



Unless the grain of wheat shall die

The moral and theological case
against Terminator seeds

Sean McDonagh and Donal Dorr
with a foreword by Roland Lesseps

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against Terminator seeds**

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'Give us seed,
so that we may live and not die,
and that the land
may not become desolate'

– Genesis 47:19

Foreword

Fr Roland Lesseps, SJ

What is Terminator technology? Simply expressed, this technology produces plants that are genetically engineered (by inserting several foreign sequences of DNA into the DNA of the parent plant) in the laboratory in such a way that the seeds produced by these plants are sterile. Harvested seeds planted by a farmer will not germinate. This forces the farmer, therefore, to buy seeds year after year from the company that owns the patent on these seeds. This technology offers no benefit for farmers or consumers. The only advantage would be to commercial seed companies hoping to increase their profits by forcing farmers to purchase seeds from them each season.

In Zambia and other developing countries, the majority of farmers are reliant upon farm-saved seed. There is a treasure in the local seeds kept by farmers. The Biodiversity Community Network of Zambia is making an extensive study of the great wealth of traditional food plants grown by our farmers, including sorghum, pearl millet, cassava, sweet potato, groundnuts, cowpeas, the common bean, and many indigenous leafy vegetables, each species having a large number of varieties. Traditional farmers select crops and varieties to meet different requirements such as yield, early maturity, ease of cultivation, processing, human nutrition and flavour. Crops and varieties are also shaped through natural selection influenced by factors such as disease and insect pest pressure, rainfall amount and patterns, and the local soil types.

Saving some seed for planting in the next season is one common practice of the approach to farming called low external input and sustainable agriculture. It involves cooperation with nature, not fighting against it. Improving and maintaining soil fertility with on-farm produced organic material and natural methods of pest management (such as interplanting and use of pest control agents from trees or shrubs grown on the farm) are some of the other practices of sustainable agriculture.

A wonderful example of someone with this approach to agriculture is Rita Hamusokwe, who participated in several sustainable agriculture courses at Kasisi Agricultural Training Centre

in Zambia. She is a small-scale farmer near Chongwe, a little town about 50km east of Lusaka, the capital city of Zambia. Mrs Hamusokwe is a 62-year-old widow who supports 10 children and grandchildren on her farm. Rita's passion is not just about farming, but includes sustaining soil fertility and maintaining nature. She successfully runs her little farm with organic methods, using low external input agriculture. She saves some seed from every harvest for planting in the next season. That is one way she reduces input costs and so increases her profit.

This sustainable approach, and the livelihoods of farmers such as Rita Hamusokwe, would be under threat if seed companies were able to use Terminator technology. In this booklet, Sean McDonagh and Donal Dorr raise important questions about Terminator technology. They argue that a technology which stops farmers from sharing seeds and forces them to buy new seeds for every growing season is grossly immoral. Since poor farmers cannot afford to buy seed every year, they will go hungry. This moral evil is compounded by the fact that, since this Terminator technology attacks the very principle of life itself, it could jeopardise the whole evolutionary process if Terminator genes spread to other plants. Furthermore, destroying the life principle in an organism is not a right relationship with creation which should be received as a gift from God to be shared by all.

The immorality of Terminator technology becomes even more evident from the following arguments put forward by Donal Dorr. First, it widens the gap between the wealthy and the poor. Secondly, it increases the extent to which the global market or the local market for food is controlled by one company or a small group of companies, with the result that producers and consumers of the food are at the mercy of the company or companies. Thirdly, it lessens the extent to which the environment is shared by all. Fourthly, it lessens biodiversity of crops, which threatens millions of people with famine if the remaining varieties are destroyed by some disease or pest. And fifthly, the technology has not yet been adequately and objectively tested for its long-term consequences for the environment and future generations of people.

Donal Dorr expresses the immorality of Terminator technology powerfully when he says that it 'represents the very antithesis of the three guidelines which Progressio and other agencies believe to be crucial to social justice and authentic human living in our world

today, namely: live simply, live sustainably and live in solidarity with the poor.’

