

# AGAINST THE GRAIN



Why governments must  
defend the right to germinate  
against the biotech's push  
to terminate

A report from

**PROGRESSIO**  
CHANGING MINDS • CHANGING LIVES

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Cover picture: Maria Margerita Sumba, a farmer in the hills near Cuenca, Ecuador

**Progressio has been campaigning against Terminator technologies since 2005. It is a founding member of the UK Working Group on Terminator technology and its current Chair. Progressio is also a member of the UK Food Group.**

Progressio is an international charity working to tackle poverty and injustice in developing countries. Progressio is the working name of the Catholic Institute for International Relations which is registered in the UK as a charity (number: 294329) and a company limited by guarantee (number: 2002500).

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# EXECUTIVE SUMMARY

The practice of seed-saving and seed sharing is at the very heart of small-scale farming and central to the livelihoods of 1.4 billion people in the developing world. But its future – and the food security of those who rely on it – is now under serious threat. Terminator technology – which uses genetic engineering to make plants produce sterile seeds – could destroy age-old farming practices. These so-called ‘suicide seeds’ could push millions deeper into poverty and dependence on multinational seed companies competing for a share of a global seed market worth about US\$19.6 billion.<sup>1</sup> Terminator technology is not simply ‘another form of GM’ as some have tried to argue. If commercialised, it would put even greater pressure on natural habitats and local environments which are already threatened by the risks of climate change. And this is certainly not the time to be making the situation worse.

Progressio, which chairs the ‘UK Working Group on Terminator Technology’, believes that **we need to act now** to ensure the current UN ban on Terminator technology, which is becoming weaker by the day, is upheld at this May’s 9<sup>th</sup> meeting of the Conference of the Parties to the Convention on Biological Diversity (COP9) – a high level UN summit where key decisions are taken on global biodiversity issues.

## The Effect of Terminator on the Poor

It is on the lives of the poorest farmers that Terminator could have the most devastating effects. Terminator will put an end to seed-saving, thus jeopardising food security for millions. The relentless rise of the seed multinationals has already locked millions of farmers into buying commercialised seed and denied them choice. Seed industry concentration and market forces are undermining small-scale farming in developing nations. The facts are shocking:

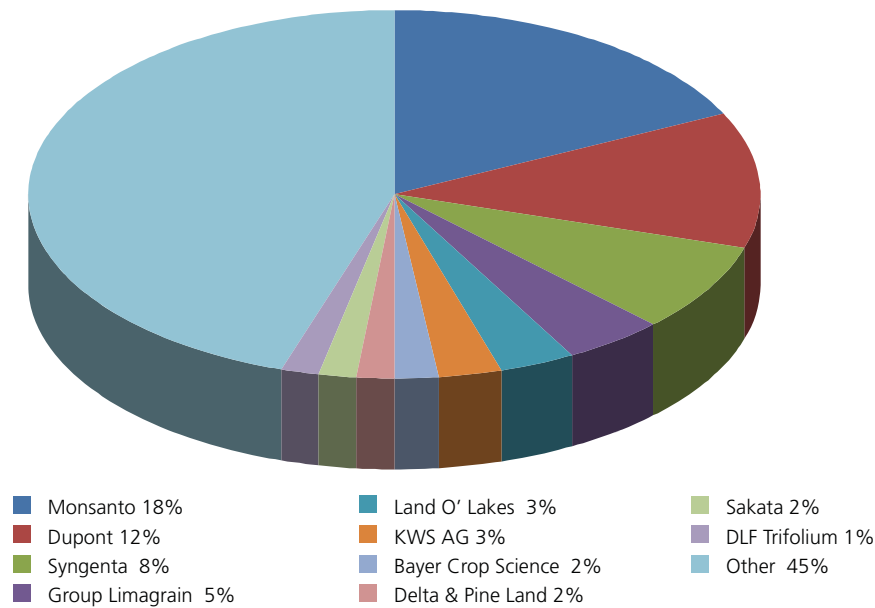
- As market demand for commercial crops rises, small producers are forced to abandon local and indigenous varieties.
- Seeds which people once saved now have to be sourced from seed companies while foodstuffs farmers once grew on their land now have to be bought from shops.
- The top 10 seed companies control 55% of the total commercial seed market.

The danger is that Terminator is the logical next step in seed companies’ bid to privatise plant life and would leave farmers with no choice at all.

## A Hot Topic: Why Action is Needed Now on Terminator

Until now, the development and commercialisation of Terminator technology has been held in check by a temporary UN ban, also called a ‘moratorium’. This moratorium was agreed by the UN Convention on Biological Diversity (CBD) in 2000 to prevent field-testing and commercialisation of the technology until its effects on people and the environment can be scientifically assessed. The CBD meets again this May and has the power to lift the moratorium completely. Progressio is concerned the moratorium is already being undermined as corporations and governments explore several different avenues to enable them to bring the technology to market. One is a biotech research programme called Transcontainer. This is developing Terminator in a different guise, as Zombies – suicide seeds which can be ‘brought back to life’ by applying chemicals purchased from the seed firms. The European Commission is using public funding for Transcontainer – and effectively undermining the CBD’s temporary ban on Terminator – to the tune of €4.17 million. Progressio is concerned that this ‘Zombie’ technology could be the Trojan horse through which Terminator is unleashed into Europe. If Zombies were licensed for Europe, the moratorium will have been effectively overturned, with devastating consequences for poor farmers across the globe.

## Global Seed Market Share



Source: [www.etcgroup.org/en/materials/publications.html?pub\\_id=615](http://www.etcgroup.org/en/materials/publications.html?pub_id=615)

### Terminator: A Special Case

The CBD ban states that products incorporating Terminator technologies should not be approved until internationally accepted assessments prove they don't pose a threat to health, livelihoods or the environment. These wide ranging assessments demonstrate that the CBD sees Terminator as of broader concern than other Genetically Modified Organisms (GMOs).

Some countries such as the US, Canada, Australia and New Zealand have tried to weaken the ban by introducing case-by-case, country-by-country language in the text of the moratorium. If introduced at this year's CBD meeting, this language would further undermine the ban and render it meaningless.

The EU and UK have already adopted a weak interpretation of the ban by stating that all applications for Terminator technology licenses would be dealt with on a 'case-by-case', 'country-by-country' basis. This is in line with their current legislation on GMOs<sup>2</sup>. Yet, case-by-case assessments would ignore socio-economic impacts altogether, and the potentially catastrophic effect Terminator would have on poor farmers. This 'case-by-case' and 'country-by-country' interpretation effectively undermines the moratorium. Without the ban, developing nations would struggle to withstand pressure from biotech companies to license Terminator and launch it worldwide.

### A Critical Moment

The timing of Terminator technology is abysmal: saving seed and preserving biodiversity are critical survival strategies for poor farmers as they try to adapt to a changing climate. The threat of drought and unpredictable rain patterns increase the likelihood of failed harvests and the need to re-sow seeds and locally adapted varieties are far more resistant to a variable climate than commercial seeds. The devastating effect of Terminator technology on agricultural biodiversity and the practice of seed-saving will make poor farmers even more vulnerable to the effects of climate change.

