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Brot für die Welt

recipes against hunger

success stories for the future of agriculture

september 2001

GREENPEACE

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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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contents

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

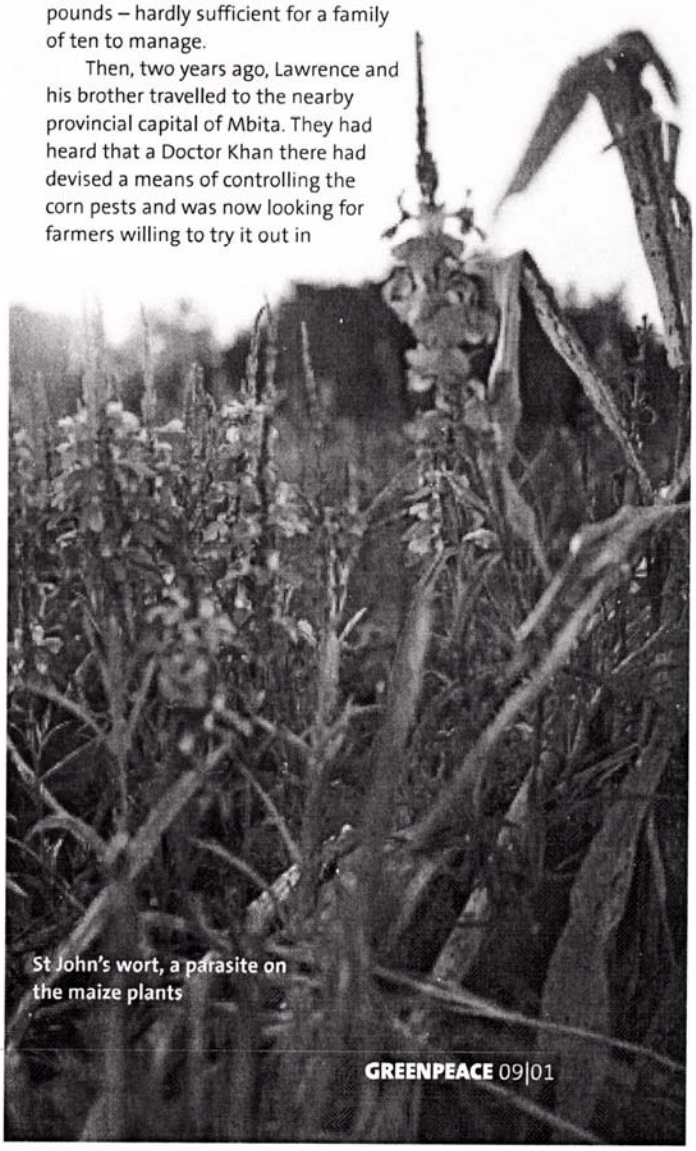
One after another, the men from the vicinity rise to their feet from the benches Lawrence Odek has brought from the nearby church to provide a proper setting for the 'field day' – the agricultural information day being held at his farm. They praise their host's pioneering spirit and gladly reveal what 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;

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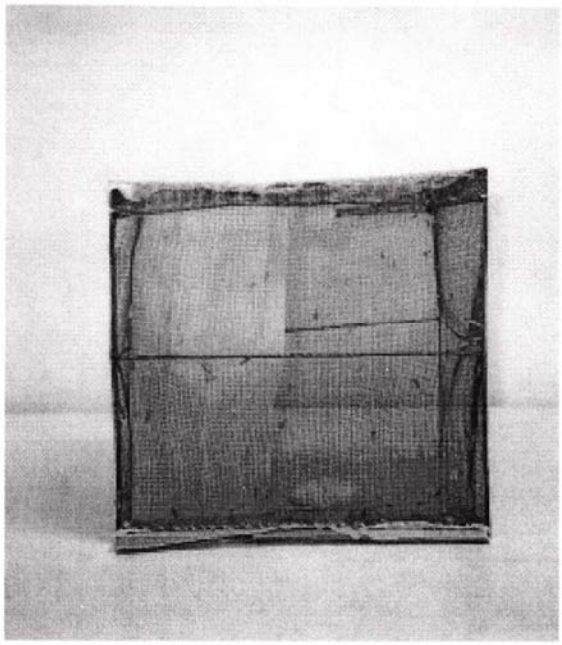

Captured *chilo partellus* moths (left) and a handful of their larvae (below). The Indian scientist Zeyaur Khan developed the "push-pull" method to fight the moth's caterpillars which destroy large quantities of Kenya's maize crop

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