

# THE GENE TRADERS

Security or profit  
in food  
production?

PROCEEDINGS OF AN INTERNATIONAL CONFERENCE

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London

**i** INTERMEDIATE  
TECHNOLOGY

*new economics*

## THE EMPEROR'S NEW GENES

PAT SPALLONE

The self interest of the North .... has converted cultivators into clients and consumers .. It has monetized the entire existence of the human race. Its very success has eroded the genetic diversity from which it took its own origins. It has eaten its own mother.

Erna Bennett (1925 - 2012)

<http://agrobiodiversitie.wordpress.com/2012/01/06/erna-bennett-has-passed-away/>

A report on the Gene Traders: Security or profit in food Production? International Conference, 14-15 April 1992, London, organized by Intermediate Technology and the New Economics Foundation, in association with GRAIN (Genetic Resources Action International), the Henry Doubleday Research Association, Oxfam and the School of Oriental and African Studies.

'We expect a lot from farmers,' George McRobie began, warmly welcoming us to this extraordinary two-day conference on the Future of World Agriculture 'We expect them to give us enough food, healthy food, to maintain the soil, water and genetic variety. Much of this is thwarted by agrochemical companies such as ICI and Ciba-Geigy who say these things are under control. When you hear them say this, run for your lives.' The impetus for the meeting, which brought together twelve distinguished speaker from the industrialized North and developing South, was growing awareness of one of the greatest threats to food security for the majority of the world's food producers: that is, the dwindling of the range of species and varieties of plants, livestock and fish.

The Gene Traders conference spoke to this concern in the light of shifting corporate priorities.

## INTRODUCTION

One of the greatest threats to food security for the majority of the world's food producers is the erosion of genetic diversity (ie the range of species and varieties of plants, livestock and fish). The existence of a large genetic pool, in the form of a broad spectrum of flora and fauna, helps small-scale farmers (many of them women) to maximise production in the highly variable environments in which they cultivate their crops, raise livestock and fish. Diversity is strength. For most small scale producers, food security at a household level is dependent on maintaining choice and flexibility in the technology (knowledge, skills, processes, and equipment) used for production.

Technology is a key element in maintaining diversity. But, technology tends to benefit those who control it, and thus, for poorer producers this implies the need for decentralised systems which are manageable by the producers themselves, and which are based on their knowledge.

The erosion of genetic diversity is driven by a number of factors including widespread introduction of high-yielding varieties, mechanisation, increasing adoption of monocultures, increasing pressure on resources requiring the clearance of land which would normally produce a range of 'wild foods', increasing dependence on *ex-situ* conservation measures (ie genebanks) rather than on-farm conservation strategies, and grazing and fishing beyond the limits of biological sustainability.

In addition, farmers are threatened by macro-economic factors which are likely to reduce their access to, and control of, these genetic resources. In the past, genetic resources have been considered the common heritage of humanity, and access to wild varieties has been unrestricted. However, more recently, new varieties developed in the rich countries (often using genetic material taken from poorer countries) have been afforded protection through Plant Breeders' Rights, which guarantee royalties to the breeders on sale of their varieties.

The FAO has taken steps to strengthen the position of small farmers, by promoting the concept of 'Farmers' Rights'. While there is now widespread recognition of the important role of farmers in the conservation and management of genetic and other natural resources, little is being done to translate the rhetoric into action. There is no lack of material available to illustrate existing complex and sophisticated techniques and technologies employed by farming communities to maintain or enhance diversity. Neither is there a lack of evidence to demonstrate that 'poor' communities are capable of innovation and adaptation. What is lacking is evidence of this knowledge and skills being built on and enhanced in food production and fisheries projects and research programmes.

Many Southern NGOs have extensive knowledge and skills in this area, but with a few exceptions the North is lagging behind. There is a need for the Northern development community to recognise farmers' knowledge, and to restructure projects to meet the needs of food producers who are at the sharp end of the changes that are occurring. The Gene Traders conference provided an opportunity for NGOs and aid agencies to take up the challenge and provide a forum for sharing and making use of our 'corporate' experiences. The next challenge is to take this knowledge further, both at the level of feeding into the macro economic debate and at the level of working directly with those who have the greatest knowledge of diverse production systems - the men and women whose daily responsibility it is to keep families and communities alive.

Forum who have prepared a letter to the President or the members of the Legal Affairs Committee of the European Parliament. This is the first joint action that members of this conference might take under the suggestion that we pressure via partitioning, lobbying, and so on.