### What Needs to Happen Now

Progressio insists that the world needs to abide by the CBD moratorium and internationally accepted assessments on the potential impact of Terminator technologies *before* they are brought to market. It is therefore imperative that the CBD ban is maintained and that countries such as the UK and EU state interpret it

## Ecuador: changing times, lost varieties

Progressio recently compared practices in Azuay, in Ecuador's Southern Sierra, and the more isolated jungle area of Napo. In Napo, where producers are shielded from market pressures, seed-saving is routine and producers have grown the same crops for generations. By contrast, producers in Azuay, keen to reach the market in nearby Cuenca, are generally dependent on buying hybrid seed due to demand for non-local crops. While they tend to save seeds from some traditional crops, they always buy seedling plants or seeds for vegetables. Although these hybrid crops do produce seeds, these cannot be saved. Already, local varieties – once the mainstay of people's diet – are being lost. And families are having to buy from shops foodstuffs that they previously grew for themselves. **'A while ago, we collected 48 varieties of potatoes locally but (...) we are used to a different type of potato now and so we really only grow three or four varieties.'** Jose Campos, Octavio Cordero, Azuay province, Ecuador.

not on a case-by-case, country-by-country basis, but as an outright, albeit temporary, ban. Without a global ban, there is nothing to stop the potential release of Terminator technology into the marketplace. That is why Progressio is calling on the UK and EU to go against the grain and take strong action at or before the 9<sup>th</sup> Conference of the Parties to the CBD in Bonn on 19-30 May 2008.

## OUR RECOMMENDATIONS:

### For the UK:

- 1 The UK government should make a strong statement at the 9<sup>th</sup> Conference of the Parties to the Convention on Biological Diversity (COP9) supporting the CBD moratorium on Terminator technology (Decision V/5). It should make clear that the UK recognises it as a *de facto* ban, rather than interpreting it as allowing case-by-case, country-by-country assessments of Terminator technologies. This means that, before *any* application for a Terminator product release is considered, scientific assessments recognised by the international community must show that Terminator poses no risk to people or the environment.
- 2 The UK government should voice strong opposition to European funding of the Transcontainer project and its research on Zombie technologies.

### For the European Union:

- 1 The EU should make a strong statement at the 9<sup>th</sup> Conference of the Parties to the Convention on Biological Diversity (COP9) supporting the CBD moratorium on Terminator technology (Decision V/5). It should make clear that the EU recognises it as a *de facto* ban, rather than interpreting it on a case-by-case, country-by-country basis. This means that, before *any* application for a Terminator product release is considered, scientific assessments recognised by the international community must show that Terminator poses no risk to people or the environment.
- 2 The EU should acknowledge that the Zombie technologies being researched and developed by the Transcontainer project are Terminator technologies.
- 3 The EU should put an immediate stop to the European Commission's funding of Transcontainer.
- 4 The EU should consider redirecting its funding for Transcontainer into research on sustainable agriculture and agroecology.

**If they don't act urgently at COP9, the UK and EU risk making a mockery of International Biodiversity Day on May 22. As Progressio's Sol Oyuela says: 'Letting Terminator technology loose would sow a deadly harvest for poor farmers.'**

# 1. INTRODUCTION: AN URGENT CALL FOR ACTION

The spectre of Terminator has loomed large over the seed industry for exactly a decade now – and controversy has dogged its every move. This technology – which uses genetic modification to make plants produce sterile seeds – continues to spark frenzied debate. Civil society and some governments, including a number of developing nations, are concerned about the ethics and potential impact of Terminator, particularly on poor communities. By supporting a UN ban on Terminator, they have so far managed to resist efforts by the biotech lobby to bring it to market. But now, there is a real risk Terminator could slip in through the back door in a different guise.

## Claims and counter-claims

Terminator's backers – a powerful alliance of the biotech industry and governments with vested interests – claim that Terminator will prevent GM (genetically modified) contamination of non-GM crops, thus silencing opponents of genetic engineering.

Terminator's detractors – including Progressio, which has been campaigning against Terminator since 2005 – beg to differ. They argue that Terminator genes, like any other GM gene, could spread to other crops, contaminating non-GM crops and making them produce sterile seeds. Progressio's concern in particular is the devastating impact on farming communities in developing nations: the advent of 'suicide seeds' threatens seed-saving and age-old agricultural practices, which in turn threatens biodiversity and food security.

Amid the controversy, governments agreed a moratorium (temporary ban) on the technology at a meeting of the UN Convention on Biological Diversity (CBD) in 2000 (see box right). The temporary ban recommends against the field-testing or commercialisation of suicide seeds until proper scientific assessment has been made of their potential impact on health, the environment and – most significantly – socio-economic factors in farming communities worldwide. The breadth of this assessment demonstrates that the impacts of Terminator are potentially far greater than of other GMOs.

### **The CBD ban (Decision V/5), signed in 2000, recommends:**

'... products incorporating such [Terminator] technologies should not be approved by Parties for field testing until appropriate scientific data can justify such testing, and for commercial use until appropriate, authorized and strictly controlled scientific assessments with regard to, inter alia, their ecological and socio-economic impacts and any adverse effects for biological diversity, food security and human health...'

**Undeterred, the pro-Terminator lobby is now trying a disturbing new strategy to undermine the moratorium.**

## Terminator 2.0

Now, even with the moratorium in place, laboratories in Milan are developing the next generation of Terminator – commonly known as Zombies. Through this technology, the fertility of sterile seeds can be reactivated with the application of a chemical. They are ‘brought back from the dead’, hence the term Zombie. The €5.38 million Transcontainer project is undertaking a three-year research programme to develop this technology. And, thanks to a €4.17 million grant from the EC, it is using taxpayers’ money to do so.

The Transcontainer project claims that Zombies are not the same as Terminator. But Progressio disagrees. We see Transcontainer as an attempt to sidestep the moratorium and introduce Terminator through the back door.

**Transcontainer also insists its research focuses on producing ‘biosafe’ GM crops and trees for Europe. Progressio believes that, if this Terminator technology were approved in Europe, it would soon be marketed globally – with devastating consequences for the world’s poor.**

## Overtaking the ban

In the meantime, the only obstacle of any significance between Terminator technologies generally and the global seed market is the CBD moratorium. The biotechnology companies are not content with trying to slip round the ban by introducing Zombies. In the past they have leant on some rich nation governments, such as the US, Canada, Australia and New Zealand, to weaken the CBD moratorium by introducing case-by-case, country-by-country language in the text of the CBD Terminator decision (see ‘The CBD ban’ box above). If introduced at May’s COP9 meeting, this language would further undermine the ban and render it meaningless. The CBD ban is the main international legal instrument to ensure proper assessments of Terminator’s impact and globally binding rules on its use.

**Without the ban, developing nations would struggle to withstand pressure from biotech companies to licence Terminator and launch it worldwide.**

## Crunch time

In Europe and the UK, case-by-case, country-by-country assessments of Terminator technologies reduce the debate to a narrow scientific assessment of its impact on health and the environment. The socio-economic impacts on the developing world – on poor farmers who depend on saved seed to feed their families – are being ignored. Unless this blinkered approach were challenged, Terminator technologies would slip through, one by one.

The UK and EU must lead by example. Their case-by-case interpretation effectively sidelines the ban. Instead, they must voice strong support for the ban, and encourage other states to do the same, at or before the 9<sup>th</sup> Conference of the Parties to the CBD (COP9) in Bonn (19-30 May).

