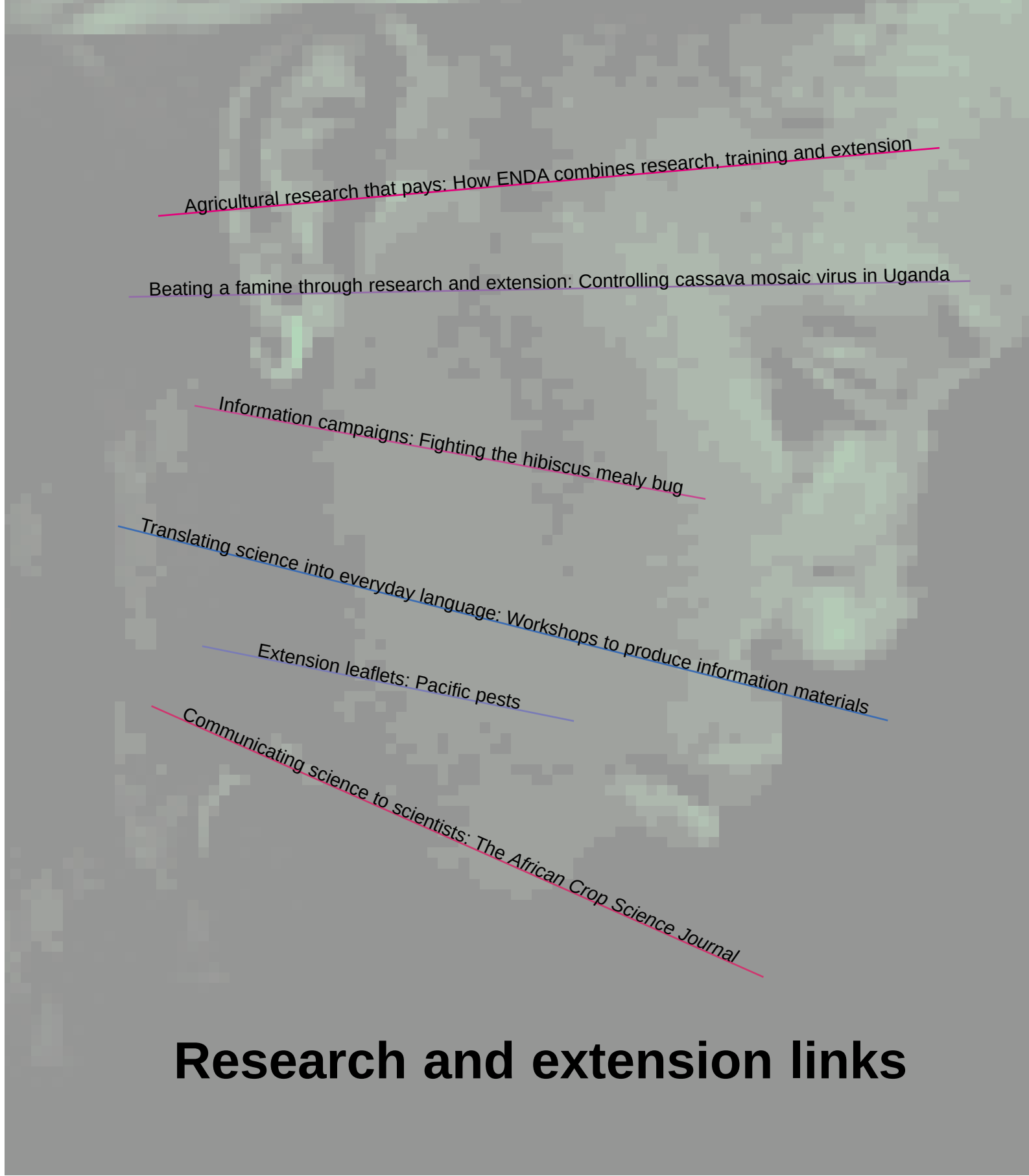

Research and extension links

Traditional agricultural research and extension are changing. The old model, still all too common in the developing world, is for researchers to beaver away in their laboratories and experiment farms, occasionally emerging to announce a new breakthrough. It is then the job of agricultural extension to carry the good news to the farmers.

That model has its problems. Who makes sure that the researchers are studying the right things? Often, it seems, research is done for the sake of research – another scientific paper published, another seminar presented – rather than to solve farmers' problems.

And how do extension workers get the research findings? Extensionists don't read research journals, and probably couldn't understand the jargon if they did. Without this vital link, agricultural research is simply a waste of time and money.

Various institutions are finding ways to bridge the gap between research and extension. Sometimes, a crisis such as a disease outbreak or a new pest forces them to rethink their procedures and relationships and to use new approaches. In other situations, a new organization, often an NGO, has the flexibility to bring together researchers, field workers and farmers to write materials that would be difficult or impossible to produce otherwise.

Let's not forget scientists themselves as an audience. Scientists need to publish: one of the few rewards for a researcher toiling away in a laboratory is the peer recognition that published articles bring. But publication is much more than that: it is the way that science advances, it is how a researcher learns about work done in a distant land, and builds on it. Without research journals, scientific conferences, and (the newest development) publication on the Internet, many technological advances simply wouldn't happen.

How ENDA combines research, training and extension

Paul Mundy

A clutch of problems

Take a look at a clutch of rural problems, common throughout the developing world. Problem number one: villagers want to learn better farming techniques so they can grow more crops. But getting the information they need is difficult: research institutions are too remote, and much of the research they do is not directly relevant to farmers.

Problem number two: in order to do field experiments, research institutes need land and cooperating farmers. But stuck in their laboratories, scientists lack the contacts they need with farmers.

Problem number three: extension agencies have the task of teaching farmers new technologies. But that is difficult: demonstrations require land, and setting them up is an expensive, time-consuming business.

And a solution?

ENDA, a Senegal-based NGO, thinks it has found a solution to all three problems. The solution is based on a deal between ENDA (Environment, Development and Action) and the people in a village. The villagers donate some spare land (say, 5–10 hectares) to ENDA, and the NGO establishes a training centre there for the local community.

