with them are entirely different.

The first group of risks Prof. Heidhues addressed, were the technology-inherent risks (like undesired cross-fertilisation and gene-flow from GMOs to related species, the unintended transfer of new traits to other plants and the general question of controllability of GMOs) and the area of health risks (like the risk of allergies, antibiotics or virus resistances, etc.). Regarding these types of risk, Prof. Heidhues emphasised that the way to get answers to solve them and to get closer insights is long-term research. In this context he drew attention to a statement by the President of the German Science Foundation who underlined that the new German gene technology law is disregarding the interest of research and that the re-definition of responsibilities for releasing GMOs has made research that requires open air trials practically impossible and is encouraging such research to relocate abroad.

The second group of risks is what Prof. Heidhues called the institutional market-structure types of risks. He specified that these – totally different – risks are characterised by a

dominance of multinational companies in biotechnology research, by the monopolisation of benefits of the new technologies and by the danger of blocking access for small farmers. Regarding these types of risk, Prof. Heidhues noted that the solution has to be sought in designing an appropriate institutional and policy framework with proper rules and laws that enable also small farmers to access the innovations. Moreover research management would be needed and the promotion of a research set up where public research plays a larger role. According to Prof. Heidhues public research, in particular within the system of the Consultative Group on International Agricultural Research (CGIAR), is focussing on fostering the competitiveness of small farmers and on improving their access to new technologies. This is to counter the current situation, in which the research structure is highly biased towards the needs of developed countries; biotechnology research is focused on soybeans, cotton, maize and canola – all crops that are primarily of relevance to developed countries and commercial farming. As Prof. Heidhues lined out, this bias in biotechnology research is another issue that needs to be addressed; supporting public sector research would help to move the research focus more towards the needs of small farmers.

Concluding his introduction, Prof. Heidhues thanked the organisers of the symposium and wished all participants a fruitful discussion.

Introduction to the programme of the day

Dr. Jochen Donner, Welthungerhilfe, explained the programme of the day and introduced the moderators of the two panels, Dr. Volker Weyel (panel 1 in the morning) and Mr. Kurt Gerhardt (panel 2 in the afternoon). While the **first panel session** would mainly concentrate on the risks and chances of green biotechnology and GM crops for small farmers and women farmers in developing countries, **the second session** would deal mainly with aspects of the regulatory and legal frameworks in place and of contractual user agreements on the spot. Dr. Donner also introduced the three Welthungerhilfe-facilitators for the **three "round tables"** (in between the two panels, directly after lunch), his colleagues Dr. Iris Schöninger, Mathias Sommer and Dr. Heinz Peters. He encouraged all participants to join in a lively, meaningful and open discussion especially at the round tables, where they will meet in smaller groups. These round tables would have more space for discussion among the participants – space for spontaneous individual contributions.

Panel I

Introduction – GM crops and small farmers

The first panel dealt with the question "Can GM seeds and GM food crops contribute to the improvement of the small farmers' and women farmers' production in developing countries in terms of productivity, food security, health, environment and livelihood? What are the risks and opportunities? What is the state of the art at present? What are the future perspectives?" Opening the panel, **Dr. Volker Weyel**, the moderator, pointed out that by just using the acronym *GM* in the symposium programme, the Welthungerhilfe took a neutral position and let everyone the choice of interpreting the *M* as standing for *modified* or *manipulated*. At the same time he expressed his hopes that the symposium would contribute to a more clear-cut understanding of how the *M* should be interpreted.

Hunger and the international order

To provide a background for the discussion, Dr. Weyel highlighted two issues, namely hunger and the international order. He pointed out that the rate at which people go hungry has not changed much since the adoption of the Millennium Development Goals (MDGs) by the heads of state and government of the United Nations in the year 2000, even though one of these goals seeks a 50 percent reduction in hunger by the year 2015. He con-

trasted this goal with the recent figures of the FAO Annual Report, in which the number of chronically hungry people is estimated to be 815 million in developing countries – which does not reflect a big change compared to the situation 4 years ago when the MDGs were adopted.

Political dimensions of GMOs

Dr. Weyel then continued by indicating that hunger is not only a question of basic needs and that the subject of the discussion is not just technical in nature. To underline his point he mentioned the food scarcity in some countries of Southern Africa two years ago, during which international relief aid was needed – and forthcoming. However, he contended, a large consignment of the food aid consisted of GM maize and critics said that the situation was used by some large donor countries to force acceptance of GMOs on countries which were badly in need of food. One of the countries was Zambia, which is heavily dependent on maize as staple food. Yet, the Zambian government refused to accept aid consisting of GM food. According to Dr. Weyel, this incident shows that GMOs also have a political dimension, in this case affecting the sovereignty of a small and poor country.

Presentation of the panellists

Summing up, Dr. Weyel affirmed that the question of GM food is not only an issue for technical discussions of experts about hunger but also an issue for international relations and the international order. He finished his opening of the panel by introducing the panellists: Prof. Dr. Michael B. Krawinkel of the University of Gießen and member of the Project Committee of the Deutsche Welthungerhilfe, Prof. Dr. Matin Qaim of the University of Hohenheim, Dr. Manfred Kern of Bayer CropScience, Dr. Beatrix Tappeser of the Federal Agency for Nature Conservation, and Dr. Bernd Lüttgens of the German Farmers' Association.[2]

Following this opening of the panel, two panellists gave a short presentation on different aspects of the overall topic. First in line was Prof. Krawinkel who gave a presentation about both the potentials of GM plants for international nutrition security and the risks of genetic engineering, followed by Prof. Qaim who talked about the actual impacts of GM crops in developing countries.

[2] Note of the rapporteur: The curriculum vitas of the panellists can be found in the annexe.

Presentation of Prof. Krawinkel

Hunger, the underlying problem

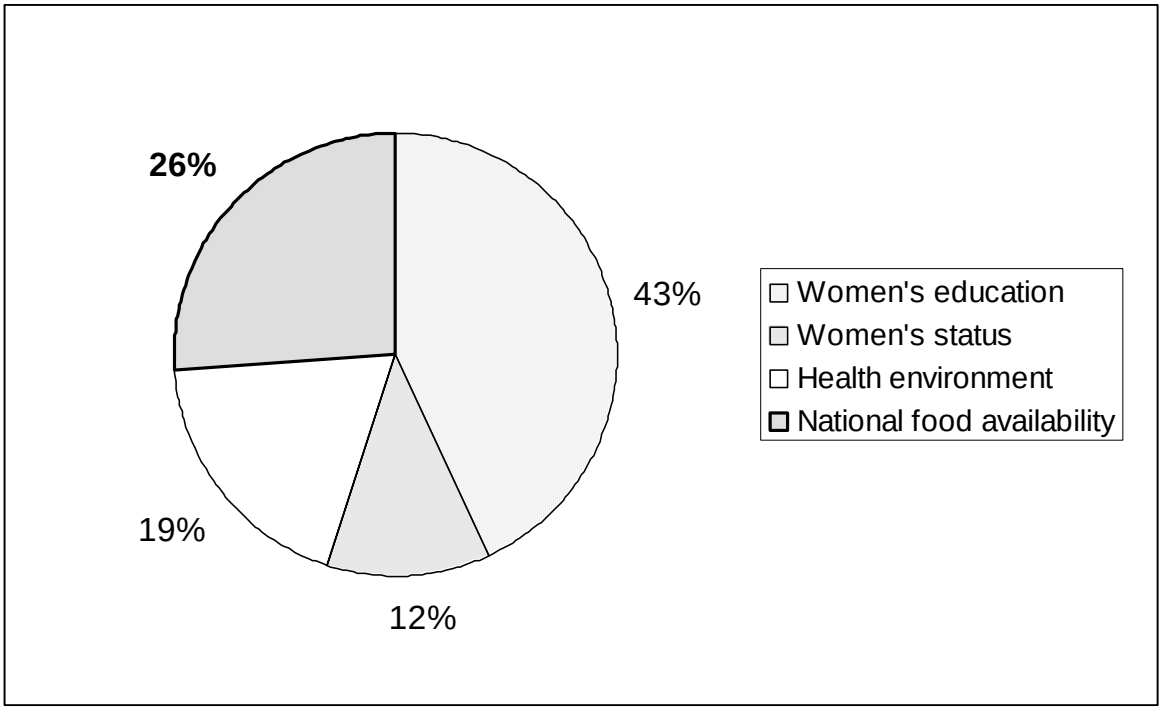
Figure 1

Prof. Krawinkel started his presentation by showing a "hunger map" to illustrate the current nutrition situation in the developing world (Figure 1) where 815 million people do not have enough to eat. He asserted that in this situation the main objective has to be to fight hunger and that technological approaches (like modern seeds, agro-chemicals and new cropping techniques) have to be used to this end, in conjunction with social approaches (like legislation, education, empowerment and health care). Prof. Krawinkel then pointed out that GMOs belong to the group of technological approaches only.

Determinants of malnutrition

To further clarify the difference between the two basic approaches, Prof. Krawinkel showed a pie chart with determinants of child malnutrition in developing countries and with their estimated contribution to the problem (Figure 2). He explained that this chart was based on the results of a meta-analysis that was carried out by the International Food Policy Research Institute (IFPRI). The main message of the chart would be that national food availability contributed only 26 percent to the problem of child malnutrition, while women's education and women's status contributed over 50 percent (with the reminder coming from a beneficial health environment). Therefore actual food availability would be a limited aspect of the problem of food security only.

