

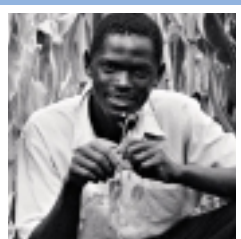
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**recipes against hunger**

*success stories for the future of agriculture*



september 2001

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# recipes against hunger

## success stories for the future of agriculture

Funded by Greenpeace, Bread for the World and the UK Department for International Development, researchers from Essex University have undertaken the largest ever study of environmentally and socially responsible farming\*.

The study includes projects on more than four million farms in 52 countries. It explores how the world's poor can feed themselves using cheap, locally-available technologies that will not damage the environment.

The three documented examples in this report – from India, Kenya and Bangladesh – show how creativity and ecological understanding lead to an agriculture that fosters biological and cultural diversity.

■ *Reducing Food Poverty with Sustainable Agriculture: A Summary of New Evidence, Jules Pretty and Rachel Hine, Centre for Environment and Society, University of Essex, Feb 2001*

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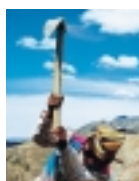
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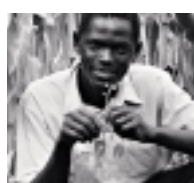


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A farmer in the Bolivian highlands harvest potatoes

# Breaking new ground

***Greenpeace has helped to fund the largest ever study of environmentally and socially responsible farming***

**G**reenpeace aims to “ensure the ability of the Earth to nurture life in all its diversity”. That includes human life – and meeting people’s food needs, through environmentally and socially responsible farming. This is at the heart of our survival. Farming methods that undermine people’s food security affect more than just those who go hungry. They undermine the environment. Forest wilderness and wildlife are destroyed in the search for food and land to farm.

Today’s agriculture industry is more like mining than farming. Its system compromises the very earth on which all our future food needs depend. The failures of the current approach to farming threaten the rich and the poor.

Rather than growing food to meet the needs of local communities for a

healthy, diverse diet, industrial agriculture produces crops to sell on world markets. While world crop production has trebled since the 1950s, more people go hungry now than 20 years ago. Small family farmers are driven off their land and local people cannot afford to buy what is grown. Too often, the result is a downward spiral of environmental destruction, poverty and hunger.

Hunger and poverty go hand-in-hand. Technological ‘solutions’ like genetic engineering (GE) overshadow the real social and environmental problems that cause hunger. These issues include who grows our food, how and where it is grown, how it is distributed, and who has access to it. Simple practical changes such as improving rainwater collection can benefit harvests dramatically. Basic social measures are also critical. Between 1970 and 1995, provision of basic health care and improvements in

women’s status and education were responsible for nearly 75% of reductions in childhood malnutrition.

There is a fundamental conflict within agricultural research and development – between an agenda that caters to the needs of private industry and one that addresses the real needs of the poor and the environment. In 1989, \$7 billion of development aid went into agriculture, forest and fishing projects worldwide; by 1999 the sum had plummeted to \$3 billion. The crisis comes not just from the falling investment. “The heart of the problem” says Von Hernandez of Greenpeace Southeast Asia “is the fact that investment supporting ecologically sound farming is so obviously being neglected”.

The argument that GE technology is vital to feed the world is based on the assumption that hunger is the result of too little food. The truth is that although about a third of the

world's children suffer from malnutrition, nearly 80% of them live in countries with food surpluses. In India (which accounts for more than a third of the world's hungry and where 53% of children are undernourished), grain silos overflowed with nearly 50m tonnes of surplus grain in 2000. In a world where free trade has higher priority than people's right to food, the existence of 1.1 billion undernourished people appears inevitable.

So what can reverse the devastation caused by the agriculture industry and ensure that the world can feed itself in the future? Funded by Greenpeace, Bread for the World and the UK Department for International Development, Essex University researchers undertook the largest ever study of environmentally and socially responsible farming. The study includes projects on more than four million farms in 52 countries. It explores how the world's poor can feed themselves using cheap, locally-available technologies that will not damage the environment. This research is not a formula for global food security; nor is it an exhaustive catalogue of the 'real answers' to the problem of hunger. It does however show the reality and potential of

environmentally responsible agriculture. The findings are dramatic: switching to these farming methods improves harvests for these farmers by an average of 73%.

Agricultural projects in India – as shown by the work of the Deccan Development Society – illustrate how results from traditional farming can be improved using environmentally and socially responsible methods. Initiatives such as the Government of Rajasthan Watershed Development Programme show local people ways to increase the fertility of the land. Techniques such as planting trees, hedges or crops halt erosion. While these methods are simple, their impact is real: in villages that employ these methods, the yield of rice, wheat or sorghum has often more than doubled, while poor soils have regained fertility.

Solutions lie not in feeding the world but allowing the world to feed itself. Food security – the ability of a community to feed itself consistently on a diverse diet – is a complex problem that will not be solved overnight: it depends on people having access to land and money. GE provides neither.

Not only do GE crops not provide the solution, they also pose a threat of

irreversible harm to the environment – the real basis of people's food security. GE technology, and the industrial system it maintains, increases dependence on expensive farm

**“The time has come to recognise the false promise of genetic engineering and the agriculture industry. It is time to support the real revolution in farming that meets the needs of local communities and the environment, restores the land degraded by the agriculture industry, and helps the poor to combat their own hunger”**

chemicals and single food crops, denying people a balanced diet and destroying the environment on which we all depend. It increases dependence on the companies that supply the technology and the countries that



**Above: agricultural research in Kenya. Right: Gabriel Crispín, a Bolivian farmer, and his son Esteban. Their food security depends upon them being able to feed themselves – not upon the spread of genetic engineering**







### Applying compost to the soil in India

supply the loans to pay for it. Far from a solution, GE crops extend all the worst practices of industrial agriculture. Perversely, its widespread adoption would lead to more hungry people – not fewer.

The time has come to recognise the false promise of GE and the agriculture industry. It is finally time to support the real revolution in farming that meets the many needs of local communities and the environment, restores the land degraded by the agriculture industry, and helps the poor to combat their own poverty and hunger. To do this, it is also time to acknowledge that farming – and the technologies that now are a part of it – must belong to the communities and culture in which it exists. Culture and agriculture are related; decisions taken about how we – both in industrial nations and in the world’s poorest countries – use the land and grow our food must take that fact into account.

Academic and campaigner Professor Miguel Altieri of the University of California at Berkeley explains it simply. “In Latin America, 80% of the agricultural land is in the hands of 20% of the farmers; and this is the best agricultural land ... 20% of the land is in the hands of 80% of the farmers, the peasants. But they [the

peasants] are the ones who are producing 50% of the potatoes, 60% of the corn, and 70% of the beans. It is the small and poor farmers who are feeding the continent – not the large farmers.”

Those poor farmers, in Africa, South and East Asia as well as Latin America, are also the ones who have the skills and the motivation to protect their environment, for their benefit and for the benefit of the global commons on which we all depend. The challenge of the coming agricultural revolution is to help provide the support to allow those farmers both to feed themselves and their communities and to protect their environment. European and North American farmers may soon have to learn the same lessons.

Greenpeace works for real solutions. The future for farming lies in recognising its role not only in the production of food, but also in providing us with the clean water, diverse wildlife and plants, and the fertile soil on which all our futures depend ■

PHOTOS: SOPHIA EVANS, MATTHIAS ZIEGLER, SOPHIA EVANS, FLORIAN JAENICKE

# Turning the world upside down

***Lakshmi is one of the lowest of the low – a dalit, or ‘untouchable’, at the very bottom of India’s hierarchy of castes. But one of the most influential agricultural scientists in the country, M. S. Swaminathan, a pioneer of hybrid rice and father of the ‘Green Revolution’, will soon be beating a path to her door in the tiny village of Humnapur in the state of Andhra Pradesh***

It wasn't long ago that people from Lakshmi's background were seen by many in higher castes as sub-human, fit for only the most menial jobs and not even worthy of a name. Worse, she was abandoned by her husband, who took her son with him when he left. In many parts of India, women in any caste are considered inferior to men, and an abandoned woman the most contemptible of all.