**The UK and EU must voice strong support for the CBD moratorium – and take action to stop EU funding of Transcontainer.**

**In calling for Terminator’s socio-economic impact on farming worldwide to be assessed, the CBD moratorium recognises that Terminator poses a greater potential risk to developing nations than any other GMO.**



## 2. THE HOT DEBATE: TERMINATORS AND ZOMBIES

It is exactly 10 years since the US government and Delta & Pine Land (D&PL) first patented a technology that became known as Terminator. Today most large GM companies are developing their own versions.<sup>3</sup> Although Terminator has not yet been field-tested, the world's largest cottonseed company Monsanto (which recently bought D&PL) is already developing it in greenhouses in the US.<sup>4</sup> Now the biotech industry is keen to bring it to market. But first they have to persuade the public and policy-makers that Terminator seeds are safe and beneficial. Terminator is being touted as the 'biotech solution' to the problem of GM contamination. Its critics refute this claim – and even argue that Terminator crops could make neighbouring plants sterile. They believe Terminator will have a devastating impact, particularly on developing nations. Now the biotechs have pulled another rabbit out of the hat – Zombies.

### The science bit

So what exactly are Terminator and Zombies? Terminator, scientifically known as V-GURTs<sup>5</sup>, is the genetic modification of plants to make them produce seeds that are sterile. In Monsanto's version, the suicide trigger is an antibiotic in which seeds are soaked. Terminator seeds would be loaded with inducements – patented genes for herbicide tolerance or insect-resistance – but could be used only once. Farmers would have to buy fresh seeds each season, instead of using seeds saved from previous harvests.

The Zombies being developed by the EC-funded Transcontainer project are essentially Terminators which can be brought back to life. They contain a mechanism by which seed sterility is reversible and fertility can be recovered, by applying a 'chemical inducer'.<sup>6</sup> But this chemical would only be available commercially: farmers would be forced to buy chemicals every year – or fresh seeds. In combination, the net effect of Terminator and Zombie is to produce an artificial 'on-off' switch for seed fertility. Either way, the seed companies control seed fertility and are guaranteed repeat business.

### Terminator by default

The nub of the controversy raging around Transcontainer is the distinction it makes between Terminator and Zombie technologies. It insists that the two bear only a 'partial' resemblance to each other. The Transcontainer website states that the development of Zombie seeds is 'not aimed at restricting the use or propagation of crops' – which, it accepts, is the primary goal of Terminator. Zombies, it clarifies, include 'functions to restore the fertility of the crops'.<sup>7</sup>

But Progressio insists that Zombies clearly are – in design and impact – a Terminator technology. In Zombie technologies, as with Terminator, seeds are genetically programmed to die by default: viable seeds are only produced through, for example, a chemical inducer. Significantly, the Finnish researcher who first pioneered Zombies classifies them as V-GURTs.<sup>8</sup> The US National Research Council did likewise in 2004.<sup>9</sup>

Although Zombies are not designed with the intention of restricting seed use, their effect would be precisely that (see Section 5). Like Terminator, Zombies will enable seed multinationals to tighten their grasp on the world's agricultural genetic resources and restrict farmers' rights to save seeds.

**Progressio believes that Terminator and Zombie technologies are the same in design and impact. So any reference to Terminator technologies in this report also applies to Zombies.**

## The case for Terminator

The biotech industry's rationale for Terminator technologies is that they are the solution to a growing problem associated with GM crops: GM contamination. Terminator seeds will, it is claimed, prevent engineered genetic traits (transgenes) in GM plants from spreading to non-GM plants and wild plants. Interestingly, it is not that long ago that the biotech industry was denying the very existence of GM contamination.

Some biotech companies claim that Terminator offers all the much-touted benefits of GM crops without the awkward problem of cross-contamination. Delta & Pine Land went as far as to claim that Terminator 'provides the biosafety advantage of preventing even the remote possibility of transgene movement'.<sup>10</sup>

### **Terminator is therefore a 'techno fix' to a problem of the GM industry's own making – a circular argument with a perverse internal logic.**

Some biotech corporations have stated publicly that they have no intention of commercialising Terminator technology – yet continue to plough vast sums into its development. Monsanto, meanwhile, has performed a complete U-turn on earlier commitments. In 1999, its then CEO Robert Shapiro wrote an open letter to the Rockefeller Foundation stating, 'We are making a public commitment not to commercialise sterile seed technologies, such as the one dubbed "Terminator".' By 2005, however, Monsanto had revised that pledge, committing itself not to use Terminator in food crops but envisaging the possibility of Terminator being used in non-food crops, such as cotton and grass. Referring to new versions of Terminator, Monsanto's current "pledge" states, '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.'

If Terminator's 'containment strategy' can be proven scientifically to be effective, Terminator will open a way for the rapid expansion of GM food production in the developing world. But the biotech giants' claims about Terminator as 'safe' biotechnology are hotly disputed by its detractors.

## The case against Terminator

Terminator's detractors – a broad alliance of civil society, agronomists, environmentalists, scientists, farmers, NGOs and politicians – refute the biotech industry's scientific claims about Terminator. Critics believe Terminator will have far-reaching, potentially catastrophic effects on millions of people. They fear that the biotechnology companies have a hidden agenda and that they are using their power and influence to stifle proper debate about Terminator.

### **1. Collateral damage**

Progressio is fundamentally concerned about its potential impact on the livelihoods and sustainability of poor farmers. The impact will be felt in age-old farming practices that are particularly prevalent in poor farming communities (see Section 3):

- Sterile seeds could sound the death knell for seed-saving –harvesting seeds from one crop for sowing next season.
- Contamination by commercialised GM crops could make indigenous and local plants produce sterile seeds.
- Market pressures are already forcing farmers to abandon local varieties and depend on commercialised seed (Section 4). Terminator would only accelerate this process.

And, as Terminator seeds are phased in, farmers will be forced to pay for either fresh seeds or chemicals (for Zombies) every year.



*A community in the southern sierra of Peru work together to sow seeds.*

**Millions of people currently depend on seed-saving for their food and livelihood – and a changing climate will only increase this. Without seed-saving, they would be forced to rely on commercial seeds and put their food security in the hands of multinational seed corporations.**

## **2. Dubious science**

Terminator's detractors also refute categorically the claim that there is any such thing as a fail-safe biotechnology. The technologies currently available cannot prevent cross-contamination, for both practical and technical reasons:

- Plant parts or seeds from GM or non-GM crops could be mixed accidentally during seed production, harvest, storage, transport or processing.
- Terminator crops still produce pollen and could cross-pollinate with neighbouring non-GM or organic crops, allowing 'gene flow'. GM traits could contaminate non-GM food and feed, and could compromise the fertility of seed that farmers had intended to save.
- The Terminator system relies on a chemical-sensitive 'genetic switch' to activate a toxin gene that prevents seed germination – but the treatment of seeds with this chemical may not be 100% effective. It may prevent farmers from seed-saving but may not be sufficient to guarantee gene containment. The genetic switch may also be activated by some of the plant's own chemicals or unpredictable biological factors such as gene silencing<sup>11</sup> – which could lead to fertile seeds being produced.

A 2006 DEFRA-funded report by the Advisory Committee on Releases to the Environment concluded that 'none of the methodologies currently available guarantee transgene containment'. Advisers to the CBD concurred in 2005.<sup>12</sup>

Terminator's detractors cite other possible biological effects:

- The antibiotic in which some Terminator seeds would be soaked is used in medicine to kill bacteria. Some fear it could upset the fragile balance of microbes in the soil.<sup>13</sup>
- Chemical inducers used with Zombies will, in some cases, be toxins. Existing techniques and standards for testing GM crops would be inadequate to assess whether such toxins could harm human health, let alone wild animals that might feed on them.<sup>14</sup>

## **3. Hidden agendas**

To find the real motivations behind Terminator technologies, it helps to ask one simple question: who will benefit from them? Terminator offers no agronomic benefit to farming communities – but huge potential for the seed companies to tighten their control on the seed market, as the next section explains.