Figure 2: Determinants of child malnutrition in developing countries*

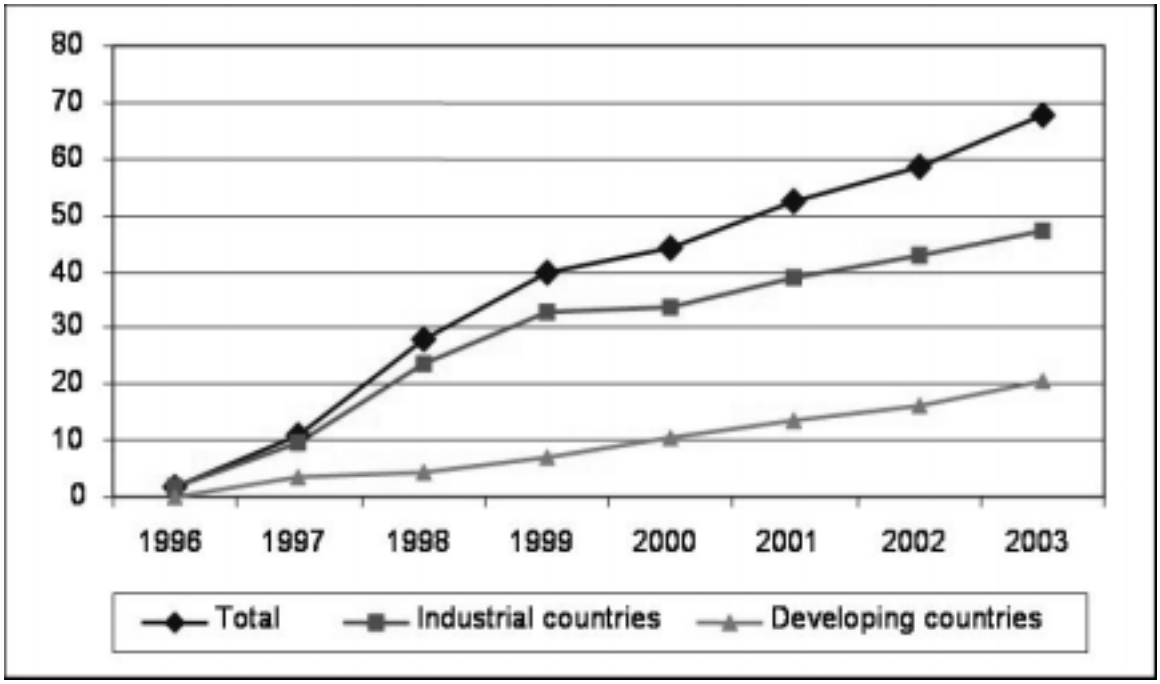


* Estimation, 1970-1995. Source given by Prof. Krawinkel: IFPRI (2000).

The global spread of GM plants

Turning to GM plants and their role in agriculture, Prof. Krawinkel showed a graph representing the increase in the global cropping area of GM plants between 1996 and 2003, indicating that the increase is impressive both in total and for industrialised countries, but that it is lower in developing countries (Figure 3). To put the figures into a context, Prof. Krawinkel added that the total global GMO area corresponds to the total agricultural area in Canada.

Figure 3: Cropping area of GM plants (million hectares)



Source given by Prof. Krawinkel: James (2003).

Classification of GM plants

Looking in more detail at the properties of GM plants, Prof. Krawinkel distinguished between input and output properties: input properties (like herbicide tolerance, diseases resistance or adaptation to extreme environmental conditions) would be relevant for the improvement of agricultural production, while output properties (like micronutrient-content, prolonged shelf-life, improved processing properties or production of pharmaceutical substances) would be relevant for product quality, for trade and for the consumers. Prof. Krawinkel pointed out that amongst input properties herbicide tolerance plays the main role, while traits that are of particular relevance to developing countries, like adaptation to extreme conditions, are only at the stage of research. With regard to output traits he maintained that they are still mainly at the research stage as well, but that all these traits are the potentials that are mentioned when the benefits of biotechnology are discussed.

Environmental effects of GM plants

Next Prof. Krawinkel discussed the environmental effects of GM plants, starting with the case of herbicide-tolerant GM crops. Amongst the potentials of this particular trait he counted the reduction in the use of herbicides and the possibility of a more flexible application of herbicides, both leading to lower costs. Substantiating his points, Prof. Krawinkel referred to studies showing that on fields where GMOs are grown the application of herbicides was different from non-GMO fields, with the results of the studies ranging from a reduction in the use of herbicides on GMO fields by 40 percent, to even an increase in its use by 7 percent. Regarding the risks of herbicide-tolerant GM plants, Prof. Krawinkel pointed to the development of resistance by weeds in the long-term, which would undermine the herbicidal effect of the corresponding GMOs. He also drew attention to the potential occurrence of new pests through mutations. For references to studies on which these statements are based, he cited a brochure that he had jointly produced for the Welthungerhilfe.[3] Concluding his assessment of herbicide-resistant GM plants, he underlined that a reduction in herbicide use is not guaranteed and that pest control may become more difficult in future.

Prof. Krawinkel then turned to the issue of biodiversity, where he saw a potential advantage of genetic engineering, because GM plants allow both a more flexible and less intensive use of herbicides and a more efficient use of the land under cultivation, thus limiting the expansion of agricultural land use. However, he also cited a finding that the diversity of animals in GMO fields has been found lower than in fields under conventional cropping and that herbicides that were used in cultivation of GMOs lead to a deterioration in animal life. Summing up the effects of GM plants on the diversity of animal life, he indicated that the positive and negative effects are not sufficiently known yet.

Another environmental aspect of GM plants Prof. Krawinkel looked at was gene-flow. Here affirmed that modified genes are found in wild relatives of modified plants, for which he referred to a study that proved the existence of GM traits in local varieties of maize in Mexico. Prof. Krawinkel asserted that this possibility is the reason why the risk of a reduction in agricultural diversity is mentioned by some authors and why the co-existence of GM and non-GM plants is endangered. At the same time Prof. Krawinkel maintained that the transfer of genes is not necessarily a dangerous phenomenon in itself, because they are not necessarily advantageous in natural selection and the modified trait may disappear again in wild habitats; he also recalled that transfers of genes happen with conventional crops as well. And Prof. Krawinkel saw the possibility that distances between GM crops and other plants can be wide enough to avoid the transfer of genes. However, in his final assessment of gene-flow he stated that the genetic diversity of plants can be

[3] Krawinkel, Michael and Johanna Mahr (2004). Grüne Gentechnik – Chancen und Risiken für die internationale Ernährungssicherung. Deutsche Welthungerhilfe, Bonn.

endangered through the transfer of genes and that more research is needed to address this issue.

GM crops ("Golden Rice") and food quality

Turning to the aspect of food quality, Prof. Krawinkel focused on vitamin and trace element deficiencies, referring in particular to "Golden Rice", which was designed for a higher beta-carotene content to help meeting the needs of vitamin A-deficient populations. He pointed out that supporters of this approach (i.e. of promoting crops that contain higher amounts of essential micronutrients) say that it enables a cost-effective and sustainable provision of vitamins and trace elements (like vitamin A, iron and zinc). According to Prof. Krawinkel the supporters of Golden Rice also contend that a sufficient intake of vitamin A would be possible through daily consumption of Golden Rice from childhood onwards, which is why it is not seen as a therapeutic but as a preventive approach to vitamin A deficiency. Taking up an argument of critics of Golden Rice, Prof. Krawinkel highlighted the question of whether the human organism can benefit from the beta-carotene in the rice; he expressed his astonishment that so little efforts would have been made until now to prove its bioavailability. Prof. Krawinkel stated further that according to estimates of this bioavailability the daily consumption of Golden Rice will not meet the beta-carotene needs of populations at risk of vitamin A deficiency. He also mentioned the experience of trying to get people accept brown rice and concluded that introducing Golden Rice will not be easier. Prof. Krawinkel finished his outlook on Golden Rice by stating that there is still a lack of nutrition-related information and that more research is needed. Generally, he advocated a more integrated approach for the future, which should consist of a combination of transgenic approaches, the promotion of vegetable consumption and the dissemination of nutrition information.

GM plants and potential health risks

The next point that Prof. Krawinkel discussed was the potential impact of GM plants on human health. He shared his general impression that especially health risks are much less researched than environmental risks. After explaining that the risks of food derived from GM plants are usually compared with the risks of food derived from conventionally grown crops, he then asked (i) which potential health risks are really targeted in research, (ii) whether enough efforts have been made to identify the health risks, and (iii) whether potential health risks really can be identified by the methods applied? Based on these open questions he concluded that a lack of proven health problems does not guarantee the absence of health risks.

One particular health risk Prof. Krawinkel addressed was the risk of allergic reactions: he explained that genes that are introduced into other organisms can precipitate allergies by producing new proteins. He conceded that surveys do not indicate major allergic risks compared to conventional foods, but at the same time he questioned the reliability of these investigations because they would not always address allergic risks and even then allergies would be difficult to detect by animal experiments or cell culture experiments. He also outlined that there is evidence that the Bt-protein may cause food allergies in people inhaling it. These circumstances would make it extremely important to label food for potential allergenicity and to carry out further research. Another sort of health risks of GM plants that Prof. Krawinkel mentioned was the transfer of genes. He acknowledged that comparatively little is known about the consequences of such transfers, but he asserted that unexpected pathogenic effects can occur when mutations of bacterial flora of the gut happen, when new viruses occur or when new proteins or toxins are observed.

Outlook on future developments

Concluding his presentation, Prof. Krawinkel affirmed that genetic engineering of plants has a potential for promoting international nutrition security, but that some risks – and also

some benefits – are neither fully understood nor taken into account in the assessment of GM plants. Instead of engaging in fundamental debates he called for more publicly financed research and for more aid for developing countries to help them cope with the challenges they are faced with regarding GMOs. Underlining the latter, he referred to a meeting with an adviser of President "Lula" of Brazil, from which he had learnt that for the necessary regulation and the scientific body in the context of GMOs, developing countries need donor support to maintain and ensure food security and the protection of health and of the environment.

Presentation of Prof. Qaim

The current debate

Prof. Qaim gave the next presentation to introduce the subject of Panel I; he presented recent research results to illustrate potential impacts of GM crops in developing countries.

Opening his presentation, Prof. Qaim acknowledged that GM crops and developing countries are a very controversial topic, with many people arguing that GMOs do have a role to play in developing countries and others suggesting that this is only the hypocritical reasoning of multinational companies who want to push their products and promote their technologies that have not gained ground in other parts of the world, especially not in Europe. Against this background Prof. Qaim briefly reviewed some of the main arguments that are being exchanged in the public debate about GM crops.

Potential benefits of GM crops

Starting with the case of the supporters of biotechnology, Prof. Qaim invoked the argument that with GM crops there is potential for agricultural output growth, which would increase food availability and food security. He continued by referring to the potential of income generation, especially from GM crops that are useful for small farmers in developing countries. The next argument he quoted was that GM techniques could bring forth more nutritious and healthy staple food crops, i.e. crops that contain more vitamins and trace-minerals. And finally he put forward that it is argued that GM crops could lead to environmental and health benefits, especially if in-built resistance mechanisms replace – or at least reduce – toxic agro-chemicals that are currently being used both in the developing and in the developed world.