I do not know about any Catholic Church statement specifically on Terminator technology. However, way back in 1990 Pope John Paul II, in his World Day of Peace Message, wrote: ‘We can only look with deep concern at the enormous possibilities of biological research. We are not yet in a position to assess the biological disturbance that could result from indiscriminate genetic manipulation and from the unscrupulous development of new forms of plant and animal life’.¹ On 24 July 2007, Pope Benedict XVI told priests in Italy that: ‘Everyone can see today that humanity could destroy the foundation of its own existence, its earth, and therefore we can’t simply do whatever we want with this earth that has been entrusted to us, what seems to us in a given moment useful or promising, but we have to respect the inner laws of creation, of this earth, we have to learn these laws and obey them if we want to survive.’²

This booklet explores the moral and theological arguments against Terminator technology. These arguments will surely strike a chord with farmers throughout the world who rely on saved seeds for their livelihoods and who seek to farm sustainably – not just for their own future but also for that of the planet. For their sake and for our own, we must do all we can to ensure that Terminator seeds are not unleashed on our world.

The Terminator gene

Fr Sean McDonagh, SSC

The ancestry of the 'Terminator gene' goes back to the 1950s. In 1956, John Davis, who would later go on to become Secretary for Agriculture in the Eisenhower Administration, wrote: 'the only way to solve the so-called farm problem, once and for all, and avoid cumbersome government programmes, is to progress from agriculture to agribusiness'.³ At that time the average family farm was small and pursued a mixed form of agriculture. These family farms were self-sufficient in food. Surplus production was usually traded on local markets, before moving on to a national or international market. In truth, the market economy was somewhat peripheral to the farming community because it was largely self-sufficient and consumed a minimal amount of energy, especially fossil fuel energy.

Crusaders for private enterprise felt that this kind of operation was very inefficient. For one thing, it was not contributing to the Gross Domestic Product (GDP) since there was minimal trading. These people proposed to bring farm production and the marketing of farm products under the single umbrella of agribusiness. They argued that, if this were done, the wonders of scientific and research technology could be harnessed in the interests of more 'efficient' food production. This would lead to a golden age where the consumer would have an abundance of cheap food. Because it was supposed to benefit everyone, government and industry pursued this vision with vigour.

Over 50 years later, this dream of fullness and plenty, of cheap and nutritious food, is turning into a nightmare. Petrochemical agriculture is destroying land and water, as well as polluting the air. The huge increase in the use of chemicals is having a deleterious effect on environmental health. Rachel Carson researched this in her ground-breaking book *Silent Spring*, published in 1962. She found that organochlorines were harming bird life and also affecting human well-being. If the environment is unhealthy, human health will also be affected.

Around the world small and medium-size farmers have been pushed off the land. Farm technology and research has ignored the needs of small-scale organic farmers and has been concentrated

instead on energy-inefficient farm technologies and machinery. These benefit agribusiness corporations, machinery manufacturers and the petrochemical companies.

The Green Revolution

These policies led to the Green Revolution which, in most quarters, is presented as an overwhelming success because it increased food production. It is important to remember that the Green Revolution is not simply a success story about hybrid crops, irrigation systems, cheap inorganic nitrogen, and pesticides. John H Perkins, in his book *Geopolitics and the Green Revolution*, recounts the environmentally destructive and socially unjust aspects of the Green Revolution.⁴ In detailed case studies, Perkins insisted that much of the enthusiasm for the new crops stemmed from concerns about national security and potential revolutions. The theory was that unless a country with a growing population such as India could generate more food, it could lead to Marxist revolutions in many Third World countries.

It is interesting to note that the organisations which promoted the Green Revolution, such as the Ford and Rockefeller Foundations, had very strong links with the petrochemical world.

In the mid-1990s this ‘feed the world’ argument was adopted by corporations involved in genetically engineering food in order to promote their technology as the solution for world hunger. In reality the causes of famine and hunger around the world are much simpler and will not be eliminated by a ‘wonder’ technology. These have more to do with the absence of land reform, with gross inequalities in societies, with the lack of access by poor people to cheap credit and, finally, with the bias against women in many societies. This fact was recognised by the participants at the World Food Summit in Rome in November 1996. The resolution stated that the main causes of hunger are economic and social. People are hungry because they do not have access to food production processes, or money to buy food.