# 3. WHY AND HOW TERMINATOR WILL AFFECT POOR FARMERS

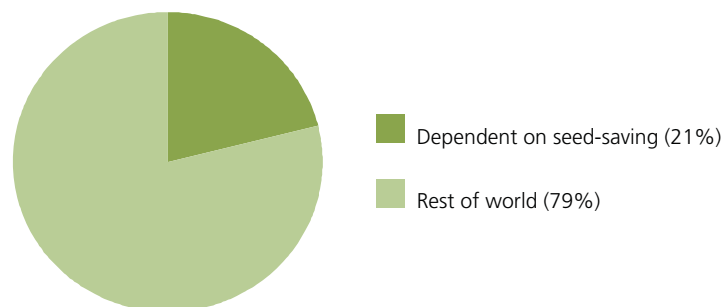
Seeds are a potent symbol of fertility, the very start of the food chain. For millions of small-scale farmers, the age-old practice of saving seeds is central to their livelihoods and food security. The tradition has helped preserve and develop the rich biodiversity of many nations – a heritage now being plundered by biotechnology companies. Once, a farmer's right to save seeds was unquestioned and enshrined in law – but today the big seed companies are eroding those rights. A glance at the recent history of these companies shows us where Terminator might lead. Slowly, through the courts, through the lab and through market forces, they are privatising plant life.

## A fragile harvest

In the developing world, small-scale farming is the basis of most people's livelihood and crucial for most communities' survival. And central to this kind of agriculture is the practice of seed-saving.

- 70% of the world's poor people depend on small-scale farming to feed their families and earn a living.<sup>15</sup>
- An estimated 1.4 billion farmers in developing nations depend on seeds they save themselves or exchange with neighbours.<sup>16</sup>
- 80% of poor farmers in Africa depend on locally sourced seed.<sup>17</sup>

### Percentage of world population dependent on seed-saving



Source: Concern Worldwide. [http://www.concern.net/documents/514/Concern\\_UnheardVoices.pdf](http://www.concern.net/documents/514/Concern_UnheardVoices.pdf)

A 2007 study by Progressio in Zimbabwe found that the seeds of local and indigenous crops play a crucial role in ensuring food security, especially in the face of climate change.

- 70% of the farmers surveyed used saved seed for most food and cash crops, excluding maize and cotton.
- Commercial seeds are too expensive or too hard to get hold of.
- The poorer the household, the greater its dependence on saved seed. But very poor families are often forced to eat or sell their seeds.
- More initiatives are needed to help save, market & preserve seed (eg: community seed banks), to break the poverty cycle.

*Source: Progressio (2007), Seed-saving and climate change in Zimbabwe.*

For centuries, small-scale farmers – especially women – have saved seeds to breed thousands of plant varieties adapted to local soils and climatic conditions and resistant to local pests. This agricultural biodiversity is a key factor in food security, particularly in poor communities. Even if a farmer has no cash, saved seeds help provide a varied diet for his family – and self-reliance.

The very present danger of climate change makes seed-saving all the more important. The threat of drought and unpredictable rain patterns increases the likelihood of failed harvests and the need to re-sow seeds. Locally adapted varieties are far more resistant to a variable climate than commercialised seeds. When Progressio surveyed Zimbabwean smallholder farmers in 2007 (see Zimbabwe box), many noted that people were turning back to traditional varieties of crops such as sorghum and millet because of their resilience to the ‘new’ climate.<sup>18</sup>

### **The right to life**

In most cultures, seeds are synonymous with life, fertility and growth. Terminator stands in complete contradiction to the fundamental principles upon which nature’s life cycle is founded.

What’s more, small-scale farmers have played a huge role in conserving and developing plant genetic resources over generations. Indeed, their work has provided the genetic base for commercial seeds. But now the developing nations whose rich biodiversity makes them ‘countries of origin’ for so many varieties are being sold down the river by the big biotechs.

A farmer’s right to save his own seed – once unquestioned and enshrined in global conventions – is gradually being eroded. Suicide seeds pose an obvious threat to seed-saving. And there’s the risk of indigenous and local varieties becoming sterile through GM contamination (see Section 2). But there are other less obvious but equally insidious threats as companies try to tighten their corporate grip on nature’s life cycles, through the courts, through the laboratories and through aggressive business practices.

**‘Seeds are the patrimony of all humanity.’  
– World Forum on Food Sovereignty, 2001**

## Privatising plant life

Today, seed sales are big business and, thanks to constant acquisitions and mergers, it's a game with increasingly few players.

- The estimated market value for commercial seed sales worldwide is US\$19.6 billion.<sup>19</sup>
- GM seeds now account for 25% of the total value of the seed market.<sup>20</sup>
- The top 10 seed companies control 64% of the total patented seed market.<sup>21</sup>

The seed giants' grip on the food market in developing countries has been consolidated with the help of a flurry of legislation aimed at protecting their property rights – and at undermining farmers' rights to save seed. Most significant in this regard is the World Trade Organisation agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), specifically Article 27.3(b). TRIPS made it mandatory – for the first time – for developing countries to provide plant variety protection through patents or *sui generis* forms of monopoly rights. This move has both privatised plant life and boosted seed industry concentration by handing more control to the patent holder and the seed industry in general.<sup>22</sup>

However, the courts have not offered sufficient protection for the seed industry's profit margins. Legislation has been hard to enforce and seed companies have had little recourse when farmers have used their seed varieties without permission and without paying royalties, intentionally or otherwise. So the seed giants have explored other avenues, this time through their labs. Enter Terminator seeds: the perfect self-policing biotech solution to the problem of how to protect property rights and guarantee financial returns on companies' Research and Development investments.



*Women sharing a meal: women save seeds to grow food for their families in Peru.*



*Small-scale farmers have conserved seeds for generations.*

### **The death of choice**

For a glimpse of the socio-economic impact of Terminator, we need only consider how the seed multinationals – who are also the biotech giants developing Terminator technologies – are cornering an ever-greater share of the seed market.

Market forces have played a key role. Commercial seeds – either hybrid or GM varieties – condition the market to reject local varieties. In some cases, companies are reported to offer incentives to lure farmers into buying commercialised seed. The rise of intensive farming is the logical next step, leaving marginalised groups with even fewer options.

Terminator technologies are likely to accelerate this process. Commentators fear that the seed industry will make the latest genetic traits – such as built-in resistance to herbicides and pesticides – available *only* in sterile seeds.<sup>23</sup> As the ETC Group insists, Zombies are a ‘dream scenario’ for the seed companies: selling chemicals to bring seeds back to life would be far cheaper for them than producing, warehousing and distributing seeds each year.<sup>24</sup> Worse still, companies are likely to introduce GM Terminator genes into all commercial seeds, even those that are currently GM-free.

Once the competition is destroyed, the seed giants would be free to increase their prices at will. It is no coincidence that the biggest seed companies are also the largest suppliers of the agrochemicals on which GM farming relies heavily. It does not take much imagination to see how Zombies would boost this market concentration.