#### VOTE OF THANKS

**Patrick Mulvany, Food Production, ITDG**

I want to underscore the commitment that we're all making, picking up Henk Hobbelink's concern that though we've heard the stories from the South, we've had discussions amongst ourselves and we've had very dynamic working group discussions, what are we actually going to do? Highlighting a few points at random: CIIR says it's going to produce a comment; within Oxfam there is going to be more lobbying internally to get the policies developed within the Overseas Division; ITDG are going to do more to keep biodiversity high on our agenda with our partners and organizations in the South, and are also committing themselves to work much more closely with networks in the North and South. With the Genetics Forum letter there is an action we can take immediately after this meeting. I think each of us has got to think very clearly about the particular actions that each of us can take in our own lives, in our own organizations to take these ideas forward. It's simply not enough to have gone away from this conference with the pleasure of having heard all of these talks.

This meeting, so far as we are concerned, is a platform, a launching pad, a way for all of us who have been involved in this kind of work in the UK to get together and to be able to take forward the ideas that have been discussed widely throughout Britain and Europe and indeed the rest of the world. It's a springboard for action, and I think we should commit ourselves in one way or another to be able to come back (maybe through these electronic networks) and say what we have done in 3 or 6 months time. Have we taken steps forward? Have we actually done anything to contribute positively, not only in the South but in the North, to the actions which are necessary? I think ITDG has an increased commitment and I would hope that is the same for all the organisations who are here and also for the many who were unable to come for one reason or another but have expressed interest and concern.

We have committed ourselves on the policy front; we have committed ourselves on the funding and support of agencies; we have committed ourselves to facilitate the policy dialogue and to involve ourselves in campaigns. But what we ought to commit ourselves to is what, actually, are we going to do? And if all of you are willing we will circulate everybody in three months time and you can reply with a checklist of what has actually happened.

It strikes me that in this global race to conserve biodiversity, the Northern Agencies, corporations, funding bodies, etc. have a pretty poor record. This diversity is conserved in the South by small farmers in that global race the people in the South are the winners and I think it's about time that we rewarded success.

Can I just pass a vote of thanks to the people who organised this meeting. Particularly to SOAS for providing excellent facilities and the food. To the organizers including Henry Doubleday, NEF and ITDG. To my colleagues in IT Publications who provided us with a bit of refreshment to accompany the launch of *Growing Diversity* yesterday - I hope you have all bought lots of copies. And particular thanks to GRAIN which has been the catalyst to this meeting and I hope remains the nodal point for the network amongst ourselves in the European dimension.

I'd like also to thank the facilitators and rapporteurs, including the excellent summing up from Erna Bennett. Thanks to yourselves for your excellent participation and hanging in there through shifts in the timetable etc. Particular thanks to the speakers who have travelled far and survived the pressure of long days and nights. Their message from the small farmers has been well received by all of us and we must thank them for that. We must take this message out to our Government. We must make sure that we can network and lobby more effectively and we are particularly indebted to them for making this meeting possible and sharing their experiences with us. Thank you very much indeed.

# THE GENE TRADERS

## Security or profit in food production?

### 1) LOSING THE LANDRACE - FORFEITING THE FUTURE

While many may ponder the consequences of global warming, perhaps the biggest single environmental catastrophe in human history is unfolding in the garden. The erosion of genetic diversity in agriculture - silent, rapid and inexorable - is leading us to a rendezvous with extinction.

*Cary Fowler/Pat Mooney, The Threatened Gene*

Biodiversity is the variation in genetic make-up that exists amongst plants and animals. The extinction of individual animal species (such as the dodo or the black rhino) has attracted most attention, but the loss of genetic diversity *within* a species is equally important and much more common. This is particularly true in agriculture, where the mass extinction of traditional varieties, or landraces, is seriously threatening the survival of our main food crop species, such as rice, wheat and corn.

Although our global population today relies on 30 plants for 95% of its food needs, the huge variation that exists within those species is essential for them to continue to thrive. Different varieties are adapted to dealing with different pests and climatic conditions, so seeds can be chosen to suit a particular niche. But once a characteristic has been bred out, it can never be recaptured, and this can weaken a plant's ability to adapt to changing conditions.