Patenting life is pernicious

One of the most pernicious aspects of genetically engineered (GE) foods, often called GMOs (genetically modified organisms), is that the seeds are patented. The extensive patenting of living organisms arose as a result of the decision by the US Supreme Court in the *Diamond versus Chakrabarty* case to allow the patenting of a bacteria

in June 1980. One cannot exaggerate the momentous nature of this decision. It constitutes a break with the way most cultures have viewed life down through the ages. The philosophical, ethical and legal bases on which the decision was reached are at odds with most cultural and religious traditions. The concept of individual property rights to either resources or knowledge is alien to indigenous people. The reality is that Chakrabarty did not create 'his' bacterium. As Key Dismukes, a former director of the Committee on Vision of the National Academy for Sciences in the US observed, 'he merely intervened in the normal processes by which strains of bacteria exchange genetic information to produce new strains with an altered metabolic pattern. "His" bacterium lives and reproduces itself under the forces that guide all cellular life.'⁵

The US Supreme Court's view of life is radically different from the way life is understood in the Judeo-Christian tradition. The first line of the Bible insists that everything was created by a living God: 'In the beginning God created the heavens and earth' (Genesis 1:1). Patenting, which espouses a view of life as atomised and isolated, is a fundamental attack on the biblical perspective which sees life as interconnected, mutually dependent and a gift from God.

The lawyer Andrew Kimbrell believes that the US Supreme Court's decision has 'transformed the status of the biotic (life) community from a common heritage of the earth to the private preserve of researcher and industry'. He points out that the ruling would set the stage 'for increasing competition among agribusiness corporations as they vie for ownership and control of the planet's gene pool, patenting everything that lives, breathes and moves.'⁶ This is exactly what happened aided by a compliant World Trade Organisation. The corporations want nothing less than to patent the seeds of the staple crops of the world. This would give them phenomenal profits and control over people's lives across the globe on an ongoing basis, because people need to eat each day.⁷

With the new patent regime now enacted into law in many countries through the mechanisms of the World Trade Organisation, the courts have promoted the corporate agenda in many countries. But the corporations were still not happy. They believed that farmers were still sharing seeds, despite the fact that now the seeds were legally the property of the companies. In Canada and the US, Monsanto engaged the services of an investigative agency to gather

information on over 1,000 farmers whom they considered were cheating on their patented seeds.⁸ The affected farmers have coined a new word – bio-serfs – to capture the feudal relationship which now exists between the companies and the farmers. Percy Schmeiser, a canola farmer for 50 years, was one of these victims. Though he is adamant that he never planted Monsanto's GE canola, the company filed a lawsuit against him for patent infringement because some genetically engineered plants were found on his farm. He believed that he was the aggrieved party because the GE canola had destroyed his conventional seeds business which he had built up over 50 years. The law was so prejudiced against the interests of farmers that a court ruled against him in 2000.

The court publicity from this and other cases did a lot of damage to Monsanto's public image. Agribusiness corporations like Monsanto believed that some farmer clients may not abide by the conditions of patenting agreements, but pursuing more and more farmers through the courts could only intensify a growing anger against the industry. This is where agribusiness companies saw a huge benefit from developing seeds that would not germinate at the second planting. It would rid them of the harmful and expensive policing role. This is what gave rise to the Terminator technology.

Terminator technology

The development by the Delta and Pine Land company (later acquired by Monsanto) of what is benignly called a Technology Protection System, but what is more aptly called Terminator technology, is also another reason for asserting that the 'feed the world' argument is spurious. Because Terminator seeds self-destruct after the first crop, this technology, if it becomes widespread, will surely strike the death knell for the two billion small-scale subsistence farmers who live mainly in the Majority (Third) World. Sharing seeds among farmers has been at the very heart of agriculture since its inception 11,000 years ago. Terminator technology would effectively stop farmers sharing seeds. Hope Shand, a research director with the Canadian ETC Group (Action Group on Erosion, Technology and Concentration), is alarmed at such a development: 'Half the world's farmers are poor. They provide food for more than one billion people, but they cannot afford to buy seeds for every growing season. Seed collection is vital for them.'⁹