**The relentless rise of the multinational seed corporations has eroded farmers’ right to choose whether or not they save seeds. Terminator seeds may leave them with no choice at all.**

## 4. A FORETASTE OF TERMINATOR TODAY

The steady rise of commercial seeds and strong market forces are making traditional farming based on seed-saving seem increasingly less viable. This has huge implications for small-scale cultivation in developing nations: instead of producing food for the family and local trade, farmers are coming under mounting pressure to prioritise cash crops for international export. Already this process is having a devastating impact, particularly in poorer communities. Biodiversity is being lost and already farmers are finding to their cost that the prospect of higher profits is too often a mirage. The steady march towards large-scale farming – one roundly condemned by the UN's groundbreaking International Assessment of Agricultural Science and Technology for Development (IAASTD) report, published in April 2008 – will only quicken if Terminator is let loose.

### The rise of monocultures and monopolies

Monoculture – where large swathes of land are dedicated to a single crop – is the logical conclusion of the move towards corporate seed control. Since the first hybrid<sup>25</sup> maize seeds were commercialised in the 1920s, the seed companies have extended their reach to the point where, by the 1990s, 'almost every ear of corn grown from California to Kazakhstan' was a hybrid.<sup>26</sup> Hybrids were in fact a precedent for Terminator: their seeds cannot be reused as they perform poorly in the second generation. Already, where hybrid seed is sold, farmers are tending not to save seed and seed exchanges are becoming a thing of the past.

In developing countries, small-scale farmers are gradually being lured away from traditional self-sufficiency and surrendering their autonomy to corporate farming. The rise of seed farms in India is a case in point. The poorest subsistence farmers become even more marginalised as the localised market – where once they could sell local produce or barter for seed – all but disappears. Some are forced to sell what little land they have to commercial outfits. Crucially, the social networks on which localised economies depend are eroded, leaving the poorest in society even more vulnerable.

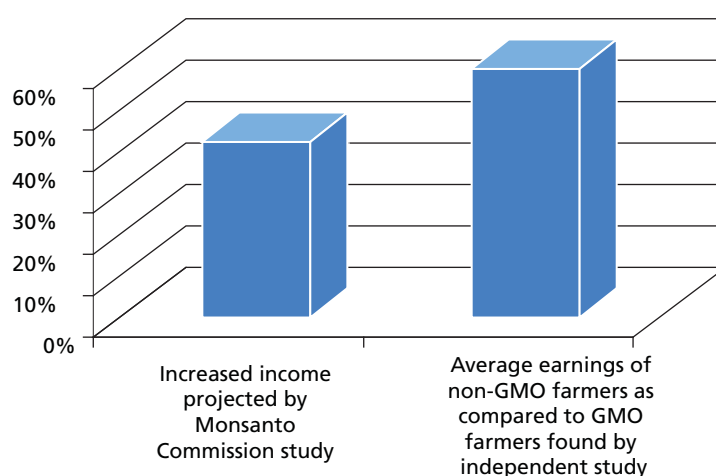
The premise that commercial crops and intensive farming are 'better for the poor' has also been given short shrift by the UN's IAASTD report. The report concludes that agriculture's priorities must be to raise yields and protect soils, water and forests – and that small-scale agro-ecological farming has far greater potential to solve the global food crisis in the long term.<sup>27</sup> This case study from India points to the same conclusion.

### India: high hopes, empty promises

In India, national and multinational seed companies often enter into contracts with local farmers who grow crops on their own land. Seed companies pay for labour and buy the crop at a fixed price: the farmer covers expenses such as agrichemicals and electricity (for irrigated crops). A Monsanto-commissioned study of the 2004 season claimed that its GM cotton brought a 42% net increase in income to farmers in Andhra Pradesh. But an independent study (<http://www.i-sis.org.uk/IBTCF.php>) found that non-GM farmers earned on average 60% more than GM farmers. Yields of non-GM cotton were more than 30% greater than for GM cotton, with 10% less expense.



## Earning and income differences between GMO and Non-GMO farmers



Source: Institute of Science in Society. [www.i-sis.org.uk/IBTCF.php](http://www.i-sis.org.uk/IBTCF.php)

### The gender question

Terminator's threat to seed-saving will have a disproportionate effect on women. About 70 per cent of the world's poor depend on small-scale farming – and more than two-thirds of these producers are women. Saving seeds is central to their whole way of life. It has traditionally been the woman's role to provide a varied and nutritious diet for her family by growing diverse local crops. Women produce 70% of food for local consumption in sub-Saharan Africa.<sup>28</sup>

Women's seed-saving also feeds into the local economy: local farmers exchange seed and knowledge in a system which includes even the poorest of society because no money changes hands. These activities provide women with valuable bargaining power and autonomy – a stake in the household economy in which they would not otherwise be able to participate. In rural India, 'women keep seeds like a secret',<sup>29</sup> closely guarding their seed and their knowledge of seed. Terminator's threat to seed-saving undermines women's status in both the family and society – and society would be the weaker for it.



*Rosa Jara (centre, in tunic) grows her vegetables without chemicals and sells them at the agroecological market in Cuenca, Ecuador.*

## Progressio's position on GMOs

Advocates of GM crops argue that they will play a crucial role in solving the problem of world hunger. They present world hunger as an issue of insufficient food availability and they see food production as the solution.

Progressio contends that the main reason for world hunger is inequitable access to food. People go hungry because they do not have money to buy food that is available or because they lack the means to produce it.

Most farmers in developing countries struggle to afford even the most basic inputs (seeds, fertilisers etc). GM seeds and their associated agrochemicals pose a huge risk to the food security of poor farmers because these products are patented. This means that farmers have to buy seeds from the companies that own the property rights. So farmers are prevented from saving and sharing seeds – and become more and more dependent on outside sources.

Patenting seeds has led to control of the world's food chain being increasingly concentrated: just four or five companies control production of virtually all GM seeds worldwide. Patents do not recognise the contribution that farmers and indigenous people have made to seed development over centuries – but instead threaten to push poor producers deeper into poverty and dependency.

### How farmers are kicking back

Small producers in many developing countries have long been suspicious of GM crops and are starting to make a noise about Terminator technologies too. As recently as June 2007, the Cusco regional government in southern Peru banned all GM varieties, specifically to conserve the genetic diversity of native varieties.<sup>30</sup> The law was passed in response to lobbying from local farmers. Indigenous groups from Cusco have also spoken out against Terminator.

Civil society groups have played a key role in fighting off efforts – by the biotech industry and governments such as the US, Canada, Australia and New Zealand – to overturn the CBD moratorium, particularly at the previous meeting of the CBD (COP8) in 2006.



*A communal grain store run by a farming cooperative in Pedro Carbo in Ecuador enables farmers to cut out the intermediaries.*

### **Agroecology: an alternative vision**

Progressio and its partners in many developing nations are working against the grain. They are promoting agroecology – just the kind of sustainable agriculture highlighted by the UN's IAASTD report of April 2008. It favours sustainable agriculture that promotes small-scale cultivation, ensuring there is enough food for people to eat without damaging the environment rather than prioritising cash crops for export produced with intensive methods.

Seed-saving is central to agroecology. It emphasises crop diversity and rotation and uses organic methods, avoiding monocropping's high agrichemical inputs. Crucially, agroecology makes a priority of conserving and developing local resources and knowledge. For the land, this means better water conservation and soil management, producing organic fertilisers and reforestation. All of this leads to better harvests.