But when Greenpeace visited her, Lakshmi set out on her modest front porch a cornucopia that may hold nothing less than a key to the future of farming if it is to be just and sustainable. From simple woven baskets and clay pots she brought out more than 80 varieties of seeds – part of one of the richest and most diverse agricultural heritages in the world.

When he drops by, Professor Swaminathan will see that this 'community gene bank' is part of a larger picture. Lakshmi manages the seeds for her *sangham* – a voluntary association of poor women. And her sangham is one of 75, each comprising around 60 families, in the Deccan Development Society (DDS) – an organisation which is turning ecologically-smart, people-centred agriculture into living reality, and demonstrating daily that high-technology, capital-intensive farming is unnecessary and inappropriate for hundreds of millions of the world's poorest people.

Along with the community gene banks, which they stock and control, the women of DDS have established their own food security systems, with grain stores in each village that they control and manage themselves. To support their efforts, a local farm science centre brings together and

organises traditional knowledge and helps develop fertilisers and pesticides from natural sources such as the neem tree.

DDS has also built a 'green school' where dalit children, who otherwise face a life of little more than bonded labour, learn practical, income-generating skills as well as academic subjects that allow them to enter 'mainstream' society should they want to do so. And DDS is training women in radio and video production so that they can tell their stories to the wider world. Some of these new video makers are travelling as far as Peru to share their knowledge of ecological agriculture, or 'permaculture', and to learn from others.

"The fact that dalit women, who are poor, illiterate and marginalised, can manage such complex projects is the strongest political statement of the decade" says P V Satheesh, the Director of DDS.

At first sight, there could be few less promising environments for a sustainable agricultural revolution. These villages – in the Medak district of the state of Andhra Pradesh – are on the Deccan, a raised plateau that rolls for hundreds of kilometres across southern India. Rainfall is sparse and uncertain. Most of the soil is poor – often only a few centimetres of dust and pulverized laterite rock which, in the dry season, gives the ground a rusty red colour. Similar dryland terrain covers some two thirds of India. So the success of DDS's work holds lessons for vast areas of the country, as well as for many other parts of the world.

The Deccan is a harsh, unforgiving land, but with care it can be made to bloom. As recently as 30 years ago more than 70 different crop varieties were grown in some fields. Half a century ago, mangos from this region were so prized that the Nazeem of Hyderabad, hereditary ruler in the district, sent armed guards to protect the caravan of bullock carts that brought the fruits to his palace.

As a small boy, Jayappa showed a gift for learning. Twice



**Over 80 varieties of seeds are kept in Lakshmi's clay pots**

his uncle had to drag him away from a local mission school: the family needed even the tiny amount of cash that a young child could bring working for landlords, and education was a luxury they thought they could not afford. When Jayappa was 11 his father died and a local large landowner illegally seized the family's tiny parcel of land. At 17 Jayappa borrowed some money, took the landlord to court and won, but spent nine years in wage labour to pay off the debt.

For another 20 years, Jayappa worked in different parts of Andhra Pradesh much of the time for landlords embracing high-tech agriculture, always for pitiful wages. "We, the wage labourers, saw the land being killed while we remained poor" he says. Then, in the 1980s Jayappa heard about the fledgling DDS: groups of the very poorest coming together, pooling their small savings, gradually achieving greater autonomy, and adopting environmentally friendly farming techniques.

Returning to his home village, Jayappa set up a sangham with DDS help. He started with other men but found that too many of them wanted loans from the community chest for extravagant and unrealistic purposes. Conflict threatened to tear the sangham apart. The solution, he says, was to turn to the women. They tended to make more modest and sensible decisions.

Beginning with savings of as little as 5 rupees a month (approx. 0.25 euros or £0.08) the women's sanghams in Algot and other DDS villages have gradually brought back into cultivation extremely marginal lands which before could barely yield more than 40-50kg per acre. Now, the rejuvenated lands yield 200-300kg of sorghum, 50kg of pigeon pea, 50kg of assorted pulses and amaranth, fibre crops, and enough fodder for two head of cattle per acre. Together, the DDS has generated the equivalent of thousands of new jobs over a decade, and earnings per acre increased up to 12 times. And all this, while eliminating the use of chemicals and increasing the biodiversity in the fields.

Initially, plants such as sun-hemp are used to improve the soil. Large quantities of cow manure are also added to increase soil fertility. Simple earthen banks and rock dams help retain soil moisture. Water retention benefits not only the small holders themselves, who are often on the higher

and poorer ground, but also their neighbours downstream, who find their wells fuller for a greater part of the year as a result.

Crops are used in combination to maintain soil health. Typically, these will include varieties of sorghum (known locally as jawar), a drought-tolerant crop which extracts nutrients, and leguminous crops like pigeon pea, which add nitrogen to the soil.

Walking across one of these fields one commonly sees a mix of a dozen or more species of food plants. Manemma, a sangham member in the village of Gangwar, has 22 different varieties growing on three acres. These include five varieties of jawar, black gram, green gram and horse gram, finger millet, pearl millet and two varieties of foxtail millet, sesame, three varieties of pigeon pea, cow pea, field bean and bindhi. There are also wild vegetables, which have been eliminated or made toxic on chemical intensive farms. Some wild plants are highly nutritious and are important for local food security throughout the year. Indian spinach, for example, is one of the richest sources of vitamin A precursor in the plant kingdom.

"None of this is our invention" says Suresh, chief scientist at KVK, the local farm science centre. "Almost all of what we teach are things that some local farmers have been doing in some form for centuries. All we have done is to put the knowledge together in easy-to-use form, and helped disseminate it more widely".

What is new is the way that the centre has collected and systematised best practice in indigenous knowledge. A good example is a non-pesticide management (NPM) system which KVK disseminates using a 'mandala' display of seeds and treatments. This lays out actions and interactions in time and space which the farmer needs to manage in order to protect their crops through the year without the use of artificial pesticides. It may sound complicated, but the mandala portrays complex information and relationships in a way that is easy for to literate and non-literate alike to understand. Along with community gene banks like Lakshmi's, DDS rates its most important achievement as the creation of village-based, community-owned and managed, public distribution systems (PDS). These stock essential food



Left: the 'green school' where 'untouchable' children learn practical skills. Right: the 'mandala' explains the methods of crop management to non-literate farmers



grains produced by the sangham members, ready for distribution at affordable prices during lean times of year.

The need arose because the government-owned PDS system has been a near disaster; it encouraged the purchase and consumption of rice imported into areas like the Medak district where it had never been a part of the staple diet.

“Eating rice became fashionable” says Satheesh. “Communities which had thrived on a highly nutritious diet based on sorghum and millet switched over to a staple that was alien to them. Their immune systems were compromised and they were laid bare to diseases”.

“Culture and food are inseparable” he adds. “Denial of indigenous food is a political act, and we must become conscious of it”. With a community-controlled PDS, traditional foods that were once almost forgotten have become common again in many households. Prices sometimes differ considerably from those in the regular markets. For example coarse millets that fetch very little outside in the ‘mainstream’, are given a high value in the women’s markets.

Even though the rains are poor this year, the women’s sangham in Eedulpally village will be able to feed their family three times a day without going into debt. But there is more to PDS than just having enough food to stay alive – it is a matter of human dignity. “We used to be very lonely” says Sundaramma, a leader of the sangham. “We would work all day and then we would be alone in our houses in the evening. Now we meet, work, talk and sing together. We share our burdens. Previously we didn’t even know what a bank was. Now we are talking with men and with people in

higher castes. We have become *ushar* (alert, intelligent).

