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AD HOC OPEN-ENDED INTER-SESSIONAL WORKING GROUP ON ARTICLE 8(j) AND RELATED PROVISIONS OF THE CONVENTION ON BIOLOGICAL DIVERSITY
Fourth meeting
Granada, 23-27 January 2006
Item 10 of the provisional agenda*

COMPILATION OF SUBMISSIONS ON POTENTIAL SOCIO-ECONOMIC IMPACTS OF GENETIC USE RESTRICTION TECHNOLOGIES (GURTS) ON INDIGENOUS AND LOCAL COMMUNITIES

Note by the Executive Secretary

1. In decision VII/16 D, paragraph 4, the Conference of the Parties requested the Executive Secretary to compile information provided by Parties and indigenous and local communities on the potential socio-economic impacts of genetic use restriction technologies and submit the compilation to the Ad Hoc Open-ended Inter-Sessional Working Group on Article 8(j) and Related Provisions of the Convention at its fourth meeting.

2. SBSTTA recommendation X/11 requested that the Executive Secretary notify Parties, other Governments, indigenous and local communities, smallholders farmers' organizations, organizations and other relevant stakeholders to present new comments on the Potential Impacts of genetic Use Restriction Technologies (GURTs) on Smallholder Farmers, Indigenous and Local Communities and Farmers' Rights and present these directly to the next appropriate meeting of the Working Group on Article 8(j) and Related provisions to ensure the widest and most up-to-date information be considered at that meeting in order to assist the consideration of issues under the mandate of the Working Group on Article 8(j) and Related Provisions. In response to this request, the Secretariat sent out Notification 2005-48 of 26 April 2005, inviting new comments on this issue.

3. The Executive Secretary is circulating herewith a compilation of submissions received from Parties, other Governments, indigenous and local communities, smallholder farmers' organizations, organizations and other relevant stakeholders, pursuant to these requests.

* UNEP/CBD/WG8J/4/1.

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I. SUBMISSIONS FROM PARTIES

[07 July 2005]

MEXICO [SUBMISSION: SPANISH]

Unidad Coordinadora de Asuntos Internacionales

UCAI/241005

México, D.F, a 21 de junio de 2005

SECRETARIA DE MEDIO AMBIENTE

Y RECURSOS NATURALES

SR. HAMDALLAH ZEDAN

SECRETARIO EJECUTIVO DEL CONVENIO SOBRE LA DIVERSIDAD BIOLÓGICA

PRESENTE

Me permito hacer referencia a la notificación SCBD/STTM/DCM/va/48601 del Secretariado del Convenio sobre Diversidad Biológica, mediante la cual solicita a las Partes presenten información nueva respecto a los Impactos Potenciales del Uso Genético a las Restricciones Tecnológicas (GURTs) en los derechos de los pequeños propietarios, granjeros, indígenas y comunidades locales, al respecto comento a usted que México no cuenta con información inédita sobre el tema, sin embargo cabe destacar la siguiente información sobre el tema:

México ha estado en contra de las tecnologías de restricción de uso genético y uno de los argumentos técnicos mas fuertes a favor de mantener la moratoria a la experimentación en campo y a la comercialización de GURTS es que una vez aprobados los que se están desarrollando actualmente, serían estos los que se utulizarían y el estado del arte de la biotecnología enfocado al desarrollo de otros métodos de bio-contención dejaría de impulsarse.

Muchos de los posibles impactos negativos identificados del uso de las GURTS están en función del tipo de agricultura que se tiene en determinada region. Nuestro país cuenta con una gran proporción de la población rural que realiza actividades agrícolas a pequeña escala, lo cual involucra prácticas tradicionales como el intercambio de semillas así como seleccionar y guardar semillas para la siguiente temporada de siembra, estos escenarios son muy vulnerables a la introducción involuntaria de algunos tipos de GURTs.

Por ultimo nuestro país desea enfatizar la necesidad de llevar a cabo más investigación sobre el uso de GURTs así como un enfoque de “caso por caso” para el análisis de los riesgos y beneficios de estas tecnologías. Nuestro país se ha pronunciado en contra de las modificaciones genéticas en maíz que puedan limitar su consumo como alimento humano, e hizo una declaración al respecto en la Primera COP-MOP, en Malasia 2004.

Sin otro particular, le reitero la seguridad de mi consideración más alta y distinguida.

Atentamente,

EL TITULAR

Translation 1/

Paragraph 2:
"Mexico has been against genetic use restriction technologies and one of the most strong technical arguments in favor of maintaining the moratorium of the experimentation in the field and of the commercialization of GURTs is that once those that are currently being developed are approved, these would be the ones that will be used and the state-of-the-art of the biotechnology focused on the development of other methods of bio-containment would not longer be promoted.

Paragraph 3:
Many of the possible identified negative impacts of the use of GURTs are based on the type of agriculture that a region posses. Our country has a great proportion of rural population that carry out agricultural activities on small scale, which involve traditional practices like the exchange of seeds as well as selecting and keeping seeds for the following planting season, these scenarios are very vulnerable to the involuntary introduction of some types of GURTs.

Paragraph 4:
Lastly, our country wishes to emphasize the necessity to carry out more research on the use of GURTs as well as an approach of "case by case" for the analysis of the risks and benefits of these technologies. Our country has expressed its opposition against the genetic maize modifications that could limit its human consumption."

II. SUBMISSIONS FROM INDIGENOUS AND LOCAL COMMUNITIES

INDIGENOUS PEOPLES OF CUSCO, PERU

[30 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

Cusco 27 September 2005

Mr. Hamdallah Zedan
Executive Secretary of the Convention on Biological Diversity
United Nations Environment Programme
413 St-Jacques Street, 8th floor, Office 800
Montreal, Quebec, Canada, H2Y 1N9

Ref: SCBD/STTM/DCO/va/48601 "Advice on the Report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies".

Dear Mr Zedan,

We are witting to you in reference to the CBD Secretariat notification SCBD/STTM/DCO/va/48601 of 26 April 2005 titled “Advice on the Report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies”. In response to your request to present new comments on the Potential Impacts of Genetic Use Restriction Technologies (GURTs) on Smallholder Farmers, Indigenous and Local Communities and Farmers’ Rights we present this submission to you and kindly request to be referred to the next meeting of the Working Group on Article 8(j) and Related Provisions to take place in Granada, Spain in February 2005 to ensure that our views on this matter contribute to the widest and most up-to-date information to be considered at that meeting and assist the consideration of issues under the mandate of the Working Group on Article 8(j) and Related Provisions.

We, indigenous peoples from the Andean farming communities of Cochamoco, Chuachua, Charcapata, Quico, Pinchimuro, Pucarumi, Pampacancha, Mahuayani, Colpac´ucho, Challmachimpana, Colca -

1/ This is an unofficial, courtesy translation provided by the SCBD.

Yanatile, Hatún Qeros, Choquecancha, Lares, Cachin, Cochayoc, Rosaspata, Chawaytire, Sacaca, Pampallaqta, Amaru, Paru Paru, Cuyo Grande, Upis, Coñamuro, and Tinke in the districts of Pisaq, Paucartambo, Ausangate, Tinke, Lares, and Yanatile in the department of Cuzco, Peru, concerned about the potential impacts of Genetic Use Restriction Technology (GURTS) on indigenous biocultural heritage, food systems, and livelihoods, convened in a meeting that brought together seventy-one indigenous leaders and community members from six districts and twenty-six communities from six districts in the department of Cusco, Peru,, on the 26th and 27th of September 2005 in Choquecancha in the district of Lares, Peru to analyze and debate indigenous peoples issues and concerns with regards to Terminator, sign this Declaration of Indigenous Peoples of Cuzco, Peru on the Potential Impacts of Terminator as submission to the Convention on Biological Diversity's notification to indigenous organizations "Advice on the Report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies" (Ref: SCBD/STTM/DCO/va/48601).

As traditional indigenous farmers we are united to defend our livelihoods which are dependant on seeds obtained from the harvest as a principal source of seed to be used in subsequent agricultural cycles. This tradition of seed conservation underpins Andean and Amazonian biodiversity and livelihood strategies, the traditional knowledge and innovation systems customarily administered by indigenous women who have made such biodiversity and livelihood strategies possible and indigenous cultural and spiritual values that honor fertility and continuity of life.

Having analyzed and discussed our issues and concerns about Terminator, we would like to bring to your attention the following potential impacts of Terminator on our human rights, livelihoods, and cultures as a result of its voluntary or involuntary introduction into traditional indigenous agricultural systems:

- **Loss of Indigenous Biodiversity:** Andean and Amazonian biodiversity, both domesticated and wild, is put at risk for contamination through gene flow from Terminator crops, and, as Terminator seeds would not be 100% sterile in the second generation, this risk is great. Indigenous farmers who save the seeds of contaminated varieties for replanting may find that a percentage of their seeds do not germinate, potentially translating into significant yield losses. Such contamination could cause farmers to lose trust in their own seed stock, turn their backs on traditional varieties, and increasingly depend on the purchase of Terminator varieties for harvest security so that they can guarantee at least one germination period. Similarly, the introduction of foreign genes into uncultivated varieties through gene flow from Terminator could irreversibly alter the wild varieties on which indigenous peoples have traditionally depended for important medicines and food. As a center of origin for potatoes, Peru is home to over 2,000 varieties of potatoes and is considered one of twelve megadiverse countries where 70% of the world's biodiversity resides. Biodiversity forms the basis of global food security and sovereignty for peoples and communities around the world. The spread of Terminator to indigenous agricultural systems in Peru could force indigenous farmers to abandon their traditional role as stewards of biodiversity and in doing so threaten current and future global food security. Considering that Terminator patents on potatoes have recently been claimed (Syrgenta, US Patent 6,700,039, March, 2004), the introduction of GURTS to Peru presents a high risk for irreparable contamination of this center of origin of potato.

- **Erosion of Indigenous Knowledge and Innovation Systems:** Traditional knowledge and innovation systems of Andean and Amazonian indigenous peoples are built around seed saving and seed exchange between plant breeders, particularly as evidenced by the extensive crop and seed exchanges at the popular weekly barter markets in the communities of Qachin, Choquecancha, Lares and Wakawasi in the district of Lares. Terminator technology would have a concrete impact on these knowledge systems by jeopardizing the availability of fertile seeds for collective exchange and breeding. As a consequence of Terminator, the very

processes of adaptive interaction between man and the climatically complex Andean and Amazonian ecosystems which has allowed for the evolution and current vitality of a highly specialized body of indigenous knowledge would be paralyzed. Indigenous peoples hold as their responsibility the perpetuation of the knowledge of their ancestors for the benefit of their descendents. Terminator technology attacks present and future Quechua generations by jeopardizing the perseverance of this knowledge. No ancestral knowledge exists in indigenous communities concerning the use of transgenic crop varieties which means that indigenous farmers would be at a loss for how to effectively cultivate such varieties. Furthermore, since indigenous communities trust the fertile seeds and associated knowledge which have proven effective and reliable for their ancestors, the introduction of Terminator, which is difficult to distinguish from actually fertile seeds, is an assault on indigenous knowledge systems and indigenous farmers´ faith in their collective intellectual heritage.

- **Loss of Food Sovereignty:** To achieve food security, indigenous peoples in Cuzco depend on the exchange of diverse foods between diverse agroecological zones that are found at different altitudes along the eastern slopes of the Andes which connect the Peruvian Sierra to the Peruvian Amazon. The barter markets in the Lares Valley, for example, are supplied by potatoes and other carbohydrate-rich Andean tubers from the high-altitude agroecological zone, called the *puna*, while corn and other sources of essential amino acids, like quinoa, arrive from the mid-altitude agriecological zone called the *keshua*. Finally, indigenous traders carry vitamin-rich fruits and spiritually significant coca leaves to the barter markets from the low-altitude jungle agroecological zone called the *yunga*. Terminator seeds would have a concrete impact an these barter markets and food sovereignty because fertile seeds would become decreasingly available for the collective breeding and sowing which makes the food diversity found at these barter markets possible. Furthermore, though these barter markets are traditionally important loci for the exchange of fertile seeds, the introduction of Terminator would cause indigenous traders to distrust these seed exchange systems due to the risk of receiving infertile seeds from Terminator crops. The erosion of the barter markets, seed exchange practices, and a diverse food supply would increase food insecurity and impact the general health of Andean and Amazonian indigenous peoples. Additionally, the genetic contamination or unintentional use of Terminator seeds could result in immediate yield losses and food insecurity for individual indigenous farmers.

- **Erosion of Human Rights of Indigenous Peoples:** The human right of self-determination implicates the right of indigenous peoples to food sovereignty and food security. Terminator would have a concrete impact on the right of indigenous peoples to self-determination by eroding biodiverse systems and associated traditional knowledge systems which provide for food sovereignty and food security in indigenous society.

- **Erosion of Local Economy:** Both unable to and often uninterested in producing for the formal market where the value of their crops is very low, indigenous peoples have developed alternative systems of administration, production, distribution and consumption of goods and services that are autonomous from the formal market. These Andean and Amazonian economies are based on mutual care between indigenous communities and guided by ancestral principles of reciprocity and solidarity which govern the exchange of crops, seeds and knowledge. In the case of Lares Valley, studies have shown that the flow of goods in the barter markets is significantly greater than that found in urban (non-indigenous) markets. In fact, the extent of the exchange of nutritious foods and medicinal plants among Lares Valley populations is so vast that these barter practices are, in effect, subsidizing the healthcare system provided by the state. Terminator seeds would have a concrete impact on this economy by paralyzing traditional seed exchange systems which depend on continuous cycles of seed germination thereby eroding the biodiversity, traditional knowledge, and

associated local employment that underpin the local economy. The resulting dependency on the purchase of Terminator seeds to guarantee harvest security would contribute to the further disintegration of the local economy and consummate the extension of the formal, multinational economy into indigenous communities in the form of the Terminator seed market. Since indigenous farmers lack the financial resources to prevail in this economy, migration of indigenous peoples to urban centers in hopes of seeking alternative livelihood strategies would increase, thereby aggravating urban and rural poverty.

- **Marginalization of Women:** In indigenous Andean and Amazonian society, women are traditionally responsible for seed administration which includes seed selection, storage, sowing, and refinement across agricultural cycles as well as the transmission of seed knowledge to their children. In short, it is the women who are the traditional breeders of new plant varieties, and it is the women who are largely responsible for the tremendous agrobiodiversity that exists today in Peru. Terminator seeds would have a concrete impact on the role of women in indigenous society by interrupting or altogether eliminating the practice of seed saving, rendering the traditional seed knowledge of indigenous women inoperative and worthless. Without the traditional respect conceded to indigenous women for their seed expertise their social standing would plummet, and they would suffer immediate marginalization in indigenous society. The traditional roles and responsibilities of Andean and Amazonian indigenous women would inevitably be forced to change.