*Native to the Andes, the potato was introduced from the New World to Spain and the UK in the late 1570s. For 250 years all the potatoes grown in Europe were descendants of these two introductions. In Ireland, the potato became the staple crop of the poor, and one third of the population was totally dependent on it for its food. When the potato blight, Phytophthora infestans, struck in 1845, it swept across the country wiping out the entire crop, because genetically limited potatoes had no resistance to the disease. Between one and two million people died of starvation. Andean potatoes, some of which had genes affording them resistance to the virus, came to the rescue - without them, potatoes would probably have disappeared from our dinner plates.*

*Crop uniformity led to the devastating impact of the southern corn blight in the late 1960s. In 1970, American farmers lost 15% of their most important crop, and a billion dollars in lost yield. Some southern states lost half their harvest and many of their farmers. Two years later, the highest yielding wheat variety the USSR had ever seen, which covered forty million hectares of land from Kuban to the Ukraine, failed to survive the harsh Russian winter. At least 20 million tonnes - or 30-40% - of the winter wheat crop was lost and 27 million tonnes of grain were imported from the West. The world has never been the same since. Grain prices soared by 50% in less than six months. North American farmers thought they had died and gone to heaven, while the South suffered the burden of the price rises. Between 1972 and 1973, grain imports to developing countries rose by 25%, but their cost doubled to \$6 billion.*

## 2) GREEN IMMIGRANTS

Twelve thousand years ago, our ancestors began to cultivate several hundred of the many thousands of wild plants they used for food, medicine, shelter and so on. By the end of the stone age, virtually all of our major crops such as wheat, corn and rice had been domesticated. Maintaining diversity was the key to the development and evolution of agriculture.

Virtually all today's crops originated in a few centres of diversity in the Tropics. Trade in seed began with people's first travels. The first recorded seed collecting expedition was initiated by Queen Hatshepsut of Egypt in 1482 BC. A few centuries later, Nebuchadnezzar built his wife the Hanging Gardens of Babylon stocked with exotic flora from the Middle East. Between the 16th and 19th centuries, Europeans dominated plant collecting expeditions.

However, it was the systematic planting by colonialists of vast areas of land with imported crops, such as tea, coffee and rubber, that accelerated the movements of species around the world. The history of colonialism is easily equated with an epic saga of botanical conquest.

*The entire coffee industry in Latin America grew from a single cutting from Ethiopia, where coffee originated. After being transported to Yemen 1000 years ago, seven plants were sent to India, spawning the Sri Lankan coffee industry. A single cutting shipped to Amsterdam in turn gave rise to all the Latin American plantations. Ethiopia's coffee has provided thousands of predominantly European traders with millions of pounds. But since the global coffee industry arose from a few plants, its diversity is limited to a few varieties. The wild plants of Ethiopia continue to rescue the coffee trade from disasters such as the 1870s coffee rust which wiped out the industry in Ceylon, India, East Asia and parts of Africa. However, the Ethiopians receive little or no recompense for this critical contribution as they struggle to pay back massive debts.*

## 3) CRISIS IN MODERN AGRICULTURE

Commercial plant breeding and modern agricultural methods are divorcing farmers from their seed and people from the origin of their food. The Green Revolution, which promised to eradicate hunger, has brought damnation rather than salvation to millions of farmers, and crop uniformity continues to increase the threat to the world's food supply.

The process of crop extinction began in the 19th century, picked up speed early this century, and has spread like a raging cancer over the past 30 years. Modern plant breeding techniques and the introduction of nitrogen fertilizers after World War II increased dramatically this momentum. The high-yielding varieties (dubbed 'miracle' seeds) produced in this way demand that the soil and the local environment adapt to their needs, rather than the other way round. As a result, natural ecological balances are upset (sometimes irreversibly) and ever-increasing external inputs are needed for the crops to thrive. Despite resistance from farmers, in some countries, like Indonesia, it is illegal to plant traditional varieties.

*The 1950s and 1960s saw a rapid spread throughout the world of hybrid seed, pesticides and fertilizers which promised to increase crop yields by up to 100%. Political motives behind the Green Revolution were as important as humanitarian, particularly in SE Asia where communism was gaining ground. Although yields did improve in places, the miracle seeds required expensive*

*support packages of technologies, fuel and chemicals, and were therefore out of the reach of the majority of the world's farmers. Nevertheless, by the mid-1970s, 44% of all wheat land and 27% of all rice lands were planted with miracle varieties. In the North, the impact was equally dramatic, taking a heavy toll on genetic resources. Only 3% of the varieties of 75 vegetables recorded in the US have survived this century; the rest are extinct.*

*In the Philippines, the 'miracle' rice strain IR-8, was hit by tungro disease. The variety that farmers switched to, IR-20, proved fatally vulnerable to grassy stunt virus and brown hopper insects. So farmers moved on to IR-26,, a super-hybrid resistant to almost all known diseases and pests in the area. However, it proved too fragile for the islands' strong winds, so breeders decided to return to an original Taiwanese strain known to cope in such conditions - only to find that it had been all but eliminated by local farmers as they planted virtually all their ricelands with IR-8.*

#### **4) WHO OWNS GENETIC RESOURCES?**

**Today, the search for seeds and plants is big business, the domain of governments and multinational companies. As wild varieties disappear, genetic resources become more valuable. Companies are scooping up genes with 'useful' characteristics (sweetness, colour, etc) and patenting them as their own creation. Thinly veiled varieties of crops are patented in the North and sold back to the countries in the South.**

Until recently, genetic resources have been considered the common heritage of humanity, and access to wild varieties has been unrestricted. However, over the past thirty years, the rise of commercial plant breeding has led to pressure to protect the ownership of products and to assign economic values to genetic resources.