When they started the sangham in Eedulpally, the women could not even afford a second good sari. Now they no longer have to stay indoors while their clothes are drying after a wash, and, in addition to the food bank, the

women of Eedulpally have been able to create a *balwadi* – a shady place for young children of sangham members to be cared for instead of having to sit out in the blazing sun all day while their mothers work in the fields.

Over in the village of Basantpur the sangham has created a medicinal garden that can meet many of the essential health needs of the community. On just 5 acres of rocky ground flourish 45 or more species of shrubs and trees. Santoshamma, a sangham member who looks after the garden, proudly displays some of its contents: gooseberries, grown for their high content of vitamin C; neem, whose leaves are used to treat scabies and for ailments affecting newborns and young mothers. Extracts from three plants in one part of the garden are combined to make an *ayurvedic* (traditional Indian medicine) treatment effective against



**The DDS has generated thousands of new jobs. Earnings per acre have risen up to 12 times at the same time as eliminating the use of chemicals and increasing biodiversity**

coughs, stomach pain and various skin diseases, while pomegranate is used for loose bowel motions and for dysentery. Bandagurja is applied to a snake bite, and will keep someone alive for long enough to get them to hospital even if they have been bitten by a king cobra – one of the world’s most deadly snakes.

Mahatma Gandhi called dalits the ‘people of God’. The women’s relationship to the land is about more than producing food: it is a religious commitment, expressed in daily acts and in festivals throughout the farming year. In Medak district, every season is interpreted as a state of the mother earth goddess. “When the streams and rivers flow full: mother is bellyful and flows in content” they say. “When land is replete with diverse crops: mother is heavily pregnant. When the ear-heads are forming: mother is in birth pangs. When seed formation is taking place: mother is breastfeeding her children”.

One of the greatest challenges is to equip the rising generation of children with the confidence and skills to defend their culture and also be capable of dealing with the modern world. To this end, DDS founded a ‘green school’ or *pacha saale* in 1993 to give a second chance to local dalit who either never had the chance to go for government schools or had to drop out because of poverty and other pressures.

Every aspect of the school – from its physical structure to its curriculum – reflects a philosophy of self-reliance and environmental protection. Its hive-like buildings were made with local rock and without precious resources like wood and cement. They cost less than half the average of new buildings in the area, and are cool even on the hottest day.

“We are questioning the construction of knowledge” says Satheesh, Director of DDS “The normal assumption is that it flows down from those with higher education. Here we see much of that reversed”.

Another crucial battle for DDS is with, and for, the media. In Andhra Pradesh, like in most of India, television and radio tend to reflect official policy in favour of ‘high-tech’

**“ With genetically modified crops we would have to purchase many different inputs. The technology would come with many uncertainties and with hidden costs”**



**Learning self-reliance**

agriculture. In response, DDS has trained some sangham members in radio and video production skills so that they can make their own programmes. “With video we can express ourselves” says one determined young women, known to everybody as ‘General’. “When outsiders make films about us, they don’t understand what we’re saying. You film us selectively. We know our own stories”.

The women of DDS have shown they can produce more and healthier food from the land with fewer inputs than the methods touted by so-called modernisers. They have reversed the degradation of natural resources, increased their resilience to adverse events, and created, strong supportive local groups. Others are following their example without prompting, and they have won respect from scientists, economists and other professional elites.

So what will Lakshmi tell Professor Swaminathan?

“When we ate hybrids [‘green revolution’ crops] we found they made our skin itch terribly. The cattle did not relish the fodder from these crops, and did not thrive. Hybrid sorghum extracted too many nutrients from the soil, leaving it dead.

“With GE [genetically engineered] crops we would have to purchase many different inputs. The technology would come with many uncertainties and with hidden costs.

“This year the rain is scarce. But even without good rain we are still hopeful of a crop because our varieties can withstand drought, and, thanks to all the manure we add, the soil is full of life. Whenever rain comes, life will return, and some of our crops will pull through because we have such variety.

“I have no interest in or need for genetic engineering because in my hands I have all these seeds, which I can also share with others. These seeds give us good, nutritious food and excellent fodder for our animals. We know them very well. We know our land very well” ■

WORDS CASPAR HENDERSON | PHOTOS FLORIAN JAENICKE  
Contact and further information: Deccan Development Society [www.ddsindia.org](http://www.ddsindia.org)

## YEAR-ROUND HARVEST IN THAILAND’S RICH GARDENS

Called simply ‘homegardens’, Thailand’s private smallholdings are really little paradises – miniature tropical forests containing a wealth of different plants. Productive and efficient, and often no bigger than just 2000m<sup>2</sup>, the homegardens provide everything that a family needs for life. But these long-tended treasures are



threatened by migration to the cities and industrialised agriculture.

Like a canopy the leaves of the coconut palms sway above the garden. The palms offer shade as well as fruit and building material. Underneath, all kind of fruit trees like mango and papaya thrive. One level below, fast-growing banana plants mix with berry shrubs and maize.

On the ground floor wild spinach, root

vegetables such as yams or sweet potato and a range of herbs spring up. There’s something to harvest year round, beneficial insects keep away the pests, wilting leaves and dead plants provide a rich compost. The homegardens are complex ecosystems which secure a stable livelihood for many families in Thailand and other tropical countries. And for the environment they provide a precious gene pool due to their high biodiversity.

## MAIZE *the gold of the Mayas*

Eaten on it’s own with butter, or processed to polenta or tortillas, maize tastes good, and it is no surprise that the crop – the “gold of the Mayas” – has spread far and wide from its Central American birthplace. Maize began its triumphal march across the globe just five centuries ago, and is now the world’s third most important food crop after wheat and rice. In 2000 almost 591m tonnes was produced. In Latin America about half of the total cereal production – almost 76m tonnes – is maize; Africa grows 34m tonnes – more than a third of cereal output. Three quarters of the global ‘zea mays’ harvest is used for animal feed.

There are 50,000 varieties of maize stored in the gene banks of the world – a tremendous genetic wealth of varieties to suit many climates and conditions. And the cobs are also genetically manipulated; in the USA the so-called Bt-maize that contains an insecticidal toxin is grown on more than 20m hectares.





**MORE THAN  
COFFEE**  
*help for Brazil's  
smallholders*

Organic fertiliser made of milk, sugar beets, bone meal and cows manure; banana plants giving shade and providing the soil with nutrients after their leaves have been converted into compost – these are the tricks of sustainable agriculture that make APTA, a Brazilian NGO, popular among farmers in the Brazilian state of Espirito Santo.

There are more than 70,000 smallholders along this

part of the Atlantic coast whose main source of income is coffee. Because world market prices are extremely low farmers do not even reach a third of their already low average income. They are not even able to ask for better prices for organic coffee.

Because poverty and hunger are not only the result of bad harvests, APTA helps to increase harvests sustainably.

New sources of income like growing fruit and vegetables are proposed and the way the produce is marketed is being changed: rather than share the profit with middlemen, the smallholders from the region sell onions, fruit and vegetables on the market and earn double the income.

**TREASURES OF  
THE FIELD**

*caring for the seed  
in Ethiopia*

Stored within the countless tins and bags that line the shelves of the Institute for Biodiversity Conservation and Research (IBCR) in Ethiopia's capital Addis Ababa are the seeds of hundreds of varieties of food crops. These range from the long-forgotten to commonly used regional varieties.

Ethiopia is the cradle of many crops – and the IBCR is a veritable treasury. But conserving this rich genetic legacy requires more than just seed archiving. It is also necessary to conserve the knowledge of the farmers about local food-crop varieties, their breeding improvement and their conservation.

That's why the IBCR cooperates with about 200 farmers who preserve and propagate the traditional varieties. By so doing the researchers commonly discover that some varieties are better suited for difficult cultivation conditions than the

most recent hybrid high-yielding seeds which – being hybrids – cannot re-seed productively and have to be purchased anew year after year. Through a long process of adaptation, local varieties are productive with much less or even without the chemical means to dominate the agricultural-ecosystems. They are much more robust against diseases, pests or drought stress.