- **Disruption of Indigenous Cultural and Spiritual Values:** According to the worldview of Andean and Amazonian indigenous peoples, all things in nature including humans, animals, plants, soils, waters, winds, and valleys are intimately interconnected and form a unified whole of cultural and spiritual significance called the *Pachamama* (Mother Earth). For indigenous peoples, demonstrating respect for the *Pachamama*, for example, through offerings at the beginning of the agricultural cycle in August, is fundamental for ensuring high agricultural production and fertility for the year to come. Accordingly, concepts such as fertility and continuity of life are central to indigenous belief systems. Terminator seeds would concretely have an impact on indigenous cultural and spiritual values and way of life by injecting the experience of seed infertility and barrenness into a cultural context where such phenomena are unprecedented and inexplicable. If the *Pachamama* previously explained a process by which life continuously and reliably replenishes itself, the introduction of sterile offspring of Terminator plants into indigenous society would precipitate a reconceptualization by indigenous peoples of the *Pachamama* and the workings of nature. A realization of the existence of sterile seeds in the natural order would cast a dark cloud over indigenous society which traditionally hopes and prays for fertility and continuity of life. In addition, the loss of traditional varieties resulting from a new dependence on Terminator technology could mean the disappearance of those varieties which have specific ceremonial and ritual significance. During the Quechua marriage ceremony, for example, the *bole* and *suytu* varieties of potato symbolize woman and man, respectively, and are important for bringing the bride and groom together in happy union. Specific varieties are even used in ancestral rituals not only to evaluate the current well being of the Pachamama, but also as means by which to predict the future. Terminator technology puts the biodiversity which sustains a myriad of indigenous customs such as these ones at risk.

- **Loss of access to seeds and disappearance of indigenous agriculture:** For centuries indigenous peoples in the Andes and the Amazon have depended on conserving seeds from the harvest for use in subsequent agricultural cycles and for diffusion among social networks of exchange determined primarily by kinship bonds. Therefore, for indigenous peoples the ownership of seeds is fundamentally collective, an arrangement which harnesses the creative potential of group (as opposed to individual) efforts to breed plant varieties and adapt to

complex Andean and Amazonian climactic conditions. Terminator technology is the ultimate form of intellectual property protection which seeks to claim private ownership over forms of life. This approach to seed ownership—private as opposed to collective—not only clashes strikingly with an indigenous worldview, but threatens to supplant traditional seed ownership arrangements. Terminator seeds would have a concrete impact on indigenous farmers' access to seeds by creating a dependency on the purchase of privately-owned Terminator seeds once indigenous farmers lose faith in their own seed stock. Since indigenous farmers lack the financial resources to sustain such a dependency, their access to seeds would be limited and they would be forced to seek alternative livelihood strategies. Migration to urban centers would increase while indigenous agriculture would diminish.

Considering the impacts indicated above we express publicly our most strong rejection to any type of development, commercialization, and/or field testing of Terminator technology.

In response to the request from the CBD Secretariat for "new comments" on GURTS so that it has "the widest and most up-to-date information" for consideration,

We respectfully propose:

- That the Working Group on Article 8(j) of the CBD inform the 8th Conference of the Parties of the CBD (COP8) in Brazil (March 2006) of the dangers of GURTS to biodiversity, traditional knowledge systems, and local and global food security as well as of the numerous potential impacts of Terminator on indigenous peoples if allowed to enter traditional indigenous agricultural systems.
- That the Parties to the COP8 thoroughly review and consider the conclusions of the "Ad Hoc Technical Expert Group report on the potential impacts of genetic use restriction technologies on smallholder farmers, indigenous and local communities" (AHTEG report)
- That the Parties to the COP8 strengthen the recommendation of paragraph 23 of decision V/5, that no GURTS should be approved for field testing or commercial use. We urge Parties to further strengthen the current moratorium on the Terminator.
- That the Parties to the COP8 secure the full and effective participation of indigenous peoples in all future processes overseen by the CDB concerning GURTS.

Finally, we reserve the right to carry out campaigns and actions that impede the reversal of the international *de facto* moratorium on Terminator technology and the execution of corresponding international and national legal actions that threaten the interests of Peru and its indigenous peoples.

Pauktuutit Inuit Women of Canada

[30 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

**AN INUIT PERSPECTIVE
ON GENETIC USE RESTRICTION TECHNOLOGY AND
BIOTECHNOLOGY**

*Advice on the Report of the Ad Hoc Technical Expert Group
on Genetic Use Restriction Technologies*

September 19, 2005

PAUKTUUTIT
INUIT WOMEN OF CANADA

Reference:
SCBD/STTM/DCO/va/48601

Submitted to:
Executive Secretariat,
Convention on Biological Diversity

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**AN INUIT PERSPECTIVE
ON GENETIC USE RESTRICTION TECHNOLOGIES AND BIOTECHNOLOGY**

INTRODUCTION

In 2002, Pauktuutit Inuit Women of Canada conducted a modest survey among Northern informants to gauge Inuit thoughts and opinions about biotechnology. The study was prompted by a report released by the Canadian Biotechnology Advisory Committee that made recommendations on how Canada might amend the Patent Act to meet the demands of this new technology.2 Pauktuutit considers the 2002 survey

2/ Canadian Biotechnology Advisory Committee, November 2001. *Biotechnology and Intellectual Property: Patenting Higher Life Forms and Related Issues. Interim Report to the Government of Canada Biotechnology Ministerial Coordinating Committee*. Ottawa.

results relevant to the issue of Genetic Use Restriction Technologies (GURTs) that is currently before Convention on Biological Diversity's Working Group on Article 8(j).3

The debate over biotechnology and the manner in which this research is conducted is of great concern to Inuit as well as to all Indigenous peoples in Canada and around the world. Much of the philosophy behind the modern patent system and the World Trade Organization (WTO) is in conflict with the world view of Indigenous peoples. Inuit are struck by the lack of wisdom and direction in modern society where scientific progress to solve one problem can create even greater damage to the environment and further risks to human survival.

Pauktuutit is the national non-profit organization representing all Inuit women in Canada. Its mandate is to foster a greater awareness of the needs of Inuit women, and to encourage their participation in community, regional, and national concerns in relation to social, cultural, and economic development. It is Pauktuutit's belief that Inuit women have an integral role to play in the governing of our communities and our society. As Inuit women, we are the links to the past and links to the future. Inuit women are the vessels of culture, language, traditions, teaching and child rearing. These are the very important qualities to governing any society. Inuit women must take their rightful place as equals in the implementation of all self-governing arrangements and institutions.

Pauktuutit has established a reputation as a national organization with strong community roots and support. The organization derives its mandate and seeks its instruction and direction from Inuit women in the communities. Our work relies on keeping Inuit women in the communities informed and actively involved in the development and implementation of our initiatives. Pauktuutit realizes that traditional knowledge can play an important role in biotechnology and genetic research and therefore we feel we should have some say in these discussions.

This submission will argue that biotechnology research and GURTs must proceed with caution and be sensitive to the concerns of Inuit and other Indigenous peoples. Though the biotechnology of seed research may have little impact in the Arctic, the biotechnology of aquaculture is of concern. Tripoloid fish stocks that grow bigger and faster offer economic potential in northern waters but they pose the risk of undermining wild fish stocks if they escape.

It is a mistake for humans to think that they understand the impact of these technologies. Lessons should be learned from the past when the patent system fuelled the rapid introduction of chemical technologies. During the 1950s and 1960s, the patent system provided the incentives to accelerate the development of new chemicals like dioxins. These chemicals brought prosperity for many in the South but now contaminate the plants, the animals, the fish, and sea mammals used by Inuit. Today, some Inuit mothers have twice the allowable levels of dioxins in their breast milk. It is obvious that genetic technologies are much more powerful than the plastics and other chemicals of earlier decades, and therefore caution is essential. Contamination of the environment through the use of GURTs may have dire consequences and may be irreversible.

Inuit rely heavily on harvested food. Traditional/country foods provide valuable and unique nutritional, cultural, spiritual, economic, and social benefits to Inuit. In general, harvesting and consuming traditional foods is integral to the social fabric, cultural identity, and overall health and well-being. In the North, nutritious southern foods are available but they are expensive to buy and do not provide many of the

3/ This submission is offered in response to the request by the CBD's Executive Secretariat for new comments on the potential impacts of GURTs on smallholder farmers, Indigenous and local communities and farmers' rights (SCBD/STTM/DCO/va/48601).

non-dietary benefits of our traditional/country foods. In addition, southern foods are linked to the growing incidences of obesity, diabetes, and heart disease.

This submission is organized in the following manner: a brief introduction will be provided of Inuit life, traditional knowledge, and Inuit views of nature. Included in this discussion is a summary of an informal survey conducted by Pauktuutit to evaluate what Inuit think about biotechnology and the use of traditional knowledge in research. It is clear that Inuit are distrustful of the technology and the motivations behind the research. With this background discussion this document will then focus on the implications of biotechnology and GURTs in the Arctic. Additional comments also will be offered.

INUIT TRADITIONAL KNOWLEDGE AND VALUES

Inuit have every reason to believe that the biotechnology industry has an interest in our traditional knowledge. We have a unique and specialized knowledge of the Arctic ecosystem. Within living memory the small and regionalised populations of Inuit have moved into permanent communities. Even Inuit DNA may be viewed as ideal for genetic research because of the unique and isolated populations.4

Inuit have a strong connection to the past B a connection to the land, to wildlife, and to each other. Even though the wage economy has taken precedence over the traditional hunting way of life, it is not unusual to live out on the land for a time. Many Inuit practice a mixed economy — earning a living through employment and other times pursuing a hunting way of life. The wage economy provides the money to buy the supplies and equipment for harvesting country foods. Sharing is an important feature of Inuit culture. Inuit have always turned to one another for help. This, and by recognizing the importance of the land and wildlife, has ensured Inuit survival through the centuries.

In Nunavut, traditional or Indigenous knowledge is referred to as *Qaujimajatuqangit*. *Inuit Qaujimajatuqangit* (IQ) is to think in a very ecological way. This knowledge identifies different creatures and the many factors that help Inuit understand their behaviour. Inuit still may depend upon these resources directly for food and indirectly as the food for their food. The relationship of living things and the environment is a complex web of life. *Inuit Qaujimajatuqangit* may not be quantitative in nature but it can be very precise.

Inuit maintain a holistic, ecosystemic view of the natural world and this is incompatible with the commodification and privatization of animals, organisms, cell lines, DNA, and genes. A fundamental pillar of Inuit culture is sharing; some Inuit find it difficult to embrace any notion that an individual or company can claim to be the private owner of a living species or the owner of a DNA sequence, gene, or cell line. Inuit view the ecosystem as complex and inter-related and this is inconsistent with the idea that certain elements can be private property. The commodification and privatization of living things is incompatible with the collectively-owned knowledge and world view of Inuit.

Inuit Views on Biotechnology and Related Issues

As noted earlier, a few years ago Pauktuutit conducted an informal survey of informants from across the Arctic to get some sense of what Inuit thought of the relationship between humans and nature, of biotechnology, and of the use of traditional knowledge for research and commercial gain. The exercise highlighted some of the challenges associated with this type of inquiry. Any consultation with holders of traditional knowledge must address the question of how to introduce the topic in a meaningful way and how to solicit responses that can effectively inform the debate. Providing too simple an introduction to the

4/ The National Geographic Society's Genographic Project is an example of the interest in sampling the DNA of admixed populations; groups that tend to be more isolated and that tended to intermarry.

subject can result in feedback that is not balanced and which does not readily apply to the specific issues at hand. This is especially true with respect to a topic like biotechnology and GURTs.

Early in the process of conducting the informal and opportunistic survey, it became apparent that individuals were unable to, or were unprepared to comment about biotechnology without some form of introduction to the topic. It proved too difficult to provide such a statement over the telephone, especially in Inuktitut. Pauktuutit therefore prepared a plain language document for translation that offered a very basic statement on biotechnology and the kinds of issues that the technology raises. The topic is complex and difficult to introduce in a brief plain language format that is readily translated into Inuktitut. It was necessary to avoid words like DNA, genes, and cell lines because there are no Inuktitut equivalents. The plain language document was first distributed to potential informants before efforts were made to contact them. Both elders and youth were contacted as well as individuals working in regional and cultural organizations across the Arctic.

When asked about Inuit views of nature and the role of Inuit in the natural world, the respondents stressed that nature must be respected and left alone and not tampered with; that the natural world should be kept in its natural state. Inuit are a part of the natural world. One western Arctic informant comment that it was the role of human beings to respect the land, that “Nature is a wonderful thing, clean and unspoiled and should be kept this way.≅ Another stated "Nature is its own producer" and humans should not tamper with it. The land and the people have an intricate relationship and the people should be consulted if anything is planned that will alter this relationship in any way. An Elder from Rankin Inlet, Nunavut offered a traditional view: “Animals are food and should not be bothered. Animals were placed on this planet to serve a purpose, to serve as food for people. Plants and animals should be respected and not messed around with.” This was echoed by another Elder who stated: “we are humans on Earth, we eat the animals that are provided for us, they are not our own. These animals are given to us for us to eat by the creator.”

An Iqaluit student commented that there is a symbiotic relationship between Inuit, their land, and natural surroundings: “...nature has been respected by Inuit for thousands of year and still is to this present day. Inuit respect their natural surrounding and therefore Inuit have a positive place/role with nature.” Others expressed concern about the role of science. An informant from Labrador felt some scientists had a “simplistic understanding of a complex environment” and this is what causes mishaps within the environment.

Informants were asked about their views on the modern patent system and the movement towards patenting higher life forms such as plants and animals. They were asked about the idea of patenting cell lines, the DNA, or the genes of people. The wording of this question inevitably led to comments of distrust about the financial motivations of governments and companies over the welfare of people. Having reduced the topic and issues to a brief plain language introductory statement, resulted in generalizations that prompted strong comments. Most informants were highly critical of the notion of granting property rights over the genes of plants and animals especially if the intent or motivation was for economic gain. For some it was disrespectful to the plants and animals to make such claims. Others argued that products from nature are for all humans to own collectively or are completely beyond the realm of ownership. No one, not even Inuit, can own any animal or own the rights to any animal. Only animals can own their own genes and all animals belong to the land. Everyone should benefit from research, but no one party can lay claim to an animal. An Elder hunter from Rankin Inlet felt uncomfortable at the thought of patenting the genes of animals that he had hunted for all his life.

Some noted the dangers of the technology that could impact the natural environment and leave Inuit disadvantaged in practising their traditional ways. Changes to the plants and animals in an environment would affect the people closest to it.

In general, the whole idea of owning animals or a person's genetics was viewed as unacceptable. As one informant noted:

> I don't think that any government, company has the right to take a living animal or plant or humans and test them to use as their product, living things are not just simple objects that you can pick at, test and take away something (genes) to use for selfish reasons. Mother nature and life is something that should not be messed around with. People and other living things are made up the way they are, for a reason and it's not right to interrupt the natural process in which living things are supposed to go through...You can't put a price on any living thing, they're more valuable than any amount of money. Life is priceless.

The informants were asked their views about governments or companies claiming rights over plants or animals that have been used for centuries by the Inuit. The effort was to evaluate how Inuit viewed the use of TK in research associated with biotechnology. Inuit are familiar with the issues associated with the use of traditional knowledge (*Inuit Qaujimajatuqangit*) and traditional ecological knowledge by outside researchers. Researchers often come and ask questions to the benefit of their academic careers. The consensus was that there must be a clear process of consultation. Governments and companies should consult with the people who have traditionally used the plants or animals if they have any plans to claim it. "We, as Aboriginals, have rights. One right is that we should be consulted with first if any use of our knowledge is being used." A biology teacher from Labrador stated: "Inuit who are working with scientists have the right to be informed about the research and what they plan to do with the data collected."

"Claiming ownership of a plant or animal that has been used for centuries by Inuit or any other people is not right." The relationships Inuit have with their resources and environment are based on very old and very successful traditions. Informants indicated these relationships cannot, and should not, be broken by companies or by the government merely because they have commercial interest in these resources. Holders of traditional knowledge are challenged by existing intellectual property right (IPR) systems that do not accommodate the age and collective nature of most TK. They are now discovering that companies want to learn from the holders of IQ, use modern processing techniques to refine what is essentially Inuit intellectual property, and then claim patent protection for their "inventions." A typical comment by the informants is "... scientists who use traditional knowledge should not be able to recognize a part of a plant or animal as theirs because it is collectively owned by all people who use it." Another stated: "It would not be right if scientists used traditional knowledge and not give any recognition to the sources they used."