ENDA extension staff and four trainees from the village live in the centre's dormitory and work the land, growing crops and raising livestock like any other farmer. They also run experiments and arrange demonstrations of new farming methods. For example, they may plant rows of new varieties of maize alongside a plot of traditional varieties; they then invite the villagers in to compare the results for themselves. Some 50 or 60 visitors can be expected at any one such field day.

The training centres make ideal sites for researchers to conduct field experiments, says Chierro Bal Seck of ENDA's action-research team. The centres are located on village land, have staff to plant and weed the crops, and there is a ready-made audience of local people to view to results and adopt practices they like. Scientists from ISRA (Institut sénégalaise de recherches agricoles, the government agricultural research institute) and the University of Dakar can ask ENDA for help in doing research at the centres. And ENDA has signed an agreement with the University of Minnesota for American students to conduct research in Senegal using centre facilities.

ENDA's library offers readers a wide range of information on development topics *(Photo: Paul Mundy)*

Of course, the local farmers themselves may also suggest topics for research, says Chierro Bal Seck.

Examples of research being conducted include the rapid multiplication of planting materials that grow from cuttings, such as potatoes, cassava and strawberries; experiments to control nematodes in tomato and okra; and a study to find ways of best using the large amount of biomass produced by leucaena (a nitrogen-fixing tree widely planted to improve soil fertility).

There are four such centres already: one at Sébikotane, near Dakar, and others at Sandiara (in the west of the country), Mérina Diop (east-central), and Nguénienne (west-central), established with support from the UNDP (United Nations Development Programme) and Caisse française de développement. Established in 1998–99, they have already played host to top-level policy-makers, including the heads of the World Bank and FAO.

The centre in Mérina Diop is particularly interesting. Central Senegal is a particularly poor area, subject to desertification. Large numbers of people are unemployed, and many young people move to Dakar or emigrate to the United States, where some become involved in drugs and prostitution. ENDA and UNDP, which supports the training centre, hope that it will contribute to solving all of these problems.

Ten more centres are planned in the immediate future. Chierro Bal Seck says that if these are successful, ENDA hopes to establish a total of 640 centres: two for each rural community in Senegal.

ENDA's goal is for the centres to be able to support themselves financially. That means growing and selling enough produce to pay for the running costs, including the salaries of the staff and the trainees. So far, the centres raise 70 percent of their costs by selling produce; this percentage is expected to rise as their livestock enterprises reach full production. The centres can also sign production agreements with local traders and exporters.

About ENDA

ENDA is an international NGO that focuses on environmental and development problems throughout the developing world. Headquartered in Dakar, Senegal, it has offices in 21 developing countries: 14 in Africa, five in Latin America, and two in Asia.

ENDA was founded 1972 after an international conference in Stockholm on the environment. It operates as a federation of 24 semi-autonomous teams, each focusing on a specific area of development, including health, energy, gender, urban affairs and publishing. It receives most of its funding from bilateral aid agencies and NGOs in Europe, and from the European Union.

"You can't take [the press] out just to see the cabbages you've planted"

ENDA works closely with the media in Senegal to ensure that its work reaches a wide audience, says Simon Meledge, who handles ENDA's public relations. He produces press releases, holds press conferences, and prepares kits for reporters containing information that reporters can adapt for their stories.

Each year, he organizes several visits for journalists to sites where ENDA has been working with local people. He spends quite a lot of time identifying the most interesting stories to tell. It is important to choose the right time and place. "You can't take them out just to see the cabbages you've planted," he smiles.

Unlike in some countries, it's not necessary to pay journalists in Senegal to ensure they report on a story. If Simon Meledge organizes a press visit, he makes sure he covers the journalists' transport costs. But it's up to the journalists to decide whether to write anything. Conferences and book launches are good "hooks" for news stories. Simon Meledge has a list of journalists he invites to such events.

ENDA gets quite a lot of coverage on the radio. It produces two or three programmes a month, and pays to have them broadcast. Plus, Simon Meledge and his colleagues are often invited to participate in round-table discussions on the radio.

ENDA was one of the pioneers of the Internet in Senegal, and it has an extensive and informative website (www.enda.sn).

900,000 books in 25 years

One of ENDA's 24 teams is a publishing unit known as "ENDA Edition". This publishes about 10 books a year in English and French, on all the subjects covered by ENDA itself.

Between 1974 and 1997, ENDA distributed nearly 900,000 copies of books. An estimated 70 percent of these were sent to Africa, and 20 percent to Europe. The most successful title? A French edition of the health guide *Where There is No Doctor* (*Là où il n'y a pas de docteur*) by David Werner, which has sold more than 134,000 copies. A more typical book has a print run of between 1500 and 6000.

ENDA co-publishes many of its titles in collaboration with United Nations agencies such as Unicef, and with CTA.

The prices are intentionally low; they are intended to cover the publication costs rather than make a profit. There is a two-tier pricing structure for books: *Where There is No Doctor* is sold for 5000 CFA francs (€7.62) in the developing world but three times that (€22.87) in the "North".

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Beating a famine through research and extension:

Controlling cassava mosaic virus in Uganda

Paul Mundy

A mystery disease

Farmers in Luwero, north of Kampala, first noticed the mysterious disease in 1988. Yellow blotches appeared on the leaves of their cassava plants, stunting their growth. The leaves eventually fell off, and when the farmers dug up the starchy roots of the plants, they found nothing to eat.

Local extension staff at first blamed cassava green mite, but researchers later identified the true culprit: cassava mosaic, a disease caused by a virus. This virus is common throughout Africa, but before then had not caused serious problems.

This time, though, the problem was bad. About 2000 hectares of cassava plantings were wiped out by the disease in 1988. Carried by whiteflies, the virus spread steadily south by about 20 kilometres a year, decimating Uganda's second most important food crop. By 1999 it had covered the whole country and had spread into neighbouring countries as well.

Second only to bananas

Cassava accounts for some 30 percent of the food eaten by Ugandans – second only to bananas. Farmers learned that there was nothing they could do to fight the virus: all native varieties were susceptible to it. They abandoned cassava and switched to other crops, such as sweet potato. In Kumi district in the east of the country, farmers planted more than 30,000 hectares of cassava a year in 1986–88; by 1992, they were growing less than 5000 hectares. At the height of the epidemic in 1996, Uganda's total cassava production had fallen by 90 percent, from 4 million tons to under 500,000 tons a year.