PHOTOS: OPP, THORSTEN FUTH, TOP SOPHIA EVANS, BELOW MATTIAS ZEIGLER



# A remedy against moths and genetic engineering

**Using all the resources at their disposal, the big agrochemical companies are trying to muscle genetically engineered maize into the Kenyan fields. Yet scientists in the East African country have developed a natural method of cultivation which achieves better yields for the farmers**

One after another, the men from the vicinity rise to their feet from the benches Lawrence Odek has brought from the nearby church to provide a proper setting for the 'field day' – the agricultural information day being held at his farm. They praise their host's pioneering spirit and gladly reveal what other improvements, in their view, the 48-year-old farmer might be able to make. And if jests, derision, or envy should mingle with the miscellaneous praise, Lawrence Odek knows how to respond: "It's better to invite all the neighbours to the field day" he explains. "Much better than being pestered by people every day when they come to gape at my maize plantations – and trample down my harvest in the process."

Two fields the size of tennis courts have turned the Odek farm into an agricultural attraction. One of them resembles the majority of maize-growing plots in the sun-scorched Lambwe Valley at the Kenyan shores of equatorial Lake Victoria: a square of barely hip-high, moth-eaten plants with ears as shrivelled as dried prunes. Purple St John's wort sprouts amid the tangle of yellowing growth, a parasite that feeds on the roots of the already sickly plants. And in direct proximity to this agronomic disaster, a crop rises in unblemished green; healthy, and so high that not even the tallest of the field day visitors can reach the tops of the plants with outstretched arms. As the farmers stand assembled between the two plantations, no jokes or teasing interrupts Lawrence Odek's explanation of this incredible contrast.

When, roughly a century ago, colonial farmers set up the first maize plantations, the crop imported from America soon

outstripped sorghum, the traditional staple. Corn was easier to grow, produced higher yields, and was tastier to boot. Unfortunately, it was also more susceptible to parasites from the alien African fauna and flora. For St John's wort, in particular, it proved the ideal host – as it was for a half-inch, mud-brown moth called *chilo partellus*, which was imported accidentally from India in the 1920s, and whose caterpillars have been voraciously eating their way through East African corn fields ever since. Together the weeds and moths now destroy half of Kenya's corn crop, at an annual cost of millions of dollars.

For the subsistence farmers of the Lambwe Valley, the damage is even more devastating. They lack the funds needed to buy the imported agrochemicals used by the big farms to curb their losses. They don't even have money to finance their children's education, so most of them pay school tuition in kind, that is, with maize. If the harvest is bad, the children have to drop out of school or else the family will go hungry; sometimes both these things happen at once. At the end of a semi-annual growing season, Lawrence Odek used to have a yield of rarely more than three sacks of corn, some 400 pounds – hardly sufficient for a family of ten to manage.

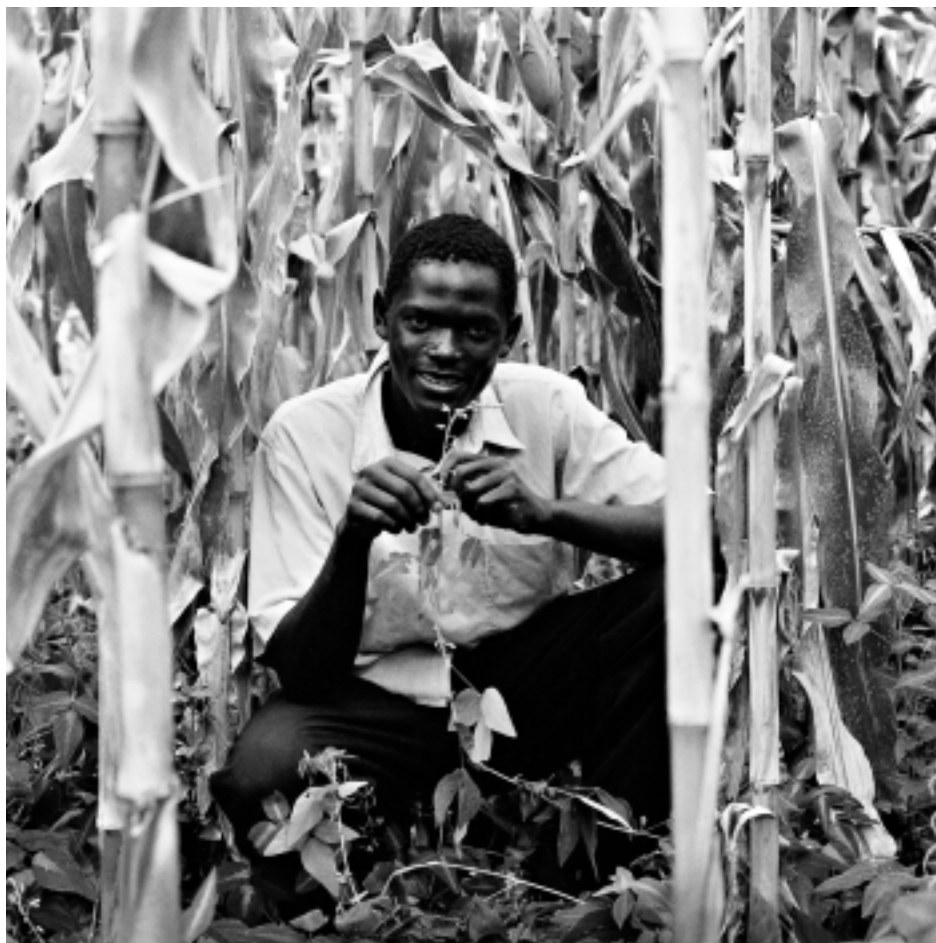
Then, two years ago, Lawrence and his brother travelled to the nearby provincial capital of Mbita. They had heard that a Doctor Khan there had devised a means of controlling the corn pests and was now looking for farmers willing to try it out in

St John's wort, a parasite on the maize plants





**Above: The Odek brothers Lawrence (left) and Joseph (right) travelled to Mbita to learn about the 'push-pull' method of pest control from Dr Zeyaur Khan. Aman Rabilo (right) is another pioneer of the method that delivers good harvests without agro-chemical input. Healthy maize – as in the picture – is a rarity in Kenya. Most fields are moth-eaten and weakened by parasitic St John's wort**



practice. After some deliberation they agreed to plant one of their fields according to Khan's new 'push-pull' method.

Zeyaur Khan, a scientist from India, is a research director at the International Centre for Insect Physiology and Ecology (ICIPE), an organisation whose fame spread even beyond scientific circles in 1995, when its director – Hans Herren – was awarded the World Food Prize. Herren had been able to stop the African manioc harvest from being wiped out by the mealybug – not with sprays, as others had vainly tried, but by populating the fields with the pest's natural enemies: ichneumon flies and ladybugs. Khan hoped to apply a comparable method to maize. If anything, the hurdles were even greater, since he had to contend not only with an insect but also with the St John's wort. While rigorous scientific methods conquered the moth, a lucky break did the same for the plant.

Khan's team of scientists tested more than 400 different kinds of grass to ascertain where the imported *chilo partellus* moth and its only slightly less voracious African cousins deposited their eggs most frequently. The finding: moths love napier. Given a choice between maize and this reed-like plant, 80-90% of moths opt for the wild grass. That discovery gave Khan the 'pull' element in his method. When planted all around a cornfield, napier 'pulls' the moths away from the useful plants. For the 'pushing' he sought an herb that, sown directly between the maize, would repel the moths. This role was finally allocated to a South American legume called desmodium. Experiments revealed, however, that this silvery

plant offered even more: it prevents rain from washing away the topsoil, fertilises the ground by storing nitrogen, and – what no one had expected – suppresses parasitic plants. It emerged that the roots of the desmodium secrete chemical substances that keep St John's wort at a safe distance. The 'push-pull' strategy created more work for the Odek brothers at first. But their efforts have been rewarded: they now reap 15 sacks of corn from a single field – five times the previous yield from their total acreage!