Informants stressed the important long-term relationship Inuit have maintained with the plants and animals within the Arctic environment. Inuit knowledge is the result of generation after generation of learning and this has fostered respect for the environment and the collective ownership by all who use the resources. This has resulted in a remarkable adaptation to the Arctic. It seems wrong for someone to then claim ownership to these resources, especially if these claims are developed from research based on *Inuit Qaujimajatuqangit*. Recognition must be given to the use of any IQ in research.

Informants were asked if there were certain organisms that have cultural, spiritual, or traditional importance and should therefore be exempt from research or experiments. Overall, informants indicated that the plants and animals that Inuit depend upon should be protected. As the Anglican priest noted "... all the plants and animals have a pretty deep significance in Inuit culture, any planned studies on these species should consult first with the people it will affect most." An informant from Labrador stated: "Plants proven to be associated with the Inuit people should be legally recognized and protected from commercial industry." For some, all living things should be outside of the domain of experimentation, manipulation, and ultimate claims for patent ownership — everything belongs to nature.

Some of the informants identified specific species that were of particular significance but these were not linked to spiritual or sacred importance. Plants used for teas were of special note. One informant indicated:

> …certain types of plants like the 'Labrador Tea' or the 'Caribou Moss' should not be toyed with because there are many similar plants throughout the north and if these plants were to be toyed with that could filter and affect all the other similar plants throughout the north and the plant in its natural state could become extinct.

Most informants felt that Inuit should not be denied the rights to continue to use natural products in a traditional manner and fear that any scientific research may prevent their legal access to them.

When asked if Inuit should be compensated or paid for the use of any traditional knowledge that is commercialized or made into a product or medicine, or a cure, informants stressed the value and utility of Inuit TK. The question of compensation, however, is a complex one. Living organisms and the associated traditional knowledge to use them as food or otherwise are collectively owned. Today's intellectual property laws are geared toward individual ownership. The informants indicated that it stands to reason that Inuit should be compensated for the use of their *Inuit Qaujimajatuqangit*. Inuit have the right to be compensated for any information they have given that may have lead to a commercialized product. Inuit also have the right to be notified of what is being done with the knowledge they are providing.

One informant stated the public should be made aware of any products, medicines or cures that are made from traditional knowledge. Inuit deserve the credit for their creativity and practicality. For centuries Inuit relied on such innovative and inventive products and they shouldn't be just taken away from them. Inuit deserve some sort of payment.

Nonetheless, there runs an element of Inuit traditional altruistic values within some of the comments. For example:

> If Inuit traditional knowledge is used to create a product that is later commercialized, then Inuit should be compensated. However if it's for medicine, then I don't think we should be charging people or companies. Human health supercedes any monetary value, but we should be accredited for the knowledge.

Another commented "...if an idea comes from Inuit, Inuit are to be compensated, only one exception, if it's for medicinal purposes, Inuit shouldn't have to be compensated." One student suggested that compensation for the commercialization of Inuit knowledge should be used for a monitoring system to check wildlife for bacteria and environmental contaminants.

AN EXAMPLE OF ARCTIC GENETIC RESEARCH, INUIT TRADITIONAL KNOWLEDGE, AND V-GURTS

Arctic char is an important traditional food source for many Inuit (see table 1). The species is the most northerly freshwater fish and is uniquely adapted to the very low productivity and temperature regimes of the Arctic environment. Genetic studies of high Arctic freshwater stocks reveal them to have very low genetic diversity and suggest that existing populations are derived from a small number of founding individuals. Generally, arctic char grow slowly with some genetically unique sub-populations being sensitive to overfishing. 5/ The fish are susceptible to persistent organic pollutants and this is of concern

5/ See *Case-study 3. An Indigenous Community Says No: Negotiating Access to Charr Broodstock in Northern Canada*, in David Greer and Brian Harvey, *Blue Genes: Sharing and Conserving the World's Aquatic Biodiversity*.

to Inuit. In addition, improperly managed genetic manipulation and cross-breeding of the species holds the potential to further undermine a critical food source among Inuit. The fragile ecosystem of the Arctic makes this a very real possibility.

An aquaculture company in the Yukon Territory has bred a strain of arctic char under the trade-mark brand 'Yukon Gold.' Characteristics of the fish include high feed conversion rates, growth in a range of temperatures, low metabolic rates, large harvest size and tolerance to a range of environmental conditions. The company saves some eggs for breeding and 'shocks' the rest to create sterile triploid fish; these fish have a set of three chromosomes instead of two. Essentially, this is a form of variety use restriction technology (V-GURTs); the fish cannot reproduce and the trade-mark protected strain is therefore protected from unauthorized or unlicensed use. The technology manipulates the genetic make-up of the fish to render them sterile. In theory, if the triploid fish escape, they cannot reproduce. However, triploid fish are known to occur occasionally in nature.

Cultured triploid fish populations are relatively easy to mass produce and are therefore economical. 6/ Triploid arctic char are favoured because they grow bigger and faster in cold water. As such, arctic char has the potential to be a very valuable commercial product throughout Canada's northern regions.

TABLE 1:
Top Five Traditional Foods Consumed in Each Inuit Region Ranked by Common Use Across Regions and the Number of Days per Year the Food was Eaten.

	Inuvialuit	**Kitikmeot**	**Kivalliq**	**Baffin**	**Labrador**
Caribou	94 days	62 days	99 days	68 days	68 days
Arctic Char	26 days	47 days	21 days	47 days	10 days
Trout		16 days	5 days		26 days
Muskox	5 days	16 days			
Cloudberry			10 days		16 days
Beluga Muktuk			10 days	5 days	
Seal				52 days	
Partridge					16 days
Narwhal Muktuk				10 days	
Eider Duck		10 days			
Goose	10 days				
Whitefish	10 days				

Information was gathered during fall and late winter. Adapted from *Canadian Arctic Contaminants Assessment Report II: Highlights*, pp. 73. Indian and Northern Affairs Canada, Ottawa, 2003. URL: http://www.ainc-inac.gc.ca/NCP/pub/pub_e.html

Earthscan/IDRC 2004.URL: http://network.idrc.ca/minga/ev-67657-201-1-DO_TOPIC.html (accessed September 2005).

6/ A problem with triploid salmon is that some show deformities, such as lower jaw defects, slower growth, and higher mortality. This has tended to discourage the aquaculture industry from using triploid salmon. See Fisheries and Oceans Canada *Biotechnology to Help Protect Wild Salmon Stocks.* URL: http://www.dfo-mpo.gc.ca/science/aquaculture/biotech/fact7_e.htm

As a general rule, aquaculture has a high probability of escape. For Inuit, who rely heavily on wild fish stocks (see Table 1), the question of hybrid fish escapes is very real. Yet the potential dangers remain largely unknown. Escaped fish are likely to compete with wild fish stocks for food and habitat in what is a fragile, low productivity environment. Bred to be more temperature tolerant, triploid arctic char may out compete wild stocks for food. In addition, there is little known about the breeding behaviours of sterile triploid arctic char. There is concern that these fish may compete for spawning beds and may initiate fruitless breeding or mating behaviours. This could reduce the productivity, fecundity, and the long-term viability of the wild fish stocks.7 It is with some of these concerns in mind that the United Nations' Food and Agriculture Organization's (FAO) Commission on Genetic Resources for Food and Agriculture recommends that the effects of GURTs on aquatic populations become an active and necessary study area. 8/ More information is needed before triploid fish achieve widespread use in the fragile Arctic ecosystem.

The arctic char aquaculture company has actively sought to establish a joint venture with different Inuit communities across the Arctic in order to gain additional brood-stock. It was hoped each participating community would provide the sperm from six fish from two separate locations near the community. The planned venture involved the University of Guelph in Ontario which has conducted genetic mapping of the species. The wild stocks are needed to broaden the genetic diversity and improve the cold tolerance and growth rates of the existing trade-marked strain. The original stock was bred two or three decades earlier from a small number of fish.

Under the proposed venture, each participating Inuit community (Hunter Trapper Organizations) was to receive an equity share in a newly founded company and would retain ownership of the original stock. The company, however, would own the new genetically improved and economically profitable hybrid stock. Apart from the equity shares, the company suggested the communities would benefit through education and practical experience in fish farming. Inuit expressed concern that the sale of genetically improved farmed fish would have a negative effect on markets and prices for wild-caught fish. As a counter argument, it was suggested that successful farming of hybrid fish would increasing consumer awareness of arctic char, that farming would reduce commercial harvesting pressure on wild stocks, and this would ensure a viable and valuable sport fishing industry.

The proposed joint venture never materialized. Not all communities were willing to participate and after some study, the Nunavut Wildlife Management Board refused to entertain the proposal. The company, however, has gained access to new brood-stock, partly from the research activities of the University of Guelph and from one Inuit community that has provided wild fish. The nature of the arrangements with the university and the community are unclear. For Inuit, outstanding issues included the IP rights related to the genetic mapping conducted by the university and the impact of aquaculture on the health of wild fish stocks and on the market value for wild fish.

7/ The Yukon company had a significant breach of a holding tank in May 2003 and lost about 12,000 fish. Some fish escaped into a nearby creek and efforts were taken to prevent them from getting into a lake that already contained char. See Stephanie Waddell, *Thousands of Char Lost in Fish Farm Fiasco,* Whitehorse Star, May 2, 2003. URL: http://www.whitehorsestar.com/auth.php?r=28731&arc=1. Escaped char have been reported in a local Whitehorse lake as far back as 1997. See Alan Macleod, *Problems Bloom in Popular Pond,* Yukon News. URL: http://www.yukonweb.com/community/yukon-news/1997/sept3.htmld/#problems.

8/ See *Potential Impacts of Genetic Use Restriction Technologies (GURTs) on Agricultural Biodiversity and Agricultural Production Systems*, Commission on Genetic Resources For Food and Agriculture, Working Group on Plant Genetic Resources for Food And Agriculture, Rome, 2 - 4 (CGRFA/WG-PGR-1/01/7). The document was also available for the CBD's COP7 meeting in February 2004. See UNEP/CBD/COP/7/INF/3, 12 January 2004: http://www.biodiv.org/doc/meetings/cop/cop-07/information/cop-07-inf-31-en.doc (accessed September 2005).

DISCUSSION

In the Northwest Territories and in Nunavut, a research license is required for scientific activities.9 The licenses cover both biological and cultural enquiries including genetic research, traditional knowledge, and ethnobotany. If properly applied and enforced, the Scientists Act can serve as a model on how to control access to biological resources and how to manage benefit sharing. Communities must consent to research proposals using consent forms that must be available in both English and Inuktitut. The forms must detail the legal aspects of data collection, its designated use, and may include IP considerations, data storage and security issues, confidentiality, and the rights of the participants. The Act respects TK and the holders of TK based on this process of prior informed consent and the obligation that the research results must be returned to the knowledge holders and to the community in a plain language, easy to understand format.

With respect to the example presented here of Yukon arctic char fish production and the collection of new genetic stock to enhance the existing aquaculture brood-stock, it is unclear whether Inuit participants were aware of the implications of genetic mapping, the trade-mark branding of a strain, and the aquaculture techniques that create triploid fish. Given the views expressed during Pauktuutit's 2002 survey, it is not likely that Inuit would have accepted these activities as legitimate or appropriate. However, when Inuit were unwilling to participate in the company's venture to provide wild brood-stock, the company gained access to new stock through the activities of a university. 10/

The use of the modern IPR system — especially the patent system — to accelerate the development of biotechnology is of concern. The absence of a clear understanding of the power of these technologies by those who have the most to gain financially is worrisome. There is a need to challenge the technological ideology that Western society is obligated to accelerate R&D and must quickly market such powerful new technologies as transgenic species and cloning. The lobbyists who argue that the state should provide economic subsidies to business through strengthened rights and lower standards under the patent system, adhere to this ideology. They adhere to the belief that innovation is inherently good — that faster innovation, even in the absence of society's ability to fully understand the consequences of biotechnology, is inherently good. In a small way, the genetic manipulation and use of arctic char for aquaculture reflects these issues. The consequences are not fully understood. Inuit are only now coming to terms and living with the consequences of the technological revolutions of past decades — the plastics and chemical revolutions and the green revolution that brought herbicide and pesticide contaminants to the fragile Arctic ecosystem. Like a microcosm or barometer for the rest of the world to monitor, Inuit and the Arctic plants and animals are sensitive to the technological innovations of the south. This is true of GURTs as well. Pauktuutit recommends that the CBD continues to advocate caution with respect to GURTs.

For Pauktuutit and other Indigenous peoples, there is the question of what constitutes 'invention' and what constitutes 'discovery.' This is compounded with respect to the use of traditional knowledge and resources in new patentable genetic-based inventions. At what point was the intellectual property of an Indigenous person a mere 'discovery' and where on the continuum does it become an 'invention' that can be protected under the IPR system? When does the isolation of genetic material become an 'invention' if it is based on the 'discovery' of the genetic material's value and utility generations before? What if the

9/ For most scientific activities, licensing is administered for the NWT by the Aurora Institute and by the Nunavut Research Institute in the Nunavut Territory.

10/ The University of Guelph=s Axelrod Institute of Ichthyology received Northwest Territories Scientific Research licences in 1997 and 1998 for research projects to (1) enhance arctic char culture in Canada, (2) to collect fish eggs and cryopreserve sperm for the development of new strains of arctic char, and (3) to develop new strains of arctic char for aquaculture. See the Arctic Science and Technology Information System (ASTIS) licensing records 46726, 45033, and 44979. URL: http://136.159.147.171/scripts/minisa.dll/3765/astis/contentse.htm?GET.

laboratory techniques are standard and do not constitute a new process or technique? Why does the process of isolating genetic material using standard laboratory techniques constitute an invention? Where on the continuum do the 'creations of the mind' come in during these processes?

Laws evolve to meet new challenges and new technologies. Pauktuutit hopes that the evolution of IP legislation will not only evolve to address the social and ethical concerns of biotechnology, but that it will consider related issues associated with the use and access to traditional knowledge. Admittedly, Pauktuutit's concerns go beyond the realm of biotechnology and GURTs and encompass the broader concerns about the loss of control over cultural heritage. Indigenous peoples have the right to benefit from their collective and historical creativity and innovations. It is with these concerns in mind that Pauktuutit looks to the wisdom enshrined in the Convention on Biological Diversity and the potential it holds for protecting the Arctic ecosystem and Inuit culture and intellectual property.

Indigenous World Association (Indigenous ECO-SOC NGO) [30 SEPTEMBER 2005]
& Na Koa Ikaika o Ka Lahui Hawaii [SUBMISSION: ENGLISH]

General Comments Re: AHTEG Report

1. The report's findings are at best speculations. Annex I Sec A. I clearly indicates that "all the impacts…are considered only as "potential" impacts and not as something already proven." Given the significance of the GURT debate to Human Rights and to Indigenous Peoples some effort by the CBD must be made to obtain accurate and real data on impacts to indigenous peoples. In part the problem arises from the Fact that some of the 'indigenous participants' are not representative of indigenous plants and agronomists. Example: The Indigenous Peoples Council on Bio-colonialism (IPCB) is a non-profit U.S. Corporation – not a council of indigenous peoples or farmers.