Women and seedsaving

In poor rural communities seedsaving is the responsibility of women. As farmers, gardeners and keepers of culinary traditions women have played a key role in shaping the world's agricultural biodiversity. Seedsaving promotes self-reliance in seed, guarantees crop diversity and a nutritious diet, and empowers women both in their community roles and within the household.¹⁰

Genetic engineers, breeders and commercial seed growers have over the last five decades gradually taken over the control of seeds. Market forces are eroding farmers' rights to save seeds and as a result undermining women's status. The maintenance of agricultural biodiversity is also at serious risk. In the words of women farmers from Ecuador:¹¹

'What is happening now is that we are losing our native seeds and seeds from elsewhere are coming in. They [the seed companies] come saying they are great seeds but they are not our own. They are not from here... It's a cost to have to buy seeds every time. On the other hand it is great for them [the seed companies] because they can sell, sell, sell and we have to buy again and again. This is our problem.' – Edmira Vangari (from Azuay province in Ecuador's high-altitude Andean region)

'Every year we sow from the seeds from our own harvest. With corn, when we harvest we first of all separate out the good, fat kernels to save for sowing. The same with beans – kidney beans and broad beans, we sort them to take out the good seeds. And when the time comes to sow, we sow these seeds. Here, the majority of people save native seeds. Most of us plant to eat and to harvest for ourselves, and if there is any extra they sell it, and if not they just save seeds and eat what there is.' – Narcisca Sinchi (Azuay)

'I am not interested in genetically modified seeds – not at all interested. What we need to conserve and buy is native seeds and plants. That is what is best for us and the environment.' – Teresa Guichay (Azuay)

'We save our seeds to resow the next year for everything we grow. We do it so that we don't have to buy seeds each year. We have always saved seeds. That is just the way to produce – we have never done it any other way. It is not a new thing for us.' – Magdalena Grefa (from Archidona province in Ecuador's low-lying Amazon region)

Terminator technology will enable the transnational agribusiness corporations to control and profit from farmers in every corner of the globe. It will lock farmers into a regime of buying genetically engineered seeds that are herbicide-tolerant and insect-resistant – and so copper-fasten farmers onto the chemical treadmill at the very point when the phenomenon known as ‘peak oil’ is about to hit the world. In January 2008, oil went past the US\$100 a barrel mark. Major oil companies are spending \$100 billion each year on exploration, yet they are barely able to meet the current global demand which stands at about 85 million barrels each day. In fact, in 2006, oil production fell in 32 countries, including Britain. ‘Peak oil’ does not mean the end of the oil era. It does mean that more oil is being consumed than is being discovered, and therefore – with demand rising sharply from China and India – oil will be more difficult to find and therefore much more costly to buy. Many people think that transport and suburban and commuter living will be the first casualty of ‘peak oil’. In fact, petrochemical agriculture will be the first to be hit hard. As we have seen, modern agriculture, for its success, depends on huge amounts of petrochemicals. It is conservatively estimated that it takes 10 calories of fossil fuel energy to produce one calorie of food energy. This does not include the cost of processing and shipping food across continents. This kind of farming was understandable in a world where fuel prices were very cheap. It will not survive in a world where fossil fuel stocks are quickly diminishing.

At the ethical level I suggest that a technology which, according to Professor Richard Lewontin of Harvard University, introduces ‘a “killer” transgene that prevents the harvested grain from developing’¹² must be considered grossly immoral. It is a sin against the poor who will go hungry, against nature and against the God of all creativity and compassion. Furthermore, if there is horizontal gene spread (where genes transfer from one species to another), the Terminator gene could spread to other neighbouring crops and also destroy wild and weedy relatives of the crops modified with the ‘Terminator’ gene. History is littered with examples of humans carrying species from one place to another with disastrous consequences. Think of the damage which the introduction of rabbits and cane toads has done in Australia!

