

# Seeds of Change

## Talking about Sterile Seed Technology

### Preface

Biotechnology has swept across the fields of agriculture in just a few short years, forever changing the face of farming. In particular, the ability to genetically modify seeds has resulted in massive innovation. This transformation of agriculture has also brought with it considerable discussion and debate about how biotechnology should be used and its implications for global agriculture and food security. One significant example of biotech's innovations is sterile seed technology.

The development of sterile seed technology has prompted an especially emotional debate, involving expensive public relations exercises, the formation of pressure groups, and passionate protests. In this highly charged atmosphere, many Canadians have been left out of the conversation.

Canadian Foodgrains Bank is inviting you to engage in a fresh approach to discussing this issue. This conversation is important because the Foodgrains Bank has as its mission the goal of ending hunger. In practical terms, the Foodgrains Bank provides food to some of those who are hungry, supports activities to assist such people to feed themselves and speaks out on related international and domestic policies that affect hunger.

Sterile seed technology could have significant implications for many of the people with whom the Foodgrains Bank works (i.e. small-scale farmers in developing countries). It could fundamentally alter the ability of these farmers to save seeds, as well as to breed and exchange new varieties of plants. It also has the potential to increase their productivity.

These deliberations, therefore, are to help the Foodgrains Bank formulate a clearer understanding of this technology and its implications for global hunger.

This guide is designed to help you become involved in this public discussion. The approach we will use for the dialogue is called public deliberation.

### **What is public deliberation?**

*Deliberation is a way of discussing important issues and wrestling with tough choices. A deliberation is not a debate, with opposing sides trying to win, but neither is it a casual discussion. It is a way for citizens to reason and talk together, and to work through choices about basic directions for our communities and our country.*

Deliberation is not just an opportunity to express your views or try to change other people's minds. It is a way to determine what action is in the best interest of the public as a whole. It

involves thinking not just about what is best for you personally, but what is best for everyone. The objective isn't for someone to win, the objective is to make sound decisions.

In a deliberation, everyone has a say and everyone listens. People explore what others think as well as their own beliefs. They don't have to come to conclusions. But they do weigh the consequences and costs of various options based on what is truly valuable to them, and to others. People who participate in deliberations say that talking together in a non-confrontational way helps them better learn about and understand complex issues, and gives them a new respect and understanding for other points of view.

There are no easy answers to the challenges posed by complex issues such as those associated with sterile seed technology. Whatever approach we decide to take, there will be trade-offs. To get one thing, we may have to give up another. We have to decide what is most important to us, and try to find areas of common ground between us so that we can move forward together.

### **The purpose of this guide**

Often people are concerned that they don't know enough about an issue to be able to contribute to a deliberation. That is where this guide comes in. It provides an overview of some of the issues associated with sterile seed technology and explores several 'approaches' or courses of action to respond to the issue. You can participate without having read the guide, though, because the starting point for any deliberation is people's own experiences and values. The moderator of the deliberation will help you share your opinions and concerns. Nobody needs to be an expert.

*The approaches outlined in this guide are not mutually exclusive, nor are they the only ways to look at the issues related to sterile seed technology. They are intended as a jumping-off point for your deliberation, not as the final word on the subject.*

What the different approaches do is provide a framework – a way to look at the issues of sterile seed technology according to different values, and to consider some of the tough decisions and trade-offs associated with different perspectives on the issues. It is hoped that through deliberation, you and the other participants may find some values and principles that you have in common, even though you may disagree about other things.

### **The topic: Sterile seed technology**

The issue of sterile seed technology may in some ways be distant from the daily lives of farmers and consumers right now. While crop varieties have been genetically modified to cause second generation seeds to be sterile, they have not yet been given field trials or been commercially developed. However, the technology to do this does exist. And should biotech companies pursue the commercial development of seed varieties whose sterile offspring cannot reproduce, this would have enormous ramifications.

There would be implications for the estimated 1.4 billion farmers around the world who depend on saved seeds to plant the next year's crops, for biotech companies striving to develop better crops, for the environment, and for society at large.