No wonder the other farmers are stepping up to introduce the method in their own fields. There are, however, two factors holding back 'push-pull'. For one thing, the desmodium seed needs to be purchased (which is expensive) or grown (which takes a long time). Moreover, for 'push-pull' to work properly, the farmers need precise instructions on how to lay out the plantation. At Lake Victoria, they have made a virtue of necessity: at field days, the corn growers instruct each other in the method, an arrangement that proves much more effective than having outside experts tell the farmers how to work. Khan is convinced that his method will also work outside Kenya. In 1999 Ethiopian and Tanzanian agricultural instructors were due to be trained in Mbita. Acute shortages of funds delayed the programme;

**The Odek brothers now reap 15 sacks of corn from a single field – five times the previous yield from their total acreage**



Captured *chilo partellus* moths (left) and a handful of their larvae (below). The Indian scientist Zeyaur Khan developed the “push-pull” method to fight the moth’s caterpillars which destroy large quantities of Kenya’s maize crop



both countries suffered poor corn harvests at the same time. To help solve these problems, Hans Herren used money from his World Food Prize to found the organisation ‘Biovision’ – whose task is to spread the ‘push-pull’ method.

Stephen Mugo has no financial difficulties to contend with, although his research field is the same as that of Zeyaur Khan. The seven-figure budget for his project, Insect-Resistant Maize for Africa (IRMA), is paid from Switzerland – by the Novartis Foundation for Sustainable Development established by the genetic engineering combine of the same name. Mugo views the involvement of the multinational organisation as “a humanitarian contribution to the war against world hunger”.

The project opened its office in Kenya because of the ‘advantageous political situation’, as Mugo concedes. Although the release of genetically modified organisms is not permitted officially, anyone knowing how to pull the right political strings can receive special authorization. Last year, the agrarian multi Monsanto started planting its genetically manipulated sweet potatoes there. Nor are the IRMA people expecting difficulties once their outdoor experiments with genetic maize commence in early or mid-2002.

“These people know which side their bread is buttered on” says a journalist from a Kenyan trade magazine who asked that her name remain undisclosed for fear of reprisals. According to her information, the big corporations keep in the decision-makers’ good books by means of carefully targeted donations, sponsoring, and footing expenses – everyday occurrences in a country whose corrupt government is pilloried by the World Bank and the International Monetary Fund. When Hans Herren addressed a convention organised by Novartis in Nairobi to demand

equal funding opportunities for non-genetic methods, he was denounced by high-ranking government officials. The denunciation patently stems from self-interest. Insiders report that these same government officials have already launched a company that will manage sales of the seed once the development of the genetic maize is completed.

To IRMA coordinator Mugo, such mud-slinging is an embarrassment. The political and commercial aspects of the project are none of his concern; “I concentrate on the scientific work”. And in that context, he claims, he can show dazzling results. His team, he says, was working on the *bacillus thuringiensis* which occurs as a natural insecticide in the soil, and has identified an active substance variant that is especially effective against moth larvae. The technique of transplanting bacterial genes is well-known; in the USA, Bt-maize has been in the fields for years. All Mugo needs to find now is a variety of corn suitable for Kenya.

The scientist intends to tackle any impending environmental risks with the help of a group of specialists charged with investigating interaction between industrial products and the biological realm. He is unconcerned by the fact that independent experts regard the timeframe envisaged as downright negligent. The sole problem Mugo recognises is that the moth larvae will eventually become Bt resistant, not least as a rigorous resistance management programme like that implemented in the United States is not viable in the African farmers’ minuscule fields. But the benefits, he believes, offer more than ample compensation. ‘push-pull’ on the other hand, he regards as little more than a nice idea, because the planting sequence will overtax many of the farmers.

Mugo believes that simultaneously cultivating three different types of plants is simply uneconomical. With Bt-





**Napier grass growing next to maize. Attracted ('pulled') to the napier and repelled ('pushed') by the legume desmodium, the moths leave the maize fields and Kenyans employing the 'push-pull' method benefit from higher yields**

maize, on the other hand, the technology comes in the seed, so that nothing can go wrong. "All the farmers have to do is sow, reap, and eat."

Of course, they would have to buy the seed first. Plus chemical herbicides (because Bt-maize is not immune to St John's wort) and chemical fertiliser, before their – quite substantial – investment can hope to bear fruit. In the 'push-pull' method, by contrast, the do-it-all desmodium enriches the soil with nitrogen all by itself. "Quite apart from all the other problems" the Kenyan trade journalist comments "the fact is that the poverty-stricken African smallholders couldn't afford the genetic technology in the first place. That shows that winning the battle against hunger is not the objective here, but rather the marketing, under the mantle of humanitarianism, of a controversial technology."

Lawrence Odek can only agree. "There is not a single man attending my field day who could afford the seed for

conventional high-yield maize." If there is one farmer in the entire Lambwe Valley capable of making any investments in his farm, it would probably be himself – something he, incidentally, owes to the very double and triple planting from the 'push-pull' method criticised by Mugo. Whereas the corn crop is devoted almost exclusively to covering food and school tuition, he can readily sell the Napier grass and desmodium; both are in high demand as fodder.

Which explains why Odek is now faced with an altogether novel problem. Should he spend the money he has made on a cow barn and venture into dairy farming? "My neighbours keep giving me all kinds of advice" the farmer says. "But nobody can make the decision for me. Before I learned about 'push-pull' I was never faced with such dilemmas" ■

WORDS MARCEL KEIFFENHEIM | PHOTOS MATTHIAS ZIEGLER

# Genetic engineering produces risks, not solutions



**The Ethiopian Dr Tewolde Egziabher, aged 61, represents the developing countries at conferences on genetic engineering, biodiversity and gene patenting. The ecologist runs the Ethiopian environmental protection authority and the non-profit Institute for Sustainable Development**

**GREENPEACE** *Are you happy about the agricultural giants' offers to fight world hunger with new plants developed through genetic engineering?*

**TEWOLDE** Not at all. It's naive to imagine that plants and their highly efficient gene pools – which have evolved over millions of years – can be improved by replacing or adding a new gene. The interaction between genes and proteins is far too complex. Which is why so many genetic experiments go wrong.

**But don't you take their offer seriously?**

No, they're missing the point. Famine in developing countries is mainly the result of unfair distribution. Today, the world is producing more food than ever before – but there are still more people starving than ever before as well. Producing even more food doesn't automatically mean that the poor will benefit. They simply haven't got the money to buy it. And genetic engineering isn't going to change that.

**Couldn't the genetic engineering industry produce plants that are better adapted to dry or salty soils?**

There's a lot of propaganda about this, but there's absolutely no proof that these plants are more prolific. The big companies actually have very different goals: they want to supply farmers with strains that are immune to specific pesticides, in order to make them dependent on these pesticides. The life sciences industry also has a second goal: to take control of the developing countries' existing seeds

and gene pool. The strategy is always the same: they supply free seeds until farmers have used up their own resources or the resources are no longer usable, and then they start charging fees.

**That's a serious accusation.**

It coincides with the experiences we've had with pesticides and artificial fertilisers. And it's the very same agro-chemical companies that are pushing genetic engineering today. Controlling seeds and charging the poor farmers for this service is not going to solve the problem of famine.

**If the farmers' harvests improve, they can afford to pay the fees.**

Some 30 different parties own patents for the notorious 'golden rice'. None of them charge fees at present. But once they have the farmers under their thumbs, they'll get their money. Agricultural companies are using patents to make us dependent on their seeds. There could hardly be a more effective form of colonialism. The genetic engineering industry will effectively be able to hold us hostage. That isn't the way to bring about world peace. Rather, it will spark an unprecedented rebellion with waves of refugees heading for the most affluent countries.