The promoters of GMOs originally said that gene flow was

impossible. Then they claimed that they were developing Terminator technology in order to prevent such gene flow. Now they want to introduce a new genetically engineered technology, called by its opponents 'Zombie seeds', which will make the seeds' sterility reversible. Once again it is clear to Hope Shand of the ETC Group that: 'A scenario in which farmers would have to pay for a chemical to restore seed viability creates a new perpetual monopoly for the seed industry. Even if these "Zombie seeds" are not being designed with the intent to restrict seed use, the reality is that farmers will end up having to pay for the privilege of restoring seed fertility every year. Zombie seeds are no more acceptable than suicide seeds – there is simply no such thing as a safe and acceptable form of Terminator.'¹³

Is Terminator technology a fundamental evil?

A traditional interpretation of natural law, by moral theology in the Catholic Church, viewed moral behaviour as conforming to the patterns found in nature. In such a case an action is fundamentally evil because it subverts the natural order.

Modern moral theology does not follow this physicalist and static interpretation of the natural law as articulated by the Scholastics.¹⁴ What should replace it is not, however, a total abandonment of the concept, leading to a free-for-all in which any person is entitled to disrupt the whole pattern of nature with little or no concern for the consequence. Rather we must correct and deepen our conception of natural law, taking full account of the given evolutionary pattern which modern science has discovered in nature. Unfortunately, the very phrase 'natural law' is no longer acceptable to many ethicists because it is associated with a purely static understanding of nature. Perhaps, then, it may be more helpful to speak instead of 'respecting the pattern of nature' or some similar phrase.

The fundamental point is that in creating the Terminator gene the scientists involved use knowledge and technologies which they have received from others and previous generations, in a cold and dispassionate way, to attack the very principle of life itself. Such activity is especially harmful within an evolutionary context because it could jeopardise the whole evolutionary process, particularly if Terminator genes spread to other plants. And this is happening at a time when the extinction of species is rampant. The consequences of

these actions in terms of promoting hunger and starvation only add to the moral evil involved. In the contemporary world, the scientists involved have an obligation to inform themselves about the likely negative outcomes of their activity. To engage in the construction of Terminator genes without taking account of the short-term and long-term consequences of such activity must be seen as a fundamental evil, which cannot be justified in any circumstances.¹⁵

The theologian Michael Northcott points out that the new Gaian cosmology of James Lovelock stipulates that 'there are moral and biophysical limits to what humans can do on planet earth, just as the ancients held'.¹⁶ At an even deeper theological level, Orthodox theologian John Zizioulas argues that men and women are appointed priests of creation. This means that humans depend on 'their right relationship with the material creation for their own redemption'.¹⁷ Destroying the life principle in an organism is certainly not a right relationship with creation which ought to be received as a gift from God to be shared by all. This is especially so in relation to food production which is necessary for everyone's well-being.

Terminator technology eliminates the principle of regeneration at the heart of creation: 'I tell you the truth, unless a grain of wheat falls to the ground and dies, it remains only a single seed. But if it dies, it produces many seeds.' (John 12:24) It involves the stealing of knowledge from local communities and small farmers and it belittles and undermines their ancient ecological wisdom. It destroys community and local initiative – the communities of small farmers who traditionally exchange and share seeds from year to year. It ignores the people's voice – the people who want to farm sustainably – and particularly disempowers women, who in many poor communities play a leading role in seedsaving and seed sharing.¹⁸

The corporate world, apparently oblivious to these concerns, is eager to commercialise the Terminator gene. Religious groups and those who care about the future of agriculture beyond the oil era should campaign against this immoral technology.

Terminator theology

Donal Dorr, MA

To be human is to have the privilege of being a co-creator with God. Up to a couple of hundred years ago, we humans exercised this gift of co-creation mainly by rearing and educating children, by fostering community, and by various kinds of work, especially farming and craftwork. A tiny minority of people – those who had a leadership role in society – could also cooperate with God by working to promote peace and harmony in the wider world. Co-creation also took place through the occasional important technological breakthroughs which changed the way people lived. One thinks here of the shift from a hunter-gatherer lifestyle to the regular planting of crops or the breeding of livestock; and of the development of terraced farming or of aqueducts; and the invention of the printing press. But such technological breakthroughs occurred so rarely that people had plenty of time to adapt to the changes they brought about.