Diversified cropping systems are less prone to attack by disease and pests – and are less vulnerable to climate change and its effects. Agroecology farms in Central America recovered much faster from Hurricane Mitch than those using conventional methods, largely due to their soil conservation techniques and their social networks. In China, a study in *Nature* (2000) showed that planting several varieties of rice in the same field increased yields by 89%; the incidence of disease fell by 94% and pesticides were soon redundant.

Agroecology is also about building a localised economy. Supply chains are short: farmers sell mainly at local markets, avoiding intermediaries. Extra inputs – from pesticides to labour – are also sourced locally. Even those most likely to be marginalised – including women and the very poor – are included.

## Against the grain in Ecuador

In the dramatic Andean highlands of Ecuador, farming is hard graft. Families manage only enough to feed themselves, with little to spare to sell. And life is getting harder, due to soil erosion and contaminated irrigation water. Poverty and malnutrition are endemic.

Now two local organisations, Red Agroecológica del Austro and CEA, which are both funded by Progressio, are working with small communities in four provinces to promote seed-saving and to help conserve their natural resources. Local trainers lead workshops in preserving native seed varieties, organic practices and sustainable use of natural resources (such as water and land). They help farmers establish links with local markets to sell their organic products. And Progressio's partners are also working with grassroots groups to help them lobby policymakers for better protection of local resources.

Already agroecology is bringing marked improvements to people's lives, according to Progressio's research:

- Families have a more varied diet, eating more fruit and veg.
- Farmers do not buy as much food to supplement what they grow.
- Farmers' income has risen, thanks to direct sales and no intermediaries.

For more information on agroecology, visit [www.progressio.org.uk](http://www.progressio.org.uk)



*Fernando Ruiz, a Progressio development worker, teaches local communities about sustainable farming methodologies.*

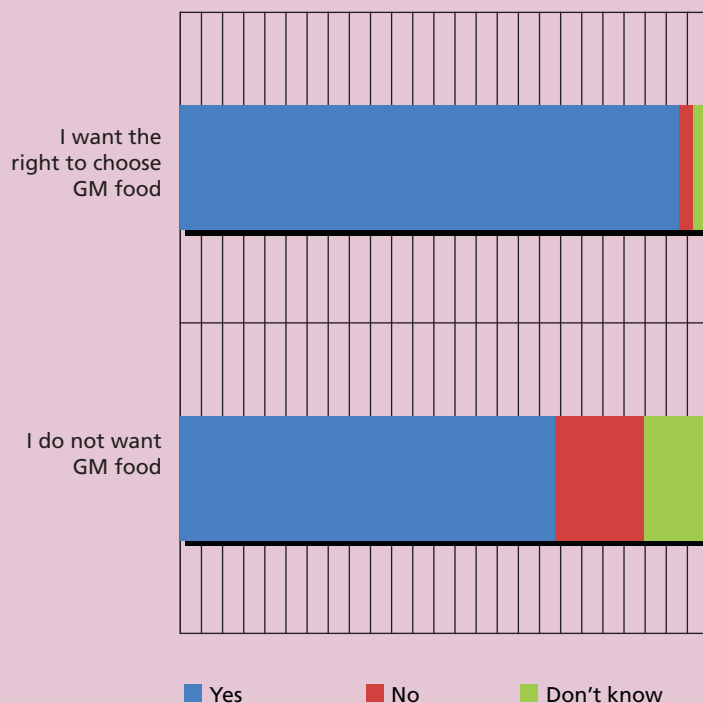
# 5. THE SCANDAL OF TRANSCONTAINER'S ZOMBIES

The European Commission is funding Transcontainer's research into sterile seed technology to make GM crops and trees more marketable. In so doing, it is flying in the face of widespread public opposition in Europe to GMOs. Transcontainer is undermining the Convention on Biological Diversity (CBD)'s ban on Terminator technologies by using public funds to develop Zombies. Progressio warns that there is no room for complacency: the stakes are too high. Zombies could be the Trojan horse through which Terminator is let loose worldwide.

## Europe speaks on GMOs

UK and European consumers have clearly shown that they do not want to eat GM food. According to Eurobarometer (2001), 71% of the European public are opposed to GM food and 95% want to be able to choose whether or not they eat it.

If Terminator technologies are approved for commercial use, seed companies could introduce GM Terminator genes into all their seeds, to boost their sales. This will increase the proportion of GM crops grown and make it increasingly difficult to guarantee that food and crops are GM-free.

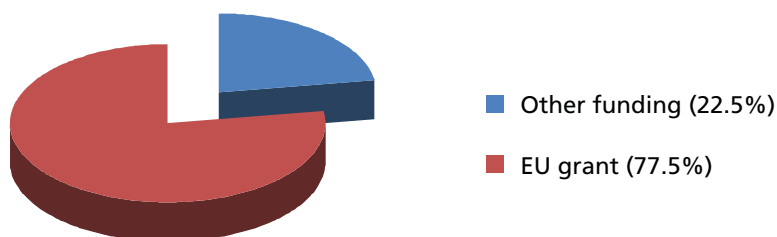


Source: Eurobarometer (2001). [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_154\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_154_en.pdf)

### The Transcontainer contradiction

More than 70% of European consumers are opposed to GM crops<sup>31</sup> and in 2006 the European Parliament passed a resolution calling on the Conference of the Parties to the CBD to uphold the ban on Terminator.<sup>32</sup> The EU is a signatory to the CBD and agreed the need for the moratorium in 2000. So we have to ask why the European Commission – the EU’s executive branch – is funding the Transcontainer programme’s research into Zombies to the tune of €4.17 million (£3.4 million)?

### Funding Sources of EC Transcontainer Project



Source: [www.transcontainer.wur.nl/UK/About/](http://www.transcontainer.wur.nl/UK/About/)

Transcontainer’s three-year programme is a collaboration of 13 research partners – both public and private. Developing ‘reversible transgenic sterility’ or Zombies in oilseed rape is one of several research elements. The project will come to an end in April 2009 when the results of the research will be up for corporate grabs. That deadline makes action *now* all the more urgent.

### The EU’s rationale

One of Transcontainer’s stated aims is to develop GM crops and trees that are ‘biologically contained’. And Transcontainer insists that this technology is purely for the European market.

The Transcontainer project does not accept that Zombies are V-GURTs and so, by implication, does not agree with its critics that it undermines the CBD moratorium on Terminator technologies. However, it does accept that its work may have consequences for the CBD ban. The Transcontainer website states: ‘The results of Transcontainer will contribute to an informed decision [on] whether the moratorium should be continued or modified in the context of supporting EU coexistence measures.’<sup>33</sup>

As for any wider use of Zombie technologies, Transcontainer contents itself with the verbal equivalent of a shrug: ‘It is up to governments and society as a whole to decide whether the existing risks of transgene spread of GMOs are at an acceptably low level in order to allow their release in the field.’<sup>34</sup>

**By insisting on its narrow European focus, Transcontainer is trying to brush aside any debate about whether its research has any implications for the developing world.**

### The danger with Zombies

Transcontainer’s arguments cannot conceal the potentially huge impact of the technologies it is developing. The biotech industry is hardly likely to let its multi-million-pound investments in seed technology research and development go to waste. If Transcontainer manages to convince scientists and policy-makers that Zombies are the biotech solution to the problem of GM contamination, it’s likely that the biotech giants will push for them to be commercialised as soon as possible – and not just in Europe.