Plummeting cassava production brought famine in its wake. In 1994, an estimated 3000 people died of starvation in eastern and northern Uganda. Girls were forced into early marriage because their parents needed the dowry money to buy food. Cases were reported where young girls were exchanged for cassava.

Partnership pays off

Uganda's National Agricultural Research Organization (NARO) was on the spot. It had to find a solution, and fast. Dr William Otim-Nape, a virologist who headed NARO's cassava team, and scientists at the NRI (Natural Resources Institute) in the UK began an aggressive research

Healthy cassava plants and (far right) plant showing symptoms of cassava mosaic virus *(Photo: CTA)*

programme. They marshalled support from various donors, including Canada's IDRC, the Gatsby Charitable Foundation, Britain's DFID, USAID and the World Bank. Gradually, the scientists came to understand the disease and how to control it.

The government first attempted to prevent the disease from spreading by destroying infected plants. That didn't work: in one research trial, 4 hectares of the main variety were decimated by the disease, despite the strictest sanitation measures. Clearly, another answer was needed, one based on cassava varieties that were resistant to the disease.

None was found in Uganda. So William Otim-Nape and his team went further afield – to IITA (International Institute of Tropical Agriculture) in Nigeria. They produced hybrids by crossing resistant varieties from IITA with local cassava varieties. They tested these hybrids in the field, and found that they were resistant to the disease. Finally, there was hope.

Another breakthrough came in 1996, when William Otim-Nape and researchers at the Scottish Crops Research Institute were studying the genetic make-up of the virus. They found it was a hybrid of two existing viruses that had previously caused little harm – the first time such a hybridization had been seen in this family of viruses.

Involving farmers in research

Normally, breeding a new crop variety takes up to 10 years because of the careful testing, selection and re-testing that is needed. But faced with the looming famine, the researchers had to cut corners. They invited farmers to help evaluate the new varieties. The farmers carefully evaluated each one, and cooked and tasted the tubers. They took cuttings from the ones they liked home with them to plant on their own farms. At the end of the season, the researchers visited the villages to discuss the merits and de-merits of each variety with the farmers. In this way, it was possible to halve the time needed to develop and release a new variety to 4–5 years instead of 8–10 years.

Cassava is an unusual food crop in that it is not grown from seeds. Instead, farmers cut the long, knobbly cassava stems into short stakes, each with several knobs or "nodes", and plant these cuttings in the soil. The nodes on the cuttings sprout and put down roots, forming new cassava plants.

This has both advantages and disadvantages. The advantage is that each cassava plant is genetically identical to its parent: it is a clone. That means that once the researchers had found resistant varieties that farmers liked, they did not have to worry about making sure the variety

was pure (as is necessary with sexually reproduced crops such as rice and wheat). The disadvantage is that one cassava stem can produce only six or so cuttings, instead of the hundreds of seeds on a rice or wheat plant. That means it takes a long time to multiply enough cuttings to plant a field of cassava.

Fortunately, scientists at CIAT (Centro Internacional de Agricultura Tropical) in Colombia had developed a way of growing cassava plants from a very short section of stem containing just a single node, instead of the several nodes on a standard cutting. Using a special humidity chamber, it was possible to grow far more plants from a single stem, greatly speeding up the multiplication of resistant varieties.

Working with farmers

It was clear that the new varieties could succumb to the disease if they were planted in isolated patches: the virus would simply spread from the surrounding susceptible varieties, swamping the new varieties despite their resistance. Large areas were needed where only resistant varieties were planted. But for that, a massive campaign to inform farmers and to multiply cuttings would be required.

The NARO researchers called on the extension service for help. The District Agricultural Officer appointed staff to coordinate the cassava programme in each district, county and sub-county. With support from the Gatsby Charitable Foundation, the researchers trained the extension staff and provided them with transport and allowances, creating a National Network of Cassava Workers, or "NANEC" for short.

NANEC workers in each district began an ambitious training programme for farmers. This covered information about the cassava mosaic disease itself: how it spreads and how to control it. It also discussed the resistant varieties, the need to destroy infected plants and use only healthy plants, and how to make and use a cheap humidity chamber. In all, more than 35,000 farmers were trained directly; these went on to train other farmers, reaching 200,000 farmers in all.

The NANEC workers collaborated closely with community organizations such as women's groups and young farmers' associations. These groups multiplied and distributed cuttings, ran on-farm trials of new varieties (some 600 trials in six years), and managed demonstration plots that could be used to train their members. More cuttings were produced on government land and prison farms.

When they realized how important it was to get rid of the source of the disease, villagers took it on themselves to punish farmers who grew susceptible varieties. They fined offenders or subjected them to social pressure. Traditional "community police" destroyed the infected crops. The most effective community groups were those that already existed – 20 or 30 farmers who would get together to dig and weed each other's fields in turn. Such groups could easily add the cassava training to their activities. NANEC also helped form new groups, but these did not prove as durable as the existing groups.

The mass media were used as well. NARO hired journalists to write newspaper and radio stories, and paid for airtime for a radio programme on cassava.

The results of success

The success of this approach is reflected in the statistics. By 1998, Uganda's cassava production had recovered to pre-epidemic levels. By 1999, output was 16 percent above levels in 1989, the peak year before the epidemic hit. Instead of famine, the country now has the opposite problem: a glut of cassava, pushing prices down. Uganda has begun exporting fresh roots and cassava chips to its neighbours, and is establishing factories to process the surplus yield.

Success in the fight against cassava mosaic has also led to changes in the research and extension system. NARO has been restructured, and regional research stations have been established in each of 12 agro-ecological zones, so as to bring research closer to the farmers. To ensure still closer links between researchers and farmers, responsibility for the transfer of new technologies to farmers has been moved from the Ministry of Agriculture to the semi-autonomous NARO. Coordination with extension has improved, and NARO scientists now use participatory research approaches much more readily. Partly as a result of the epidemic, the previously centralized extension service has been devolved to district governments. Many NGOs involved in agricultural development have adapted the NANEC approach for their own uses.