In more recent times there has been rapid development in the physical, chemical and biological sciences. This has prompted a huge rise in the number and frequency of technological breakthroughs. This, in turn, has led to what we may call an axial shift in the relationship between humanity and the world we live in – an enormous increase in our power to control and change both ourselves and our environment. Now, for the first time, we humans have the ability to exercise our co-creative powers in a truly radical way; or alternatively to misuse this power and effectively destroy ourselves and our world. So humanity is faced with stark choices about how this power is to be used.

Applied science

In this new situation a great change has taken place in the purpose of scientific study. In former times people studied the sciences primarily in order to understand what was happening in the world. This study was conducted mainly in the context of institutes of higher learning and it was assumed to be 'objective' or 'disinterested', in the sense that its primary value was discovery of the truth.

Nowadays this is no longer the case. The vast majority of scientific research which is taking place in today's world can no longer be described as a 'disinterested' search for truth or a 'disinterested' attempt to improve human welfare.

Nowadays a very large number of scientists are working directly or indirectly for government agencies seeking to develop more effective weapons. A further high proportion of scientific research is funded by very powerful transnational corporations – especially pharmaceutical companies and companies involved in agribusiness. The research which is carried out in universities is frequently funded by these wealthy corporations, and universities have become more and more dependent on such funding. This sponsorship can quickly undermine the objectivity of the research. Furthermore, the companies themselves devote enormous sums of money to their own research departments. This privately-funded research is by no means 'disinterested'. Its ultimate purpose is to enable the companies who fund it to make greater profits.

This means that there is now a very wide disproportion between the amount of time and resources devoted to 'pure science' and 'applied science'; and almost all of the applied science is controlled by agencies which ensure that it serves their own narrow interests. The consequence of this is a shortage of funding for the kind of research which has no practical benefit for the military or for profit-motivated private companies. This results in a down-playing of research into fundamental issues which do not have obvious immediate benefits to the funding agencies. It also means that far more time and resources are devoted to the kind of research which would benefit the rich and the powerful than that which would benefit the poor of the world.

There is a further and even more shocking consequence, namely that a large question-mark hangs over the objectivity of much of the research that is taking place. Such is the power of the corporations which make key decisions about research funding, that one can no longer be sure that a research process was not biased in favour of a desired outcome, or that reported results accurately reflect the outcome of the research. Harmful side-effects or long-term consequences may be concealed, or there may be a failure to take account of the effects which the applications of the research could have in the wider society.

Research on seeds

Against this background we can now consider two approaches to developing a theology of research on seeds or indeed of any other current area of major scientific research. The first and most obvious is a theoretical approach. It begins by recalling that God has invited us to share in the creation of the world. A particularly important way in which we cooperate with God is scientific research, because it enables us to discover and develop more effective ways of promoting human welfare. From this point of view, research into ways of developing more productive or pest-resistant seeds would be seen as very valuable. The issue of the ways in which such seeds are controlled and used would then be seen as *a separate issue*, a moral issue which should not be confused with the question of the scientific research.

The other approach addresses the issue in a less theoretical and more realistic way. It starts 'from the ground up' by recognising that a very high proportion of the scientific research which is taking place today into seeds is being funded directly or indirectly by a small number of very powerful transnational corporations which control most of the agribusiness market. The purpose of the research is to enable the companies who fund it to increase their profits and to become more powerful – if possible by cornering some segment of the market. In this situation the scientific research carried out by the scientists is just part of a much wider operation which includes not only the marketing of the new products but also a whole array of PR through advertising and the placing of favourable reports on the research in scientific journals.

Once we take account of this reality it becomes clear that there is only one realistic way to look at the scientific research which is going on into the development of genetically modified seeds – and particularly into what has come to be called 'Terminator technology' and more recently, 'Zombie' or 'exorcist' seeds (a form of Terminator seed that can be brought back to life by treating it with a chemical). 'Zombie' seeds are being researched and developed through the Transcontainer project which is being publicly funded by the European Commission. Given the socio-economic implications of the development of Terminator technologies, it is not appropriate for a public institution to sponsor such research – particularly since the beneficiaries of that research will be the agribusiness corporations. It is unrealistic and confusing to attempt to make a sharp distinction

between this research, on the one hand, and, on the other hand, the practical application of the research. A moral and theological evaluation of this kind of research and its applications must take account of the actual situation in which it is taking place.