There are real cases involving indigenous peoples who are opposing GURTS and GMO generally such as the case of Hawaiians opposing GURTS and GMO in traditional foods and the White Earth Recovery Project's opposition to efforts to GMO in Indian wild rice. Significant work has been one by CINE – the Center for Indigenous Nutrition Education in Canada on the impacts of endemic food crops and health. These people should be included in the GURTS debate but are not.

The CBD should make an effort to interface with the real indigenous peoples who are farmers rather than continuing to legitimize purported 'indigenous' organizations such as the IPCB and Call of the Earth who have dominated the 8j process to date.

2. The GURTS issues should not be under the 8j working group. It impacts much more than traditional knowledge, including cultural survival, human rights, food security & ABS issues.

A better approach would be to allow indigenous ECO-SOC credentialed natives and organizations direct participation in the CBD and to have the AHTEG work directly with the CBD rather than through the Working Group on Article 8j. Criterion should be specified to ensure that farmers are included.

Specific Comments:

I. Violations of Human Rights Law

Indigenous peoples and agronomists are opposing GURTS because it threatens their cultural survival, livelihoods and traditional agricultural practices, foods, medicinals. As such, it is a violation of Article 1.1 and 1.2 of the International Human Rights Covenants. These provisions provide in part:

Article I

1. *All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.*
2. *All peoples may, for their own ends, freely dispose of their natural wealth and resources with out prejudice to any obligations arising out of international economic cooperation, based upon the principle of mutual benefit, and international law. In no case may a people be deprived of its own means of subsistence.*

The current effort being pursued by the CBD and under the UPOV and the FAO Treaty on Plant Genetic Resources for Food and Agriculture (FAO Treaty) are efforts "arising out of international economic cooperation." These efforts clearly have negative impacts on indigenous peoples. In addition, under the specific provisions of UPOV, CBD and the FAO Treaty, the genetic resources of indigenous peoples and communities are expropriated to status. This prevents indigenous peoples from disposing of their natural wealth and genetic resources and freely pursuing their economic, social and cultural development. Most importantly, it is undeniable that in order to survive, indigenous peoples must be able to maintain their 'means of subsistence'. GURTS threatens the subsistence practices of indigenous peoples.

In addition, the continuing practice of the CBD to relegate the GURTS issue to the 8j working group and to deny indigenous peoples their right to file interventions and address issues on the floor means that indigenous farmers, women and healers' perspectives will be marginalized and that indigenous academics who do not work in their communities on issues relating to the propagation of food and medicinals, will continue to control and marginalize the process.

Recommendations:

1. We call upon the Parties at COP8 and to the FAO to disband the membership of the AHTEG and to convene consultations with indigenous agronomists, farmers, medicinal healers, health and nutritionists regionally in order to obtain reliable data from the indigenous peoples and natives impacted by the GURTS on positive and negative impacts of the GURTS on their cultural survival and human rights.
2. We call upon the Working Group on Article 8j and the Conference of the Parties to the Convention on Biological Diversity (COP8) to recommend maintaining the language adopted in 200 that supports a defacto moratorium on GURTS until accurate data from indigenous planters, etc. can be obtained.

Kenya Small Scale Farmers' Forum [30 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

Ref: SCBD/STTM/ DCO/va/48601

Advice on the Report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies (GURTS)

From the Kenya Small Scale Farmers' Forum
30 September 2005

Submission to the Convention on Biological Diversity (CBD) Working Group on Article 8(j) on GURTS

We, the Kenya Small Scale Farmers' Forum (KESSFF), representing crop farmers, pastoralists and fisherfolk, do call upon the Working Group on Article 8(j) to advise the 8th meeting of the Convention on Biological Diversity (CBD) that Genetic Use Restriction Technologies (GURTS) should not be commercialised.

We call upon the parties at the COP8 to fully consider and implement the recommendations in the Ad Hoc Technical Expert Group (AHTEG) on GURTS, that the international ban on GURTS should remain intact. We also support the report's recommendation that governments develop national laws that prohibit commercialisation of GURTS.

1. **GURTS is unacceptable to farmers**

We oppose this genetically engineered technology because it produces crops whose seeds are sterile. As farmers, we cannot accept this. We are shocked that this technology exists, and that anyone would even contemplate using it.

2. **GURTS will make poor farmers poorer**

All of our members save their seed. But these crops with sterile seed will mean that farmers will have to buy their seed. They are already poor, but having to buy seeds each season will make them even poorer.

3. **GURTS will get accidentally planted and cause crop losses**

We do not trust regulations or seed companies to ensure that GURTS seeds do not accidentally contaminate or get mixed in with conventional seed, or planted by mistake. But farmers planting sterile seed face disaster and hunger.

4. **GURTS threatens our local varieties**

We greatly fear that GURTS crops will contaminate our open-pollinated local varieties. If this happens we will lose our seed. Our seed has been developed by our ancestors and ourselves, and has stood the test of time. Our seeds do well in our climate and our soil. We know that the more seed diversity we have, the better equipped we are to face the environmental and climate change challenges ahead.

5. **GURTS will cause us to lose our knowledge of seed saving**

We also fear that if GURTS are commercialised, the traditional knowledge we have on breeding, saving and preserving of seed will be lost. We will become dependent on imported seed and knowledge that we cannot access or afford.

6. GURTS threatens communities

Seed exchange is also an important part of village co-dependency and relationships. This technology will kill our communities.

It seems obvious to us that GURTS will cause hunger and poverty. GURTS is a technology that will cause dependence on multinational companies. We have heard these companies' claims that genetic engineering will increase yields and help farmers. But the threat to food security and farmers' lives from GURTS suggests to us that these promises are insincere.

We therefore urge the Working Group to appreciate the threat that this dangerous technology poses to Kenyan small scale farmers, and to farmers and food across the world. Please ensure that GURTS seed are never grown or commercialised.

Sincerely,

Rebecca Musyoka,
Vice Chairlady,
Kenya Small Scale Farmers' Forum

III. SUBMISSIONS FROM OTHER RELEVANT ORGANIZATIONS

The Independent Science Panel (ISP) [12 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

September 9, 2005
Prof. Joe Cummins
The Independent Science Panel
The Independent Science Panel (ISP) is a panel of scientists from many disciplines, committed to the Promotion of Science for the Public Good. The panel's home is London UK
http://www.indsp.org/index.php

Ref: SCBD/STTM/DCO/va/48601 "Advice on the report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies

Hamdallah Zedan
Executive Secretary
Convention on Biological Diversity
United Nations Environment Programme
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413 Saint-Jacques Street
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Canada H2Y 1N9
scretariat@biodiv.org

"Genetic Use Restriction Technologies Should be Eliminated and Use of Public Funds to Develop Use Restriction Technologies Should be Prevented"

Dear. Dr. Zedan:

I am providing advice on genetic use restriction technologies on behalf the independent science panel. I am appending a copy of my speech "terminator corporations' suicide seeds" a lecture presented at sustainable world international conference, 14-15 july 2005, london. that speech report includes references to numerous articles dealing with genetic use restriction technologies. genetic use restriction technologies are commonly referred to as "terminators".

Terminator technologies serve little benefit to anyone other than corporations who profit from the seed use restriction. Corporations such as Monsanto have backed away from the deployment of terminators for the time being while there has been an explosion in the development of novel use restriction technologies based on startling new discoveries in plant molecular genetics that led to the identification of homeotic genes that govern the pathways leading to cell differentiation. Homeotic genes produce proteins that recognize regulatory genes called MADS-boxes that control genes for formation of reproductive tissue, leaves, branches ,etc. That discovery has led to a flood of inventions that use MADS-box factors to control flowering or gamete production to create terminators in trees and in crops. Such techniques frequently use cell suicide toxins to abort formation of gametes or flowers and those toxins provide tangible hazards to those consuming food or feed. From the plethora of patents and patent applications for terminator technologies it seems likely that regulatory agencies will soon be swamped with applications for commercial release of such technologies. Many such technologies may be presented to the public as obfuscations , difficult for the layman or farmer to grasp, they will be, in effect, hidden terminators. It is essential that a clear principle should be established. That principle is that terminators have no place in human agriculture. Their use should be outlawed.

It is worth pointing out that the fundamental research and development of terminator was done by the United States Department of Agriculture (USDA) in a collaboration with Delta and Pineland Corporation. The financial support for the MADS-box box family of terminators came from government granting agencies and from the USDA-US forest service. Government research granting agencies and departments fund extensive research on terminator technologies that serve the interests of corporations and not the tax payers providing the funds to support technologies that are designed to serve the interests of corporations not family farmers. Government funding of terminator research should be stopped.

Family farmers and the public will both lose from the widespread use of terminator technology. Indigenous farmers will suffer from an inability to tap into crop improvements. In Canada there was a government funded study promoting the distressing notion that essentially all seeds production be placed in the hands of corporate seed producers. Saving seed, when seeds are not terminated, would be outlawed. Canada may be the first country to impose a draconian system of corporate food production. Unfortunately, Canada may not be the last country to impose the corporate agenda on the public. The World should demand of the United Nations that they at last stand up for the good of the people of the world.

Appended Report

TERMINATOR CORPORATIONS' SUICIDE SEEDS

Joe Cummins *Department of Biology, University of Western Ontario, London, Ontario, Canada*

Lecture presented at Sustainable World International Conference, 14-15 July 2005, London.

Canada has become the world's leader in doing the wrong thing in the area of genetically modified (GM) food and feed. For example, Canada is the largest exporter of canola in the World. The Canadian government has promoted distribution and sale of GM canola and has encouraged open field testing of canola modified with pharmaceuticals such as the anticoagulant hirudin. There has been little effort to limit pollution of non-GM canola, and there is clear evidence that the canola of western Canada is extensively polluted with transgenes from GM crops [1]. The Canadian government has, in a sense, provided a welcome to GM pollution in order to promote the growth and distribution of GM crops. Nevertheless, corporations and their lackeys in the Canadian bureaucracy crave complete control of the seed and thus food and feed production. The government set up the Seed Sector Review advisory committee, which issued a report calling for changes to legislation to (a) collect royalties on farm-saved seeds, (b) compel farmers to buy officially certified seed, and (c) terminate the right of farmers to sell common seed.

The report was financed by the Agriculture Ministry at a cost of nearly a million dollars to the Canadian taxpayers that essentially rubber-stamped the demands of multinational agricultural corporations [2]. In this way, the onerous licensing requirements of the biotechnology industry are to be extended to all seeds, imposing a form of serfdom on any remaining independent farmers.

The development of "terminator" technology goes hand in hand with the corporate move to control use and production of seeds. Terminator technology is the use of genetic modification to produce seed that produce a crop with seed that is infertile (produces seeds that commit suicide when planted). In other words, terminator blocks viable seed production, production of pollen or ovule or production of flowers. The corporate gains complete control over production of seeds needed to produce food and feed.

The first terminators were developed by the United Sates Department of Agriculture (USDA) and corporate interests, and that technology was patented jointly by the corporation and USDA. As in Canada, the regulator of GM crops also acts as an advocate and commercial developer of such crops (a clear conflict of interest). The first terminator patent was granted to USDA and The Delta and Pineland Corporation (later joined to Monsanto Corporation) in 1999. That patent provoked a flurry of opposition both on the basis of the fundamental right of farmers to save seed, and on the scientific ground that the genetic changes might harm those consuming the crops. In response to those concerns, Monsanto Corporation backed off from immediate production of terminator seeds. But in spite of that action a great deal of government sponsored research In US has focused on development of terminator technology to provide financial benefits for corporations. The government research granting agencies have been lavishly providing taxpayer funds to prestigious universities to develop new and more effective means of producing terminator crops that primarily benefit corporations and reduce independent farmers to serfdom.

Beginning in 1999, The Institute of Science in Society in London, England has distributed a number of reports by Dr. Mae-Wan Ho and myself. In those reports we described the genetic technology of the original and later biotechnology inventions [3-7]. The basic design of the constructions has been to prevent reproductive tissue from developing in a way that allows the seed-producer to maintain fertile lines in order to produce commercial seeds that fails to produce pollen, or produce seeds that will not germinate. The genes used to produce such lines usually involve aborting reproductive cells with cell-suicide genes producing toxins such as barnase, a ribonuclease that digests cellular RNA, diptheria toxin or excess phytohormone production in the reproductive tissue. In some cases, anti-sense genes have been used to block reproductive cells from maturing. Anti-sense genes are complementary copies of the RNA gene messages governing reproductive cell maturation forming double stranded RNA that is recognized as an invading virus by the plant cell and destroyed.

During the 1990s, a startling new discovery in plant molecular genetics led to the identification of homeotic genes that govern the pathways leading to cell differentiation. The homeotic genes produce

proteins that recognize short stretches of DNA called MADS-boxes, regions controlling transcription of the genes involved in formation of reproductive tissue, leaves, roots branches, etc. that govern plant development [9]. That discovery has led to a flood of inventions employing the MADS-boxes transcription factors to control flowering and gamete production as terminators in trees and in crops. Steven Strauss of the US Forest Service in Oregon has been field-testing poplar trees modified with cell suicide genes to eliminate flowering and plans to extend that system to shade trees. Finish researchers at Sopanen University are developing sterile silver birch [10]. Along with the cell suicide toxins and their impact on animal life, the sterile trees must be propagated asexually and thus lack genetic diversity rendering them sensitive to attack by emerging pathogens and without a reservoir of diversity to mitigate the attack of the novel pathogen. A flood of patent applications has begun to appear for control of flowering or sexual development in both evergreen trees and crop plants [11].

I have described an armamentarium of evolving ways to produce terminator trees and crops. The current array of genetic tools has been added to a large array of genetic tools for sterilizing or castrating crops and trees to protect corporate control and profits. When the first proposals to develop terminator plants were put forward, response from independent farmers and the public was strong and vocal. There was a resounding negative response. For the time being corporations publicly moved back from the project. But behind the scenes academic, corporate and government laboratories connived to produce terminators with new and more potent capability. It seems clear that copious government funding is being squandered to promote the interests of rich corporations against the expressed will of the majority of people. The manner in which academe willingly and unquestioningly promotes research which acts against the rights of individual farmers should be brought to the attention of the public. The people must find a way to insure that that their governments act in their interests, not the interests of corporations. As we proposed four years ago Terminators must be terminated!

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Mediterranean Information office for Environment [29 SEPTEMBER 2005]

Culture and Sustainable Development (MIO-ECSDE) [SUBMISSION: ENGLISH]

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Athens, 27 September 2005

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RE: Comments on the potential impacts of GURTs on Indigenous Peoples, Local Communities, Peasants and Small-Scale Farmers.

The Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) 11/ would like to express its high concerns regarding the application of Genetic Use Restriction Technologies (GURTs) and submit to your attention a list of negative impacts they might produce on indigenous people, local communities, smallholder farmers etc., in the Mediterranean as well as worldwide.

Biosafety Hazards

The seed industry is promoting GURTs as a mechanism for containing unwanted gene flow and genetic contamination from genetically modified plants (GM plants) in response to increased concerns (supported by scientific findings and case-studies) that escaped genes from GM plants are posing threats to agricultural biodiversity, especially in centers of crop genetic diversity.

The industry argues that engineered sterility of seeds offers a built-in safety feature for GM plants because seeds produced from unwanted pollination will be completely sterile. Saying so, it assumes that the specific trait is secured for each single seed in the second generation, i.e. that the applied technique has 100% of success.