Some campaigners have advocated for an outright ban on sterile seed use, while proponents suggest the technology should move forward on a case-by-case basis.

## **Background**

Sterile seed technology, which has also been known colloquially as ‘terminator’ technology, would allow biotech companies to prevent the unauthorized use of their genetically modified crops, since farmers using their seeds would not be able to reproduce the seed (Szumigalski, 2006). Sterile seed technology is one form of a Genetic Use Restriction Technology (GURT).

Sterile seed technology involves changing the genetic makeup of a plant cell, so that plants regenerated from this cell would develop sterile seeds, which would not germinate in the next generation. Plants bred with sterile seed technology would generally require an external chemical application to switch on the sterile seed gene. Toxins produced by the activated sterile seed gene destroy the embryo, rendering the seeds sterile. All other aspects of plant growth would remain unaffected. In some situations pertaining to hybrid crops, a chemical trigger would not be necessary (Szumigalski, 2006). The technology is unlikely to be 100 percent effective or reliable (Ban Terminator, 2005).

Sterile seed technology was originally developed by the Delta and Pine Land Company of Mississippi, specifically for tobacco and cotton. It could potentially be applied to all seed-propagated crops. A patent for the technology was granted to the US Department of Agriculture and Delta and Pine Land Company in 1998 (Szumigalski, 2006).

As of October 2005, five companies and two universities held 22 patents on sterile seed technology (Ban Terminator, 2005). In contrast, the Consultative Group on International Agriculture Research (CGIAR), a world network of publicly-funded plant breeding research centres, announced in 1998 that member centres would not pursue sterile seed technology (Primal Seeds, 2006).

In 2000, the United Nations’ Convention on Biological Diversity (CBD) recommended a moratorium on field testing or commercial use of products containing sterile seed technology until appropriate scientific data could justify further development and testing. A de facto moratorium has existed since then (Canadian Food Inspection Agency, 2005).

## **Current Status**

While the de facto moratorium on sterile seed technology is still being followed, it came under significant debate at a recent UN meeting. The possibility of easing the moratorium was raised at UN Convention on Biological Diversity (CBD) meetings in Curitiba, Brazil at the end of March. It is understood that Canada, Australia, New Zealand, along with the US (which is not a party to the CBD) and a number of biotech companies lobbied the gathering to allow for field testing of sterile seed technology. They suggested that instead of an outright ban the technology should rather be assessed on a case by case basis. However, this was unanimously rejected by the CBD’s working group dealing with the issue (ETC group, 2006).

## What principles should guide our country in its approach to sterile seed technology?

### Some Views

The Government of Canada:

*“Overall, the Government of Canada recognizes that, as with any new technology, GURTs raise issues relating to environmental safety and human health, and possibly socio-economic issues. Any research or adoption of any example of this technology must proceed with caution, to enable a full evaluation of any risks and benefits on a case-by-case basis.”*

(from a statement from the Canadian Food Inspection Agency, Plant Products Directorate, Plant Biosafety Office, posted February 24, 2005)

Monsanto:

*“The responsible approach is to investigate the range of available GURTs and the appropriate applications. To that end, Monsanto is engaged in dialogue with experts and interested parties to learn what technology applications might be available and how they could be used to address biotech stewardship, maintenance of intellectual property rights, and protection of the needs and rights of farmers. Monsanto does not rule out the potential development and use of one of these technologies in the future. The company will continue to study the risks and benefits of this technology on a case-by-case basis.”* (from Monsanto’s 2005 Pledge Report)

La Via Campesina:

*“Terminator is a direct assault on farmers, Indigenous cultures and on the food sovereignty and well-being of all rural people, primarily the very poorest. If Monsanto bullies the UN into allowing ‘case by case’ assessment of Terminator, it means farmers will be carried off the land coffin by coffin.”* (from Chukki Nanjundaswamy of India from La Via Campesina, an organization representing tens of millions of peasant farmers worldwide)