Criticisms of genetic engineering

Turning to the contra-side of the discussion, Prof. Qaim reflected the concern of critics of genetic engineering (GE) about environmental and health risks of GM crops. He pointed out that many detractors of biotechnology argue that high-tech is inherently inappropriate for small farm, that it might be disruptive for traditional farming systems and that only a couple of large-scale commercial growers might benefit but not the small-holder farmers who dominate developing country agriculture in large parts of the world. He indicated that – because of the clear dominance of multinational corporations in the commercialisation of GM crops – there are fears that GM technologies might lead to an exploitation of small-scale farmers, that multinationals might drive small-scale farmers into new dependencies (with obvious negative social outcomes) and that existing disparities might increase.

Admitting that these are no new arguments, Prof. Qaim expounded the rationale behind this account: to make clear how entrenched the debate is on both sides, with neither supporters nor opponents of GMOs moving away from the standpoints they have taken once. Agreeing with Prof. Heidhues, he expressed his feeling that the empirical evidence that has been accumulated in the recent past is not entering the debate – whether for lack of knowledge of these studies or because people do not want to take up the information – and that his intention was to focus on this evidence in the remainder of his presentation.

Disaggregation of the global GM crop area

Like Prof. Krawinkel before him, Prof. Qaim showed a graph of the global GM crop area (Figure 3 above) to illustrate the development over time, until reaching 70 million hectares on a world-wide basis in 2003. He conceded that industrialised countries have a clear lion-share in the cultivation of GM crops, but he underlined that – with around 30 percent – developing countries do make up a significant share by now. Prof. Qaim then detailed that it is basically Argentina (with 21 percent), Brazil and China (with 4 percent each), followed by South Africa, India and Mexico, that make up this developing countries' share. Nevertheless he also mentioned that additional countries have started growing GM crops more recently, including Columbia, Uruguay, the Philippines and Indonesia.

Differences between GM crops

In his next point Prof. Qaim looked in more detail at the characteristics of the GM crops that are being grown at the moment. He stressed that GM crops are not equal to GM crops and that, therefore, these crops need to be differentiated. Of the four crops mentioned by Prof. Heidhues before (soybeans, cotton, maize and canola) and of the two main GM traits (herbicide tolerance and insect resistance), Prof. Qaim stated that in developing countries there are only two technologies that have found significant adoption so far: insect-resistant Bt-cotton on the one hand and herbicide-resistant soybeans on the other hand. With regard to herbicide-tolerant soybeans, Prof. Qaim explained that these crops are grown in Argentina and Brazil by large-scale farmers and are therefore of not too great an interest in the context of the symposium, whose focus was on small-scale farming. Contrary to that, and in contradiction to Prof. Heidhues' assertion that none of the currently grown GM crops are of major relevance to small and poor farmers, Prof. Qaim insisted that cotton is a crop that is grown by millions of small-holder farmers in many parts of the world, especially in China, India and South-Africa. With this argument he also justified the focus on Bt-cotton in his presentation, which he declared was based on results of impact studies that have been carried out by different research groups and that have been published in peer-reviewed journals.

Bt-cotton and small-scale farmers

Prof. Qaim described that Bt-cotton is a technology that makes cotton plants resistant to the cotton bollworm, a very serious insect pest in large parts of the cotton-growing world, where farmers would use tremendous amounts of chemical pesticides in an effort to control the pest. According to Prof. Qaim, it is therefore not surprising to see that farmers have adopted this technology and that these adopters have been reducing their use of chemical insecticides by very significant amounts, i.e. by 30-80 percent. Prof. Qaim also outlined that the Bt-technology induces yield gains – not because it makes the crop higher yielding as such, but because it decreases crop losses. Despite the use of insecticides, farmers would suffer from yield losses caused by the bollworms; a better and more effective protection against this pest would therefore significantly increase *effective* yield gains. Prof. Qaim asserted that in spite of higher seed costs, on average farmers are realising very significant income gains with Bt-cotton. He acknowledged, though, that average values cover the variability of individual results and that not every single farmer who adopts the technology benefits. Nevertheless he maintained that the average values show that farmers in general benefit tremendously. To illustrate this point he invoked the internationally recognised poverty line of one Dollar a day, which amounts to an annual income of 365 Dollars. Comparing this value with the annual income gains of farmers (470 Dollars in the case of China), he showed the dimensions of the impact, taking this also as reason for the rapid adoption of the technology by these farmers (Table 1).

Table 1: International evidence on the impact of Bt-cotton

	India	China	South Africa	Argentina	Mexico
Insecticide	-50%	-65%	-33%	-47%	-77%
Yield	+34%	+24%	+22%	+33%	+9%
Per-ha gain	$111	$470	$18	$23	$295

Sources given by Prof. Qaim: Qaim et al. (2004), Pray et al. (2002), Thirtle et al. (2003), Traxler et al. (2003).

Prof. Qaim also rejected the possibility of a technology-inherent bias against small-scale growers, i.e. he denied that only large-scale farmers benefit from Bt-cotton. To support this view he referred to studies that have shown that small-scale farmers, especially in China and South-Africa, benefit from the technology – in many cases even more than large-scale farmers. Prof. Qaim then highlighted that cotton is the crop that consumes the biggest amount of pesticides world-wide, which would translate the reduction in insecticide use into very significant reductions in absolute pesticide volumes. According to Prof. Qaim, reductions in pesticide use also lead to environmental benefits and to benefits for those farmers who were applying the pesticides manually and without protective clothing.

Intellectual property rights and the distribution of benefits

Turning to another issue, Prof. Qaim portrayed the image of multinational companies seemingly exploiting small-scale farmers in developing countries through their technologies. To rectify this impression and to illuminate this relation, he showed the distribution of the benefits of the adoption of Bt-cotton between farmers and private companies (Table 2) and explained the variation between countries with differences in their intellectual property rights (IPRs).

Table 2: Distribution of benefits of Bt-cotton and adoption rates

	India	China	South Africa	Argentina	Mexico
Farmers	66%	94%	58%	21%	84%
Companies	34%	6%	42%	79%	16%
Adoption	7%	58%	50%	5%	35%

Sources given by Prof. Qaim: Qaim et al. (2004), Pray et al. (2002), Thirtle et al. (2003), Traxler et al. (2003).

Picking one extreme case, China, as example, Prof. Qaim drew attention to the fact that in China the Bt-cotton technology is not protected at all. According to him, this means that there is quite some competition in the seed markets, with at least 25 different companies selling Bt-cotton seeds, which keeps prices low. He added that the lack of intellectual property (IP) protection also means that farmers can re-use their seeds – which about 50 percent of farmers would be doing. Prof. Qaim gave this setting as reason for the big share of benefits (94 percent) that Chinese farmers can appropriate from growing Bt-cotton. However, he also pointed out that in the other countries farmers are the main beneficiaries as well, capturing more than half of the overall benefits that the technology generates – with the exception of Argentina. There, Prof. Qaim explained, Bt-cotton is patented and seed prices are excessively high, which would mean that seed companies (basically Monsanto) are the main beneficiaries and that farmers only get a share of the benefits of 20 percent.

Technology adoption and freedom of choice

Prof. Qaim then asked whether the situation of Bt-cotton growers in Argentina is what is meant by exploitation – and refuted his suggestion by asserting that farmers can only be exploited if they were forced to use the technology. However, he clarified that although the technology has been commercialised in Argentina in 1998 already, only 5 percent of the farmers have adopted Bt-cotton. 95 percent of farmers plainly reject the technology or, as Prof. Qaim described drawing upon the experience of surveys he was involved in, have tried it out once and abandoned the technology again after realising that it does not pay off. Therefore Prof. Qaim came to the conclusion that the notion that crop adoption is irreversible is wrong, because farmers decide each year whether they are going to buy the seeds or not – and they only do so if it is worthwhile. Nevertheless Prof. Qaim agreed with Prof. Heidhues in that there can be problems of access to a technology; he affirmed that if prices are too high there is an access problem and that too strong IP protection can be detrimental for farmers. Summing up his views on the argument of exploitation, Prof. Qaim maintained that this argument is overrated because farmers have the choice to say no to a technology and do so. He supported these views with the fact that in countries where there are higher benefit shares for farmers, adoption rates are also much higher (with the exception of India where the technology has only been commercialised recently and where crops are still at the stage of adaptive breeding).

The relative contribution of GM crops in the fight against hunger

Coming to his conclusions, Prof. Qaim affirmed that agricultural technology is not a silver bullet in the fight against hunger and poverty – and that people who argue that way are not serious. But he affirmed likewise that it can be an important ingredient in strategies to fight hunger and poverty. Responding to Prof. Krawinkel's differentiation of interventions into technological and social approaches and of his qualification of the importance of mere food availability, Prof. Qaim highlighted that agricultural technology can not only be a solution to the problem of food availability, but also to the problem of distribution. He indicated that people who are hungry do not have sufficient income to purchase the food they need and that agricultural technology could help in that it can contribute to increase the income of those people who are poor and who are hungry. Prof. Qaim maintained that when 70-75 percent of the poor are living in rural areas and depend on the agricultural sector, increases in agricultural incomes can be very beneficial – even if they do not come from food crops. For this reason Prof. Qaim suggested that cotton can have a very important role to play, also in the food security debate. Having established the relative importance and the potential of agricultural technologies, Prof. Qaim underlined the importance of using GM crops to address local problems and he differentiated between GM crops that benefit small-scale farmers (like Bt-cotton) and GM traits where such benefits are more questionable (like herbicide tolerance).

Intellectual property protection and public research

Another factor influencing the distribution of the benefits of GM crops that was noted by Prof Qaim was the strength of IP protection. He stressed that the higher the level of protection, the lower the benefits for farmers (because companies reap larger shares of the benefits) and the more acute the problem of technology access. In this context Prof. Qaim saw a potential threat to the social optimum when relying on the private sector alone: even if private companies are not exploiting small-scale farmers, they are neither developing specific technologies for small-scale farmers because of the lack of lucrative markets. Prof. Qaim stated that private companies are developing GM technologies for soybeans, cotton and canola, but he wondered who is going to develop GM cassava, GM sweet potatoes, GM millet or GM sorghum, or who is going to target agronomic traits that are of particular relevance for developing countries only. His conclusion was that not only more public research is needed to delve into those areas that are neglected by the private sector, but also that more private-public sector partnerships are needed in order for this to

happen. Prof. Qaim ended his presentation with a call for a more healthy discussion that overcomes the emotional and entrenched debate that he had outlined in the beginning and he expressed his hopes that a more constructive debate could help materialise technologies that have a potential for the developing world.