NARO is trying to copy the approach for other crops, too. William Otim-Nape, now NARO's Deputy Director-General responsible for outreach, says that a coffee wilt disease is the next target. Like cassava, coffee is an important crop in Uganda, and it is propagated in the same way, by cuttings, so the same approach may work.

The fight against the cassava mosaic epidemic has left a permanent mark. "It has changed the way everybody thinks in agricultural research and extension," says William Otim-Nape. And it shows how scientific expertise, organization and a modest amount of funds can be brought to bear in a relatively short time to overcome a crisis. These are lessons that other countries, growing other crops, can learn too.

FOR MORE INFORMATION

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Information campaigns:

Fighting the hibiscus mealy bug

Joseph Seepersad
Wayne Ganpat

The majestic samaan tree with its huge, sprawling branches had been a landmark in the city of Port-of-Spain, Trinidad, for over 150 years. It had withstood the elements during all that time, and seemed destined to last for several generations to come. But it was slowly dying. It had fallen prey to the pink hibiscus mealy bug, an insect pest that had made a rather inauspicious entry into the island just a few months earlier, in mid-1995.

The story began two to three years before that, when the mealy bug caused considerable damage to crops and other plants in neighbouring Grenada. But nothing more was heard for a while, and it seemed that the threat to other countries had passed.

Then a few localized outbreaks were reported in Port-of-Spain, where the harbour was located. The authorities thought that traders had brought the pest to Trinidad, so they imposed restrictions on them. At the same time, they tried to eradicate the pests in the isolated pockets where they were identified, using the "spray, cut and burn" system. However, reports of the mealy bugs quickly multiplied: they were spreading fast.

The mealy bug seemed to prefer hibiscus, a pretty flower found in many gardens. As the pest spread, it became clear that the public had to be alerted via the mass media. So the Ministry of Agriculture began an information campaign in earnest, appealing to the public to "spray, cut and burn". Since without control, the mealy bugs could spread very easily, the ministry hired teams to carry out the job if necessary. But officials had to rely on reports from the public – reinforcing the need for a national thrust.

Love your enemies

Despite all these efforts, the bugs did not seem to notice: they spread to crops, trees and other plants. Sorrel, used to make a traditional Christmas drink, was severely affected. Mealy bugs became media stars.

It was clear that "spray, cut and burn" wasn't working. New ideas were needed.

The new approach was based on integrated pest management, with biological control as the core. Biological control relies on natural enemies: spiders, dragonflies, lacewings, parasitic wasps and other insects that kill pests. Two of the mealy bug's natural enemies were introduced into Trinidad, and they eventually managed to control the mealy bugs.

Anatomy of the campaign

How did the lowly mealy bug come to loom so large in the public eye?

Not surprisingly, a lot of planning and attention went into the effort. Two committees were established – a technical advisory scientific committee, and a task force implementation committee. The same person chaired both: Cynthra Persad of the Ministry of Agriculture. The technical committee was made up of representatives of the ministry's Extension Division and all the major agricultural research organizations operating in Trinidad – local, regional and international. It made technical recommendations and devised strategies for dealing with the problem. The implementation committee consisted mainly of representatives of the various divisions of the Ministry of Agriculture. Its main role was to coordinate the implementation of strategies and to provide feedback to the other committee.

The committees recognized that public awareness and extension programmes were essential to alert people to the mealy bug and the devastation it could cause. The Extension Division used different types of media, particularly radio and television, to inform people and to tell them to report the bug to the authorities if they saw it. Even later, when the control efforts shifted from "spray, cut and burn" to biological control, it was still important to reach the public to know where the predators should be released, and to monitor the level of control.

Three- and five-minute radio programmes were broadcast on various stations. To enable people to identify the insect, detailed descriptions and pictures had to be widely distributed. Colour posters and handbills were distributed to the public. At the height of the campaign, short television programmes were also produced.

Since messages had to get out to as many people as possible very quickly, the ministry's limited facilities for producing mass media materials could not handle the job. Cable television has made Trinidad's viewers a sophisticated lot, so the television programmes had to meet

BOX 15

Jingle bug

A radio jingle was produced for the campaign. It went like this:

If you see the mealy bug
Report it right away
Don't delay…
Stop its destruction

demanding broadcast criteria. Extension Division staff drafted the technical content and the scripts; the production was contracted out to commercial media houses. Similarly, since the posters aimed to show the symptoms as realistically as possible, printing was also contracted out. The factsheets and leaflets were developed and produced in-house.

Timely and appropriate dissemination of the message was key. Normally, commercial radio and television stations broadcast the government's educational materials outside the peak viewing and listening times. But media surveys showed that those times were not suitable. The same surveys suggested which stations were best to reach specific audiences. For example, certain radio programmes were geared to commuters, young people, people with certain cultural backgrounds, and so on. For television, programmes on the mealy bug were shown at prime time, or at other times when many people would be watching.

Money well spent

It didn't come cheap: the commercial stations did not broadcast these programmes for free. But it proved to be money well spent. Surveys later showed that most people had heard about the mealy bug through the mass media.

How was it possible to get such resources from the government relatively quickly? Perhaps it was the very visible destruction caused by the pest in other countries, and the realization that the same could happen in Trinidad.

The information and education strategy did not depend only on the mass media. The extension field staff were mobilized to deal with the threat, particularly in areas where outbreaks had occurred. They visited households, held programmes in schools, gave talks at Rotary Club meetings and community organizations, and came armed with lots of materials to give away. They set up exhibits in shopping malls and outdoor markets. Very importantly, too, they responded to numerous telephone calls by the public: the publicity materials advertised numbers that people could call to report the bug or to ask questions.

The reasons for success

The programme was successful: only a small amount of damage eventually occurred. The samaan tree in Port-of-Spain was saved, and is flourishing today. Newspaper editorials acclaimed the Ministry of Agriculture and its staff. With FAO's help, the experience has been shared widely, both within and outside the Caribbean.

The reasons for success? The matter of appropriate technology and the way it was handled perhaps stand out. The biological control methods were introduced at the right stage, and this was possible only because the national committees had been put in place as soon as

the problem appeared to be a difficult one. Having one person chair both committees ensured a built-in link between research and extension.