**Why does the UN development programme UNDP support genetic engineering?**

Because its work is dependent on money from the industry. The report definitely discredits the UNDP. I often wonder whether it is really still on the developing countries' side.

**How can the world's affluent countries help?**

By supporting developing countries' endeavours to improve their infrastructures. We need decent roads for transporting the food produced here to the markets. We need to preserve food, and be in a position to process it. And we need warehouses where we can keep surplus food from good harvests in store for harder times.

**None of this is necessarily inconsistent with using genetic engineering in agriculture, though.**

We should only start contemplating this new technology when we've solved the other problems. We don't need any new plants for food either; nature provides all the nutrients we require. These nutrients simply need to be distributed evenly. Genetic engineering doesn't present solutions; it presents risks. The tropics are home to an incredible array of species, and a valuable and irreplaceable gene pool. If genetically manipulated species were to be released, they could contaminate this gene pool, and many strains or species would die out. And that would be irreversible.

**Do you believe that sustainable farming can produce enough food to eliminate famine completely?**

Yes, I really do. Jules Pretty's study\* provides a lot of examples to support this view. Farming in the north has ceased to become an alternative for us. It destroys the soil and contaminates the ground water, which is ultimately our drinking water. We can use artificial fertilisers, but only if they improve the soil quality rather than destroying it. All the methods need to pass a test: they shouldn't be allowed to disrupt natural cycles and processes. Bio-farming is no longer a luxury for us. It is our only remaining hope.

INTERVIEW: MICHAEL FRIEDRICH

\* Reducing Food Poverty with Sustainable Agriculture: A Summary of New Evidence, Jules Pretty and Rachel Hine, Centre for Environment and Society, University of Essex, Feb 2001





# A message from Bangladesh

***Densely populated and threatened by floods and storms – Bangladesh is one of the poorer countries of the world. But there are seeds of hope: farmers bring in better harvests and live better since they use the methods of ‘nayakrishi andolon’ – new agriculture. The revolutionary simple model finds more and more supporters and can become an example for a whole region***

**K**orshed Alam is part of a revolutionary movement, but he doesn't carry a gun. His day begins at 4am, but he works for no boss except himself. His mission is political, yet it springs from the very soil itself. He farms a mere 3.5 acres in one of the world's poorest countries, yet the movement he is a part of has the potential to strike at the very heart of modern industrial agriculture.

Korshed's revolution is an ecological one. Like tens of thousands of farmers all over Bangladesh, he has abandoned the chemicals and hybrid seeds of 'modern' agriculture for something, well, even more modern. It's a shift that he's made not just because he is committed to the principles of organic agriculture, but because it simply makes sense.

"It's changed my life," he declares, squatting with other farmers in the shade of a large jackfruit tree in Nandoria village. "Before we changed, everyone had skin diseases from

the chemicals. We couldn't even take the fish because they were poisonous, and there were no wild plants to eat because they were either dead or very bitter. Now we've got good food, and it even tastes different – it's healthier and there are more vitamins."

Conventional farming wisdom preaches the value of efficiency, of maximising the yield of a single staple crop like rice or corn. This is how Korshed used to farm. He would buy the latest 'high yielding variety' seeds at the local market, and spread artificial fertiliser on the soil. Obediently following the doctrines of governmental extension agents, he would spray his crop several times to keep pests under control. But even as the poisons began to contaminate the soil and water all around him, he saw no alternative.

He explains: "Before we started using chemicals our soil was good, and just adding a little bit of fertiliser gave us a huge boost in productivity. But the yield soon began to go down, and we had to put on more and more fertiliser per acre. The amount of fertiliser we had to use went up a hundred times over thirty years. To make things worse, the price tripled over the same period. So everybody was losing – but they had to keep pumping in chemicals to try and get enough yield to pay for next year's seeds and to buy enough to eat."

Locked into a vicious chemical treadmill, farmers all over the country started to go bankrupt. Many had to sell their land and move to the cities in a desperate search for work. And all the while no-one thought to question the basic economics of conventional agriculture. Corporate adverts for

new hybrid seeds and ever-better chemicals flooded the billboards and the airwaves. Everyone thought there was no alternative.

Then came the 1988 flood. Floods are a regular occurrence in Bangladesh, and far from being the disasters they are often portrayed as, regular flooding is essential to renew soil fertility and fish stocks. But the 1988 deluge was unusual – it lasted for weeks, and many farmers lost everything. It hit particularly hard around Tangail, a small town three hours north of the capital Dhaka, where a small, radical NGO called UBINIG was conducting a research programme with handloom weavers.

“We had no experience in agriculture even” remembers Farida Akhter, now Executive Director of UBINIG, whose name is the Bengali acronym for ‘Policy Research for Development Alternatives’. “But we felt we had to do something. So we gathered together a medical team, took care of drinking water and helped buy people clothes.”

But as soon as the water started going down, UBINIG – which had a strong environmental background – found itself in a quandary. A group of farmers approached Farida asking for financial support so they could buy chemicals and seeds to start farming again.

“We thought it would not help to supply them chemicals” says Farida. “Instead we said if they wanted to talk about doing something else, we could.” So UBINIG called community meetings, and discussed with the farmers the alternatives to chemical-dependent farming. “It was the women who responded most positively” she recalls. “Most of the men, especially the younger generation, could not see any alternative to chemicals.”

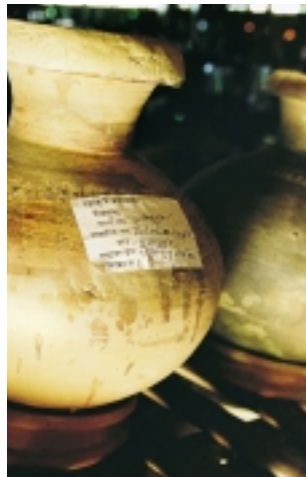
Then at one particular meeting an elderly midwife stood up. “We should not be using pesticides at all, because it destroys our bodies” the woman declared. She told the meeting about all the miscarriages she’d seen, and blamed chemicals for ruining the health of both people and animals. It was a breakthrough. Other farmers chimed in, telling stories of terrible diseases, of spiralling debts, and of soil that although once renowned for its softness had become more

recently as hard as cement. “Now our number one principle is no pesticide” says Farida proudly. “We got that first principle from that woman.”

That one meeting didn’t just change the farming practices of those who attended, it sparked a nationwide movement – now called the *nayakrishi andolon*. ‘Nayakrishi’ means ‘new agriculture’. It’s a name that was chosen to show that the practitioners of ecological farming were not going backwards towards traditional agriculture, but forwards to something new and better – having learned from the mistakes of the ‘green revolution’. And the results were staggering.

Korshed is now proud of his fields. “Using modern agriculture in this field here I only used to get one crop – of sugar cane” he says, pointing across a stream to a small plot full of lush growth. “Now, because we’ve started inter-cropping I get seven – onions, garlic, potatoes, radish, lentil, pumpkin and sweet potato. And I still grow sugar cane in between. I don’t have to buy any chemicals, and I can sell the surplus at the local bazaar.” Instead of artificial fertiliser, nitrogen is fixed in the soil by leguminous crops like pulses and okra (‘lady’s finger’). Korshed pulls up an okra plant, and shows how the root clump is clustered with white nitrogen nodules. Compost is made from water hyacinth (which grows ferociously on all the ponds, and used to be considered an invasive weed), banana leaves, rice paddy straw and cow dung. In Bangladesh’s steamy climate it rots down in less than a month. The soil is soft and covered in worm casts. “They are nature’s plough” he says. Seeing this example in Nandoria village, ten villages around have declared themselves Nayakrishi, and eighteen more have expressed interest.