Debate of the panellists

Opening the general debate and following up on Prof. Qaim's conviction that the fears of corporate exploitation are unfounded and exaggerated, **Dr. Weyel** asked Dr. Kern, the representative of Bayer CropScience, whether Bayer exploits farmers and what are the target groups of Bayer.

The role of green biotechnology at the international level

Dr. Kern classified the first part of the query as "sexy question" that only serves to tease or entertain people, and shortly answered it with a "no". He then proceeded to provide the background of green biotechnology at the international level through quoting chapter 16 of the Agenda 21, which was adopted at the United Nations conference in Rio de Janeiro, and which provides the following list of activities concerning the environmentally sound management of biotechnology – "especially within developing countries":

a) Increasing the availability of food, feed and renewable raw materials;

b) Improving human health;

c) Enhancing protection of the environment;

d) Enhancing safety and developing international mechanisms for cooperation;

e) Establishing enabling mechanisms for the development and the environmentally sound application of biotechnology.

However, according to Dr. Kern, this programme did not work and still is not working.

The role of private companies and the potential of co-operations

Dr. Kern affirmed that companies want to make money out of their technologies and that this is also true for Bayer CropScience. Yet, he also highlighted that there are different players in this field (with Monsanto being the biggest one) and that the judgement of these different stakeholders concerning the role of the private sector is very different. Dr. Kern outlined that the approach of Bayer CropScience is another one than that of BASF or of Monsanto or of others. Regarding Bayer CropScience, he declared that the company is eager to explore ways to bring GM technologies to developing countries, which is why the company is analysing the statements of other key stakeholders in the process and why it implemented a project to appraise the Human Development Report 2001. Dr. Kern also referred to statements by Kofi Annan and Jaques Diouf about using green biotechnology in rural areas for the reduction of poverty to explain his company's commitment in this context. In particular, Dr. Kern cited own published papers that deal with the perspectives of green biotechnology in developing countries and with the potential for co-operations.[4]

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[4] Kern, M. (2002). Food, feed, fibre, fuel and industrial products of the future: challenges and opportunities. Understanding the strategic potential of plant genetic engineering. Journal of Agronomy and Crop Sciences, Vol. 188, pp. 291-305.

Kern, M. (2002). Plant biotechnology: perspectives for developing countries between 2002 and 2025. African Journal of Food and Nutritional Sciences, Vol. 2, No. 2, pp. 39-46.

Kern, M. (2001). Partnerships in public and private sector agricultural research. Agriculture and Rural Development, Vol. 2, pp. 2-6.

Expanding on the issue of co-operations, Dr. Kern stated that since more than 6 or 7 years Bayer is trying to obtain requests for co-operations from other organisations that are on the ground in the rural areas of the very poor countries. According to Dr. Kern, such co-operations are necessary to answer the question of what can be done with the technology *per se* – or what would be done if the technology would *not* be in the hand of the private sector? He affirmed that, in the end, the question is not who owns the technology but what shall be done with it in the future? He specified that herbicide-tolerant sugar beet is inappropriate for African countries, that herbicide-tolerant soybeans are not the key to African countries, but that drought-resistant corn or drought-resistant cassava would work. Yet, he also made clear that if there is no market there won't be any investments by the private sector. Nevertheless he offered some other approaches: insect-resistant cotton could pay off in African countries, co-operations for insect-resistant corn or drought resistance could be possible. Dr. Kern only demanded that the particular requirements need to be spelled out and that specific co-operation requests are made.

Technological "apartheid" and the future of global food production

Another obstacle for developing countries that was named by Dr. Kern was the unclear position of European countries with regard to GMOs. He maintained that developing countries will not move ahead as long as they cannot be sure about the exportability of their crops to the European market. In this context he saw the fault not with private businesses but he evoked the picture of "technological apartheid" that differing statements from the western world would have brought to developing countries; he declared that after 10 years of green biotechnology, this technology has passed the poor in developing countries.

Based on his experience in the different companies he had joined (Hoechst, AgrEvo, Aventis and Bayer CropScience), Dr. Kern expressed his confidence that in the year 2025 20 percent of global food production will come from genetically engineered crops. Disaggregating a projection into the year 2025, Dr. Kern showed for industrialised countries that almost 30 percent of the food production will come from GM crops – a figure that falls to 20 percent for Asian countries and to 15 percent for Latin American countries. For African countries the projection showed only a share of 6 percent for GM crops in total food production. In this development Dr. Kern saw a failure in the fulfilment of what was said by the United Nations, by the FAO and by other key stakeholders in the process, i.e. to employ biotechnology to help the poor in developing countries. He regretted that the debate was revolving around risks and 3 or 4 crops only, while more than thousand plants are genetically modified in different laboratories, in different places, for different reasons.

Public-private partnerships and technology transfer

Returning to the issue of co-operation, Dr. Kern stressed again that public-private partnerships and the commitment and the input of NGOs are needed to direct future developments and research to make biotechnology accessible for the poor. He gave the example that without local or public input any steps taken by the private sector would be interpreted the wrong way, claiming that if Bayer CropScience would start to go for insect-resistant cabbage, people would say "Oh, what are they doing now? They want to make money with the poorest of the poor!" Consequently feedback from NGOs would need to come forward to provide details about the kind of crops that are needed and how a co-operation could look like. Therefore the private sector would have established a scientist exchange programme to enable scientists from developing countries to transfer and adapt technologies from laboratories in western countries to local crops.

Taking up the issue of public-private partnerships, **Dr. Weyel** invited Dr. Lüttgens to comment on that and to present the views of the German Farmers' Association, which would also have international connections and, therefore, could act as advocacy group for small-holder farmers.

Enforced passivity of German farmers

Dr. Lüttgens replied that he has got a problem discussing the issue of GM crops because German laws would prevent German farmers from growing these crops. Therefore his association could not provide first-hand experience to small farmers in developing countries, even though he saw a potential of GM crops in increasing yields, in tackling the issue of pollution with pesticides and in bringing higher quality products – all of which could provide huge benefits.

Conceding the provocative nature of this question, **Dr. Weyel** turned to Dr. Tappeser to state that GM food and GM seeds are a matter of fact that cannot be abolished, asking whether she sees a chance for some sort of peaceful co-existence between the different modes of production?

Political straightjackets and European legislation

Dr. Tappeser first commented the previous contributions to give the full picture of these issues. She stated that it is wrong to say that the German GM laws hinder research. She declared that the German GM law is a translation of the corresponding European directive and that the possibilities for the German government to do it another way were limited. For this she provided the example of zero tolerance regarding the issue of outcrossing from experimental releases, which would come as a legal opinion from the European Commission and not from the German government.

Pesticide use, herbicide tolerance and weeds with GM crops

Following the call to take current research results into consideration, Dr. Tappeser then referred to a study on pesticide use.[5] She cited this analysis of US agriculture of the past 9 years, saying that there has been a 20-30 percent increase in pesticide use with GM crops. She referred to data showing that with herbicide-tolerant soybeans there has been some form of reduction for the first 2 or 3 years. Nevertheless she claimed that the subsequent increase could have been foreseen by biologists or agriculturalists because of the high selection pressure that occurs due to the long-time use of the same broad-spectrum herbicide. Dr. Tappeser stated further that for this reason the weed has become more tolerant and that there has been a weed shift, so that farmers have to use more or additional pesticides in order to fight the problem.[6]

GM crops and Argentina

As a second point, Dr. Tappeser commented the data Prof. Qaim had presented about Argentina. She related the 250 percent increase in soybean production over the last years with the 5 percent adoption of GM crops, underlining her suspicion that if there is such a huge difference the technology might not benefit the small farmers.[7] She also added that following the big economic problems in Argentina there has been a lot of hunger in the country. In this context she quoted donors who attributed this problem to the production of soybeans for export, which would not leave enough food on the local market.

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[5] Benbrook C.M. (2004). Genetically engineered crops and pesticide use in the United States: the first nine years. BioTech InfoNet, Technical Paper No. 7. Online at http:/www.biotech-info.net/highlights.html#technical_papers.

[6] Note of the rapporteur: Pesticides comprise both insecticides and herbicides.

[7] Note of the rapporteur: Please see the comment by Prof. Qaim below for a clarification of the misunderstanding about the production of GM *soybeans* and the adoption rate of GM *cotton*.

GM crops, reduced biodiversity and weediness

Next, Dr. Tappeser turned to the aspect of biodiversity. She referred to a series of large-scale evaluations in England, which specifically dealt with the consequences of herbicide-tolerant crops for biodiversity.[8] She described that in these studies a comparison has been done between a conventional setting and a conventional setting plus the herbicide-tolerant crops; the three crops tested were canola, sugar beet and maize. Dr. Tappeser then specified that these studies, with one exception, had found a significant reduction in biodiversity of wild plants and insects. Regarding the exception she explained that in this case the herbicide used in the conventional maize field was atrazine, which is now forbidden all over Europe (and in Germany since 1992) because of its toxic characteristics, which would invalidate this result. Providing another example, Dr. Tappeser referred to the experience in Canada, where there are huge plantations of herbicide-tolerant canola. She stated that there are major weed problems with the herbicide-tolerant canola itself because canola plants now show up as volunteers in the fields, which requires taking recourse to other herbicides again.

The importance of general public research and regional differentiation

Like the previous speakers, Dr. Tappeser called for more publicly funded research, not only to investigate the chances and impacts of GM crops in developing countries, but also to study the cultural, climatic and socio-economic conditions in which small farmers and especially women farmers operate. Contrary to this need, Dr. Tappeser stated a general reduction of publicly funded research, not only in the context of developing countries but also for countries like Germany, where some of the agricultural faculties will be shut down. To underline the importance of a broader and differentiated approach in research, she referred to Hans Herren, the director general of the International Centre of Insect Physiology and Ecology (ICIPE) in Kenya. She commented that the ICIPE develops technologies that are adapted to the requirements of the farmers in Kenya by following a "push-pull-strategy" and she established Hans Herren's credentials by pointing out that he has received the Agricultural Food Prize in 1995 by the FAO.[9] Dr. Tappeser cited him as saying that it is not only technology – or biotechnology – but the general conditions like education, right to land, fair and open markets and the control over resources that need to be improved. She affirmed that these issues are at the core of the debate, because there is not just one solution all over the world but there will be different solutions in different regions of the world. Therefore an answer to the debate would be to empower local governments and farmers, an approach that should not be restricted to money transfers from the rich countries.