The communication effort was also crucial in arousing concern in various quarters and in mobilizing resources. In some ways the communication effort broke new ground – by contracting out certain aspects of production and dissemination. But in other ways it stuck to certain basic principles – relying on its foot soldiers, the much-maligned extension field staff, to bring the message home to the people.

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Translating science into everyday language:

Workshops to produce information materials

Paul Mundy

Translating science

All over the world, agricultural scientists in research institutes and universities are working to solve farmers' problems. They develop new crop varieties, test the use of fertilizers on different soil types, and look for ways to control the pests, diseases and weeds that can dramatically reduce the amount of food a farmer can harvest.

Once the scientists have found a new technology, they typically write it up as an article describing their experiments, and publish it in a scientific journal. But translating the scientific language in the article into something that farmers (and extension workers) can understand is very difficult. Here's a typical sentence:

> Results of the experiment showed that a high phenol content in organic residue from various species resulted in slow decomposition rates and inhibited the release of nutrients.

It is hard for a farmer or extension worker to understand this, let alone put the information to use. It's necessary to translate it first into something like:

> If you want to know if a particular type of plant will make good compost, bite one of the leaves and taste it. If it makes your tongue curl up, it probably won't rot very quickly. That means it will not make good compost.

Translating scientists' language into something normal people can understand is a major challenge. It's hard for the scientists to do: they are used to scientific terminology and often see no other way of expressing their ideas. Indeed, they often deliberately use technical language because they want to make sure that their statements are accurate and are suitably hedged with enough *if*s and *but*s.

Translating science into everyday words and concepts is hard for extension workers and farmers, too: very few have enough scientific background to do it. All too often, the science does not get translated: it gathers dust on library shelves.

Participatory workshops

How to get this translation done? One method, used by IIRR (International Institute of Rural Reconstruction) in Nairobi, Kenya, is to run workshops that bring scientists, extension workers, NGO staff and farmers together to develop information materials jointly. A team of

Above: Participants in a workshop in Bogoria, Kenya, run by ITDG (using IIRR's approach but without IIRR involvement) studying a manuscript on paraveterinary medicine *(Photo: Paul Mundy)*

Right: Ethnoveterinary specialist Dr Jacob Wanyama (standing) discussing the formatting of a manuscript with computer staff at a workshop in Bogoria, Kenya *(Photo: Paul Mundy)*

facilitators, editors, artists and desktop publishing staff helps the participants present, edit, illustrate and revise the manuscripts. A 2-week workshop can result in a set of extension booklets or a 200-page, easy-to-read manual.

IIRR's workshops are very different from the scientific conferences familiar to many participants (see Box 16). It is an extremely flexible process. Each manuscript is presented, critiqued and revised at least twice during the workshop. This gives the opportunity for participants to revise them substantially, drop a manuscript if it is unsuitable, split it into two or more parts, or combine two manuscripts into one.

All the workshop participants – farmers as well as senior scientists – contribute to what goes into the final book. The scientists ensure that the information is scientifically accurate. The extension workers and NGO personnel make sure that it is easy to communicate. The farmers present make sure that the text and illustrations are easy to understand and the information is relevant to their needs.

Early in the workshop, the participants brainstorm ideas for new topics (other than those already prepared) that should be part of the publication. Individuals, or groups of participants, can write completely new manuscripts, and present and revise them during the workshop itself.

Even the format of the resulting book can be decided on during the workshop itself. In one workshop, for example, participants considered three possible formats: a set of booklets, a single book, or loose-leaf pages. They chose the single book because they felt it would be most useful and convenient for extension workers to use.

BOX 16

How a workshop works

Preparation
Before the workshop, a steering committee lists potential topics and invites resource persons to develop first drafts on each topic, using guidelines provided. These participants bring the drafts and various reference materials with them to the workshop.

Draft 1
During the workshop itself, each participant presents his or her draft paper, using overhead transparencies of each page. Copies of each draft are also given to all other participants, who critique the draft and suggest revisions.

After the presentation, an editor helps the author revise and edit the draft. An artist draws illustrations to accompany the text. The edited draft and artwork are then desktop-published to produce a second draft. Meanwhile, other participants also present papers they have prepared. Each, in turn, works with the team of editors and artists to revise and illustrate the materials.

Draft 2
Each participant then presents his or her revised second draft to the group a second time, also using transparencies. Again, the audience critiques it and suggests revisions. After the presentation, the editor and artist again help revise it and develop a third draft.

Draft 3
Towards the end of the workshop, the third draft is made available to participants for final comments and revisions.

Finalizing
The final version can be completed, printed and distributed soon after the workshop.

Fast, efficient

Producing information materials using conventional methods can take a long time: you have to write the drafts, edit the text, prepare illustrations and lay out the publication. The resulting prototype is then reviewed by specialists in the subject matter, before final revisions are made. Manuscripts get lost, authors and reviewers may disagree, and people cannot be contacted easily. The process can seem never-ending.

Ideally, information materials intended for farmers should be pre-tested to make sure that they are relevant and easily understood. But this extra step rarely happens: the publication deadline is looming, or there are no funds left to do a pre-test.

The workshop process overcomes these problems because everyone is working on the manuscript at the same time. They can exchange ideas, argue, collaborate, and check on each other's work. The farmers and extension workers in effect pre-test the materials as they are being produced. The whole process of writing, pre-testing and revising is telescoped into an intensive workshop period.

Beating writer's block

Many people find it hard to write. The workshop helps them to put their knowledge down on paper. It helps development organizations to document what they have done and what they have learned, enabling them to share valuable experiences with others.

When the book is produced, everyone who participated in the workshop feels he or she contributed to it. They tell their colleagues and other organizations about the book, helping to make sure it is distributed widely.

During the workshop, the participants are all working on a common product. They create the book together. Everyone contributes: there are no passive participants. This builds a sense of common purpose and common understanding, greatly improving the chances that they will continue to work together after the workshop is over.

Farmers as experts

The farmers play another, vital, role. All too often, scientists and extension workers forget that farmers have a deep and detailed knowledge of the crops they grow, the animals they keep and the soils they till. The technology recommendations that scientists produce sometimes ignore this "indigenous knowledge". Involving farmers in producing information materials is an excellent way of making sure that their voice is heard: scientists are able to listen to farmers' opinions, and the farmers are able to contribute information that goes into the book.

