GROWING Affinities

ISSN 0122-8048

A BULLETIN ABOUT COOPERATION IN AGRICULTURAL RESEARCH

Scaling Up the Doubly Green Revolution

Strategies to spread innovations in agriculture

In the days when combating hunger by raising agricultural productivity was the sole mission of the Future Harvest centers of the Consultative Group on International Agricultural Research (CGIAR), they had a clear strategy for spreading technical innovations. International crop breeding programs developed improved varieties of the major cereals, working in tandem with national research programs across the developing world. Together with appropriate crop management practices, these varieties were disseminated on a huge scale, particularly in more uniform and favorable environments, mainly through national agricultural extension systems.

This "classical" technology transfer approach gave extraordinary results, boosting food supplies, bringing down the prices of key staples, and thus generating enormous economic benefits for the developing world's poor consumers. The so-called Green Revolution also delivered large environmental payoffs by making it less necessary to bring fragile, marginal lands into food production.

At the same time, though, agricultural intensification put pressure on the environment, as reflected in declining soil fertility and contamination of water supplies through excessive use of agrochemicals. Moreover, despite large gains in agricultural productivity, hunger persisted in some regions and among the producers of certain crops. Most disconcerting, though, rural poverty proved highly recalcitrant throughout the tropics, casting a long shadow on the great technological, economic, and social achievements of the 20th century.

In response to those challenges, the Future Harvest centers and many other organizations embarked in the 1990s on new initiatives aimed at achieving what agricultural scientist Gordon Conway called a "doubly green revolution." The idea was to create new waves of economic impact that would reach into previously neglected corners of the tropics while preserving the natural resources on which rural livelihoods depend.

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International Center for Tropical Agriculture

Growing Affinities

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The International Center for Tropical Agriculture (CIAT) publishes this bulletin once a year for people who share our commitment to innovative cooperation in agricultural research for development.

CIAT is one of 16 food and environmental research organizations known as the Future Harvest centers. The centers, located around the world, conduct research in partnership with farmers, scientists, and policymakers to help alleviate poverty and increase food security while protecting the natural resource base. The Future Harvest centers are funded principally through the 58 countries, private foundations, and regional and international organizations that make up the Consultative Group on International Agricultural Research (CGIAR).

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FOCUS

Building a Knowledge Base for Scaling Up

The issue of "scaling up" and "out" agricultural technologies and other innovations has received a lot of attention in recent years from the CGIAR centers and other R&D organizations. One event dealing with this challenge, held in 1999, focused on innovations emerging from agroforestry research. Two others, organized in 1999 and 2000 by the CG's NGO committee, drew on case studies to identify key principles involved in the spread of technical and social innovations in rural areas.

Profiting from the outcomes of those and other consultations, we decided last year to make scaling up the theme of our internal annual review. We'll soon publish a volume containing most of the papers given in the review. The article featured in this issue of *Growing Affinities* summarizes the main messages of those papers.

In another day scaling up was not a major research issue for the centers. But by broadening our development mission, we've changed that. Reducing poverty and improving natural resource management requires the centers to develop knowledge-rich solutions that can be adapted to diverse circumstances. But delivering those solutions on a large scale is obviously not an easy job.

What role must the centers play then? In my view it's to accompany partner organizations in their scaling-up initiatives and to conduct research aimed at finding out what works and what doesn't. In this way we can build a knowledge base for scaling up that helps our partners identify the best bets—principles, approaches, and tools—for different situations. If we can do that successfully—and I think we've made a good start—the centers will have an extremely valuable new international public good to offer our partners in developing countries.

Joachim Voss
Director General, CIAT

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Scaling Up the Doubly Green Revolution

Though improved crop varieties have figured importantly in those initiatives, the products of the new research have tended to be less seed-based and more knowledge-intensive, consisting of R&D methods, improved practices for natural resource management (NRM), and so forth. Ten years or more into this endeavor, it is reasonable for donors and others to ask whether and how the more complex technologies can be spread as widely as their more straightforward predecessors, generating impact on the same order of magnitude.

This article addresses that question, drawing on a dozen or so contributions by CIAT staff to the Center's 2002 Annual Review on scaling up.

Continuing Commodity Challenges

Judging from some of those papers, serious challenges remain in disseminating seed-based technologies, and for some crops this task has proved less than straightforward.

Keeping rice competitive

Take the case of rice farmers in tropical America. Even though improved varieties are now universally grown in the region's irrigated production areas, growers are hard pressed to remain competitive in international markets. One reason is that rice producers in North America benefit from large government subsidies, placing farmers to the South (where protective policies have been weakened) at a disadvantage.