The issue of co-existence

Dr. Tappeser ended her comment by addressing the issue of co-existence, where she saw a possibility to grow GM crops in countries where there are no native relatives of the plant, where there is no possibility of survival and where agriculture can be organised in a way that GM crops and non-GM crops are separated. She saw this possibility for tomatoes and potatoes in Europe, but not for canola, and neither for GM maize in Mexico.

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[8] Squire, G.R., D.R. Brooks, D.A. Bohan, G.T. Champion, R.E. Daniels, A.J. Haughton, C. Hawes, M.S. Heard, M.O. Hill, M.J. May, J.L. Osborne, J.N. Perry, D.B. Roy, I.P. Woiwod and L.G. Firbank (2003). On the rationale and interpretation of Farm Scale Evaluations of genetically modified herbicide-tolerant crops. The Royal Society. Philosophical Transactions: Biological Sciences, Series B, Vol. 358, No. 1439, pp. 1779-1799. (And 7 other publications in the same edition.) Online at http://www.pubs.royalsoc.ac.uk/phil_trans_bio_archive.shtml.

[9] Note of the rapporteur: The food prize he received in 1995 was the World Food Prize of the World Food Prize Foundation.

Following the first rounds of comments, **Dr. Weyel** stated that there was not much time left for discussion but that before opening the floor to the audience he would give each panellist the possibility to comment the contributions of the others.

The need to differentiate between insect resistance and herbicide tolerance

Prof. Qaim expressed his wish to clarify some of the misunderstandings regarding Dr. Tappeser's and his presentations. First he referred to the USDA study that showed an increase of 20-30 percent of pesticide use after the introduction of GM crops in the US. He conceded that this might be true but that one should differentiate between *herbicide*-tolerant and *insect*-resistant crops. He explained that he had carried out studies about herbicide-tolerant crops in Argentina, which have shown that there is a doubling in the herbicide amount used per hectare for those farmers who are growing herbicide-tolerant soybeans. Prof. Qaim therefore acknowledged that there is not a reduction or an increase of pesticide use with GM crops *per se*, but that it is important to differentiate between the technologies one talks about. Complementing the picture, he pointed out that for the use of chemical insecticides there is a very big decrease with Bt-cotton in the US.

A corrected view on GM crops and Argentina

The next misunderstanding in Dr. Tappeser's comment, which Prof. Qaim addressed, was that she has made a connection between a 250 percent increase in the production of soybeans and the 5 percent adoption rate of GM technology Prof. Qaim had talked about. Prof. Qaim clarified that Dr. Tappeser was talking about *soybeans* while he had referred to *cotton*. He underlined that GM soybeans have been adopted by 100 percent of farmers in Argentina, meaning that every farmer has adopted herbicide-tolerant soybeans. Prof. Qaim expressed his conviction that it is inappropriate to make blunt statements about things the public might not understand the right way.

Finally Prof. Qaim also took up the connection between hungry people in Argentina and the increase in soybean production, which Dr. Tappeser had made. He asserted that poverty rates in Argentina have increased after the year 2001 because of the financial and economic crisis in the country and that this crisis has nothing to do with GM technologies. He pointed out that Argentina is among the biggest agricultural exporters of soybeans, maize and beef and that the increase in the production of soybeans therefore could not be responsible for a presumed lack of food in the country. Prof. Qaim affirmed again that farmers adopted GM soybeans because they were benefiting from it. He declared that his studies in Argentina show that 90 percent of the benefits that are being generated by the technology go to farmers. He explained that the technology is not patented, that farmers are reproducing their own seed, that seeds are very cheap and that this is the reason why 100 percent of the farmers have adopted this technology. He closed his remarks by underlining the importance of avoiding misunderstandings in the public debate.

Political freedom within Europe and the economic background of co-existence

Following Prof. Qaim it was **Dr. Kern**'s turn to comment the previous contributions. Expressing his critical views on Dr. Tappeser's comments, he turned to the question of co-existence in Germany. He contradicted Dr. Tappeser in saying that the German GM laws are not a realisation of what is said by the European Commission. He stated that the corresponding laws are enacted individually in the different countries. He maintained that Denmark has one regulation, the Netherlands another, Austria another and Germany yet another one. Dr. Kern indicated that in Germany co-existence would be discussed from an economic point of view only, because the crops are registered, there would be no risk at the health level, no bigger environmental risk and no additional risk in comparison to other registered crops in the European Union. He then put the minor importance of organically grown corn, canola and sugar beet in perspective to the total cultivated area with these crops (35 hectares vs. 50,000 hectares). Based on this relation, Dr. Kern wondered about

the dimension of the debate of how to compensate the economic loss of an organic farmer. He closed this issue by underlining that farmers will not risk punishment if they are held liable for increasing the level of 0.9 percent GM traces in organic produce. He maintained that there would be no chance for co-existence, that co-existence is not a question of outcrossing but of giving GM crops a chance. Dr. Kern then gave the example of Syngenta's move to the US to show the risk that is involved for the research capacity in Europe; he stressed that it is not important which products are available at the moment, but what can be done and how the technology can be used in the right framework.

The impact of GM technologies in Argentina

Providing another aspect of the impact of GM technologies, Dr. Kern showed a chart comparing the situation in Argentina now and before the introduction of GMOs. He illustrated how competitors of Bayer would have lost 50 percent of the market for pesticides, how the use of engines for ploughing, spraying and fertilising would have decreased and how the demand for agricultural engines would have gone down. Dr. Kern ascribed these effects to the "no tillage" requirement of herbicide-tolerant soybeans, which would provoke a shift in the whole production structure. He concluded that who is not adapting is going out of business.

Last words of the panellists

Prof. Krawinkel underlined the need for interdisciplinary research, mentioning that Prof. Qaim's study leaves open the question of biodiversity. He suggested complementing the work to address economic, social and environmental questions as well as health issues at the same time.

Dr. Weyel stated that time was running out, preventing a more detailed discussion under involvement of the audience. He referred this open debate to the round table session in the afternoon, only giving Dr. Tappeser an opportunity to reply to the previous comments.

Given the lack of time, **Dr. Tappeser** only formulated her wish to have a faire and open debate. She admitted that the approaches would be different, but that a real exchange would require finding common points and delimiting points that cannot be shared.

"Round Tables"

The main purpose of the round tables was to determine whether the different participants, coming from different "sides" of the discussion, can come up with common issues, common strategies and best practices for treating GM crops in the context of developing countries. In each group the results of the discussion were documented on a flip-chart, a reproduction of which can be found in the annexe. In the following the comments and statements made at the first "round table" are given by way of example.

Table No. 1

One participant opened the discussion by pointing out that **GM is just one additional path** that is followed in agricultural research and that it should not be separated from "reality" where **similar problems occur with traditional crop varieties**: outcrossing, resistances, etc. exist already as problems in agriculture. After mutation breeding, which is being used world-wide, GM is just another technological layer and in another 10 years the next one will show up. Also **health problems are not a new phenomenon**: since 15-20 years people in Europe consume kiwis despite allergic cases. But kiwis contain vitamins, therefore the advantages are perceived to outweigh this drawback. Regarding vitamins and GMOs, one participant highlighted that Golden Rice exists only as one variety, but that in Northern India there are 100 varieties of rice, each adopted to its niche. This was

not seen to pose a problem by another participant who claimed that one variety is all that is needed: once Golden Rice is released it can be used by each breeder and the world will take it on board for the purpose of further breeding. However, another participant threw in that this is part of a **monopoly game**, where commercial firms are involved and where there is the **issue of patenting**. Taking this up, another participant replied that public-private partnerships are required and that the access and the issue of patenting need to be dealt with.

Referring to the issue of outcrossing, one participant acknowledged that outcrossing is normal. Nevertheless, this participant stated that the **underlying technologies are not the same**, that there are differences between conventional crops and GM crops. Concerning the example of the kiwi, this participant conceded that **most allergies come from food**. However, the difference with the Bt-protein would be that if it had an allergen it could not be avoided by avoiding just one food (like kiwis or tomatoes) because it is everywhere. Following this statement another participant drew attention to the fact that **Bt is also being used in organic farming**, whereupon another participant replied that there it is not integrated in the crop itself.

Turning to another issue, one participant addressed the economics of plant breeding. The high initial **costs for research and development** (R&D) would raise the question of profitability, which would also be an issue for **public research**. This in turn would also raise the issue of biodiversity because the high initial costs will lead to a **focus on a few crops** only and, hence, to a **reduction of biodiversity**. Another participant added that to make a GMO is expensive because considerable costs need to be incurred for security – actual R&D costs would amount to perhaps 1 million, but the release would costs 10 million for testing and legal requirements.

Summing up the discussion so far, one participant stated that the understanding seems to be that now that we have GMOs we have something to do with them. However, this participant stressed that this is actually not the case. To use biotech would require **infrastructure and testing mechanisms**, there would be **corrupt governments** and most research would be done by private companies. This participant also put forward that tomatoes with fish genes do not occur in nature. Another participant also asked the question **whether we need GM crops**. This participant asked further who has an advantage when GM crops are cultivated. Referring in particular to Golden Rice, this participant conceded that the patent rights were waived for its use in small-scale agriculture, but asked what happens in future with other GM crops? Nevertheless, this participant also acknowledged that **centralisation of knowledge** in some big countries is not good. Another participant then pointed out that this is only a matter of funding.

Broadening the focus of the discussion, one participant enlisted **other issues** like participatory plant breeding, infrastructure, purchasing power, storage facilities and internal security that are not solved through biotechnology. This participant rather deplored that the focus on biotechnology would take away a lot of energy. Another participant added that there are also favourable studies regarding organic farming and food security, which raises the question of **what shall be done with limited financial resources**? This participant also reflected that many developing countries now cry for GMOs, but that they have never cared about their poor and food security before and concluded that GE might perhaps be useful for other purposes. One more participant agreed in that one can never say that GE will be the solution, but this participant saw a chance for GE to make a need-based contribution. Yet another participant questioned this favourable view of GE. Referring to the discussion in the morning, this participant underlined that the results presented in the first panel were based on **cash-crops** only. Quoting Jacques Diouf as saying that the poor farmers never profited from the Green Revolution, this participant wondered why they should now profit from GE. Another participant differentiated in saying that food or cash crops can be grown by poor farmers in one country and by rich farmers in another or vice versa.