A good example of this was a workshop to produce a book on traditional veterinary medicine in Kenya. IIRR organized this workshop in 1996 jointly with ITDG (Intermediate Technology Development Group), an NGO that coordinates a strong network of livestock health specialists throughout northern and central Kenya (see p. 151). Participants included scientists from the University of Nairobi, the livestock department and the National Museums of Kenya, field veterinarians, paravets, and herders and animal healers from 12 ethnic groups from all over Kenya. These healers use medicinal herbs to treat sick livestock. They are widely respected in their communities: other livestock owners often turn to them for help. In places far from the nearest trained veterinarian, these healers are often the only source of health care for livestock.

During the workshop, the scientists presented manuscripts on each disease in turn. During the discussion that followed each presentation, the healers were able to match the disease with the symptoms that they recognized – what a scientist sees as a single disease does not necessarily correspond to the local people's understanding, leading to frequent misunderstandings in the field. The healers then described the methods that they used to treat the disease. The scientists were able to say whether they felt a particular treatment would work: tobacco, for example, contains nicotine, which is highly poisonous to ticks and mites. Several treatments used by healers ended up being dropped from the book because the participants as a whole were doubtful whether they would work.

But many treatments passed the test, and the resulting book is a unique blend of scientific and indigenous knowledge. Entitled *Ethnoveterinary Medicine in Kenya: A Field Manual of Traditional Animal Health Care Practices*, it was published in 1996 by IIRR and ITDG, with support from CTA. It covers more than 60 common diseases and problems in cattle, goats, camels and other livestock species. Take as an example the section on mange, a disease caused by minute mites that burrow under an animal's skin, causing intense itching and resulting in skin infections that can kill the animal. This section gives 11 names in seven local languages, a list of symptoms and causes of the disease, several prevention methods, and a range of 11 herbal treatments involving nine plant species and three non-herbal treatments to use if the farmer cannot get modern medicines.

Lokuriana Lopuwa (left), an IIRR Turkana leader, and Alice Lorot (right) a traditional birth-attendant and livestock healer from Samburu, taking time out from the ethnoveterinary workshop in Machakos, Kenya to pose with a waiter from the hotel where the workshop was held *(Photo: IIRR)*

Helping hands

The workshop staff are vital for the smooth functioning of the workshop. IIRR works with a skilled team of editors**,** artists and desktop publishers to get the materials into the right format quickly and professionally. Each manuscript is assigned to an editor, who works with the authors to revise it, and makes sure that the draft conforms to the guidelines that have been decided on.

Many information and extension materials in the developing world consist of straight text. No pictures. That makes them hard to understand and uninteresting. Not so IIRR's publications. A group of three or four artists attends the workshop; their line drawings are one of the most distinctive features of IIRR's books. The author, editor and artist together plan each picture; the author or editor makes a quick sketch – often no more than stick figures – showing the key features, and the artist assigned to that manuscript turns this into a professional drawing.

Because the artists are in the workshop itself, they can see and hear the presentations, discuss the illustrations with the authors, and revise them if need be. Participants check each drawing for accuracy and ease of understanding, and each picture may go through three or four

revisions before it is finally accepted. The artists have a keen sense of humour. They often draw cartoons of participants and hang them on the wall – to everyone's amusement. This has become something of a tradition in the workshops.

The desktop publishing team brings text and pictures together into the final form. Their equipment includes a photocopier, several computers, a scanner, a laser printer and (very important for places with frequent power cuts) an uninterruptible power supply and backup disks.

Proof of the pudding

IIRR's Nairobi office has produced several such books since 1994, including the how-to book on traditional veterinary medicine in Kenya described above, a manual on sustainable agriculture in Eastern and Southern Africa (*Sustainable Agriculture Extension Manual for Eastern and Southern Africa,* published in 1998, with support from CTA) and a loose-leaf guide to agroforestry methods in Ghana (*Agroforestry in Ghana: A Technology Information Kit,* co-published with the Ghana Rural Reconstruction Movement in 1994).

These books have proved very popular. All 2000 copies of the veterinary manual have been sold, and a reprint is being considered. Copies were distributed to ITDG's network of barefoot veterinarians, and various development organizations bought bulk copies to distribute to their staff and clients. The book is surprisingly popular among professional veterinarians, who are coming to admit that nomadic herders who live with, and live from, their animals, have over the centuries gained deep knowledge about them and their health problems. The manual has also helped renew interest in traditional knowledge at the University of Kenya and at the Kenya Agricultural Research Institute, which has strengthened its ethnoveterinary research programme.

The sustainable agriculture book has also sold well – more than 2200 copies in two years. Alemaya Agricultural University in Ethiopia is using it as a textbook in its extension training courses. The manual is being translated into Kiswahili, the lingua franca of Eastern Africa. This is expected to increase the usefulness of the manual in Tanzania, where extension staff are often more comfortable with Kiswahili than with English. IIRR is adapting stories in the book into audiocassette format for broadcast on the radio and for use by farmers' listener groups. It is also planning a website so people throughout the world with Internet access can download information.

The success of these books has encouraged IIRR to plan more workshops. Books are planned on community-based health care, dryland agriculture, and communications for development organisations.

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Extension leaflets: Pacific pests

Peter Walton

Pests and diseases threaten not just crops, but livelihoods too. We are not just talking about a few euros, but about attacks that may make the difference between life and death for subsistence farmers. The story about cassava mosaic virus (see pp. 169–172) shows how a disease caused widespread famine in Uganda.

If their crops are under attack, farmers rely on accurate and timely advice from extension agents. The agents themselves need this same information so they can advise the farmers. But all too often, this information is hard to find, is not up to date, and may not even be relevant.

In the Pacific in the 1970s, Ivor Firman, the Plant Protection Officer of what was then known as the South Pacific Commission (now called the Secretariat of the Pacific Communituy) tried to do something about this. He developed a set of publications called *Pest Advisory Leaflets*. (Actually, he just called them *Advisory Leaflets*; the "Pest" bit was added later to clarify what they were really advising on.)

It is well worth looking at how these leaflets were produced and what lessons have been learnt after 25 years of publishing them.

Who was being advised?