Throughout Bangladesh a total of 65,000 rural households have now converted to practising Nayakrishi. UBINIG has established five Nayakrishi centres in different parts of the country, which hold workshops for farmers and co-ordinate the sharing of knowledge between different villages. The centre at Tangail now employs 40 people, many of them extension workers who travel by motorbike between



**Korshed Alam, the peaceful revolutionary. Middle and left: good husbandry of seeds in storage and in the field. Opposite: the women are traditionally responsible for keeping the seeds**





started talking with UBINIG about alternatives. We found immediately that with mixed cropping rather than monoculture we were eating better than before. We were eating our own varieties of rice and vegetables, and soon we had some left over to sell so we were gaining financially too. And our health was improving – skin diseases, stomach problems and even cholera had all gone.”

Perhaps the central thrust of Nayakrishi is the promotion of diversity – not just in the varieties of seed but in the whole ecosystem they are grown in. Nayakrishi fields are teeming with life – birds, insects, frogs and fish splash, plop and flit about in between the crops. It couldn’t be more different to the many European fields, where acres of the same crop stretch into the distance and biodiversity has been

severely reduced by modern farming practices.

the nearby villages to hold the weekly Nayakrishi meetings within the communities. One of these co-ordinators is Abu Bakar, a 25-year-old former farmer. Sitting cross-legged on a mat in Nallapara village, he is joined by 20 local farmers and their wives, as well as a crowd of eager children. Puffed rice is handed round as he works through the various agenda items. This week the discussions focus on making an inventory of seeds. Now is the time to plant paddy rice seedlings in well-tended seedbeds, to be planted out later in bigger fields after the rains. In addition, new banana trees can be put in, and the

bamboos which grow in profusion throughout the village – and are used for everything from buildings to bridges – are ‘pregnant’ and so should not be cut. It’s very detailed and very practical. Abu Bakar runs two to three of these meetings per day, covering 13 villages and 17 hamlets in total. “My main concern is to involve more farmers and to listen to their concerns,” he says. “More people keep coming to meetings because they’re curious to see how it works, and the number of Nayakrishi farmers is increasing rapidly.”

One of those attending the meeting is 58-year-old Hayet Ali. “Before I started Nayakrishi the water was so poisonous you could not put your feet in” he remembers. “We had lost many of our local varieties of seed because the government was promoting hybrids. The soil condition was hard, and we were all losing money on chemicals and buying seed. Then after the 1988 floods we

severely reduced by modern farming practices.

“See this fence – it has fifteen varieties of tree growing in it” says Raiqul Haque, universally known as ‘Tito’, the energetic director of the coastal Nayakrishi centre near Cox’s Bazaar. “Birds are coming in and making nests. Fallen leaves are decomposing on the soil, so that’s food for micro-organisms, and we’re getting some grass and other uncultivated plants coming. That’s diversity for you – it’s all over the place.”

Touring the centre, his enthusiasm is infectious. “See that pond?” he indicates over to a green patch of water, the surface of which is continually rippled by fish coming up to catch flies. “The droppings from the ducks are the best feed for fish. And those chickens over there – we’ve got 31 varieties of chicken. We’re not even ploughing here - the soil is so fertile you can just stick seeds in with your finger.”

He turns round again: “Look – if I use pesticides, I’m destroying all the life-forms, friendly insects too. If I use fertilisers I’m destroying micro-organisms in the soil. If we leave the insects they become food for the chicken. Only by ensuring biodiversity can we ensure food security for everyone.” Partly because of this commitment, the Cox’s Bazaar centre has been running a programme to replant the area’s lost mangrove jungle – once the home of tigers, elephants, monkeys and crocodiles – which was destroyed by commercial prawn farming during the 1980s.

This philosophy turns the conventional view of farming on its head. In Europe many farmers and politicians still think they have to abandon biodiversity altogether, by turning their fields into industrial operations. Mountains of food





'commodities' pile up – is this the way to ensure food security?

Tito shakes his head vigorously. “No, you don’t understand. I’m talking about food security for all life forms, not just for humans. That’s not possible without biodiversity. I might be getting one crop for me, but what about the trees, the insects, the grass and the chickens?” Put simply, the Nayakrishi view is not to see humans as separate from nature, dominating it. Instead, people are part of a much larger cycle of life, all of which has a value. It’s a much more expansive concept than simply aiming to remove chemicals from agriculture. Instead Nayakrishi sees the protection of the entire ecosystem as central to the human role.

Farhad Mazhar, Farida’s partner and co-director of UBINIG, has a story that illustrates the concept well. “When I go into a village to do training, the first thing I do is to give a farmer a stick, and tell him to hit the nearest child with it. He says: ‘No, I won’t do that.’ I say: ‘Why not?’ and the farmer says ‘Because it would hurt him.’ Then I ask the farmer ‘So why do you put pesticides on the land, which hurt the other life?’ This is an ethical principle. Insects and birds all have a right to food. So why cut a plant when it is food for another animal?”

It’s perhaps a consequence of this approach that makes Nayakrishi farmers have a rather different concept of the ‘household’ than is usual in the West. In Europe, a rural household might include a farmer and his wife, their children, and occasionally an older relative or two. In Bangladesh, cows, goats, chickens, even trees and wild plants that grow around the homestead are all considered part of

the ‘household’. Trees help shade the huts and beaten-earth courtyard from the glare of the tropical sun, whilst also providing building materials, fuel and fruit. Wild plants – so long as they’re not contaminated by chemicals – have all manner of medicinal uses and food value too. As the evening draws on in the Cox’s Bazaar centre, a flock of doves gathers on the roof of one of the huts, cooing gently. Tito scatters them some seed. “They too are Nayakrishi members” he beams.

The focus on community life is no accident. It’s one of the key pillars of the Nayakrishi approach that farmers should work together – especially on saving seed. Every household has its own seed bank, and every community has a shared seed centre where resources are pooled. And as a third backup, each regional Nayakrishi centre has a ‘seed preserving centre’ from the whole area, storing literally thousands of local varieties of crop.

Each seed centre is specially designed so that it’s kept cool and the air circulates. In the Tangail centre, hundreds of glass bottles hang from the beams of a wooden hut – each with a different colour according to the amount of light that the seed prefers. Each is carefully labelled with name, place of origin, scientific name and number. Altogether this seed centre contains a staggering 1400 varieties of crop. There are 298 varieties of rice, 68 varieties of bean, 16 of corn, 31 of wheat, 36 of chillies, 113 of jackfruit, seven of potato, four of mustard and many more. Each variety grows best in a particular type of soil and at a particular time of year.

There’s an immense skill in keeping seed – in knowing exactly which conditions to keep it in, and how many times to dry it in the sun after harvesting. It’s knowledge that was traditionally kept by women, increasing their status in the community and the household. “We get much more respect because we are the ones keeping the seed” says Sharbanu Banu in Nallapara, wrapping a bright red sari around her shoulders. “It really binds the family and the community together.” She smiles. “‘Sisters keep seeds in your hands’. That’s our slogan.”

These may be household concerns, but Sharbanu doesn’t just see herself as part of a local or national movement. “It’s global” she says. “Last year we had a three-day gathering of farmers from all over, including from abroad. The biggest issue was about the patenting of seeds – foreign transnational companies steal our seeds so they can make a profit. If some company comes round here, we don’t tell them anything.” Several farmers from nearby villages have been been to protests in Dhaka, and some went on an international ‘people’s caravan’ all over Asia in 2000, meeting other farmers and spreading the word.

“If we go for ecological agriculture then we are really fighting transnational corporations” says Farhad Mazhar. “We’re not just saying ‘We don’t want Monsanto’, but we can actually show that we’re much better off without Monsanto.” It’s not a dogmatic position. “I’m not against the market, or even international trade. It’s just that trade should be non-exploitative, and local needs should come first. Now we’ve found that Nayakrishi agriculture is more economically viable than conventional modern farming, many households



are beginning to go into cash crops for the market too.”