One participant put the question in the foreground what the **prospects** are? This participant saw Golden Rice just as the proof of the possibilities, outlining that HarvestPlus[10] is similarly developing a whole range of crops rich in vitamin A, beta-carotene, iron and zinc and asking whether they should be told to abandon their efforts? This participant concluded that the Welthungerhilfe should **simply see where there are chances** and provide support. Another participant supported the view that there are many possibilities, which scientists open up. Because of the ignorance of what comes in 5-10 years, this participant compared science with venture capitalism, where **investments in different options are made**. This participant also advocated for seeing farmers as intelligent **people who can decide for themselves**. For this reason decisions concerning GE could be left to private companies – if the products are regulated and safe and as long as monopolies are prevented. Yet another participant disputed this claim, pointing out that it would only apply *if* farmers were free, but that in reality farmers are indebted, that there are traders and narrow offers of seeds, concluding that **farmers are *not* really free**. This participant also described that farmers see the commercials of the private industry, but that there is a lack of government information; following this influence farmers would change from traditional to commercial seeds and feel better off, but actually have less money.

Condensing the discussion, one participant asked whether there is a consensus that there is a **potential of GE** but nothing real yet for poor farmers? Another participant rejected this proposition outright and highlighted that **technology always comes in packages**, that farmers become indebted and that there are thousands of suicides. And yet another participant explained that **there are too many other issues**, claiming that cassava yields are usually between 8-10 tonnes, but that there is a potential yield of 30-40 tonnes – if the proper quantity and quality of inputs is provided. Hence yield improvements would be of lower priority. Another participant was also sceptical about the potential of GE, suggesting that by solving one problem through GE others might be created. Referring to the issue of food security, one more participant rejected the potential of GE, declaring that it is not addressing the problems of the poor.

One participant differentiated between the two principal traits, Bt (insect resistance) and Roundup Ready (herbicide resistance), explaining that **Bt is a technology that can replace insecticides**. This participant described that in many parts of India cabbage and cauliflower are under heavy attack of diamond-back moths and that the screening of all gene banks has not given any resistant varieties. In this situation farmers would spray their crops up to every day, even illegally with DDT, which they get for malaria control. In this case Bt could be the better option when one is looking at the other risks; this would be for India to decide. Another participant objected that **resistance to Bt** will build up in the pests, which was countered by another participant who pointed out that this would be the same with conventional breeding.

Turning to another consequence of GE, one participant stated that **seeds disappear** if varieties are not grown for 3-4 years and asked if all the trust should be put in seed banks only, because otherwise these seeds will be gone forever. Another participant re-focussed the discussion by explaining that the poor farmers are the issue and not the technology. This participant asked **why the poor are poor** and indicated that they are “organic by default”, that they cannot increase their output because of a lack of marketing opportunities and that GM will not help – except for, perhaps, replacing spraying that is so far unavailable.

One participant contended that **people were always scared of new technologies** and that many technologies would not have been introduced with current knowledge, but that without going ahead we will never know. This let another participant ask whether, then,

[10] Note of the rapporteur: HarvestPlus is a CGIAR programme to breed staple crops with higher micronutrient contents.

the train is on the track and cannot be stopped? Whereupon another participant judged that the train was stopped already. This in turn was challenged by yet another participant who thought that there is too much concentration on one thing, but that **biotech is so "sexy"** that people go for it and spend their limited budgets on it. To underline this view, the participant referred to the rice intensification system that was developed on Madagascar but that would be neglected by research institutes. Another participant countered this proposition by arguing that both the World Bank and the CGIAR have **minimal funds** for GE. This participant claimed that less then one percent of the agricultural budget of the World Bank goes into GE and that the CGIAR only spends 10 percent of its budget on biotechnology altogether.

Taking up the differentiation between GE and biotechnology, one participant asserted that marker-assisted breeding is very helpful and that biotech in general – but not GE – is speeding up R&D. Another participant agreed that, while there is misuse of GE by some companies, **there are good approaches in biotechnology as such**; moreover pointing out that marker-assisted breeding avoids the issue of patenting.

Summing up the discussion one participant spelled out three points: **(i)** the contribution of GM technology to solve the problems discussed is low and there are many other factors; **(ii)** even though the present contribution is not big, a future potential cannot be ruled out; **(iii)** there is need for higher public spending on research, not only for GM but for agriculture in general.

Panel II

Introduction – legal aspects of genetic engineering

The second panel dealt with the question "How does the legal and contractual framework for agrarian biotechnology products like seeds influence the socio-economic existence (risks and opportunities) of small and women farmers in developing countries?" Opening the panel, **Kurt Gerhardt**, the moderator, drew attention to the focus on *legal* aspects in the discussion. He asked whether there is good law, bad law, too much law or too little – whether there is enough law to restrict and to protect what has to be protected (human health, health of animals and plants), or whether there is too much law, which might block positive developments? He indicated that these questions regard at least three groups, namely consumers, farmers and the agro-industry. He then introduced the panellists: Dr. Ricarda A. Steinbrecher of EcoNexus (UK) and the Association of German Scientists, Tania Osejo of the Alexander von Humboldt Centre (Nicaragua) and Michael Windfuhr of FIAN Germany.[11] Mr. Gerhardt expressed his regret for having only representatives of one camp of opinion in the panel. He explained that one invitee, Mr. Ismail of the University of Reading (UK), had been recommended by Monsanto but had withdrawn his participation in the last minute due to "passport reasons". To make up for this imbalance in the panel, Mr. Gerhardt announced his intention to act as *advocatus diaboli* and he expressed his confidence that opinion holders in the audience might fill in where necessary. To begin the debate he referred to Dr. Steinbrecher to give a short presentation.

Presentation of Dr. Steinbrecher

Legal frameworks and the protection of new plant varieties

Dr. Steinbrecher specified that she would give a quick background of some of the legal frameworks that are relevant to the topic. She started with UPOV, the International Union for the Protection of New Varieties of Plants, which was adopted in 1961 but has since

[11] Note of the rapporteur: The curriculum vitas of the panellists can be found in the annexe.

been revised several times. She explained that the objective of UPOV, which has 58 member states, is the protection of new varieties of plants by intellectual property rights. This would have become an issue because plants are not covered by patent laws and breeders were pushing more and more for IPRs that go further than just ordinary breeders' rights. Dr. Steinbrecher quoted UPOV's mission statement as being: "To provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society." Following UPOV, Dr. Steinbrecher referred to the International Treaty on Plant Genetic Resources for Food and Agriculture, whose objective it is to make resources much wider available than the patented domain – and which, therefore, would sometimes be seen as representing a different camp from UPOV.

Intellectual property rights, the distribution of patents and patent laws

Next, Dr. Steinbrecher named WIPO, the World Intellectual Property Organisation, and specified that individual regions like the US or Europe have their own patenting offices. In relation to this she invoked TRIPS, the Trade Related Aspects of the Intellectual Property Systems. According to her, for members of the WTO, the World Trade Organisation, TRIPS is compulsory. She also explained that it extends IPRs to cover genetic material, including seeds, plants, animals and the genes and cells of all species, incl. humans. Likewise she pointed out that 74 percent of all agricultural biotechnology patents are held by the top six corporations. She declared that this means that biotechnology is an area in which it is not cheap to patent, but where it is useful to have the patents to be able to have monopoly control over certain seeds. Going into more detail regarding patent laws, Dr. Steinbrecher mentioned that there are various laws: in Europe there would be the European Directive for the Protection of Biotechnological Inventions, which would still need to be implemented by various member states that are already getting warnings from Brussels. She highlighted, however, that some countries want to re-discuss some of the articles, for example to add the requirement that the origin of genetic material needs to be provided, including a proof of consent of the community or the country where the material is taken from. Such an addition would have the rationale to limit biopiracy.

The Cartagena Protocol, the issue of liability and the role of national laws

Also relating to the aspect of access and benefit-sharing, Dr. Steinbrecher enlisted the CBD, the convention on biological diversity. She pointed out that it was under the auspices of the CBD that the discussion and negotiation of the Cartagena Protocol on Biosafety was carried out between 1995 and 2000. Since then enough countries would have signed up for the Protocol to come into effect. However, she claimed that one area still needs to be discussed, i.e. the liability framework, which would not exist yet. She also added that various national and regional laws (e.g. the African Model Law) would complement the Protocol. This she attributed to Art. 26 of the Protocol, which states that the various parties, "in reaching a decision on import … may take into account, consistent with their international obligations, socio-economic considerations arising from the impact of living modified organisms [LMOs is what GMOs are called in the protocol] on the conservation and sustainable use of biological diversity, especially with regard to the value of biological diversity to indigenous and local communities." Moreover she quoted that "the Parties are encouraged to cooperate on research and information exchange on any socio-economic impacts of LMOs."

A "Technology Use Agreement" of Monsanto and its consequences

Following the presentation of the public legal aspects, Dr. Steinbrecher turned to the so-called Technology Use Agreements between private companies and farmers, providing an example of what Monsanto has in its agreement relating to cotton: "*Any claim or action made* or asserted by a cotton Grower (or any other person claiming an interest in the Grower's cotton crop) against Monsanto or any seller of cotton Seed containing Monsanto

Technology arising out of and/or in connection with this Agreement, or the sale or performance of the cotton Seed containing Monsanto Technology other than claims arising under the patent laws of the United States *must be resolved by binding arbitration*."[12] Dr. Steinbrecher underlined that farmers have no other choice than going to an arbitration court. She then provided a further quote: "When a demand for arbitration is filed by a party, the Grower and Monsanto/sellers shall *each immediately pay one half of the AAA filing fee*. In addition, Grower and Monsanto/sellers shall each pay one *half of AAA's administrative and arbitrator fees* as those fees are incurred. The arbitrator(s) shall have the power to apportion the ultimate responsibility for all AAA fees in the final award." Here Dr. Steinbrecher stressed that small farmers might find these payments difficult. Finally she gave a last citation: "The arbitration *proceedings and results are to remain confidential* and are not to be disclosed without the written agreement of all parties, except to the extent necessary to effectuate the decision or award of the arbitrator(s) or as otherwise required by law." According to Dr. Steinbrecher, this provision would make it more difficult for farmers to help each other and to learn from each other's experience. She also provided a general overview of other agreements that are in contracts of Monsanto:

- To use Seed containing Monsanto Technologies solely for planting a single commercial crop.
- Not to supply any Seed containing patented Monsanto Technologies to any other person or entity for planting.
- Not to save any crop produced from this Seed for planting and not to supply Seed produced from this Seed to anyone for planting.
- Not to use or to allow others to use Seed containing patented Monsanto Technologies Seed or for crop breeding, research, generation of herbicide registration data, or seed production.