The EC's funding of Transcontainer is not in the spirit of the moratorium – and EU legislators are weakening it further by interpreting it on a case-by-case basis.<sup>35</sup> That's why Progressio is calling on the EU to recognise that the biological containment strategies being developed by Transcontainer are in fact Terminator technologies. Zombie seeds are no different from Terminator – in design or impact. Whatever their designers' intent, the outcome is inevitable: the fertility of the plant would remain under the seed companies' control, forcing the farmer either to buy new seeds or to buy chemicals to restore fertility. Genetic seed sterilisation will only exacerbate and accelerate corporate control over the global seed supply.

**If Zombies were ever at large in Europe, Terminator technologies would be up for grabs: they would quickly be commercialised and marketed across the globe. Developing nations would have little chance of resisting the advance of the biotech giants.**

### Hidden agendas

Why then the glaring mismatch between some European Union politicians' anti-Terminator rhetoric and the EC's funding of Transcontainer? It seems that the powerful biotech lobby may have a sympathetic audience at the EC.

- The EU's Framework Programme 7 (FP7) – worth €53 billion – has food and agricultural biotechnology as a key thematic area.
- From 1982 to 2007, the EU spent an average of €80 million a year on GMO food research.<sup>36</sup>

## Research and Development

EU spending on GMO food research has been estimated at an average of €80 million a year. This does not take into account R&D on pharmaceutical crops and biofuels – nor does it include funding by individual member states. In 2001, the UK alone spent €47 million.

The EC's Directorate General for Research had identified biotechnology in food and agriculture as a key thematic area in the recently adopted EU Framework Programme 7 (FP7), worth €53 billion. It has so far declined to fund a so-called Technology Platform on organics.

*Source: Friends of the Earth Europe.*

A 2007 report by Friends of the Earth uncovers a very 'cosy relationship' between the biotech companies and 'policy makers at the European Commission'. It claims that one of the key biotech lobby groups, EuropaBio, has unhindered access to the most senior levels of the Commission and that this influence has 'promoted less regulation and more finance and research funding'. The unspoken premise appears to be that the biotechs can help make Europe a leading player in the global economy.<sup>37</sup>

One of the few voices urging caution over GMOs and Terminator in particular is Environment Commissioner Stavros Dimas. He has spoken out publicly against Terminator - but his principled stance has left him and the Directorate General for Environment 'uniquely singled out and sidelined' within the EC.<sup>38</sup>

### **Filthy lucre**

Terminator's critics are very concerned that public funds are being ploughed into Transcontainer. The biotech industry surely has more than sufficient spare cash to fund this research itself. The top three seed companies – Monsanto, DuPont and Syngenta – account for 44% of the total proprietary seed market – some US\$ 8.5 billion.<sup>39</sup>

Furthermore, there is widespread consensus among the scientific community that 100% safe 'transgene containment' is not currently possible – and perhaps never could be. Even some policy-makers and advisers interviewed by Transcontainer in 2007 doubted whether containment strategies could ever be reliable.<sup>40</sup> One interviewee referred to the potential conflict of interests between the EC's funding for Transcontainer and the EC's responsibility to assess and approve GM technologies, including Terminator.

**As biological containment is unlikely to be effective, the EC's funding of Transcontainer is a waste of public money and is helping to fund the corporate agenda.**



# 6. WHAT MUST HAPPEN NOW

In March 2006 signatories to the Convention on Biological Diversity meeting in Curitiba, Brazil, unanimously reaffirmed the moratorium on Terminator. But, since then, the ban has been weakened and it remains under threat. Rich nation governments such as the US, Canada, Australia and New Zealand, strongly aligned with the biotech industry, have moved to overturn the ban in the past. And Transcontainer is simply making a mockery of the CBD moratorium. Progressio is sounding a wake-up call to policy-makers in the UK and the EU attending COP9 in Bonn. It is urging them to recognise the very real threats to the CBD moratorium and to speak out at COP9 to uphold the ban. And it is calling on them to speak out against the EC's funding for Transcontainer – before it is too late.

## High stakes at COP9

When the world's governments meet in Bonn on 19-30 May for COP9, the stakes will be high. The talk at a preparatory meeting in Rome on 18-22 February focused on GM trees and biofuels. Though Terminator is not officially on the agenda for COP9, Progressio and other civil society organisations believe the biotech industry will argue that GM crops and trees for biofuels must be introduced urgently because of global warming. And, it's believed, industry will contend that Terminator technologies are the way forward because they may 'prevent GM contamination'.

Tactics used by the pro-Terminator lobby in the past suggest there is cause for concern. At COP8 in Brazil, there was a furore over a leaked memo from the Canadian delegation about its intent to overturn the ban. At the same conference, Australia, backed by New Zealand, Canada and the US,<sup>41</sup> openly pushed for the inclusion of the phrase 'case-by-case assessment' in the moratorium's text. This means it would be up to individual countries to decide whether crops incorporating V-GURTS could be used.

The pro-Terminator lobby faces strong opposition from many developing nations, including Zambia and Uganda. The governments of India and Brazil have banned the technology outright in their territories. But the political clout of the biotechs and the relatively weak bargaining power of developing nations at UN forums make it highly likely that their concerns will be overruled.

**Civil society groups played a key role in supporting developing countries in their efforts to uphold the CBD ban at COP8 in 2006. So it's crucial that they remain vigilant and vocal during COP9 in Bonn.**

## UK apathy and inconsistency

The EU and the UK, meanwhile, are turning a blind eye to the European Commission's funding for Transcontainer and their position on Terminator technologies generally is inconsistent.

Although the British government supported moves to uphold the moratorium at COP8, it still does not interpret it as an outright ban. Indeed, in February 2006, DEFRA published a policy statement calling for a case-by-case assessment of Terminator crops – which means that a Terminator application in the UK would be dealt with in the same way as any other GMO – and not require socio-economic assessments.<sup>42</sup> This is in line with EU policy on GM product approval. Both positions are inconsistent with the CBD ban and its call for socio-economic assessments of Terminator's impact.

## The 11th hour

The jury is out on Terminator. Whatever the final verdict, the world needs globally binding rules and internationally accepted assessments on Terminator technologies before *any Terminator in any guise* is field-tested or commercialised. For now, the CBD moratorium on Terminator is the only provision of this kind. Countries party to the CBD must uphold the ban at COP9. This would ensure that the release of this type of biotechnology is properly controlled.

### **As rich nation governments say they are committed to reducing poverty and seeking a better deal for the poor they must protect developing nations from Terminator**

This is in keeping with one of the most important provisions of the CBD, which recognises 'the legal responsibility of governments for the environmental impact in other countries of activities within their jurisdiction, including those of private corporations'. As discussed, these developing nations are the countries of origin for so much of the world's rich biodiversity – but risk being trampled underfoot as the biotechnology companies advance.

The EU is overlooking the potential impacts on poor farmers by ploughing millions of Euros into Transcontainer and choosing to ignore the socio-economic impact of Terminator. Instead, the EU should be addressing the problems of falling research and development into crop diversity – a consequence of seed industry concentration.<sup>43</sup> Instead of funding the biotech industry's agenda, the EU should be following the UN's IAASTD report recommendations and investing in R&D on crop variety and agroecology.