However, world leading experts and scientists are warning about the inherent instability of GM organisms due to unpredictable consequences resulting from the changes produced in their genome, which can arise

11/ The Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) is a Federation of Mediterranean Non-Governmental Organisations for Environment and Development which presently counts 101 NGOs from the entire Mediterranean region. MIO-ECSDE acts as a technical and political platform for the presentation of views and intervention of NGOs in the Mediterranean scene. In cooperation with Governments, Intergovernmental and International Organisations and other socio-economic partners, MIO-ECSDE plays an active role for the development of policies for the protection of the environment and the promotion of sustainable development in the Mediterranean region and in its countries.

suddenly and even hundreds of generations after the crops are originally modified. In the case of GURTs this could eventually result in the disabling of the mechanism that make seeds sterile and contaminate other crops as well as wild relatives. This would have a serious impact on **food security and food sovereignty** for farmers and communities that unknowingly sow these seeds. Farmers who save their seeds and whose crops have been cross-pollinated by 'sterile' plants in the area may suffer significant yield losses in the following seasons due to a reduced germination of the seeds. The consequences would be particularly harsh for the poorest farm communities and those who depend on humanitarian food aid if they re-plant food aid seeds containing the sterility trait.

Crop genetic diversity losses

Plant genetic resources for food and agriculture (PGRFA) are the biological basis of world food security and, directly or indirectly support the livelihoods of every person on earth. They comprise the diversity of genetic material contained in traditional varieties and modern cultivars, as well as crop wild relatives and other wild plant species that can be used now or in the future for food and agriculture. Broadly defined, plant genetic resources for food and agriculture include resources which contribute to people's livelihoods by providing food, medicine, feed for domestic animals, fibre, clothing, shelter, energy and many other products and services. Throughout history, human beings have used thousands of plant species for food, many of which have also been domesticated. Today only 150 plant species are cultivated, 12 of which provide approximately 75 percent of our food and four of which produce over half of the food we eat. This involution has increased the vulnerability of agriculture and impoverished the human diet. As a result, many local crops that have traditionally been important for feeding the poorest sectors of society are now under-utilized or neglected.

The contamination of crops through traits of seed sterility would even worsen these trends: farmers cold loose trust in their own seed stock and, at the same time, if the contamination persists, they could loose their traditional and local varieties and be forced to abandon their own seeds, adapted to local conditions (soil, climate, water availability) and community needs (traditional medicinal system, nutrition values, taste quality, spiritual/religious needs, etc).
Moreover, considering that local varieties are cultivated using techniques that preserve the soil and available natural resources in a broader sense, the entire ecosystem would be negatively affected.

Cultural diversity at risk

The loss of traditional varieties and decline in seed breeding would threaten the practice and retention of traditional and local knowledge including experimenting, developing new, improved strains, exchanging seeds with each other. Farmers would become totally dependent on seed companies, and therefore on whatever money they can borrow from the bank to buy inputs, and their traditional knowledge about seed breeding would be lost, at least for those cultivars which are 'taken over' by terminator seeds.
In addition, rituals and festivities celebrating the fecundity of earth and seeds (often in association with the fecundity of women), also a remarkable cultural trait of numerous indigenous and rural communities, would be lost. In this way unique elements of the tangible and intangible Mediterranean and world cultural heritage are destined to disappear forever.

The risks highlighted above are threatening even more those countries that are not prepared, from a legislative, institutional and administrative point of view, to control the widespreading of GMOs or to challenge consequences that might arise as a consequence of their application. This is the case of several Southern and Eastern Mediterranean countries, as well as of many other countries –mainly in the developing world- which are in a particularly vulnerable position vis-à-vis their commercial partners.
In these countries the information on on-going debates around GMOs in general and GURTs in particular are almost inexistent, preventing the public and concerned stakeholders to get sensitized and take position accordingly.

In view of the threats on cultural and biological diversity, indigenous knowledge systems, small-scale farming and global food security that GURTs represent and in line with the precautionary principle, we call for the BCD:
- to strengthen the existing international *de facto* moratorium on GURTs
- to undertake all necessary steps to encourage governments to ban GURTs once and for all, especially in view of their forthcoming meeting (COP8, Brazil, 20-31 March 2006)
- to promote information, awareness raising and sensitization of the public and of all concerned stakeholders on the issue of GURTs so that they might be able to get involved in the relevant discussion and push for stricter regulations.

GeneEthics Network Australia [29 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

Ref: SCBD/STTM/DCO/va/48601 "Advice on the report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies (GURTs) "

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28 September 2005
Adam Breasley
GeneEthics Network Australia

Dear Sir

I am writing on behalf of the GeneEthics Network, Australia, in response to the request for submissions to the United Nations Working Group on Article 8(j) of the Convention on Biological Diversity on Genetic Use Restriction Technologies (GURTs).

Technologies need to be guided and shaped by ethical principles, both in their development and in their application. To that end, we at the GeneEthics Network call upon the Convention on Biological Diversity and the Working Group on Article 8(j) to uphold the recommendations of the AHTEG Report on GURTS, including the recommendation that governments develop national regulations to prohibit the commercialisation of GURTS. We call upon the meeting of the UN Working Group on Article 8(j) to advise the Eighth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP8) that GURTs are a dangerous and unethical technology which threatens, biodiversity, indigenous peoples, their cultures and knowledge systems, global food security and the livelihood and cultural practices of billions of people around the planet. We support the findings of the AHTEG report into the effect of GURTs on indigenous people, local communities, and indigenous traditional ways of life, and its conclusion that the potential negative effects of GURTs far outweigh the positive impacts, requiring that the precautionary principle be implemented in the case of GURTs on an ongoing basis, reflected in appropriate legislation at national and international levels, to ensure that indigenous peoples, local communities and people's livelihoods around the globe are not put in jeopardy.In recognition of the

negative impacts of GURTs as outlined in the AHTEG report we also call on the parties to strengthen the recommendations of paragraph 23 of decision V/5 that no GURTs should be approved for field testing or commercial use.

We exhort the Working Group to advise the Conference of the Parties to consider the commercialization of GURTs as being contrary to the stated objectives of the Convention, namely the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the use of genetic resources. We believe that GURTs were developed in a spirit that runs counter to all three of these objectives and that the possible commercialisation of GURTs presents a triple-threat to biodiversity, sustainability and equity, in addition to posing unique threats to indigenous peoples, their ways of life, cultural practices and existence. We believe that the threats posed by GURTs need to be fully addressed by the convention and member states as a matter of urgency, recognizing the enormous commercial impetus driving the development of the technology and the continued push for GURTs commercialisation by some governments. In addition we call upon the Working Group to remind member states of their obligations as signatories to protect, conserve, support and promote traditional knowledge and practices within their jurisdictions.

We believe the engineering of seeds for sterility is indicative of the bankrupt imagination of the life science's industry, and an affront to women, in many places the traditional custodians of seed, and of nature's abundance, which is given free for all. The giving, sharing and saving of seeds as practiced by indigenous peoples, local communities, rural women and farmers worldwide is a laudable example of a gift-based economy in direct contrast to the greedy, corporate monopoly presently being imposed by international bodies such as WIPO and the WTO through current intellectual property laws which is now looking to entrench itself through monopoly control of supply and demand, through centralization of the global seed supply and via the manufacturing of scarcity. In a worst case scenario, the deployment of GURTs would be an unthinkable biological extension of this poisonous programme that would seek to write the dictates of corporate greed into the actual biological makeup of plants, animals and human society, with potentially catastrophic consequences.

We believe it is importantant that the Working Group advise the Conference of the Parties that any ban on GURTs be broad enough cover all applications of the technology and that it not be restricted to selective bans on the use of the technology for specific crops. For example, the use of GURTs in trees and other non-edible plants should also be opposed, as should the future development of GURTs for commercial use in livestock or other animals. We believe the ban should also extend to include so-called "traitor" technology, where flowering development, immunity, or other elements of the life cycle be dependent upon the application of a particular chemical, considering such engineered chemical dependencies to be both dangerous and unethical. We maintain that it is important that the Working Group advise the COP that the ban on commercialisation and field testing extend to all GURTs, existent and potential and not be confined solely to sterile seed technologies, recognizing the broad range of GURTs in the pipeline and the commercial impetus toward the development of GURTs provided by the present intellectual property regimes which allow for the patenting of lifeforms.

Suggestions that GURTs are an acceptable form of biological control to prevent outcrossing, pollination or flowering development in restricted, or experimental GMOS or to halt the spread of transgenes, which have been put forward by some governments and others are misleading and diverts attention away from the commercial imperative that has been driving the development of the technology, as well as from questions as to the safety of the GURTs themselves. GURTs do not provide an adequate method of biological control to prevent bio-pollution, nor has their own inherent safety been established. In recognition of the broad scope of threats posed by GURTs, including but not restricted to food securuty, and the unique threat posed to the world's forests, we restate our contention that the Working Group advise that the use of GURTs in genetically modified trees be included in any ban also, recognizing that

this is an area where arguments will be made for their utility, and that specific attention be given to establishing the scientific validity of claims that GURTs can be used safely as a biological containment mechanism.

In recognition of the number of new patented life forms and the number of GMOs now being developed for commercial purposes, as stated above we think it is likely that there will be a complimentary push for the development of biotechnological restrictions such as GURTS as biotechnology companies try to find biological means to police and restrict the use of their 'products'. It is therefore necessary we think, that the Working Group advise that the COP8 come to a resolution on the GURTs issue before the closure of the March meeting in Brazil in order to make a clear statement and to put into place the process of effective regulation. In addition, it is possible some GURTs in the future may take forms very different from the interferences in reproductive and differential development currently being developed and we believe that advice should be given to the COP that any ban should therefore be sufficiently broad in scope to include any application of genetic engineering designed to biologically restrict people's use of biological resources . As stated above we believe these kinds of technologies run counter to the stated aims of the CBD. In fact, we believe GURTs represent an attempt to re-engineer biodiversity so that it conforms to a programme exactly opposite that of the stated aims of the CBD.

Concurring with the findings of the AHTEG report that GURTs are a threat to the poor and to other already marginalised groups we see GURTs are at present, along with the WIPO and the WTO TRIPS agreement the instrument of capital which is seeking means to enforce monopoly control over biodiversity and therefore the majority world's livelihood. We therefore think it is important that the Working Group advise the COP to move to demonstrate through official opposition to GURTs that the CBD will continue to uphold its threefold mandate and work in the best interests of people and biodiversity.

Indigenous peoples, the poor, peasants, small-scale farmers and rural women , although the majority of the world's population, are often sidelined and unrepresented in debates over the introduction of new technologies and the present meeting of the Working Group affords an opportunity to democratically address the concerns of these traditionally marginalised people and to advise the Parties' of their concerns. We exhort the COP to fully consider the submissions made by all concerned stakeholders in response to the Working Group's request, in addition to upholding the findings of the AHTEG report. As they stand to be in many ways the most affected it is important that Indigenous People's continue to be fully consulted in an ongoing basis in the CBD process and we ask that the Working Group to advise Parties to ensure that there are adequate processes put in place in their own countries to ensure that this takes place.

The findings of the AHTEG report confirm that GURTs threaten to undermine the traditional relationship between humanity and nature and between traditional and indigenous people's cultures and nature in a fundamentally negative and potentially irreversible way. Where GURTs result in biologically interfering in the traditional relationships between indigenous peoples and biodiversity and cultural practices, they are in violation of Indigenous people's fundamental human right to self-determination. We ask the Working Group to advise the Conference of the Parties to fully address the issue of human rights, and that the COP seek ways in future to harmonise the CBD with international human rights treaties so as to preclude any future violations.

GURTs is a type of technology that could lend itself to abuse and to hostile use. The hostile use of any biological agent is prohibited as biological warfare under numerous international arm treaties. With the plethora of dramatic negative impacts associated with the deployment of GURTs outlined in the AHTEG report, it is imperative that the CBD moves now to distances itself from what by some could be seen as an

agent of biological warfare. This kind of activity is very far from the stated objectives of the CBD. We ask that the Working Group ask the COP to consider fully consider the seriousness of this development.

Biodiversity forms the basis of the majority of the world's livelihood. Any biotechnology which seeks to restrict the natural economy of shared biodiversity is putting many people's lives at risk, particularly and most immediately those billions of the world's poor who have no other means of sustenance. Agricultural biodiversity is conserved, cultivated and sustained by the practice of saving, sharing and exchanging seed. Seeds are thereby adapted for local conditions, and for specific nutritional or medicinal requirements. The free sharing of seeds is essential to this process. We are particularly concerned with the potential for GURTs to further reduce genetic diversity in agriculture, different ecological economies and ways of life and the disastrous consequences this would have for human life on planet Earth, not just in terms of global food and medicinal security but also crucially in cultural impoverishment. As the Convention on Biological Diversity we would ask the Working Group to remind the Conference of the Parties that they have a very clear mandate under the Convention to foster, support and protect the conservation and sustainable use of biodiversity, and to promote the equitable sharing of the benefits of biodiversity, including promoting traditional ways of life. Indigenous peoples and small farmers have been for millennia the innovators of biodiversity and it is to many generations of them that we owe our gratitude for the great diversity of biological wealth which is humanity's present heritage. We believe it is therefore the responsibility of the Convention in this instance to support the custodians and cultivators of biodiversity in their submissions, to uphold and strengthen the AHTEG's recommendations on GURTs and for the COP to denounce and ban this technology.

Yours sincerely,

Adam John Breasley
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Pan-African Conference on GMOs, Nairobi, Kenya 27-29 September 2005 [30 SEPTEMBER 2005]
[SUBMISSION: ENGLISH]

SUBMISSION TO THE UN CONVENTION ON BIOLOGICAL DIVERSITY

Working Group on Article 8(j)
On Genetic Use Restriction Technology (GURTS)

Advice on the report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies (GURTS)

REF: SCBD/STTM/ DCO/VA/48601

Pan-African Conference on GMOs, Nairobi, Kenya

27-29 September 2005

We, the participants at a Pan-African gathering on Genetically Modified Organisms, comprising of farmers' organisations, environmental and consumer organisations from 20 different African countries, meeting in Nairobi, Kenya, wish to make our submission to the Convention on Biological Diversity (CBD) Working Group on 8(j), on the issue of Genetic Use Restriction Technologies (GURTS), also known by many of us as "Terminator" and "Traitor" technology.

We call upon the Working Group to consider our concerns about GURTS, and to do everything possible to ensure that this technology is completely prohibited around the world.

GURTS are unacceptable to the African communities that we represent, work with and come from.

The objective of this technology is simply to cause total dependence, slavery even, on the multinational corporations that are behind these technologies. For African farming communities, seeds and seed saving are the principle source of their livelihoods. They are their source of food, their source of income, and are often their only available source of medicine. GURTS threaten local seed systems by preventing communities from saving their seed, contaminating and sterilising their local crops, and causing them to lose their traditional knowledge of seed saving.

We are not talking about a minority. 80-90% of the seed planted in Africa is farmer-saved seed, and African seed markets are a major target of the multinational seed industry. Across Africa, many farmers start the season with nothing but their seed that they have saved. It is the only thing that carries them through the year. Seed is life for farmers across Africa.

We come from cultures where there are many traditional practices around the saving and honouring of seed. It is sacred to many communities who believe that crops are gifts from God. For this reason many farmers offer their best seed to their ancestors in thanks, and in hope for a good year to come. GURTS are therefore a complete violation of what is sacred.

For many farmers in Africa, living year to year in a state of permanent anxiety, GURTS are a form of bio-terrorism. GURTS can never be an appropriate solution to the industry's deliberate attempts to contaminate the world's seed supply with genetically modified genes.

Everything must be done to ensure that these technologies never make it into farmers' fields.