But even as one battle seems to be going well, new storm clouds are gathering on the horizon. Genetic engineering is the new buzzword amongst the seed and chemical corporations – and Asia is being targeted by companies like Syngenta, who are eager to sell patented GE seeds to farmers across the continent. Syngenta has hit upon ‘golden rice’ as a key promotional too. The new rice is genetically enriched with vitamin A, supposedly as a way to combat malnutrition.

Haroun Rashid, who farms 2.5 acres around Baratia village near Tangail, is unimpressed. He hasn’t heard of ‘golden rice’, but he understands immediately what the game is. “In that rice we’d get only one kind of vitamin,” he counters. “What about the other kinds of vitamins.” Another farmer adds: “Imagine if one person out of a family of seven is vitamin A deficient. If you feed them all ‘golden rice’ then the other six will get sick!” Everyone laughs, and the decision is clear. “No, we’re not interested in golden rice” confirms Haroun. “We’ve had enough of these chemical things. Enough is enough.”

Instead of importing yet more innovations from the corporate laboratories of Western agribusiness, the practitioners of Nayakrishi are intent on exporting some of their ideas into a farming system they see as destructive even for those who seem to benefit from it. “Western farmers have a miserable life” says Farhad. “I know, because I have lived with them in Canada. People are very unhappy, and there are many cases of suicide.” But surely Europe at least is self-sufficient in food. “That’s a myth” replies Farhad. “Europeans produce 1 calorie of food by spending 9 calories of energy. In Bangladesh we get 3 calories of food with 1 calorie of energy. All the oil and fertiliser come from pirating the resources of other countries using military and trade

power. It’s not an argument to say that Europe is self-sufficient in food.”

“Last year I also visited some farmers in Canada, and it made me realise just how much better off we are in Bangladesh,” agrees Farida. “One farmer had 7000 acres and several huge tractors, but only his son there with him. He was lonely and I felt so sorry for him.” But surely she’s not suggesting that life is better in a Bangladeshi village than, say, a German village? “Yes I am” she replies calmly. “Life is far better in a Bangladeshi village than a German village because people there cannot lead a normal life. The government is paying them not to cultivate. It’s like a museum. But in our villages there’s a community – there are living people there.” But what about poverty? “People in Northern countries suffer from a poverty of happiness” she says. “It’s difficult for them to see that they don’t have certain things we have.”

And as for famine? Well, here’s a typical menu for an evening meal at the Tangail Nayakrishi Centre: Local paddy rice (speckled brown, not sticky, with a subtle nutty flavour), dhaal (lentils with onion, garlic, ginger, oil and water), green beans with jackfruit seeds (like soft nuts) cooked with amaranth, fresh-water prawn and pumpkin leaf (cooked like spinach with a hint of chilli) and fresh fish (cooked with onion, turmeric and other spices in a mouth-watering sauce). Followed by fresh, sweet mangoes and cow’s milk.

Anyone for a bowl of genetically engineered vitamin A rice? Thought not! ■

**“I’m not against the market, or even international trade. It’s just that trade should be non-exploitative, and local needs should come first”**

Opposite top: the roads are used for working on jute. Below: chemical-free ricefields are better habitats for other food sources including fish. This page: children play among the jute plants

WORDS MARK LYNAS | PHOTOS KAREN ROBINSON



# SRI – the revolution in the rice fields

**W**henever farmers around the world hear about the new system, they react with scepticism or even indignation. Without warning, they are not only being expected to cast their traditional knowledge about rice-growing overboard, but to forget all the things they have just arduously learned about modern techniques. No longer are perfectly cultivated seeds, new and more efficient mixtures of artificial fertilizers, or a weed and insect killer from some high-tech lab the guarantee of far higher yields. Suddenly, simply cultivating the rice paddies differently is supposedly the magic formula.

“Qualms that something this simple should not have been discovered earlier make scientists adopt a jaundiced view as well.” That is how Norman Uphoff, professor at the Cornell University in New York, describes the negative stance of many colleagues. To compound matters, this new method – the fruit of decades of observations and practical tests – has been developed not by a scientific specialist, but by a Jesuit priest.

Henri de Lalaunie, a Frenchman who is both a trained farmer and ordained priest, came to Madagascar in 1961 with hopes of helping rescue the country’s small-scale farmers from the prevailing abject poverty. He observed the way they grew rice – their basic foodstuff – and planted test fields, where he conducted further experiments on the most promising methods. Twenty years later he was able to piece this puzzle together to form an amazing new concept: his method allows more rice to be harvested from fewer rice grains. What is known as the ‘System of Rice Intensification’ (SRI) was born.

In the SRI method, only one tenth of the usual amount of rice grains is sown in the cultivation beds. The farmers don’t then wait a month before planting the shoots in the fields, but do so after just eight to twelve days. Furthermore, the shoots are planted individually, rather than closely together in bunches. While the rice is growing, the farmers need to make precise judgements. Whereas the fields are usually flooded to keep the rice plants supplied with water and, simultaneously, to keep weed volumes low, with SRI the rice gets the exact amount of water it needs for optimum growth. Rice tolerates being up to its neck in water, which is why it is traditionally grown this way, but this doesn’t necessarily mean it likes it. Leaves and especially roots are definitely much more lush when the rice gets just the right amount of water.

However, now the weeds need to be tackled mechanically. In so doing, Father de Lalaunie discovered that mechanically aerating the soil with a hoe also stimulates plant growth. The fruits of his labour: the rice harvest per hectare of land was double the average

quantity produced using the conventional method. And that (for the most part) without using chemical pesticides or artificial fertilizers! Under these growing conditions, compost proved the perfect source of nutrients.

The new method casts doubt on much established rice-growing wisdom (‘a lot needs a lot – a lot of plants need a lot of water’), yet it is really amazingly simple. It satisfies the rice plant’s natural needs more effectively; at the same time, the stress of replantation takes place not at a time when it does damage but at a point that instead stimulates the growth of its shoots. It ensures the rice has more room to develop roots and leaves, gives it just the right amount of water and supplies it with increased nutrients.

“SRI promises a higher yield than the usual method of growing rice, but also demands more skills and involves bigger risks” Uphoff says in summary. In his opinion this is one of the main reasons why this method was not developed earlier. For there are indeed practical problems: not every farmer can water his or her fields at just the right time. With terraced fields, for example, the steps are flooded from top to bottom, and there are often no pumps available. Furthermore, not everybody can afford to employ workers to dig up the weeds before the harvest has been sold. And finally, not every farmer possesses the skills and knowledge required. In addition, there are irrational fears of trying out something new and simultaneously







breaking with tradition, a step that sparks fears of placing the family's existence in jeopardy. People who grow rice can rarely afford to experiment with their livelihoods.

All the same – and maybe this is what best demonstrates the value of this system – increasing numbers of farmers in more and more countries are taking up SRI. In Madagascar there are now some 50,000 rice farmers planting their paddies according to Henri de Launie's methods. Positive reactions are being heard from China, Bangladesh, Sri Lanka and Cambodia – not only as regards the yield but also the farmers' acceptance of this method. Asia is very receptive to the new idea. Now experts are waiting expectantly for the results of cultivation tests in Cambodia, where the renowned Dutch University of Wageningen is conducting a study.

However, Norman Uphoff prophesies that “the real breakthrough will come when SRI has overcome the stigma of charlatanism”. When it is proven without a doubt that this method uses the soil and water more effectively and at the same time helps conserve the environment. Then the land will yield further profits: “Few farmers need twice the amount of rice” says Uphoff “so there is room on the fields for other grain and vegetables, which not only means the family can be better fed but also translates into a further source of income”.

**The ‘System of Rice Intensification’ (SRI) allows more rice to be harvested from fewer rice grains. But it is not easy for all rice growers to benefit**



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