**'Investment in agricultural science has decreased yet we urgently need sustainable ways to produce food. Incentives for science to address the issues that matter to the poor are weak.'**

Robert Watson, IAASTD director and chief scientist at DEFRA.

### **So Progressio is calling on the UK and the EU to act decisively at or before COP9:**

- Both the EU and the UK should make a strong statement supporting the CBD's moratorium on Terminator technology (Decision V/5). They should make clear that they recognise it as a *de facto* ban, rather than interpreting it on a case-by-case, country-by-country basis. This means that, before *any* application for a Terminator product release is considered, scientific assessments recognised by the international community must show that Terminator poses no risk to people or the environment.
- The UK should voice strong opposition to European funding of the Transcontainer project and its research on Zombie technologies.
- The EU should acknowledge that the Zombie technologies being researched and developed by the Transcontainer project are Terminator technologies (V-GURTs).
- The EU should stop EC funding for Transcontainer at once.
- The EU should consider redirecting its funding for Transcontainer into research on sustainable agriculture and agroecology. Future research projects in the competitive agriculture and food sectors, including those identified under FP7, should prioritise agri-environmental sectors, including organic farming and agroecology.

# NOTES

- 1 ETC Group 2007. [http://www.etcgroup.org/en/materials/publications.html?pub\\_id=615](http://www.etcgroup.org/en/materials/publications.html?pub_id=615)
- 2 In 2006 Defra stated "if there were such an application it would be dealt with by the UK government "in the same way as any other GMO." See Defra's statement <http://www.defra.gov.uk/environment/gm/internat/gurts.htm>. In addition, former Defra Minister Michael Meacher argued that this is contrary to the moratorium that he originally signed in 2000: "Defra's published policy has retroactively reinterpreted the CBD decision in favour of a national case-by-case approach, which is EU policy for any GMO approval. Terminator crops would thus be subject only to a scientific risk assessment, as required by EU directive 2001/18. Socio-economic factors, such as the impact on poor farmers' livelihoods, would be ignored."
- 3 *World braced for Terminator 2*, The Guardian, October 6, 1999. Twenty-two patents had been issued or applied for by October 2005 (ETC, Greenpeace).
- 4 D&P was acquired by Monsanto in 2007.
- 5 'Varietal Genetic Use Restriction Technologies' or 'V-GURTs' is the term used by the United Nations to describe Terminator Technologies.
- 6 Scientists refer to this as 'reversible transgenic sterility'.
- 7 <http://www.transcontainer.wur.nl/UK/questionsanswers>
- 8 *Terminator: the sequel*, ETC Group Communiqué #95 (May/June 2007).
- 9 *Ibid.*
- 10 This statement appeared in a brochure distributed at a UN meeting in Bangkok in February 2005.
- 11 Unexpected changes in the traits or behaviour of a plant can occur (eg: under stress conditions), causing the self-sterilising mechanism to fail.
- 12 *Submission to the CBD n'Advice on the report of the ad hoc technical expert group on genetic use restriction technologies*, EcoNexus and the Federation of German Scientists, December 8, 2005.
- 13 *Terminator technology: the threat to world food security*, The Ecologist, Vol 28 No 5, Sept/Oct 1998.
- 14 *Terminator: the sequel*, ETC Group Communiqué #95 (May/June 2007).
- 15 Concern Worldwide, [http://www.concern.net/documents/514/Concern\\_UnheardVoices.pdf](http://www.concern.net/documents/514/Concern_UnheardVoices.pdf)
- 16 The UN Food and Agriculture Organisation.
- 17 <http://www.foodfirst.org/node/1610>
- 18 Progressio is grateful to the British Embassy in Zimbabwe and the International Institute for Environment and Development (IIED) for funding this research in Zimbabwe.
- 19 ETC Group 2006. [http://www.etcgroup.org/en/materials/publications.html?pub\\_id=615](http://www.etcgroup.org/en/materials/publications.html?pub_id=615)
- 20 *Seed industry consolidation*, an unpublished report in July 2005 by Phillips McDougall. Cited by ETC Group.
- 21 ETC Group 2007. [http://www.etcgroup.org/en/materials/publications.html?pub\\_id=615](http://www.etcgroup.org/en/materials/publications.html?pub_id=615)
- 22 For more information, see *Corporate control over seeds: limiting access and farmers' rights* by Patrick Mulvany, in IDS Bulletin Vol 36 No 2, June 2005.
- 23 *Terminator: the sequel*, ETC Group Communiqué #95 (May/June 2007).
- 24 *Ibid.*
- 25 Hybrids are seeds produced by artificially cross-pollinated plants and developed to improve plants' characteristics. Their seed cannot be saved: seed from first-generation hybrid plants perform poorly.
- 26 *Terminator technology: the threat to world food security*, The Ecologist, Vol 28 No 5, Sept/Oct 1998.
- 27 See IAASTD report at: <http://www.agassessment.org/index.cfm?Page=Plenary&ItemID=2713>
- 28 Commission for Africa (2005), *Our Common Interest*. London.
- 29 *Ibid.*
- 30 [http://www.progressio.org.uk/progressio/internal/94422/regional\\_peruvian\\_government\\_bans\\_gm\\_crops\\_on\\_their/](http://www.progressio.org.uk/progressio/internal/94422/regional_peruvian_government_bans_gm_crops_on_their/)
- 31 Eurobarometer (2001). [http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_154\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_154_en.pdf)
- 32 <http://www.europarl.europa.eu/oeil/FindByProcnum.do?lang=2&procnum=RSP/2006/2541>
- 33 Coexistence refers to GM and non-GM crops being cultivated in proximity to one another. <http://www.transcontainer.wur.nl/UK/questionsanswers>
- 34 *Ibid.*
- 35 EU Directive 2001/18 provides for case-by-case scientific assessment of the health and environmental impact of GM products. No scientific assessment of Terminator's socio-economic impact would be required.
- 36 Bizzarri, Kim (2007), *The EU's Biotechnology Strategy: mid-term review or mid-life crisis? A scoping study on how European agricultural biotechnology will fail the Lisbon objectives and on the socio-economic benefits of ecologically compatible farming*. Friends of the Earth Europe: Belgium.
- 37 Friends of the Earth Europe (2007), *Too close for comfort: the relationship between the biotech industry and the European Commission – an analysis*. Belgium.
- 38 *Ibid.*
- 39 ETC Group, 2007. [http://www.etcgroup.org/en/materials/publications.html?pub\\_id=615](http://www.etcgroup.org/en/materials/publications.html?pub_id=615)
- 40 Full document available at <http://www.transcontainer.wur.nl>
- 41 Australia, New Zealand and Canada are all signatories to the CBD.
- 42 <http://www.defra.gov.uk/environment/gm/internat/gurts.htm>
- 43 *Global seed industry concentration – 2005*, ETC Group Communiqué #90, Sept/Oct 2005, Canada.



*Villagers from the Cusco region in Peru share a meal after working in the fields.*

## THE LAST WORD

**'As traditional indigenous farmers, we are united to defend our livelihoods which are dependent 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 honour fertility and continuity of life.'**

Indigenous Peoples of Cusco, Peru, submission to the Convention on Biological Diversity about Terminator, September 27, 2005.

(source: [www.iied.org/NR/agbioliv/ag\\_liv\\_documents/PeruGURTSsubmission.pdf](http://www.iied.org/NR/agbioliv/ag_liv_documents/PeruGURTSsubmission.pdf))