[03 OCTOBER 2005]
LOK SANJH [SUBMISSION: ENGLISH]

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September 26, 2005

1. We, the farmers in Pakistan have discussed seed issues particularly in reference with GMOs and terminator seeds. We have found that more than 80% farmers can be categorized as small farmers and do not have the capacity to purchase seeds. They have the traditional seed saving and sharing systems within the communities. Any law or interference with their traditional systems will bring poverty and food insecurity to these already poor communities. So we demand ban on terminator seeds.
2. We call upon the Working Group on Article 8(j) to advise the Eighth meeting of the Conference of the parties to the Convention on Biological Diversity (COP8) that GURTs is a dangerous

technology that threatens biodiversity, Indigenous knowledge systems, smallholder farmers and global food security.

3. We call upon the parties at the COP8 to fully consider the AHTEG Report on GURTS, and approve the Report's recommendation that governments develop national regulations to prohibit commercialization of GURTS.
4. In recognition of the negative impacts GURTs poses to indigenous peoples, local communities, peasants and small-scale farmers we call on the Parties to the COP8 to strengthen the recommendation of paragraph 23 of decision V/5, that no GURTs should be approved for field testing or commercial use.
5. In recognition of the negative impacts that GURTs pose to Indigenosu peoples, the parties to the convention on Biological Diversity and Secretariat must ensure the full and effective participation of Indigenous peoples in all future processes of the CBD related to GURTs.

Dr. Shahid Zia
Executive Director
Lok Sanjh Foundation

Endorsed by;

1. Lok Sanjh Foundation
2. Pakistan Dehqan Assembly
3. UD partners
   - Takhleeq Foundation
   - Holistic Understanding for Justified Research and action (HUJRA)
   - Socio Agri Development Forum (SADF)
   - Balochistan Rural Development & Research Society (BRDRS)

3. Sustainable Agriculture Action Group (SAAG)

SEARICE's (Southeast Asia Regional Initiatives for Community Empowerment) [07 OCTOBER 2005] [SUBMISSION: ENGLISH]

TERMINATOR TECHNOLOGY

WHY IT SHOULD BE STOPPED BEFORE IT STOPS FARMERS' RIGHTS

No technology is ever neutral. A certain technology may have its beneficiaries but so will there be those who could suffer from the adverse effects of the development and spread of the same technology. Terminator technology, falling under the broad term of genetic use restriction technologies (GURTS), is one such technology wherein its benefits will be limited to a very few but its impact could be disastrous adverse to millions of people around the world, especially small farmers in developing countries.

In the context of small farmer agriculture that remains the dominant mode of agricultural production in much of the developing world, it is easy to see how terminator technology will affect small farmers. For small farmers, seed saving, sharing and exchange are very important elements not only as a matter of cultural tradition but for economic and social reasons as well.

Seeds constitute a strong social and cultural bond among farmers and between communities. It has helped define and reinforce kinship, friendship and solidarity among farmers through sharing and exchange of seeds. Seeds are also a lifeline passed on from generation to generation, giving each generation of farmers a chance to improve on or adapt the seeds to new conditions or requirements. Seed sharing and exchange, among other mechanisms of social solidarity, has helped communities to survive and adapt themselves amid the vagaries of economic life and political turbulence that have swept so much of the developing world in this era of globalization.

Beyond this however, seed saving is an important economic resource and safety net for farmers as well. Seed saving translates into economic benefits for farmers who may not have to purchase seeds from other farmers or from the market every planting season. Moreover, saved seeds assure farmers of more intimate knowledge of the quality of the materials they are using. Cases have been documented wherein the quality of farm-saved seed is shown to be comparable to if not better than institutionally produced seeds, including registered and certified seeds. And where farmers are trained on better techniques in seed selection, storage and handling, farm yields can be increased by up to 20% with improved seed quality and purity. For small farmers, improved seed saving makes good economic sense than reliance on expensive commercial seeds supply every season. If terminator seeds become the norm, farmers will gradually lose that option and become entirely dependent upon those who control the technology and the seeds.

Among small farmers, income is not only derived from their own farms but also from working on other farms, including work on seed harvesting, storage and re-sowing. In many cases, farm labor is compensated by equivalent value in seeds instead of cash, making this supplemental economic activity an important source of farmers' seeds as well. Moreover, the persistent problem of lack of land access creates a mass of landless rural population who depend largely on providing their raw labor power for various farm work activities including seeds-related jobs. And even in these instances, labor may still be compensated with seeds, which landless workers can then convert into a commodity for cash. With terminator seeds however, this extensive seed-based support systems for farmers and rural workers are greatly diminished and marginalized, leaving millions at the mercy of the market and companies in control of the seeds.

All in all, we are presented with a dynamic picture of small scale agriculture upon which seed saving, sharing and exchange plays an important role in the cultural, social and economic life of farmers and farming communities. Seed saving is not just a straightforward activity of keeping seeds for the next planting but it is intimately linked to a whole gamut of cultural traditions, social relationships and economic support systems that characterize and allow farmers and farming communities to survive and adapt through generations. It is said that up to 1.4 billion people depend on farm saved seeds for their lifelines. It is these dynamic farmers' seed systems that terminator technology, along with other restrictive seed technologies in combination with intellectual property protection, now threaten to marginalize or displace in the process.

In many parts of the developing world small scale agriculture has been and is being transformed by external forces of change dating back to the era of the Green Revolution. The Green Revolution introduced farmers in the developing world to a system of capital-intensive agriculture. The system immediately marginalized millions of farmers who did not have the resources to gain access to these expensive and externally-available technologies, condemning them to subsistence and below subsistence conditions. Over the years however, many farmers who were able to ride on the Green Revolution wave found themselves also thrown by the wayside as the cost of the technologies persistently shot up, productivity plateaued, ecological resources became damaged by chemical and intensive farming, and market forces dictating credit and prices became more and more exploitative.

The era of the Green Revolution was also the era of the greatest exodus of people from the countryside to the cities, which continues today. The marginalization of farmers and their families, partly because of the Green Revolution's impact, caused rural folk by the millions, unable to make a living anymore due to ever-constricting access to productive resources in agriculture, to march into the cities to eventually populate the slums and urban underbellies of societies. Terminator technology is but an extension of the so-called Gene Revolution that followed the Green Revolution, and it continues along the path of technological development that effectively marginalizes small farmers. We therefore look at terminator technology in the context of the technological, as well as political-economic, transformation in agriculture that has affected, and in many ways, victimized farmers and farming communities, particularly in the developing world. Terminator technology represent an ever tightening web of control over seeds masquerading as "one of farmers' choices."

We are now in an era in which intellectual property rights have converged with self-restricting seed technologies to create tighter forms of control and monopoly over access to and use of plant genetic resources. We are in the era of patents on genes and life forms, genetic modification, and Pinkerton detectives harassing farmers for infringement of patent rights of Monsanto. We are in the era of agricultural trade liberalization bringing in cheap subsidized goods from the developed to the developing countries that are slowly killing small farmers and wiping them off the agricultural landscape. We are in the era in which the seed market in the developing world represents an increasingly lucrative market for the global seed giants, if only farmers can be forced to depend on and buy their proprietary seeds in the same way that has happened in the developed countries, where the market now has become saturated and profit margins are tapering off.

In this context, terminator technology is not a neutral technology that farmers simply may or may not opt to use among a range of choices supposedly available to them. In reality it is one layer in a stack of technologies, reinforced by IPR restrictions, that aims to keep or restrict farmers from saving seeds and to make them reliant on the seed market. Hybrid seeds, transgenics, and now GURTS, and soon nano-biotechnology, combined with plant variety protection and patent regimes are lethal combination that certainly diminishes farmers' rights to seeds just as is happening now to farmers across both developing and industrialized world.

But more than other restrictive seed technologies, GURTS and terminator technology represent the ultimate form of technological control beyond existing genetic modification techniques. It is potentially the ultimate profit maker for global seed giants, which will incorporate terminator technology in all their GM plants. By making seeds sterile, terminator technology altogether stops any saving and re-use of seeds, which spells disaster to farmers who have traditionally depended on seed saving, sharing and exchange. There is no assurance that terminator seeds, once commercialized, will not commingle and mix with farmers' seeds, just as cases of mixtures and mechanical contamination have taken place with GM seeds. Such instances, multiplied across communities around the world, will cause adverse impacts on local seed supply, and ultimately food security. Hence, to even consider terminator technology as a biosafety measure to contain GM contamination is tantamount to treating a patient suffering from infection by shooting the infectious wound with a gun. The cure is worse, in this case fatal, than the disease itself.

And it is rightly so that the Convention on Biological Diversity (CBD) has adopted since 2000 a virtual moratorium on the further development of GURTS and terminator technology. The same position had been affirmed in the 2003 report of the Ad Hoc Technical Expert Group (AHTEG) of the CBD, which recommended that Parties and other Governments "consider the development of regulatory frameworks not to approve GURTS for field testing and commercial use." Unfortunately, such a position is now being threatened by interest groups that seek to overturn the moratorium, specifically the Canadian government, which almost succeeded in doing so at the Bangkok meeting this year of the Subsidiary

Body on Scientific, Technical and Technological Advice (SBSTTA). Such attempts to overturn the moratorium on GURTS and terminator technology should be resisted by States, civil society and farmers' groups. Further, countries are encouraged to adopt national bans on the development and use of GURTS, such as what Brazil and India have already done.

We at SEARICE, together with farmers and farming communities whom we work with to conserve, develop and sustainably utilize plant genetic resources, therefore affirm our continuing opposition to terminator technologies in any forms that they are being developed. We believe that terminator technologies are an affront to Farmers' Rights to which we remain committed to promote and to protect. We hope that responsible global and national authorities will act swiftly and decisively to stop terminator technologies before they stop Farmers' Rights.

Seeds of Survival [03 OCTOBER 2005]
[SUBMISSION: ENGLISH]

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Submission to the Secretariat for the Convention on Biological Diversity regarding Genetic Use Restriction Technologies (GURTs) (Ref: SCBD/STTM/DCO/va/48601)

FROM: USC CANADA

OTTAWA, SEPTEMBER 30, 2005

USC Canada is a voluntary organization founded in 1945 by humanitarian Lotta Hitschmanova. We work with partner organizations in Africa, Asia, and Latin America to strengthen community livelihoods, promote food security, and support peoples' actions for social justice and equality. USC Canada aims through all of its programs to promote resilient, healthy, and just communities. In Canada, we build awareness and support for international social change through public education and policy dialogue.

Seeds of Survival (SoS) is an international program of USC Canada that works with farmers to improve food security through on-farm conservation and sustainable uses of agro-biodiversity. The program includes promotion of community seed and gene banks, farmer-led research, conservation and use of underutilized crops and land rehabilitation. This award-winning program began in Ethiopia in the late 1980s as an answer to seed insecurity challenges due to recurrent drought.
Our partners have told us repeatedly of the importance of locally-adapted seeds in the hands of farmers for meeting local food needs and for maintaining the agricultural biodiversity that is essential for global food security.

Farmers, using their time-tested knowledge and practices, have generated and maintained crop diversity for thousands of years. Many agricultural systems that have been productive, stable and resilient for

millennia are, however, currently failing to meet increasing demands in a context of unpredictable climatic variability, inappropriate land use practices and unfair trade policies. Genetic erosion is occurring at rapid pace, as seeds developed for industrial agriculture displace local crop varieties or landraces.

Crop diversity is crucial in the fight against poverty, food insecurity and environmental degradation. Crop diversity provides the raw materials needed to develop hardy, dependable, productive and nutritious crops. Crop diversity is equally crucial to cope with climate change, disease and pest outbreaks. Biodiversity is truly the foundation of humanity's food supply.

Technology that prevents plants from producing viable seeds would have significant implications for farming systems and biodiversity. 1.4 billion people depend on farmer-saved seed. Many farmers draw on their own breeding skills to adapt purchased varieties for use on their lands. If farmers have no credible choice but to adopt new Terminator (GURTs) varieties, they will become dependent on seeds they cannot afford—seeds that are not adapted to the environmental and social context of local production systems. They will have lost the option to continue to breed their varieties to fit their own particular circumstances and to generate agricultural biodiversity.

By establishing Terminator technology as a platform upon which all plant breeding will take place, corporations are further limiting farmers' access and rights to seed supply systems. Patented characteristics—such as a plant's ability to deal with climate change or disease—will only be available on the Terminator platform.

In light of our experience in the Seeds of Survival program, we agree with and reiterate the requests of the Ban Terminator campaign:

We call upon the Working Group on Article 8(j) to advise the Eighth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP8) that GURTs is a dangerous technology that threatens biodiversity, Indigenous knowledge systems, smallholder farmers and global food security.

We call upon the Parties at the COP8 to fully consider the AHTEG Report on GURTS, and approve the Report's recommendation that governments develop national regulations to prohibit commercialization of GURTS.

In recognition of the negative impacts GURTs poses to Indigenous peoples, local communities, peasants and small-scale farmers, we call on the Parties to the COP8 to strengthen the recommendation of paragraph 23 of decision V/5, that no GURTS should be approved for field testing or commercial use.

In recognition of the negative impacts that GURTs pose to Indigenous peoples, the Parties to the Convention on Biological Diversity and the Secretariat must ensure the full and effective participation of Indigenous peoples in all future processes of the CBD related to GURTs.

We believe that due to unacceptable risks and negative impacts on food security and agricultural biodiversity, Terminator technology (GURTs) must not be permitted.

Thank you for your attention.

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Submission to the Secretariat for the Convention on Biological Diversity regarding Genetic Use Restriction Technologies (GURTs) (Ref: SCBD/STTM/DCO/va/48601)

From: USC-Canada Seeds of Survival (SoS) program in West Africa

Bamako, September 17, 2005

Sustainable human development cannot be achieved without the enjoyment of farmers' full rights. Farmers in West Africa have a unique contribution to food security for all even under the most difficult conditions. They have time-tested knowledge of seeds, soils, climate and the relevant socio-economic practices that bind and save their communities. They may swing between scarcity and bounty from one year to another but they still have control of most elements that influence their lives.

There is great genetic diversity even in the worst arid land conditions in West Africa. A single community genebank, in Douentza (Mali), at the edge of the Sahara desert, possesses a great diversity of 25 species of crops and each species has a range of landraces or farmers' varieties. For example, there are over 15 farmers' varieties of pearl millet. These communities, despite difficult climatic conditions, are striving to use and conserve their landrace seeds and associated knowledge.

Genetically-modified organisms (GMOs) and potential Terminator seeds (GURTs) are the new threats to farmers' livelihoods. Risks associated with these biotechnologies are not clear. They are not culturally acceptable given current seeds supply systems in use throughout the region. Their introduction will be most devastating for the smallholder and resource-poor farmer. The introduced seeds are not adapted to the ecological heterogeneity and social contexts of West Africa and they will not be controlled by farmers or by African governments and local institutions. Farmers are not correctly informed about these issues.

Increasingly, many farmers in West Africa are subject to environmental pressures that bring them to reseed their fields more than three times when the rains fail to wet the soils. Will farmers have to buy seeds and the accompanying inputs more than twice in the course of an agricultural season? Is this economically viable?

African governments and seed companies from the North backed by their governments and financial institutions should be held accountable for problems related to the introduction and use of GMOs and potentially also Terminator seeds in Africa.

We must ask ourselves: What are the real benefits to farmers—ecologically, economically and culturally? African agriculture, it is known, has been highly receptive to all kind of innovations and introductions. However, Terminator seeds should not be allowed to make their way to Africa and add to the vulnerability of the African farmer who already lives on the margins. What will happen to the world biodiversity heritage if the priorities of agribusiness companies take precedence over farmer-led agricultural diversification?

Based on this questioning and concerns, we are writing on behalf of the farmers' communities we work with in West Africa to request prohibition of the testing and commercialization of Terminator technology. Please put a stop to this most inhuman and wrong private initiative.