In the South, many farming systems are informal and land is not owned by individuals. Strict social codes embodying the wisdom of countless generations have enabled sustainable farming systems to evolve all over the world. Using knowledge passed down over many generations, farmers carefully nurture and breed their crops to suit local conditions. Unlike the nurserymen of the 19th century or the scientists of today, they do not claim to have invented new varieties and are therefore not rewarded for their knowledge.

#### **GENE FLOWS**

*The flow of genetic resources from South to North, now as germplasm rather than whole plants, is mediated by the network of international agricultural 'research' centres. The economic pay-off to the North is spectacular. One centre in Mexico, CIMMYT, supplies 127 countries with improved breeding material through a large nursery trial programme, which recipient countries are free to use and develop as they wish. The American government itself has estimated that CIMMYT material was responsible for one quarter of the farmgate value of the US wheat crop in 1984. That same year, the US gave its regular grant of \$6 million for CIMMYT's work on cereals.*

#### **5) SEEDS FOR LIFE OR SEEDS OF DESTRUCTION?**

**Our genetic heritage is increasingly in the hands of industry, which values its assets (seeds alone) at more than \$50 billion. Industry sees biotechnology as the answer to the world's food production problems. Accelerated by the Green Revolution, the gene drain is set to gather greater momentum as biotechnology takes control of agriculture.**

Biotechnology, a blanket term for techniques which involve the use and manipulation of living organisms to make commercial products, has been hailed as one of the greatest scientific breakthroughs of all time. In fact, these techniques are only speeding up and sophisticating traditional breeding practices, so what would take 20 years can be achieved in two or three.

But biotech is life in the fast lane. The hair-raising speed of change and adaptation means that the pace of genetic erosion, accelerated by the Green Revolution, is racing ever faster. Although individual crop yields are likely to rise, there is a heavy price to pay. Apart from crop uniformity, biotech poses other problems, often unforeseen, because scientists are selecting for particular traits and are unaware of what they might be losing.

### **BIOTECHNOLOGY - PURGATORY OR PANACEA?**

*Biotechnology is not inherently good or evil; its impact depends on who is in control. Current research, dominated by industry, is giving much greater priority to the development of pesticide- rather than pest-resistant plants, which will result in greater chemical usage rather than less. Herbicide use has grown dramatically in recent years, and world sales now amount to almost \$5 billion annually (40% of total pesticide sales). Much research focuses on developing crop varieties that can resist higher doses of herbicides and are tolerant to the older, more dangerous chemicals to extend their life-spans. Despite chemical and technical advances, crop losses from pests and diseases have actually increased over the past 30 years.*

### **6) SEEDS OF HOPE?**

**Diversity is the raw material for evolution, and evolution is the prerequisite for survival. Both farmers practising the art of selection and adaptation in their fields and scientists working in industrial laboratories are key players in keeping the gene flow going. The world needs them both. The challenge we face is to bring the two increasingly divergent paths back together.**

Long before there were battles over gene banks, women in Zambia were talking with their elders and recording the use of herbs and wild vegetables, gathering the remaining grains and saving them for their children's children. In Ethiopia in the 1970s, an American scientist 'discovered' a variety of sorghum with a very high protein content and excellent baking qualities. Had he consulted the farmers, he would have saved himself a lot of time in the lab. They call it 'Sinde Lemine', or 'Why bother with wheat?' In Nicaragua, where wood fuel is disappearing rapidly, farmers have cultivated a bean called 'fast cooking means less fuel'. This invaluable knowledge needs greater recognition and remuneration from the formal sector.

*Ethiopia is pioneering a new and exciting approach to agricultural research with its Plant Genetic Resource Centre. Here, highly trained research scientists are working closely with local farmers to conserve crop genetic diversity. The centre has the latest in technology at its central gene bank, but the Ethiopians are not convinced that its carefully controlled environment is safe enough. A number of satellite seed storage units are being set up to keep farmers' seeds in the regions they come from, which are easily accessible to farmers at any time. A request to the World Bank for funding of these units was turned down. But the Ethiopians know they will never be able to build a self-reliant agricultural system if they do not save traditional seeds.*