Around the time this challenge began to emerge, traditional funding for international rice research in tropical America went into decline. The region's main rice-growing countries responded decisively, though, by forming, with CIAT support, the Fund for Latin American and Caribbean Irrigated Rice (FLAR) in 1995. This is an entirely new model for guiding and sustaining international rice research, which currently has 10 country members and receives funds from the private sector, producer associations, and government agencies.

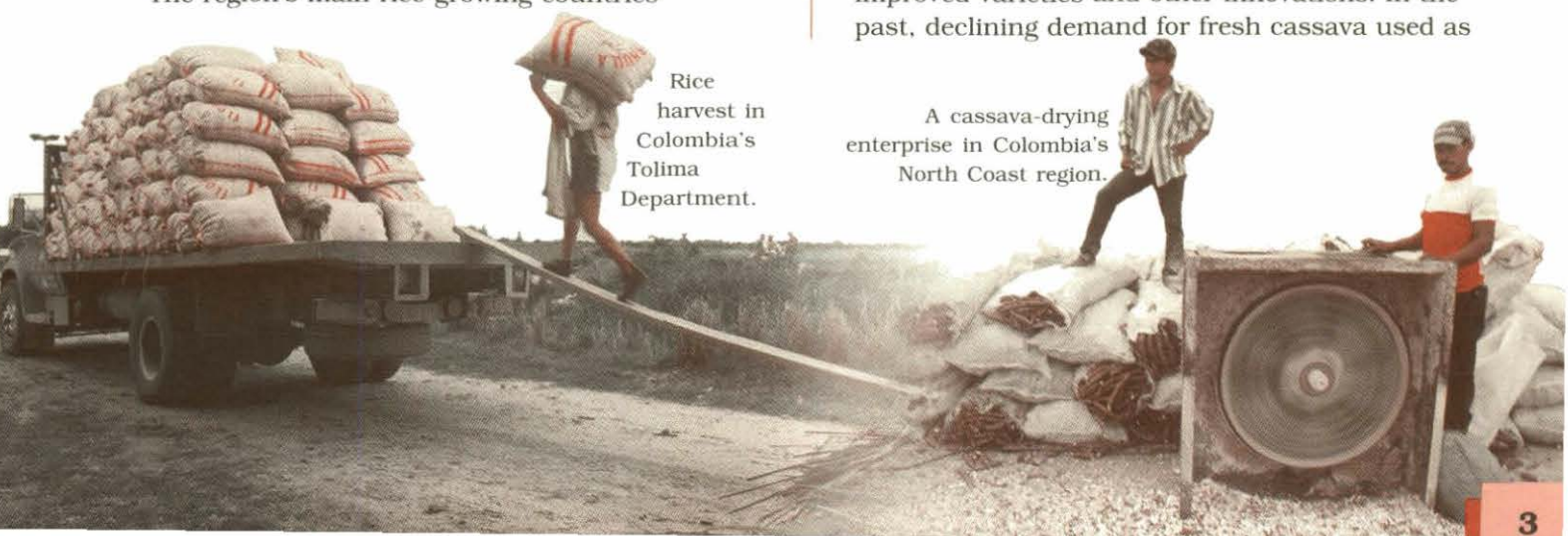
Drawing on the rice world's top research talent, FLAR has developed a whole new generation of superior rice lines for member countries. These materials outyield check varieties by as much as 20 percent, in addition to offering other valuable traits (such as insect resistance and excellent milling quality), which reduce farmers' production costs or otherwise increase their competitive edge.

More recently, the Fund has seized a major opportunity to demonstrate that it can also scale out effectively knowledge-intensive crop management practices, which will better enable farmers to exploit the genetic potential of the improved varieties. For this purpose FLAR has received a grant of nearly US$1 million from the United Nations' Common Fund for Commodities (CFC) for on-farm research and technology transfer in Venezuela and southern Brazil.

Linking cassava to new markets

In the quite different case of cassava, the policy and economic environment has also posed tough challenges for the development and scaling out of new technology in tropical America.

The region's cassava growers, in contrast with rice farmers, have traditionally been slow to adopt improved varieties and other innovations. In the past, declining demand for fresh cassava used as



Rice harvest in Colombia's Tolima Department.

A cassava-drying enterprise in Colombia's North Coast region.

food has depressed prices, giving farmers little incentive to boost production. Thai farmers, in contrast, who are linked to large export and industrial markets for cassava, have adopted *improved* varieties almost universally. In the hope of creating such links in tropical America, CIAT embarked during the 1980s on a series of integrated cassava projects, conducted in collaboration with public institutions in Brazil, Colombia, and Ecuador.