Picking up the last provision, Dr. Steinbrecher highlighted that if she wants to do research or to investigate a problem, she could not use the farmers' material but would need to go to the company to obtain consent.

Package deals and the unequal distribution of power in the south

Dr. Steinbrecher conceded that these examples did not relate to contracts in the south, where so-called "package deals" dominate. She described that these packages consist of the combination *input + seed*, which is often accompanied by loans or microcredits with sometimes very high interest rates; another form of package would be the combination *input + seed + purchase of harvest*. Dr. Steinbrecher added that the situation in Argentina is different because farmers there have passed their seeds on to neighbouring farmers. She stated that for this reason GM seeds have spread quite far, but that Monsanto would not have been able to recover its technology fees. Therefore, she indicated, the Argentinean government would have come up with a plan: farmers should pay a fee for growing corn or soybeans to the government, which in turn would compensate Monsanto for lost royalties. Dr. Steinbrecher concluded that this would be a sort of tax that is given to the company. She then described another constellation, where the private company Maggi not only owns a lot of land in Brazil to grow soybeans but were it also has other farmers under licence. In these areas the complete infrastructure would be provided by Maggi: the company would sell seeds and pesticides and buy the harvest, which would not leave a real choice for farmers to opt out. Dr. Steinbrecher expanded her examples by referring to the situation in India, where cotton would be seen as "white gold": like in a gold rush farmers would follow rumours and buy GM seeds that later on do not perform well or that prove to be faked because of the price premium for GM seeds.

[12] Note of the rapporteur: All emphasises as in Dr. Steinbrecher's presentation.

The socio-economic role of seeds

To end her contribution Dr. Steinbrecher turned to the socio-economics of seeds, where ownership and seed diversity would be big issues: if the selection of seeds is not in the hand of the community any longer, this would have an impact on communal wealth; families would no longer be able to exchange seeds freely as part of their communal heritage and the standing of women the communities would decrease because of the loss of their central role in the seed selection process.

Debate of the panellists

Mr. Gerhardt then asked Ms. Osejo what the legal situation is.

Poverty, fragile institutions and social fragmentation in developing countries

Coming from Nicaragua, **Ms. Osejo** reminded of the situation in Central America where the countries are recent democracies with a lot of economic problems. She outlined that in Nicaragua 60 percent of the population lives in poverty and that 60-80 percent thereof is vulnerable. She pointed out that the economy in Nicaragua was restructured in the 90s only, to become a free-trade economy in a short period of time. Therefore institutions would be fragile and the legislation incomplete. At the same time the farming sector would not be organised and most small farmers would neither participate in co-operative organisations, where they could be prepared for new technologies. In the current situation small farmers would not have access to new technologies, to the corresponding knowledge or to the necessary credit. Ms. Osejo explained that the government's agricultural policy would focus on the competitive sector and not on vulnerable groups. She described how farmers who are exposed to economic and health risks and have incomes of less than 1 Dollar a day have to deal with the free-trade agreement that Nicaragua has recently negotiated with the US. In this context she deplored the lack of appropriate laws to deal with this kind of agreement.

Constraints for the implementation of regulatory frameworks

Upon Mr. Gerhardt's question where there is a lack of legislation, Ms. Osejo stated that there would be a lack of the right property laws, of patent laws and of anti-trust legislation. Ill-defined property regarding land would cause problems of access to the land. Without property titles, small farmers would neither get access to credit. And replying to Mr. Gerhardt's query whether there are political movements or parties in Nicaragua that recognise this problem and intend to tackle it, Ms. Osejo confirmed that there is awareness, but she also explained that the process is not very easy because of the reality on the ground in Central America. She affirmed that the situation is very complex and that there are too many problems that prevent a quick implementation of the required legislation. She judged it will take 5-10 years to have the kind of laws to be prepared for trade agreements that regulate the introduction of new technologies in Central America.

Mr. Gerhardt picked up this example from Nicaragua to ask Mr. Windfuhr if this situation is typical for small farmers that are confronted with new developments.

Marginalisation of small farmers and regulatory frameworks

Answering in the affirmative, **Mr. Windfuhr** referred to the latest report of the Millennium Project Task Force on Hunger of the UN, which contains a typology of the hungry: 50 percent would be small farmers, 2/3 of which would be marginalised. Mr. Windfuhr then pointed out that being marginalised does not only mean living on bad soils or in very remote areas where there is a lack of market access; he maintained that it is also the marginalisation in property schemes, lack of recognition in political processes or being ignored by research. He quoted the report saying that what is needed is a different form of

agricultural production, much more oriented towards ending marginalisation. In quoting this, he underlined that the report was not written by NGOs but by World Bank staff and people like Swaminathan, "the father of the Green Revolution". He continued by asserting how a certain technology, a seed or the ownership of the seed works would depend a lot on the institutional settings in a country. Returning to the issue of property rights, Mr. Windfuhr pointed out that having a property scheme might be nice but that there are many related problems: farmers cannot claim their rights if there is a lack of courts, a lack of access to complaint procedures or a lack of security in the tenancy of lands. He argued that what is needed is not just a technical regulatory framework but a regulatory framework that works for marginalised small farmers.

The detrimental role of legislation in industrialised countries

Dr. Steinbrecher added that the industrialised countries in the North are part of the problem by pushing for legislation that is tailored to their own benefit and economic needs, without allowing enough room for marginalised groups or for small farmers. She supported her claim by referring to the negotiations about the Cartagena Biosafety Protocol, which she classified as having been a trade negotiation with different forces at work. She therefore suggested raising the issues in the North to initiate a re-thinking of values.

Reminding of the topic, *legal* frameworks, **Mr. Gerhardt** asked for examples of legislation in the North to the detriment of the *legal* situation of small farmers in developing countries.

Dr. Steinbrecher gave the example of seed protection. She asserted that, increasingly, laws require uniform and verified seeds for export and import; small farmers could not sell the seeds they have saved because it needs to be verified.

The role of unequal distribution of wealth and new technologies

To underline the complexity of the situation, **Ms. Osejo** added that people in the developing world want immediate solutions to their problems and that the reduction of poverty is the most important thing, not "to have or not to have" new technologies. She suggested that for Central America a better distribution of wealth could be a much better solution than an increase in agricultural production; production would be sufficient.

Marginalisation, access to productive resources and intellectual property rights

Mr. Windfuhr returned to the issue of marginalisation, pointing out that two different sets of regulatory frameworks would be needed: one to enable marginalised farmers to overcome their situation, which should include regulations to deal with seeds and with agricultural technologies, and another one for the specific regulation of GMOs in developing countries. He stressed the importance of access to seed in general and of the knowledge about traditional varieties. He asserted that this would be a question of both money and law; farmers would need access rights but also enabling conditions in a context where local seed markets are often monopolised. He also considered having access to publicly available research results being a pro-poor regulation. Next to access to seeds, Mr. Windfuhr enlisted access to markets and access to productive resources as being extremely important; land rights, tenancy protection and water rights would be a combined package for small marginalised farmers in many areas. Mr. Windfuhr also illustrated the need for trade regulations by explaining how trade policies, dumping of surpluses, rapid market openings and a lack of protection by national agricultural policies for small farmers may affect them heavily – marginalised farmers would be exposed to the risks of international markets, while farmers in industrialised countries are not put at the same risks. Given these issues, Mr. Windfuhr concluded that technologies or the access to seed are just single issues and that hunger will not be solved by one new seed. Nevertheless, he conceded that he is not against looking into better seeds, which would be an important component, but that he would like to have it put into the right context. Turning to the issue of GM seeds in particular, Mr. Windfuhr saw the biggest challenge in IPRs. Based on Prof.

Qaim's contribution saying that seed prices increase with the level of patent protection, Mr. Windfuhr inferred a strong relationship between property rights and the use of seeds. Accepting the patenting of agricultural seeds, he stressed therefore that any property regulation regarding seeds has to be conceived in a way not hinder the access of marginalised farmers. Next to the issue of access, Mr. Windfuhr pointed to a requirement of regulations that create real markets, without monopolies or dominant and powerful companies.

The need to regulate farmers' rights, risk-management and liability issues

Based on the investment farmers have put into the seeds for generations, Mr. Windfuhr also highlighted the need to discuss farmers' rights. He described the disappearance of traditional varieties and the risk of losing seeds that might prove to be more productive, and which farmers are able to share or to save for the next year. He also addressed the issue of risk-management and asked how small farmers can be protected against liability claims if they apply risky technologies. Likewise he mentioned the issue of GM food aid. According to Mr. Windfuhr, all of these areas need specific regulations – which are missing in most countries. Mr. Windfuhr portrayed how long the EU has taken to develop corresponding regulations, 6-7 years, before concluding that developing countries need to be given more time.

Mr. Gerhardt admitted that a long list of complaints would have emerged from the discussion, but he stressed that lamenting is not enough and asked into the round what must be done by whom and where the legislation must happen – on the national, regional or international level – to cope with these problems?

Conflicts of interest in negotiations of international agreements

Looking at the experience in Nicaragua, **Ms. Osejo** declared that there the same question would be raised, that the big question would be what kind of legal framework people want – a framework imposed by another country? – and what kind of protection Nicaragua is going to have for its biodiversity, its people and their needs. Contrary to her government's claim that the adoption of international laws is the better option, she expressed her view that the reality in each sector needs to be considered. She explained that there would be a legal contradiction in Central America because national laws would be lacking, while at the same time parts of the Cartagena Protocol are accepted. She also criticised the insistence of the United States on including "UPOV 91"[13] in the negotiation of the free-trade agreement despite a lack of knowledge about IPRs on the side of Nicaragua.

Mr. Windfuhr affirmed the need for local solutions. Regarding the issue of liability or of control, he saw the need for regulation at the national level. However, to change standards and to make them more pro-poor, he saw the need to influence this internationally, even if there is the problem of inconsistencies or conflicts. In this context he reported of recent negotiations about the voluntary guidelines for the right to adequate food, where one chapter dealt with access to food; he described how some countries were in favour of mentioning the WTO, while others wanted to mention the Cartagena Protocol.