ETC group:

*Canada – Wheat:*

*If Canadian wheat farmers (who now grow wheat on 8.36 million hectares with farm-saved seed) purchased sterile seeds, the total cost per year would be an estimated US\$85 million per year.*

*Ethiopia – Wheat:*

*In Ethiopia, approximately 90 percent of the total wheat area is planted in farm-saved seed. If sterile seeds were commercialized, it would cost Ethiopian wheat farmers an estimated US\$66 million per year.*

(These figures show the cost of purchasing seed, and do not take into account any possible financial benefits of the sterile seed technology.)

## Approaches

	<b>Approach 1: Ensure farmer control of seeds</b>
<b>Issue</b>	For millennia, farmers have saved and used selection to improve their seeds from one year to the next. Farmers have increasingly lost control over their own food production. Sterile seed technology would take away a vital element of farmer self reliance.
<b>Broad remedy</b>	Ban sterile seed technology. Find alternative ways to stimulate public and private sector research into improved seed varieties, the results of which would be readily accessible to farmers.
<b>Examples of actions: In Canada</b>	<ul style="list-style-type: none"> <li>• Increase public sector funding toward seed variety research</li> <li>• Increase farm support programs that stimulate farm-based seed variety trials</li> <li>• Provide publicly owned information and assistance to Canadian seed companies</li> <li>• Maintain a balance between public and private ownership of seed varieties through patent rules</li> </ul>
<b>Examples of actions: Internationally</b>	<ul style="list-style-type: none"> <li>• Increase overseas assistance to agriculture focusing on small farmers</li> <li>• Press for a ban on sterile seed technology</li> <li>• Increase research directed to developing country farmers</li> </ul>
<b>In support</b>	<ul style="list-style-type: none"> <li>• Over 1 billion people worldwide depend on seed saving for their livelihoods</li> <li>• Corporate concentration and increased controls could threaten farmers' autonomy and food security</li> <li>• Farmers who depend on humanitarian aid risk crop loss if they unknowingly use food grain containing sterile seed technology as seed</li> <li>• More expensive pest control measures are often necessary with the use of improved seed</li> <li>• Increased intellectual property protection would likely mean increased costs for genetic resources for both farmers and seed companies</li> <li>• Increased intellectual property protection could mean less cooperation between breeders resulting in less innovation</li> <li>• Negative effects of out-crossing from sterile seed varieties on viable seed yield of neighbouring crops is a concern</li> <li>• Sterile seed technology could be detrimental to crop genetic diversity in traditional farms, where farmers often breed and adapt local crops and exchange seeds</li> </ul>
<b>In opposition</b>	<ul style="list-style-type: none"> <li>• Farmers could profit from the introduction of sterile seed technology because more productive varieties could become available as breeding efforts increase</li> <li>• Banning it could mean lost opportunities for improved seeds and higher yields, resulting in increased hunger</li> <li>• The only realistic way to stimulate seed research is through the private sector; public sector research is inefficient, slow and costly</li> <li>• Increased government spending on research means increased taxes or reduced spending elsewhere</li> <li>• Sterile seed technology could help farmers control growth of 'volunteer' plants</li> <li>• Consumers benefit when private sector competition keeps food prices down</li> </ul>