Under one such project in Colombia, small cassava drying plants were set up to cater to animal feed industries. By 1993, 138 plants were operating, 101 of them run by small-farmer cooperatives. An impact study estimated the economic benefits at US$18.6 million over 8 years. New income from cassava processing accounted for part of the impact. But it mainly resulted from adoption of improved production technology, stimulated by growing market demand for processed cassava. A key factor to success in scaling up the new processing technology was close involvement of farmers in adapting it to local conditions and in creating processor associations.

The second half of the 1990s saw major changes in national policy, which put the drying plants in dire straits. Reductions in government spending meant the end of public sector support. And more open markets led to massive importation of cheap grain for feed, driving down the price of dried cassava chips. Despite these shocks, 56 of the drying plants, 43 belonging to small-farmer cooperatives, survived into the new century.

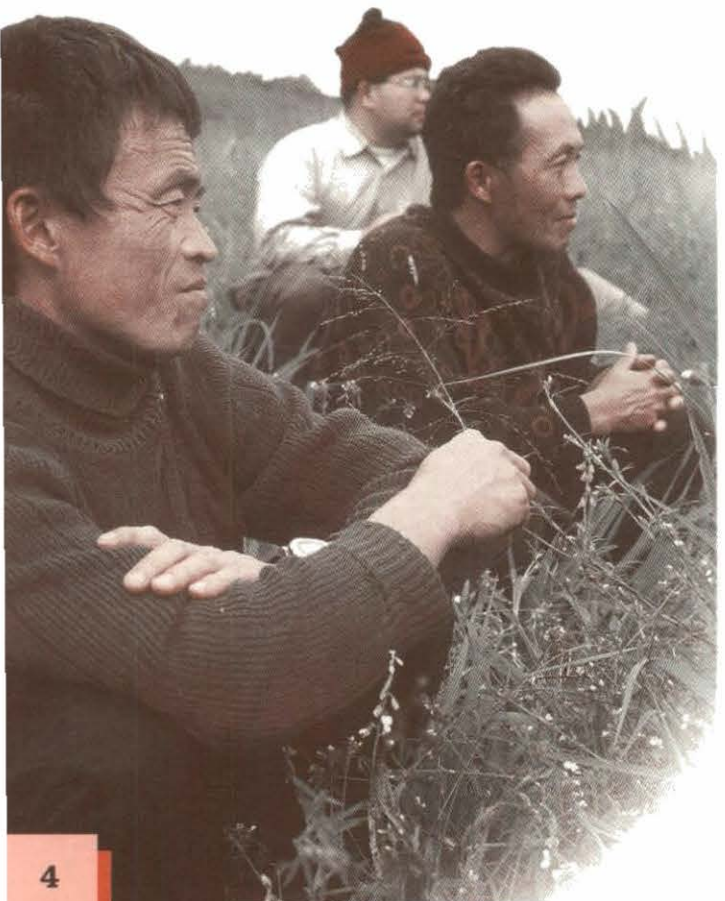
At that point further shifts in policies and economics opened the way to a new model for cassava development. Devaluation of the Colombian peso made massive grain imports more expensive, arousing interest in cassava as a cheap, partial substitute in animal feeds.

In hot pursuit of that interest, private and public sector organizations in Colombia and several other countries formed the Latin American and Caribbean Consortium to Support Cassava Research and Development (CLAYUCA), along the lines of FLAR. The model promises to be an especially potent mechanism for scaling up recent technical and organizational innovations, and for that reason it is being studied closely by the cassava sectors in West and East Africa as well as Southeast Asia. A key feature of the consortium is that it spreads responsibility for technology development and dissemination—as well as the costs—among private businesses, public agencies, and farmer groups.

An unusually complex commodity

Tropical forages are another crop for which scaling up improved technology has posed special challenges. Though many farmers in tropical America have taken up superior grasses (especially *Brachiaria* spp.), adoption of improved forages has generally been slow there as well as in Southeast Asia, despite intensive research over the last several decades.

During the mid-1990s, forage agronomists working in Southeast Asia suggested that the main reason for this was a lack of farmer involvement in the evaluation and introduction of a wide range of promising species. To disseminate improved germplasm of such a complex commodity on a large scale, they argued, requires that local extension agents and farmers become quite knowledgeable, through dialog and direct experience, about forage species' different uses and management requirements in the region's diverse farming systems and environments.