ETC Group 12/ [07 OCTOBER 2005]
[SUBMISSION: ENGLISH]

7 October 2005

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Ref: SCBD/STTM/DCO/va/48601 "Advice on the report of the Ad Hoc Technical Expert Group on Genetic Use Restriction Technologies

Dear Dr. Zedan,

On behalf of the undersigned organizations, ETC Group wishes to submit the attached comments to the CBD's Working Group on Article 8(j) on the subject of genetic use restriction technologies (GURTs), also known as Terminator technology.

We are grateful for the continued work of the Convention on Biological Diversity in facilitating information gathering and discussion on the potential impacts of GURTS. It is our hope that substantial progress will be made at the upcoming meeting of the Working Group on Article 8(j), followed by COP8.

12/ These comments are submitted on behalf of the following organizations: ANDES (The Quechua-Aymara Association for Nature Conservation and Sustainable Development), Call of the Earth, Catholic Institute for International Relations, ETC Group, Gaia Foundation, GRAIN, Indigenous Peoples Biodiversity Network, International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Worker's Associations (IUF), Third World Network.

As requested, we have limited our comments to new information that we believe is important for the Working Group to consider as it prepares to advise COP8 regarding the report of the Ad Hoc Technical Expert Group on the potential impacts of genetic use restriction technologies on smallholder farmers, indigenous and local communities.

Although the issue of GURTs is not new, the seed industry and some governments have recently renewed efforts to promote and win acceptance for Terminator technology. GURTs, therefore, is no longer a distant or abstract threat for farmers, Indigenous peoples and biodiversity, but a real and present danger. Although field tests have not been undertaken (to our knowledge), greenhouse experiments are underway.

In the past, civil society organizations have referred to GURTs (plants that are genetically modified to kill their own seeds) as "suicide seeds." Given the fact that 1.4 billion people depend on farm-saved seeds as their primary seed source, GURTs could more accurately be described as "homicide seeds."

We congratulate the CBD for facilitating important discussion on the potential impacts of GURTS and for incorporating the views of Indigenous and local communities and smallholder farmers – those who will be most directly and adversely affected by GURTs. We thank you for the opportunity to submit these comments to the CBD's Working Group on Article 8(j) as it deliberates the future of GURTs, and the potential impacts for Indigenous peoples, smallholder farmers and Farmers' Rights.

Thank you for your consideration.

Sincerely,

Hope Shand, Research Director, ETC Group and member of the Ad Hoc Technical Expert Group on GURTs, member of the Ban Terminator Campaign

Comments submitted on behalf of:

ANDES (The Quechua-Aymara Association for Nature Conservation and Sustainable Development)
Call of the Earth Llamado de la Tierra
Catholic Institute for International Relations
ETC Group
Gaia Foundation
GRAIN
Indigenous Peoples Biodiversity Network
International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations (IUF)
Third World Network

Introduction: Promotion and Development of GURTs is Increasing

When patents on GURTs/Terminator seeds first came to the attention of the CBD in 1998, the technology seemed a distant threat – many years away from commercial reality. Some governments now mistakenly assume that the seed industry has abandoned its quest to commercialize Terminator seeds, in response to widespread opposition from some scientific bodies, Indigenous peoples and farmers' organizations, and civil society. Unfortunately, this is not the case. Recent months have witnessed a sharp increase in industry efforts to promote Terminator technology and gain acceptance for the technology through the CBD. For the seed industry, GURTs is the equivalent of a "biological patent" that offers perpetual exclusive monopoly – it is a technology that is simply too profitable to be abandoned.

Companies continue to apply for, and win, patents on GURTs. For example, agrochemical giant Syngenta won its most recent US patent on Terminator technology in March 2004.[i]

Delta & Pine Land (D&PL), a US-based seed company that vows to commercialize Terminator (the company ranks 10th worldwide in terms of seed sales), distributed a new brochure on GURTs at SBSTTA10 in Bangkok. The D&PL brochure states that "The system is being developed further and we expect that it will be a few years before TPS [Technology Protection System, the company's proprietary V-GURT technology] transgenic varieties are commercialized."[ii] According to company officials, the technology is now being tested in greenhouses – but has not yet been field-tested.[iii]

Seed Industry Concentration Has Accelerated

Genetic use restriction technologies (GURTs) are being developed by the private sector in OECD countries. We believe it is important to understand the socio-economic context in which GURTs are being developed in order to fully examine the potential implications for Indigenous peoples, local communities, smallholder farmers and Farmers' Rights. Today, a handful of multinational seed and agrochemical companies dominate global seed sales and 2004-2005 saw an upsurge in seed industry takeovers. According to two recently released studies, the top 10 multinational seed firms now account for approximately half of the commercial seed market worldwide.

According to Phillips McDougall, a UK-based consulting firm, the top 10 seed companies account for 51% of the US$19,000 million global seed market worldwide.[iv] A new report by the ETC Group reaches a similar conclusion: The top 10 companies control 49% of the US$21,000 million commercial seed sales in 2004.[v] Both studies' company rankings are presented below:

World's Top 10 Seed Companies (US millions), 2004

1. Monsanto* (includes Seminis) $2,803
2. Dupont* $2600
3. Syngenta* $1239
4. Limagrain $1044
5. KWS $622
6. Land O'Lakes $538
7. Sakata $416
8. Bayer $387
9. Takii $$366
10. DLF-Trifolium $320

Source: ETC Group, September 2005.
The top 10 companies control 49% of the world's $21,000 million

Leading Seed Company Sales, 2004 (US millions)

1. Dupont* $2,620
2. Monsanto* $2,353
3. Syngenta* $1,239
4. Limagrain $1,016
5. KWS $551
6. Seminis $526
7. Bayer $386
8. Takii $$379
9. DLF-Trifolium $346
10. Delta & Pine Land* $319

Source: Phillips McDougall, July 2005.
The top 10 seed firms account for 51.2% of the $19,000 million

*Companies known to have patents on GURTs[vi]

By definition, GURTs are genetically modified (GM) seeds. The market for GM seeds is even more concentrated than the overall seed market. In 2004, one company's biotech seeds and traits – Monsanto's - accounted for 88% of the total GM crop area worldwide.[vii] According to Monsanto, its biotech seed and trait acreage covered 71 million hectares (175.7 million acres) in 2004 – roughly the size of Zambia.

/…

According to ISAAA, the estimated global area of biotech crops for 2004 was 81.0 million hectares, equivalent to 200 million acres.

Why does seed industry concentration matter, and how does it relate to GURTs? If commercialized, will GURTs bring benefits to farmers? Will GURTs result in increased competition, greater R&D and an increase in improved varieties?

The 2001 report on GURTs commissioned by the Food and Agriculture Organization "Potential Impacts of Genetic Use Restriction Technologies (GURTs) on Agricultural Biodiversity and Agricultural Production Systems" (FAO report) concludes (58,vi) that "…GURTs may well reinforce the concentration and integration trends in the breeding sector in such a way as to lead to possibilities for misuses of monopoly power, rendering farmers fully dependent on formal seed supply systems." The report warns (44), "GURTs could further concentrate market power in the formal seed sectors for some crops, due to economies of scale. This has lead [sic] to concern that firms may have the capacity to set process non-competitively."

The FAO report noted (49) that there "is concern that GURTs will narrow farmers' choices by reducing the number of suppliers." A 2003 paper by the International Seed Federation that was submitted to the Ad Hoc Technical Expert Group on GURTs asserts that GURTs will be beneficial for farmers and result in increased choices:

> "…employment of GURTs will result in increased choices to farmers. The possibility of a return on research investment will result in an increase in competition among companies, with more companies entering a market area and an increase in production of new improved varieties. This would obviously be beneficial to farmers. Prices should remain competitive and support a steady flow of new and improved varieties every year, to provide the farmers with more choices than in the past."[viii]

Given the current levels of concentration in the global seed industry, however, the reality is that farmers would have *fewer* choices if GURTs were commercialized. A new report from the US Department of Agriculture (USDA) examines how seed industry consolidation has affected agricultural research and development[ix] and finds that, in the US, private sector spending on crop variety R&D increased 14-fold between 1960 and 1996, while public expenditures stagnated. Looking at biotech maize, cotton and soybeans, USDA researchers found that research intensity slowed as seed markets became more concentrated:

> "Those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved…Also fewer companies developing crops and marketing seeds may translate into fewer varieties."[x]

While the report of the Ad Hoc Technical Expert Group report on the potential impacts of genetic use restriction technologies on smallholder farmers, indigenous and local communities (AHTEG report) noted (4.b) the potential positive impact that "GURTS may increase agricultural biodiversity through increased activity in the plant-breeding sector"
the USDA study finds that, in the case of agbiotech in the USA, reduced competition is associated with reduced R&D. Despite seed industry claims to the contrary, concentration in the seed industry has resulted in <u>less</u> innovation – not more. Ultimately, a highly concentrated seed market means less choice for farmers – not more. The experience of the US market is relevant because the US accounts for 60% of the total GM crop area worldwide.

If GURTs are commercialized, they will be introduced by a small number of very large firms in the private seed sector. The USDA study indicates that, given the highly concentrated seed market, we cannot expect R&D to increase following the commercialization of GURTs. Contrary to seed industry claims, farmers would likely have *fewer* choices – not more – than in the past.

GURTs Threatens National Sovereignty

If commercialized, GURTs pose threats to national sovereignty which in turn jeopardizes the ability of national governments to respond to the concerns of Indigenous peoples, local communities and smallholder farmers and adopt regulatory measures to protect Farmers' Rights. GURTs are now being promoted as a technological means of forcing intellectual property (IP) protection in countries that have chosen not to recognize strong IP for plants and seeds. For seed companies, GURTs offers "perfect enforcement of property rights." This analysis corresponds to the conclusion of the AHTEG report (13.c), under the category of "Dependency," that, "Practices under legal intellectual-property regimes would be undermined (e.g. no time limit, no farmers' research and breeders' exemptions and no compulsory licensing)." The FAO report (51) points to the policy question facing governments, "whether increased technological protection to genetic resources by GURTs is desirable, and how this would interface with IPR regimes. In this governments may wish to distinguish between GURTs applications that offer intrinsic production increases, and those that serve merely as use restriction strategies."

In 2005, the government of Argentina suspended negotiations with Monsanto over the creation of a payment system that would allow the company to collect royalties on use of its Roundup Ready soybeans after Monsanto initiated lawsuits in Denmark against two importers of Argentine soybeans. Argentina's national laws do not recognize Monsanto's patent claims on Roundup Ready soybeans and a 1973 seed law intended to protect small producers ensures the right of Argentinean farmers to save the seeds of self-fertilizing plants like soy or wheat.

It should be noted that some countries have passed laws to prohibit GURTs at the national level. Most notably, Brazil's biosafety law (Law 11.105), which passed in March 2005, includes the following language on GURTs:

> *Art. 6o The following are prohibited:*
> *[...] VII - the use, sale, registration, patenting and licensing of genetic use restriction technologies.*
>
> *For the purposes of this Law, genetic use restriction technologies are understood to be any process of human intervention aimed at generating or multiplying genetically modified plants in order to produce sterile reproductive structures, in addition to any form of genetic manipulation aimed at activating or disactivating genes related to plant fertility through external chemical inducers.*

Delta & Pine Land is currently promoting GURTs by pitting North farmers against South farmers. The company asserts that, "farmers in these other countries are receiving the advantages of [GM crop traits] without paying for their use, a situation that undermines the competitive viability of many farmers as well as seed and trait producers." According to D&PL, GURTs "will insure a more level playing field" because farmers everywhere would be forced to pay for the right to use GM seeds.

A forthcoming article (November 2005) in the *American Journal of Agricultural Economics*, co-authored by Iowa State University economists and Dupont scientists (the world's second-largest seed company and a company that holds patents on GURTs), notes that "GURTs should be viewed as a way to introduce IPP [intellectual property protection] and not as an alternative to existing IPP regulations."[xi] In other words,

GURTs/Terminator could become a giant crowbar to win intellectual property monopoly in the South where it is not legally recognized and/or enforced.

Agricultural economists in the United States are currently promoting GURTs by making the dangerous argument that the technology would be "world-welfare enhancing" because, with stronger intellectual property protection in the South and the North, biotech firms would have more returns and greater incentive to conduct R&D. The argument is based on erroneous assumptions, and ignores the current reality of oligopolistic seed markets (one company's biotech seeds and traits currently account for almost 90% of total biotech area worldwide). The authors concede that exclusive monopoly power of seed firms could be excessive with GURTs, but they suggest that it might be possible to place "restrictions on the degree to which R&D firms are allowed to capture IP rents." This conclusion mirrors that of the FAO report (58,vi) that, "This issue requires continuous monitoring of the situation on a case-by-case basis, and probably strengthening of competition and anti-trust institutions in developing countries and at the international level."

Although anti-trust measures are a reasonable suggestion, it is difficult to point to examples where they have been implemented – especially in the global seed industry. If GURTs were commercialized, governments would need to implement strong measures to curb excessive corporate monopoly, but there is little evidence that these kinds of regulatory or anti-trust measures are available to protect farmers, indigenous and local communities and biodiversity. The FAO report notes that, relating to Market Power, (46) "it should be noted that anti-trust laws and regulation are national, and that no international institutions support countries lacking relevant regulatory capacity. Although some developments with the WTO address this issue, significant difficulties and delays are likely in agreeing international standards."

REGARDING THE AHTEG REPORT ON GURTS

The Working Group on Article 8j has been asked to prepare its advice to the COP8 regarding the report of the Ad Hoc Technical Expert Group (AHTEG) on the Potential Impacts of Genetic Use Restriction Technologies (GURTs) on Smallholder Farmers, Indigenous and Local Communities and Farmer's Rights.

At SBSTTA10, a few Parties raised objections to the AHTEG Report on GURTs, claiming that it lacked "scientific rigour." We disagree with this characterization and wish to point out that the AHTEG included diverse representation, including Parties, other governments, indigenous and local communities, international organizations, civil society organizations and the seed industry. The AHTEG also included representatives from two companies and one government that hold patents on Terminator technology – institutions that have a vested interest in the commercialization of the technology. The CBD should be congratulated for convening an AHTEG which included diverse representation from many stakeholders. The AHTEG report provides a valid and important assessment of the potential impacts of GURTs – both positive and negative. Although the expert group included many scientists, the AHTEG's mandate was *not* to provide a scientific/technical assessment of GURTs, but to examine its potential impacts on smallholder farmers, indigenous and local communities who are traditional stewards of biodiversity.

The AHTEG Report on GURTs does not represent a consensus viewpoint on all aspects of GURTs. The report clearly states that it is not a consensus report. Even so, the AHTEG Report was attacked by a few Parties during SBSTTA10 because it did not represent a consensus. We urge the Working Group on Article 8j to consider the report as a non-consensus report. To dismiss the report is to marginalize the very valuable input of indigenous peoples and local communities, smallholder farmers and civil society representatives.

Recommendation: The undersigned organizations unambiguously conclude that GURTs is a dangerous technology that threatens biodiversity; the livelihoods, traditional knowledge and cultures of Indigenous peoples, peasant farmers; and global food security. Given the current levels of concentration in the global seed industry, we reject the industry argument that the introduction of GURTs will result in increased competition and more choices for farmers. If commercialized, GURTs will reinforce corporate concentration in the seed industry, heighten the economic dependency of farming communities on a handful of corporate seed firms, and threaten national sovereignty by introducing technological monopolies that are not regulated by governments.