	<b>Approach 2: Embrace new technologies</b>
<b>Issue</b>	Undue regulation could stifle innovation. Sterile seed technology could provide incentives to seed companies to develop better varieties of crops because of the increased potential to recover the costs of research. This has positive implications for improving global food production.
<b>Broad remedy</b>	End the ban on sterile seed technology. Strengthen the enforcement of intellectual property protection laws and ensure the wide availability of innovative technologies.
<b>Examples of actions: In Canada</b>	<ul style="list-style-type: none"> <li>• Provide public sector information and assistance to Canadian seed companies</li> <li>• Build Canada's competitive advantage as a supplier of high-quality seed</li> <li>• Reduce/remove tariffs on seeds, on a reciprocal basis</li> </ul>
<b>Examples of actions: Internationally</b>	<ul style="list-style-type: none"> <li>• Press for elimination of the ban on sterile seed technology</li> <li>• Provide improved seeds bred with sterile technology to developing country farmers at below market prices</li> <li>• In collaboration with the private sector, provide technical assistance to the private sector in developing countries to develop improved seeds</li> </ul>
<b>In support</b>	<ul style="list-style-type: none"> <li>• Companies need the assurance of patent protection to develop new high-yield, drought-resistant crops that the world needs to feed a growing population</li> <li>• Farmers could profit from increased production</li> <li>• Consumers could benefit from lower food prices that come with productivity increases</li> <li>• Improved Intellectual property protection in developing countries could increase investment in development of new improved seed varieties for those countries</li> <li>• Costs of enforcement of proprietary seed laws would be reduced with sterile seed technology</li> <li>• Reduced public investment in breeding means lower taxes or increased spending in other areas</li> </ul>
<b>In opposition</b>	<ul style="list-style-type: none"> <li>• Developed countries stand to gain the most from increased production, leaving developing countries even further behind</li> <li>• Intellectual property protection could reduce crop diversity making farmers more vulnerable to diseases and insect infestations</li> <li>• Increased agricultural productivity resulting from sterile seed technology would not solve world hunger and poverty; it is caused by lack of access to food, not lack of food</li> <li>• Plant breeders could misuse (by price gouging or forced use of cropping inputs) virtual monopoly powers granted through intellectual property protection laws</li> <li>• Sterile seed technology represents another form of economic extraction from poor countries, possibly leading to more poverty</li> </ul>

	<b>Approach 3: Encourage environmental stewardship</b>
<b>Issue</b>	The long-term environmental implications of sterile seeds are currently unknown. Thus it is important, until more is known, to follow the precautionary principle (if the consequences of an action are unknown, but could have major or irreversible negative consequences, then it is better to avoid that action).
<b>Broad remedy</b>	Maintain the de-facto moratorium on sterile seed technology until enough is known about the environmental implications.
<b>Examples of actions: In Canada</b>	<ul style="list-style-type: none"> <li>• Increase public research into the environmental implications of sterile seed technology, including its potential to stop genetic drift and dangers to wild plants</li> <li>• Increase public awareness of precautionary principle and its application to sterile seed technology</li> <li>• Encourage agricultural biodiversity and low input sustainable agricultural practices as an alternative to industrial practices of monoculture</li> <li>• Develop rules and regulations to apply to any use of sterile seed technology</li> </ul>
<b>Examples of actions: Internationally</b>	<ul style="list-style-type: none"> <li>• Push for maintenance of the de-facto moratorium</li> <li>• Support international research into the implications of the use of sterile seed technology</li> </ul>
<b>In support</b>	<ul style="list-style-type: none"> <li>• Virtually no research has been published regarding the possible environmental impact of sterile seed technology</li> <li>• The threat of out-crossing or gene flow of sterile seed genes to other crops or 'wild' relatives is too great. This could occur via the dispersal of pollen or viable seeds.</li> <li>• The industrial agriculture model (within which sterile seed technology is based) is not environmentally sustainable</li> <li>• Long-term implications for food safety and human health are not known</li> <li>• Governments may be liable for any ill environmental or health effects due to sterile seed technology</li> <li>• There is a risk of reduced biodiversity in farmers' fields due to increased homogenization of crops that could result from the commercialization of sterile seed technology. This would increase vulnerability to pest attack</li> </ul>
<b>In opposition</b>	<ul style="list-style-type: none"> <li>• Potential transgenic escape could be reduced through sterile seed technology because second generation seeds are rendered sterile</li> <li>• Sterile seed technology could provide incentive to breeders to develop new productive varieties leading to increased genetic diversity in many important crops</li> <li>• Sterile seed technology could be used to contain genetic traits that might pose environmental or health risks</li> <li>• How much certainty will be sufficient?</li> </ul>

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