Farmer Kama Zong (left) and his cousin Saishua Zong (right) take part in a farmer field day dealing with introduced forages at Ta village, Pek District, in northern Laos.

Based on those insights, the Forages for Smallholders Project (FSP) was launched during 1995 in seven Southeast Asian countries. Intensive networking among national partners and participatory evaluation of forages with farmers are central features of the project. The project recently completed its second phase with funding from the Asian Development Bank (ADB); a first phase was financed by the Australian Agency for International Development (AusAID).

By the end of the first phase, about 40 species and varieties had been adopted by some 1,750 farmers at 19 research sites, far exceeding original expectations. Based on those results, the project's second phase was designed explicitly to scale out research results, and the scaling out strategy appears to have worked well, with some 5,000 farm families now benefiting from improved forage systems. What are the main elements that account for its success?

Prominent among them is active participation of farmers in the research from an early stage, with strong support from national scientists and development professionals, well trained in participatory methods. These specialists mostly work with organized farmer groups and with "champion" farmers, who are especially successful in forage evaluation. Once such individuals come forward, they can help "spark" forage innovation in other villages through "cross-visits."

Learning to Manage Complex Systems

Apparently, farmer participatory methods are essential for scaling out a relatively complex seed-based technology like improved forages. But can they also be effective in the even more knowledge-intensive business of integrated pest, disease, and natural resource management?

The battle against crop pests

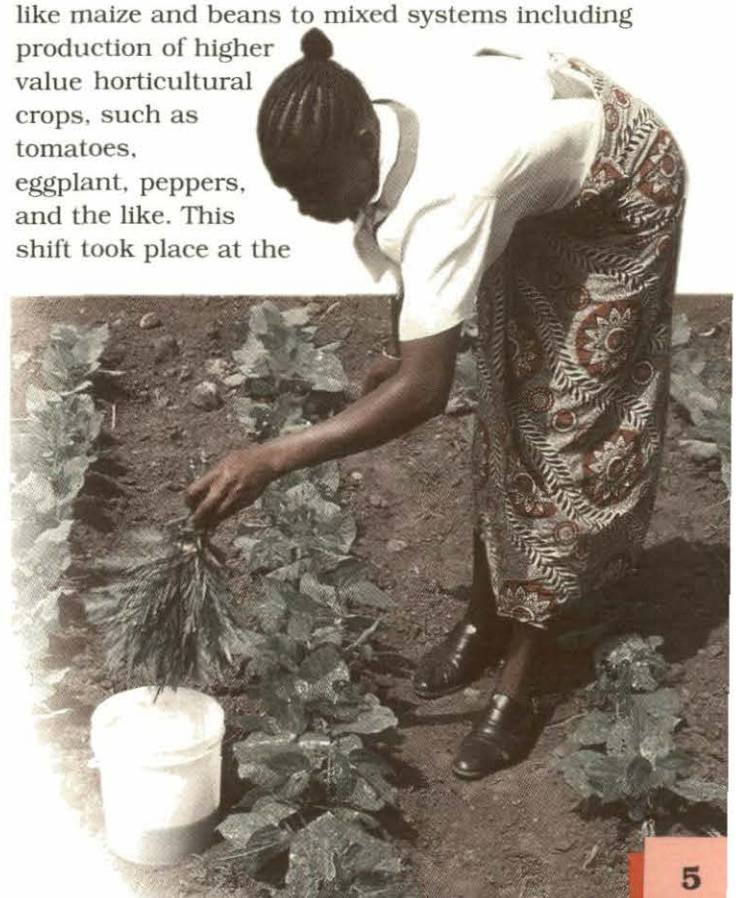
A case from Tanzania suggests that such methods do enable small farmers to develop the necessary knowledge and practices for integrated pest management, or IPM. This work began in the northern Hai District, where researchers and extension agents engaged farmers in a learning process to build a knowledge base for dealing with bean foliage beetles—the main pest of local bean crops.

To extend the learning process, national crop researchers, development officers, and NGOs encouraged the formation of dozens of farmer groups. The groups tested and adopted a wide range of new and traditional technologies, including various botanical pesticides and crop management practices. They also proved effective for sharing the lessons learned through field days, popular theatre, songs, and other activities at local schools and places of worship. Printed extension materials and radio programs in Swahili were also useful.

Through a 3-year project funded by the UK's Department for International Development (DFID), CIAT is building on that experience to scale up dissemination and adoption of IPM technologies in Malawi, Kenya, and other areas of Tanzania.