Mediating the information

It is not necessary for the theologian to know the technical details of how Terminator seeds are generated or how they work. That kind of specialised knowledge can be left to the small number of scientists who are 'disinterested' and objective in the sense that they have no vested interest in either the success or the failure of any particular scientific or technological breakthrough. What it means to be 'disinterested' in this sense is to be keenly interested in, and concerned about, the short-term and long-term welfare of the whole human community and of the environment in which we live.

It is particularly important that we have people like Sean McDonagh who can mediate between the narrowly specialised scientific world in which the research is being carried out and the wider human community, including the theological community. The task of these mediating people is twofold. Firstly, they must be aware of the technical aspects of the question; and they must situate the research and its applications within a study of the broader picture of what contributes to – or undermines – social justice and human and environmental welfare. Secondly, they must make the rest of us aware of the kind of research that is being carried out and of all its likely consequences – both the obvious ones and the less obvious or more long-term ones. This work has been carried out with dedication and objectivity by Sean; and he has succeeded in communicating the results of his work in a way that can be easily understood. His paper on 'The Terminator gene' is a fine example of this kind of work.

The work of Sean McDonagh and others has ensured that when theologians like myself attempt to make a theological evaluation of the Terminator seed project we have before us all of the relevant information. My first inclination is to say that my evaluation as a theologian is the same as that which would be made by any well-informed Christian. I see my main task as simply to recall again our vocation as humans to share with God in the creation of a better world; and to note our call as Christians to promote the Reign of God. Going on from there, I can suggest an evaluation of the current

research on ‘Terminator’, ‘Zombie’ and ‘exorcist’ seeds in terms of a well-known and rather obvious practical ethical guideline.

Evaluation

In assessing the morality of a course of action there is a widely used Latin principle or guideline which can be translated as: ‘An action is good only if all its elements are good; it is bad if any one of them is bad.’ Let us try to apply this principle to Terminator technology.

There is a strong case for saying that scientific research and its practical technological application is not a good thing if it does not meet the following minimum conditions:

- It should not, in its overall effect, result in a widening of the gap between the rich and the poor, the powerful and those who are disempowered.
- It should not have the effect of increasing the extent to which the global market or the local market in some essential product is controlled by one company, or by a small group of companies, in a way that will leave the producers or consumers of the product largely at the mercy of such a company or companies.
- It should not have the effect of lessening the extent to which the environment and control of the environment is shared by all; that is, it should not enable a small number of individuals or groups to gain a monopoly of some significant part of the environment.
- It should not have the effect of lessening biodiversity; to do so could leave millions of people open to famine or food shortage, since the few remaining strains of rice or maize or wheat could be wiped out by some virulent disease.
- It should not have long-term consequences which are likely to be damaging either to the environment or to future generations of people; nor should it be a product which has not yet been adequately and objectively tested as regards its long-term consequences.

In the light of the information provided by Sean McDonagh and others in relation to Terminator technology, it seems abundantly clear that the technology of ‘suicide seeds’, as presently conducted, fails not merely on one of the above criteria but on all five. It is evident that this technology represents the very antithesis of the

three guidelines which Progressio and other agencies believe to be crucial to social justice and authentic human living in our world today, namely: live simply, live sustainably and live in solidarity with the poor.

One can say with some confidence that this technology does not qualify as a morally justified process or as a genuine instance of co-creation with God. Therefore, it is something which should not be given the approval of individual governments or of any international agencies. Instead, the existing moratorium¹⁹ should be reinforced and made permanent and any attempt to introduce this technology or its products should be outlawed. At present, there are attempts to by-pass or get around the current ban through the development of 'Zombie' or 'exorcist' seeds. It must be said that these, too, fail to pass the five criteria mentioned above; so they must be considered to be just as morally unacceptable as the original 'Terminator' seeds.