The readers for the *Pest Advisory Leaflets* were "technical officers" in departments of agriculture in the 22 island territories and administrations across the Pacific region.

Who were these "technical officers"? They included extension agents, quarantine officers, researchers and agriculture teachers who had some form of tertiary qualification: a degree, diploma or certificate of agriculture.

It is essential to have a clear idea of just whom the leaflets are for. Without knowing this, you might just as well be writing in the dark for a blind person speaking another language. Knowing the audience's educational level and where they were located meant that it was possible to write for that audience. For example, it was known that every technical officer could speak either English or French, so the leaflets were produced in those languages.

"Writing for an audience" means taking care to use words and phrases that are familiar. The officers had all studied agriculture, so they should know phrases such as "varietal resistance" and "infestation". But if you wanted to present the same information to farmers, you would not use these terms; instead, you might say something like "some varieties are less likely to be damaged" or "if only a small number

of weevils are found on the crop, there is not a problem. But when a large number of weevils attack the sweet potatoes, then you have to do something."

Who did the advising?

All the pest leaflets were written by experts. The word "experts" has become a much-abused term, but in the case of these leaflets, the writers truly were experts in their respective areas. This is important because it meant they were able to decide what information to include, and bring it all together. They didn't need to confer with others to write the leaflet (although they usually did). And they knew from their experience just what the main points were. The leaflets quickly became recognized as authoritative; they contained up-to-date information on particular pests and diseases. And they were designed especially for a particular region: the Pacific islands.

Since the authors were experts, they were usually scientists, which meant that they were not always used to "writing to" an audience of extension agents. So during the editing process, the editor would have to rewrite the text so it would be more appropriate for the intended audience.

Choice of topics

What subjects – which pests or diseases – did the leaflets cover? The subjects were chosen in two main ways. The first way was to ask participants at regional plant protection meetings (held every two years) to list pests and diseases in order of importance. New leaflets could then be written to cover the most important problems identified. This did not always happen. So other sources of information were also used in some cases (for instance, if a new pest was beginning to threaten crops in the region, one that many plant protection staff might not have heard of because it had not reached their area yet).

There was a third way, one that is not very advisable but is worth mentioning. That is when an expert volunteered to write a leaflet on his or her favourite pest or disease. This happened only a few times, and the drafts were not accepted unless their subjects were suitable anyway. The advantage of an author suggesting a subject is that the author usually has the words at his or her fingertips, and a whole file of photographs – which, as we will see, is very helpful.

Presentation

Extension materials, for extension officers as well as farmers, must be attractive. Whatever is being presented – a radio show, a video programme or a leaflet – must be presented in such a way as to enhance the communication. In other words, does the way a message is packaged help people understand it? If it doesn't, then it is not attractive.

The *Pest Advisory Leaflets* were very attractive, in all senses. They looked good. Each one contained colour photographs and was printed on quality art paper, in an A5 format (A5 is half the size of regular A4 photocopy paper).

Of all factors, it was the leaflets' size that contributed most to their being attractive. A5 is just the right size, small but not too small – manageable. When the size was recently increased to A4 – for no good reason – the leaflets lost something. It can't be explained, but the smaller size had a greater impact.

And at just 4–6 pages long, they were the right length too. The length imposed amazing constraints on the authors (and designers!), but that was part of the impact. Being able to present information in just a few pages, with photographs, meant that only what was essential was written. It is very difficult to write with a constraint like this. But it is an effective constraint that can produce good writing.

When the series was started, a specially designed ring-binder was produced so that each recipient could keep the leaflets safe and well organized. Sort of like a loose-leaf encyclopaedia. Unfortunately, as the number of copies of the leaflets quickly exceeded the number of folders available, many recipients were unaware of this option.

The other major factor that contributed to the success of the leaflets was the photographs. Each leaflet had at least one photograph, plus a caption, on the front cover; some had three photographs, with accompanying captions. And inside were often more photographs, usually with shots taken through microscopes, or close-ups. Nearly all the photographs were excellent. A favourite is a photo of a giant African snail, complete with a droplet of water sliding slowly down its shell. Superb.

But with the need for excellent photographs came one of the production constraints: how to get photographs of this quality, quickly enough? In extreme cases, photographs were commissioned. The lack of a suitable photograph could often hold up publication for months – even years. So when an author came along with text *and* photographs, it was an attractive proposition.

After 25 years, what has been learned?

The main thing that has been learned is that the need for *Pest Advisory Leaflets* today is as great as 25 years ago. The leaflets are as popular today, and as needed, as they were when they first came out.

In some ways, this is disappointing. During this period one might have thought that national ministries of agriculture would have done something similar to the SPC's leaflets. A few have, but by no means all. Some leaflets have been translated into local languages and published jointly with ministries. But translating the leaflets also meant changing the audience from extension agents (who can speak English or French) to farmers (many of whom speak only their local languages). But this change has not been allowed for either in the level of language used, nor in the presentation format – except in one case, a leaflet for farmers on taro leaf blight.

There is a need for more effective ways of prioritizing topics and updating existing leaflets. A good example is the leaflet on taro leaf blight, mentioned earlier. This was first published in 1977. After it was published, both the understanding of taro leaf blight and the possible control measures changed. Then in 1993, an outbreak of the blight hit American Samoa and Samoa, destroying taro as both a domestic and an export crop. This was a severe blow. An initial thought was to update and reprint the leaflet on taro leaf blight. But no one could agree on the state of knowledge, or on appropriate control measures, limited though they were. A new edition of this leaflet was published only in 1999, six years after the outbreak began. Obviously, this was not good enough.

Staying with the same example, the farmer leaflet that was developed (based on the outdated leaflet and some more recent information) was used as part of a campaign to educate farmers on the blight: how to recognize it; what it is; how to cope with it. A huge number of farmer training days, combined with radio and television broadcasts, constituted a massive information campaign. This cross-linking of media, presenting similar information in different ways, is a useful and effective way to communicate, and reinforces messages. But it takes planning and the involvement of stakeholders to be successful. The farmer leaflets were developed by extension agents and farmers working together, and were tested by farmers before they were printed (similar to the approach taken in the IIRR workshops, pp. 177–182).

And the future?