The role of regulations, their scope, their enforcement and their limits

Taking up the comment from the audience that there is too much regulation to bring progress to the world, **Mr. Gerhardt** asked who would advocate this view? Providing an example of his own, he described a conversation he had had at a recent party congress of the Christian Democrats, where he had asked a farmer if he cultivates GM crops, getting

[13] Note of the rapporteur: "UPOV 91" refers to the 1991 Act of the International Convention for the Protection of New Varieties of Plants (UPOV Convention), see http://www.upov.int/.

the answer that the law would be much too restrictive. Thereupon came a comment from the audience, saying that the regulation for conventional products would be too long, too.

Mr. Windfuhr added that not having a law is also a regulation because this means a regime is in place. He illustrated this by saying that if there are policies to foster women's access to land there is a policy in favour of women's access – and if there is no policy this would be a regulation, too. Therefore talking about regulations would not automatically mean that too much is being done.

To show the limits of regulations, **Dr. Steinbrecher** provided the example of recent mud slides in the Philippines, which would have happened due to illegal logging. She pointed out that in this case there would have been appropriate legislation, but that it would not have been put into effect. She concluded that any regulation needs the involvement of the people to create awareness of the reasons behind it.

Ms. Osejo consented by saying that in Central American countries the governments, civil society and the private sector would not always respect the legal framework. She specified that there are laws in Nicaragua preventing both the unregulated and the unregistered introduction of new species, but in an analysis of an alliance of NGOs 70 percent of the samples would have shown the presence of GMOs – despite a lack of research proving their safety.

Another limit of regulations, which **Dr. Steinbrecher** put forward, is that people can only regulate what they know about: the push for regulating GE would have come only once it was realised that there are potential risks or problems; then the Cartagena Protocol would have been initiated to complement WTO provisions that do not allow stopping products from being imported because of the process which brought them about – whether it is GE or fur which has been obtained in a cruel way. For the WTO a product would be a product and the process would not matter. Dr. Steinbrecher contended that this view is in contradiction to what her organisation's genetic scientists found in their recent report "Genome scrambling – myth or reality": it is the process of GE itself which produces a lot of changes and mutations and not just the gene; this report would be available from the organisations' website at www.econexus.info, where there would be other information as well.

The MDGs, the role of technology and marginalisation

Mr. Windfuhr outlined that he represents a human rights organisation and that his organisation would not have a policy stance but focus on violations of human rights. Coming back to the overall theme, he flagged that there is an ongoing discussion within the UN about the MDGs and how they should be achieved over the next 10 years. He described that there are two trends, one looking into ways to end marginalisation of small farmers and another one looking much more into technological approaches. Yet, according to Mr. Windfuhr, hunger in poor countries is not a technology problem; 70 percent of the affected children would live in surplus regions and India, the country with the biggest single number of hungry people in the world, would have 60 million tonnes of surplus. Therefore, to realise the MDGs, there would be a need to talk about marginalisation.

Taking up the need for discussion, **Ms. Osejo** invited the participants to a meeting that is being organised in Nicaragua in April 2005 to address this topic. She asked those who are interested to contact her by e-mail.

Closing remarks

Having welcomed the participants, **Dr. Preuß** also made the closing remarks and thanked the panellists. He recognised that he has no final conclusions to offer but he indicated that the conference was not expected to provide any commonly shared position with regard to GMOs. Regarding the intention of making a rational contribution to an on-going debate,

which would be sometimes characterised by emotion and ideology, he saw his expectations fulfilled. On the other hand, however, he doubted that the diverting positions came closer together. Giving an outlook on what should come next, he argued that those in favour of the introduction of GMOs should accept the fact that producers and consumers have different perceptions of innovation than scientists; consumers and producers would not always consider the benefit of innovations, because they know that even unknown risks may affect their lives. Hence, more would need to be done to inform about benefits of GE without over-emphasising positive results and without neglecting risks. Dr. Preuß argued further that those who are against the use of GE have to realise that GMOs are a fact in the real world and cannot be ignored. He suggested to put the risks and chances on a scale so that society can decide on whether it is worth to bear the risks of the introduction of the technology. Ending his remarks, Dr. Preuß thanked everybody for a lively debate with an extensive exchange of views; he thanked the moderators, facilitators and organisers of the conference and he wished everybody a safe trip home, Merry Christmas and a Happy New Year.

Annexe

Symposium programme

Welcome address

Dr. Hans Joachim Preuß, Secretary General, Deutsche Welthungerhilfe

Introduction

Prof. Dr. Franz Heidhues, University of Hohenheim (Stuttgart), and
Vice-Chairperson, Board of Directors, Deutsche Welthungerhilfe

Panel I

Can GM seeds and GM food crops contribute to the improvement of the small farmers' and women farmers' production in developing countries in terms of productivity, food security, health, environment and livelihood? What are the risks and opportunities? What is the state of the art at present? What are the future perspectives?

Prof. Dr. Michael B. Krawinkel, University of Gießen, and
Project Committee, Deutsche Welthungerhilfe

Prof. Dr. Matin Qaim, University of Hohenheim,
Head of Department, International Agricultural Trade and Food Security

Dr. Manfred Kern, Bayer AG, Bayer Crop Science,
Head of Department, Executive and Technology Communications

Dr. Beatrix Tappeser, Bundesamt für Naturschutz (Federal Agency for
Nature Conservation), Head of Division, GMO-Regulation and Biosafety

Dr. Bernd Lüttgens, Deutscher Bauernverband (German Farmers' Association)

Moderator: Dr. Volker Weyel, former editor-in-chief of 'Vereinte Nationen' (UN Journal)

Participants' "Round Tables"

Moderators: Dr. Iris Schöninger, Mathias Sommer and Dr. Heinz Peters,
Deutsche Welthungerhilfe

Review of "Round Tables"

Panel II

How does the legal and contractual framework for agrarian biotechnology products like seeds influence the socio-economic existence (risks and opportunities) of small and women farmers in developing countries?

~~*Yussuf Ismail*, University of Reading (U.K.)~~[14]

Dr. Ricarda A. Steinbrecher, EcoNexus (U.K.) and Vereinigung Deutscher Wissenschaftler (Association of German Scientists)

Tania Osejo, Centro Alexander von Humboldt (Nicaragua)

Michael Windfuhr, Secretary General, FIAN Deutschland e.V.

Moderator: Kurt Gerhardt, WDR (regional public broadcasting corporation)

Closing remarks

Dr. Hans Joachim Preuß, Secretary General, Deutsche Welthungerhilfe

Concept, organisation and management of the symposium

Dr. Jochen Donner, Jaqueline Güldenring-Fresco and Laura Plöger, Deutsche Welthungerhilfe (DWHH)

Rapporteur

Alexander Stein, University of Hohenheim and Centre for Development Research (ZEF)

[14] Note of the rapporteur: Mr. Ismail, who had been recommended by Monsanto as expert for this discussion, had called off his attendance in the last minute. Next to Monsanto the Welthungerhilfe had also contacted other big players from the private sector (like Syngenta, Bayer CropScience and BASF). But with the exception of Bayer CropScience none of the companies involved in agricultural biotechnology was prepared to engage in a discussion – although the explicit purpose of the conference was to have a rational, objective and constructive exchange of views and arguments to help the Welthungerhilfe to find a position regarding GM food.

List of participants

Karoline Baumann, University of Bonn

Henning Baur, Consultant, GTZ/BEAF

Dr. Wolfgang Bayer, Agrecol e.V.

Ines Beuthel, BMZ

Prof. Dr. Dr. h.c. Dieter F.R. Bommer, DWHH

Lynn Brown, WFP (Italy)

Dr. Hans-Jochen de Haas, BMZ

Dr. Orlando de Ponti, Nunza B.V. (Netherlands)

Dr. Jochen Donner, DWHH

Tillmann Elliesen, E+Z/D+C

Dr. Dieter Elz, Quarterly J. of Int. Agriculture

Alice Eymard-Duvernay, InWEnt

Mirjam Gehrke, Deutsche Welle

Kurt Gerhardt, WDR

Omkar Gopalakrishnan

Robert Grassmann, DWHH

Oliver Hanschke, GTZ/BEAF

Prof. Dr. Franz J. Heidhues, DWHH and University of Hohenheim

Claudia Heland, Akademie Klausenhof

Manfred Hochwald, DWHH

Andrea Kallabis, DWHH

Dr. Manfred Kern, Bayer CropScience AG

Stephan Krall, GTZ/BEAF

Prof. Dr. Michael Krawinkel, DWHH and University of Gießen

Andrea Kuehn, University of Bonn

Dr. Marlis Lindecke, GTZ

Dr. Bernd Lüttgens, Deutscher Bauernverband

Attila Lüttmerding, BMZ

Dr. Toni Murböck, Akademie Klausenhof

Dr. Ludwig Nellinger, BMVEL

Bernd Nilles, Misereor

Tania Osejo, Centro Humboldt (Nicaragua)

Dr. Heinz Peters, Project Manager, DWHH

Kirsten Prestin, IPS

Dr. Hans-Joachim Preuß, DWHH

Prof. Dr. Matin Qaim, University of Hohenheim

Jürgen Schmitz, DWHH Nicaragua

Dr. Iris Schöninger, DWHH

Mattias Sommer, DWHH

Alexander Stein, University of Hohenheim/ZEF

Dr. Ricarda Steinbrecher, EcoNexus (UK)

Dr. Beatrix Tappeser, BfN

Edit Tuboly, Hivos (Netherlands)

Bert Uijtewaal, Bayer CropScience

Kristof Volckaert, Ieder Voor Allen (Belgium)

Jutta Wasserrab, Deutsche Welle

Dr. Volker Weyel, formerly UN Journal

Michael Windfuhr, FIAN International

Results of “Round Table” No. 1

- **GMO, plea not to overstress**
- **specific traits: breeding into many varieties not a big problem**
- **question of profitability, high initial cost**
- **loss of biodiversity**
- **<u>if</u> allergy problem with Bt it would be in <u>very</u> many products and very difficult to avoid**
- **there are some inherent questions that have to do with the technology**
- **who benefits?**
- **Do we need it?**
- **Concentration of knowledge, power...**
- **Small contribution to solving problems on a niche basis**
- **Are farmers really free to choose?**
- **There are other things still possible: e.g. cassava agronomy from 10 to 30 t/ha**
- **Regarding food security: no problem solving capacity at the moment**
- **GE/Biotech not only game in town. Look at budgets, priorities etc.**
- **$ spent actually not that much**
- **Marker-assisted breeding = huge potential**

Consensus points:

(1) Contribution ([to] food security) low at present

(2) For poor farmers do not benefit much now. Future potential, possibilities

(3) Need for public research funding for agriculture, both biotech and other. Priorities to be discussed.