Over the course of the past seven years, the CBD, in cooperation with other relevant organizations, has undertaken a number of important studies on the impacts of GURTs. Given renewed efforts to develop and commercialize GURTs, however, it is urgent for the CBD to go beyond a reaffirmation of Decision V/5 section III. In recognition of the multiple and adverse potential impacts on Indigenous and local communities, smallholder farmers and Farmers' Rights, we urge the CBD to recommend that Parties develop legal mechanisms to prohibit field testing and commercialization of GURTs.

To conclude, we recommend that the Working Group on Article 8(j) forward the AHTEG Report on GURTs to COP8 for its consideration and advise the COP8 to recommend that Parties and other governments develop recommendations to prohibit field testing and commercialization of GURTs.

Ban Terminator [10 OCTOBER 2005]
www.banterminator.org [SUBMISSION: ENGLISH]

Terminator Technology and Genetic Contamination

October 2005

The biotechnology industry is vigorously asserting that Terminator technology – genetic seed sterilization technology - offers a means of preventing the unwanted flow of genes from genetically modified (GM) crops. The industry argues that Terminator offers 'biosafety' benefits. However, the truth is that Terminator would not stop GM contamination, but would itself pose a serious biosafety risk. Industry's goal is to win acceptance for a technology that is designed to protect corporate patents and maximize profits by stopping farmers from saving harvested seed and forcing them to buy new seed every season.

> ***What is Terminator?*** *Terminator technology refers to plants that have been genetically modified to render sterile seeds at harvest (through an inducible molecular mechanism, which means that the gene for seed sterility or germination can be turned on or off from the outside – by treating the plants with a chemical or other factor). It is technically known as a Genetic Use Restriction Technology or GURTs. Terminator technology was developed by the multinational seed/agrochemical industry and the United States government to prevent farmers from saving and re-planting harvested seed developed by biotechnology and seed corporations. Terminator has not yet been commercialized or field-tested but tests are currently being conducted in greenhouses in the United States.*

The biotechnology and seed industry is promoting Terminator as a 'biosafety' solution to disguise its true role as a biological means of preventing farmers from saving and re-using proprietary seed. Terminator has been widely condemned as a threat to food security for the 1.4 billion people who depend on farm-

saved seed.[xii]

Genetic Contamination

In many areas of the world, gene flow (including through cross-pollination and seed dispersal) from genetically modified plants is causing unwanted genetic contamination – even in the South's centers of genetic diversity (the areas where our major food crops originate or where genetic diversity is greatest). In essence, GM contamination is a new type of industrial pollution that involves living, replicating organisms. This genetic pollution cannot be controlled or recalled, and contamination can increase over time.

Corporations are increasingly worried about legal liability and bad public relations resulting from the unwanted spread of genetic material from GM crops and the contamination of conventional and traditional seed stocks with GM seeds. The realities of contamination threaten to stop the approval of new GM crops that are potentially lucrative for corporations, including "pharma" crops (plants modified to produce pharmaceutical compounds) and genetically modified trees. The biotechnology industry is eager to persuade the public that biotechnology can fix the GM contamination problem it has caused. It is ironic that, in response to heightened concerns about genetic pollution, the industry is promoting Terminator technology as a 'biosafety' tool, which requires even further genetic modification and introduction of additional modified genes. The argument put forward is that engineered sterility offers a built-in safety feature: if modified genes (whether pharma genes, herbicide resistance genes or Terminator genes) from a GM Terminator crop get transferred to related plants via cross-pollination, the seed produced from such pollination would be sterile – it would not germinate, thus contamination would not spread. However, this scenario fails even in its design to offer any protection against transgene contamination of harvested seed used as food or feed, since the genetic sequences, and possibly proteins, from engineered genes (both trait genes and Terminator genes) would be present after cross pollination, irrespective of intended seed sterility.

> In August 2005, a tornado destroyed two of Delta & Pine Land's greenhouses and damaged others. We do not know if Terminator plants were being tested in the greenhouses or what biosafety risks, if any, might be posed – but this event shows that even seemingly secure physical containment is vulnerable.
> ("D&PL storm losses top $1 million" Woodrow Wilkins Jr., *Delta Democrat Times* 30/08/05)

Terminator Failure: Terminator will not stop GM contamination.

Delta & Pine Land, the US seed company that is conducting greenhouse trials of Terminator plants and lobbies for its commercialisation claims in its promotion materials that Terminator *"provides the biosafety advantage of preventing even the remote possibility of transgene movement."*[xiii] There is no scientific data made available to support this sweeping claim. There is not even any data from the greenhouse trials. In order for Terminator to be contemplated as a 'biosafety' tool - that is "to prevent even the remote possibility of transgene movement" - it must offer 100% sterility. Every single Terminator seed would need to be completely sterile in the second generation. This implies zero tolerance for even the slightest failure. In other words, Terminator technology would need to be 100% effective in order to be considered as a potential option to stop contamination via gene flow.

Scientists who have studied genetic seed sterilization models believe that Terminator will never be 100% effective or reliable as a gene containment mechanism because it will not achieve 100% seed sterility.[xiv] Terminator is a system that is made up of many constructs or pieces of genetic material that are genetically engineered into plants. In order to create sterile seeds, the technology relies on all of these constructs to work perfectly, over generations of seed breeding. Terminator depends on a number of steps and mechanisms to function and interact in succession, one after the other. The chances of failure are high

and will increase with each component included in the system. Like any technology, Terminator will only be as good as its weakest link.

Given that, at this stage, the individual components of V-GURTs [Terminator] offer less than 100% efficiency or reliability, the combination of these components in one organism will amount to still less. For example, if each of the 4 components performs to 95%, in combination their performance could reduce efficiency or reliability to as little as 81%.[xv]

There are a number of known biological events that can interfere with the reliable performance of any one of Terminator's many components, thus rendering this complex technology incapable of fulfilling its claimed 'biosafety' role. For example, events such as gene silencing and epigenetic changes to transgenes (alterations to the molecular appearance of the DNA that block the cell's own reading mechanism from accessing the genetic information of the affected genes), mutations and loss or reduction of transgene activity, are problems that have been observed with GM technologies. Additionally, segregation of the genetic components that make up the Terminator mechanism from each other or from the GM trait that is to be 'contained' can occur during reproduction and could disable the Terminator mechanism. Importantly, the main aim of all living organisms is successful reproduction and this strong evolutionary pressure means that everything in the plant itself will be working to counteract and overcome Terminator genes and remain fertile.

The industry's promotion of Terminator as a technology to prevent gene flow is an admission that contamination is a problem. Ironically, the very companies that are responsible for GM contamination are now insisting that society accept a new, unreliable technology to try to fix this pollution problem.

In fact, Terminator could actually *increase* the level and seriousness of GM contamination. If governments allow corporations to use Terminator technology in an attempt to stop contamination, it could accelerate the development and field-testing of controversial new GM plants that pose additional risks to human health and the environment. For example:

- Plants are being modified to produce plastics and other industrial chemicals as well as pharmaceuticals and vaccines (pharma crops). The field testing of these crops is controversial because it is impossible to control or contain genetically modified organisms in open-air experiments. Scientists have warned that plants that constitute food and feed crops should not be genetically modified to develop pharma crops because unintentional contamination of the food supply is virtually inevitable.[xvi]

- Experiments with genetically modified trees have enormous potential for gene flow as trees are large organisms with a long life span, and trees produce abundant pollen and seed that is designed to travel long distances.[xvii]

Terminator could be a biosafety hazard with serious consequences for Indigenous peoples, local communities, peasants and small-scale farmers

If Terminator were to be accepted under the guise of biosafety, it would have devastating consequences for farmers, food security and food safety. Irrespective of any capacity to produce sterile seeds, pollen movement from Terminator crops would take place and lead to contamination of other (open pollinated) plants nearby, at least in the first generation. Seeds (e.g. grain for food) from those plants would contain the initial trait gene (e.g. pharma gene, herbicide resistance gene or Bt-endotoxin gene) plus the Terminator genes intended to make them sterile. This contamination would affect related crops as well as wild relatives.

Terminator would have serious impacts on food security and food sovereignty for farmers and communities. Farmers who saved their seeds for replanting and whose crops had been cross-pollinated by Terminator plants grown in the area, could find that a percentage of their seeds did not germinate. This

percentage could translate into significant yield loses. Farmers would not be able to identify the Terminator seeds until they replanted seed from the first harvest, and found that the seed does not germinate. People who depend on humanitarian food aid would risk particularly devastating crop losses if they kept food aid seed that contained Terminator genes for re-planting.

Farmers who found their seed contaminated with Terminator from nearby fields could lose trust in their own seed stock. If contamination is persistent, farmers could lose their traditional and local varieties and be forced to abandon their own seed that is adapted to local conditions and community needs. Loss of traditional varieties and decline in seed breeding would also threaten the practice and retention of traditional and local knowledge.

If corporations use Terminator as an experimental 'biosafety' tool to try and stop the spread of genes from high risk GM crops, like pharma plants, and it failed, farmers in the region who save seeds could unknowingly produce food contaminated with genes from pharmaceutical-producing plants, which are not intended for human consumption and pose health and safety risks.

Terminator genes could also spread unnoticed without initially causing sterile seeds in the second or third generation. During the phase of seed production by the seed company, the GM plant itself could potentially render Terminator genes inactive through a process called gene silencing. Under the gene silencing scenario, seeds contaminated with Terminator genes could be fertile. As gene silencing is reversible over generations, "silent" individual Terminator plants might at a later stage produce pollen with active Terminator genes thus resulting in sterile seeds at an unpredictable point in the future.

Additionally, Terminator itself gives rise to safety concerns and potential risks for food, feed and biodiversity, born out of the fact that it is a highly complex system of genetic engineering. For example, it is known that modification processes (transformation and tissue culture) result in genome scrambling at the integration site of transgenes and introduction of hundreds or thousands of genome wide mutations.[xviii] The application of Terminator would thus be more likely to enhance risks than minimize them.

Terminator is designed to maximize industry profits, not stop contamination

Corporations have always been clear that Terminator was developed to be a patent protection tool. *"The new technique is to protect U.S. technology and seed patents,"* stated Terminator inventor Melvin Oliver from the United States Department of Agriculture.[xix] Delta & Pine Land, a US-based company that is developing Terminator seeds, refers to its method of genetic seed sterilization as their "Technology Protection System" because it is designed to prevent farmers from re-planting the company's genetically modified seed. The corporate seed industry began stressing the 'environmental' arguments for Terminator after global protest threatened to shut down development and commercialization of the technology.

Monsanto's activities show what biotechnology corporations really want with Terminator. The company is vigorously suing farmers in the United States and Canada for allegedly infringing patents by saving seeds that contain Monsanto's proprietary genes.[xx] As a means of preventing farmers from re-using patented seed without paying, Terminator would be the perfect solution for Monsanto and other biotechnology corporations. If commercialized, Terminator technology would allow Monsanto to enforce protection over its patents while avoiding costly lawsuits, high-priced lawyers and the bad publicity generated by taking farmers to court.

Although Terminator needs to be 100% effective in order to prevent contamination via gene flow, a lower effectiveness of only 80% sterility of harvested seed would be sufficient to deter farmers from saving and replanting seeds and force them to buy seed on the commercial market. Yet 80% efficiency would open the doors wide for uncontrollable escape of transgenes (both GM trait genes and Terminator genes).

Summary

It is paramount to reject the dangerous argument that Terminator can be used as a 'biosafety' tool. Terminator would not stop contamination, and instead, the technology would itself pose an additional biosafety hazard. The potential consequences of Terminator for peasant farmers and Indigenous peoples around the world are serious and warrant a ban on the development, field-testing and commercialization of Terminator technology.

* **Note:** This briefing draws on the in-depth analysis of Terminator models presented by EcoNexus. For more information: www.econexus.info

More Resources:

Ban Terminator Campaign	www.banterminator.org
Biosafety Information Centre	www.biosafety-info.net
ETC Group	www.etcgroup.org
EcoNexus	www.econexus.info - This website will soon offer detailed scientific analysis of Terminator

[i] ETC Group, "Who Owns Terminator Patents?" January 2005. www.banterminator.org

[ii] Delta & Pine Land, "Technology Protection System: Providing the Potential to Enhance Biosafety and Biodiversity in Production Agriculture," distributed by Delta & Pine Land, United Nations SBSTTA10, Bangkok, Thailand, February 2005.

[iii] Personal communication with Harry Collins, Delta & Pine Land, Vice-president for technology transfer, Hope Shand, ETC Group, February 2005.

[iv] Phillips McDougall, "Seed Industry Consolidation," July 2005. www.agreworld.com

[v] ETC Group, "Global Seed Industry Concentration – 2005," *ETC Communiqué*, September/October 2005. www.etcgroup.org

[vi] ETC Group, "Who Owns Terminator Patents?" January 2005. www.banterminator.org

[vii] Statistics are based on industry sources. Monsanto, "Monsanto Biotechnology Trait Acreage: Fiscal Years 1996 to 2004," www.monsanto.com See also, International Service for the Acquisition of Agri-Biotech Applications (ISAAA), "Preview: Global Status of Commercialized Biotech/GM Crops: 2004," ISAAA Briefs 32- 2004. www.isaaa.org

[viii] Harry B. Collins and Roger W. Krueger, "Potential Impact of GURTs on Smallholder Farmers, Indigenous & Local Communities and Farmers Rights: The Benefits of GURTs," International Seed Federation, submitted to the Ad Hoc Technical Expert Group on GURTs, February, 2003.

[ix] Jorge Fernandez-Cornejo and David Schimmelpfennig, "Have Seed Industry Changes Affected Research Effort?" *Amber Waves*, United States Department of Agriculture Economic Research Service, February 2004. On the Internet: http://www.ers.usda.gov/AmberWaves/February04/Features/HaveSeed.htm

[x] Ibid.

[xi] Lence, S.H., Hayes, D.J., McCunn, A., Smith, S., and Niebur, W. "Welfare Impacts of intellectual property protection in the seed industry," *American Journal of Agricultural Economics*, 87, 951-68. 2005.

[xii] See ETC group, "Statements Against Terminator," www.banterminator.org

[xiii] Delta & Pine Land, "Technology Protection System: Providing the Potential to Enhance Biosafety & Biodiversity in Production Agriculture", 2005.

[xiv] Dr. Ricarda Steinbrecher, "Why V-GURTs (Terminator) fails the requirements as a biological containment tool for biosafety", submission to SBSTTA10, EcoNexus, February 2005.

[xv] Dr. Ricarda Steinbrecher, "Is V-GURTs (Terminator) the answer to transgene contamination?",

EcoNexus. First prepared for the EU–India Dialogue Study on Biotechnology, Biosafety and IPRs in the Context of Globalisation, March 2005. This paper will be available on www.econexus.info by November 2005.

[xvi] Union of Concerned Scientists, *A Growing Concern: Protecting the Food Supply in an Era of Pharmaceutical and Industrial Crops*, December 2004.

[xvii] Claire G. Williams, "Framing the issues on transgenic forests," correspondance, *Nature Biotechnology* 23 (530-532). June 2005.

[xviii] Wilson A, Latham J and Steinbrecher R. "Genome Scrambling – Myth or Reality? Transformation-Induced Mutations in Transgenic Crop Plants." *EcoNexus Technical Report*, EcoNexus, 2004. Available at www.econexus.info. Hard copies are available by contacting A.Wilson@econexus.info.

[xix] Ethirajan Anbarasan, "Dead-end seeds yield a harvest of revolt", *UNESCO Courier*, 1999.

[xx] Centre for Food Safety, *Monsanto vs US Farmers*, January 2005.www.centerforfoodsafety.org

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