As already stated, there is still a need for these leaflets, in their traditional printed form. They could be converted into electronic format, on the Internet or CD-ROM, but these new media are no substitute for print: most of the audience does not have computers, let alone access to the Internet. But that should not stop efforts to explore new media.

Without doubt, putting the leaflets on the Internet could reduce the cost of updating information. But this still cannot be done unless improved procedures are in place for revising existing leaflets and producing new ones.

One suggestion is to take further the idea of "shell books" used so effectively in Papua New Guinea. A leaflet template, with all the photographs but without the text, enables people to translate the text into local languages (there are over 770 in Papua New Guinea alone), and to print new leaflets in that language. In this way, the resource is used to best effect and for least cost.

FOR MORE INFORMATION

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Communicating science to scientists:

The *African Crop Science Journal*

Paul Mundy

We wind our way through the courtyard, past knots of students swotting for their exams, up the stairs, and past laboratories where technicians peer into microscopes. The small office on the second floor of the agriculture building in Kampala's Makarere University is crammed with files and papers. Behind a pile of manuscripts, Margaret Ssonko sits at a computer, entering corrections into a document. Paul Nampala and Moses Osiru scratch their heads over another manuscript: what did the author mean here?

Welcome to the secretariat of the *African Crop Science Journal*. Margaret Ssonko and her colleagues are hard at work on the next issue of this publication, one of the few international scientific journals focusing on the continent's agriculture. They gladly take a few minutes to explain to us how the journal works.

Filling a gap

African scientists face a major problem in getting their research published. Journals based in North America and Europe lack a focus on tropical agriculture. Most journals published in Africa are restricted to their home countries or regions, so lack a continent-wide coverage. Without a suitable outlet, research goes unpublished, leading to wasteful duplication of effort and stultifying science and agricultural development.

The *ACSJ* fills this gap. It provides a forum for publishing the work of African scientists, and of foreign researchers working in Africa. It covers the gamut of crop sciences, from agronomy and genetics to post-harvest processing and weed science. Published four times a year since 1993, the journal contains a dozen articles and between 80 and 160 pages in each issue.

Margaret Ssonko working on the latest issue of the *African Crop Science Journal*
(Photo: Paul Mundy)

BOX 17

Why are journals important?

Researchers rely on scientific journals for three key things. First, they are the main method of preserving and communicating information about discoveries to other scientists. Found a way of fighting cassava mosaic virus? Discovered how farmers in a parched area can conserve water? Invented a better plough? Write up your findings in a journal article, and other scientists can learn from, and build on, your work.

Second, journals help keep scientists honest. An article describing a piece of research should provide enough information so that another scientist can repeat the experiment. The journal's editors and reviewers carefully check each manuscript to make sure that the methodology is sound, the results valid, and the text error-free. The rigorous checking ensures that the results reported are of the highest quality.

Third, journals are also an important part of scientists' reward system. Highly qualified yet poorly paid, working with limited funds and often in isolation, scientists require special reserves of commitment to continue their work. An article published in a prestigious journal brings a scientist the professional kudos and recognition from peers that are needed to maintain this dedication. And scientists' salaries and promotion are often tied to the numbers and quality of the articles they publish.

That does not mean that journals are the be-all and end-all of agricultural science. Too often, scientists feel their work is done if their article has appeared in a journal's pages. Much more effort is needed to take it one stage further: to translate the scientific language into a form that extension workers and farmers can understand. The story on "Workshops to produce information materials" (see pp. 177–182) describes one way to do this.

The *African Crop Science Journal* is a high-quality, professionally produced journal serving the whole of Africa *(Photo: Paul Mundy)*

Who writes articles for the *ACSJ*? Most authors are based in Africa: at universities, national research institutions and international research centres such as IITA (International Institute of Tropical Agriculture), based in Nigeria and focusing on cassava and other crops, WARDA (West Africa Rice Development Association) based in Côte d'Ivoire, and the Nairobi-based ICRAF (International Centre for Research in Agroforestry). Some authors work outside Africa but have strong links with the continent.

Articles from Eastern Africa dominate, perhaps because the secretariat is located in this region and finds it easiest to publicize the journal there. Coverage of francophone Africa is limited, although the journal accepts articles in French as well as English (and all abstracts appear in both languages).

Rigorous review

The journal calls on the services of an international editorial advisory board of nearly 40 senior scientists, based in more than 20 countries in Africa, Asia, Europe and North America. Each manuscript is checked by three reviewers drawn from the advisory board or from a wider group of scientists throughout the world. The reviewers can recommend that a paper be accepted, accepted subject to certain revisions, or rejected. To help ensure objectivity and in line with standard practice in scientific journals, the author is not told who the reviewers are.

Some journals pride themselves on the number of manuscripts they reject: the more rejections, the better the quality of the journal. Not so the *ACSJ*: remembering that many African authors speak English or French as their second, third or even fourth language, the editorial staff do their best to help polish an article's grammar and syntax.

That does not mean that all papers submitted automatically get published. About 200 articles are submitted to the journal each year; about a quarter are rejected because of technical defects. Data from a single season's experiment are not very convincing: factors such as the weather and the numbers of pests may vary from year to year. And the lack of access to libraries means that the references cited by many authors are hopelessly out of date. The *ACSJ* staff return papers with such shortcomings to their authors with suggested improvements.

Recruiting readers

Given the journal's high quality and wide range of subjects, one might expect it to have more subscribers than current the 120 or so. But libraries' budgets for acquisitions are declining throughout the world, and few individual African scientists can afford the $80 a year subscription fee. The *ACSJ* is countering this by a vigorous marketing effort to expand readership – for example, by giving away complimentary copies, promoting the journal in francophone countries, and publishing abstracts on the Internet. The staff raise funds to support the journal by providing editorial services and producing conference proceedings. They are trying to cut costs by using e-mail rather than postal services to distribute manuscripts and to contact authors.

Students like these in the Faculty of Agricuture at Makerere University in Kampala represent the future of Africa's agricultural research *(Photo: Paul Mundy)*

The students in the courtyard are still buried in their books when we leave the *ACSJ* office. To graduate and to contribute to their countries' development, they must rely on the research findings of others. *ACSJ* is doing its share to make sure that those findings are documented and made available to them.

FOR MORE INFORMATION

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