Non-applied research

Some may argue that all of the above negative evaluation of Terminator technology applies only to the practical application of research into this topic, rather than to the research itself. They may say that we should not put limits to purely theoretical research. They may further argue that it is important that scientists discover how seeds may be genetically modified since at least some aspects of this research may prove very useful now or in the future. The best response to this kind of argument is a practical one: if it once becomes clear that there is no prospect that Terminator technology will be allowed in practice, then the sources for this funding will quickly dry up, since the companies which are sponsoring it are not interested in purely theoretical research.

The question may be asked whether there are any circumstances in which Terminator technology might be morally acceptable. But moral evaluation of any line of action is to be made, not in terms of some abstract and unreal possibility, but in the light of the real situation in which it is taking place or is likely to take place. Consequently, attempts to envisage abstract and unreal situations where this technology might perhaps have a legitimate place is only a distraction from the real issue which is that this technology is to be condemned in our present world and for the foreseeable future.

Notes

- ¹ 'Peace with God the Creator, Peace with all of Creation', Message of His Holiness Pope John Paul II for the celebration of the World Day of Peace, 1 January 1990, section II, paragraph 7; available at www.vatican.va/holy_father/john_paul_ii/messages
- ² Quoted in John L Allen, Jr, 'For Benedict, environmental movement promises recovery of natural law tradition', *National Catholic Reporter*, 27 July 2007 (www.ncronline.org). Also available (in a slightly different English translation) at www.vatican.va/holy_father/benedict_xvi/speeches
- ³ In an article in the *Harvard Business Review*, quoted in Geoffrey Lawrence, *Capitalism and countryside: The rural crisis in Australia*, Pluto Press, London and Sydney, 1987, p131.
- ⁴ John H Perkins, *Geopolitics and the Green Revolution: Wheat, genes and the Cold War*, Oxford University Press, New York, 1997.
- ⁵ Quoted in Jeremy Rifkin, *The biotech century*, Victor Gollancz, 1998, p46.
- ⁶ Andrew Kimbrell, *The human body shop*, Harper, San Francisco, 1993, p200.
- ⁷ Andrew Kimbrell, as above.
- ⁸ Cathryn Atkinson, 'Seeds of doubt', *The Guardian*, February 2, 2000.
- ⁹ Quoted in John Vidal, 'Mr Terminator ploughs in', *The Guardian*, April 14, 1998
- ¹⁰ See Carine Pionetti, *Seed diversity in the drylands: Women and farming in South India*, Gatekeeper Series 126, International Institute for Environment and Development, London, 2006.
- ¹¹ Interviews conducted in September 2007 by Michelle Lowe for Progressio.
- ¹² Jean-Pierre Berlan and Richard C Lewontin, 'It's business as usual', *The Guardian*, February 22, 1999.
- ¹³ Quoted in 'Suicide-Seed Sequel: EU's "Transcontainer" turns Terminator into Zombie', news release, ETC Group, June 13, 2007, available at www.etcgroup.org
- ¹⁴ Eg Richard M Gula, SS, *Reason informed by faith: Foundations of Catholic morality*, Paulist Press, Mahawh, 1989, p228.
- ¹⁵ Cf Gula, as above, p302.
- ¹⁶ Michael Northcott, *A moral climate: The ethics of global warming*, Darton, Longman and Todd, 2007, p69.
- ¹⁷ Quoted in Michael Northcott, as above, p78.
- ¹⁸ Thanks to Mary Grey, Professorial Research Fellow at St Mary's University College, Twickenham, for these observations.
- ¹⁹ A decision by the United Nations Convention on Biodiversity that there should be no field testing or commercialisation of Genetic Use Restriction Technologies (such as Terminator technology) unless world-wide socio-economic studies have been carried out and have proven that these technologies pose no threat to people or the environment.



Unless the grain of wheat shall die

Agricultural biodiversity and the livelihoods of small-scale farmers throughout the world are being threatened by the development of Terminator seeds – seeds that are genetically modified to become sterile after the first planting. In this Comment, Sean McDonagh and Donal Dorr present a persuasive argument that Terminator technology is fundamentally wrong on moral and theological grounds.

Agribusiness companies have been pressing ahead with this technology despite a UN moratorium on the field testing or commercialisation of Terminator seeds. The authors argue that the threat from this technology, particularly to poor and marginalised small-scale farmers and to the world's environment, is too great for Terminator to be allowed to go ahead.

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