Another case, involving whiteflies in El Salvador's Valley of Zapotitán, also underscores the importance of farmer innovation in developing and spreading pest management practices. But it also illustrates dramatically why farmers, even well-organized ones, still need reliable technical support, a lesson that is implicit in the Tanzania case as well.

Over the last 2 decades, in El Salvador and many other parts of Mesoamerica, many farmers have switched from almost total reliance on staples like maize and beans to mixed systems including production of higher value horticultural crops, such as tomatoes, eggplant, peppers, and the like. This shift took place at the



Farmers in northern Tanzania's Hai District are testing new and traditional methods of pest control, such as the use of diluted cow urine, which repels insects for up to 5 days.

same time that government austerity measures resulted in radical downsizing of national agricultural research and extension services. In the absence of free technical service, many farmers turned to agrochemical companies for help in controlling pests on their horticultural crops.

The outcome was widespread indiscriminate use of highly toxic pesticides, which meant the eventual end to export markets. It also gave rise to pesticide resistance in whiteflies, which began devastating beans as well as the main horticultural crops.

Fortunately, the CIAT-coordinated Tropical Whitefly Project of the CGIAR's Systemwide IPM Program has shown the way out of this downward spiral. With funding from DFID, the project has demonstrated convincingly that the combination of sound technical assistance and farmer innovation, backed up by integrated, multidisciplinary research, can lead to large-scale development of economically attractive mixed-cropping systems, with environmentally friendly pest management.

Natural resource management

Is that same combination of farmer empowerment and organizational commitment also adequate for curbing widespread destruction of soil and other natural resources in the tropics?

CIAT scientists working to improve NRM in hillside watersheds suggest that it is, based on experience at reference sites in Colombia, Honduras, and Nicaragua. At all these sites, local farmer associations and other institutions have proved decisive for successful collective management of natural resources. A key mechanism by which this has been achieved is a network of community experimental farms, called "supermarkets of technology options for hillsides." These provide focal points for the collaborative research of various organizations, for organizing farmer participation in technology development and evaluation, and for promoting successful technologies around the sites and beyond.

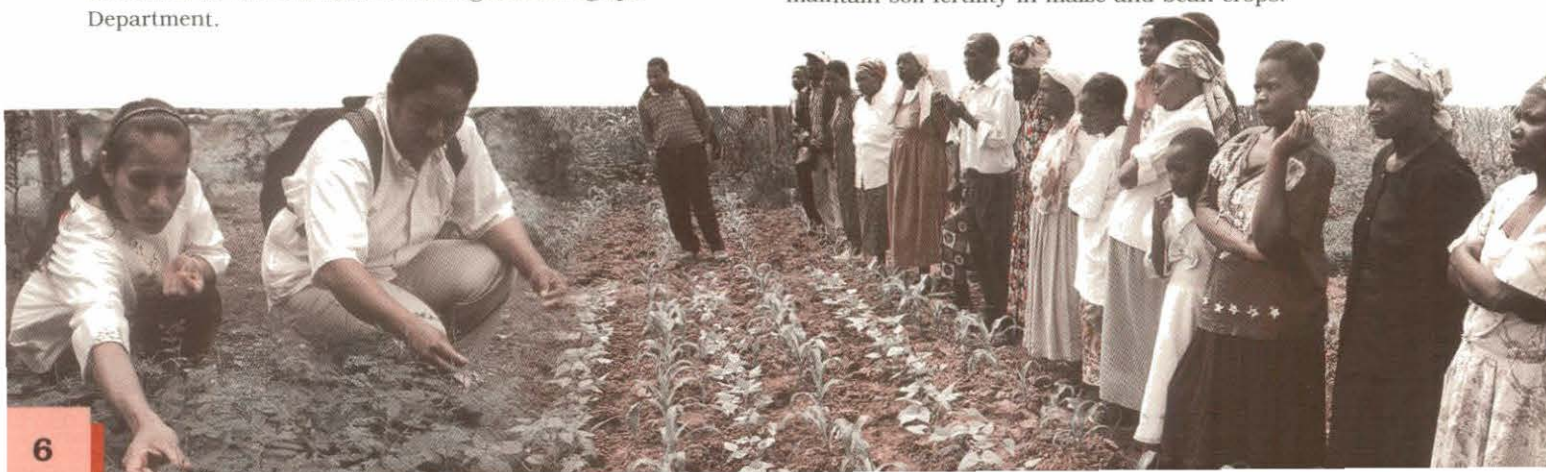
Continuous visits to those sites by farmers, NGO staff, university professors, government ministry officials, and others are one means by which innovations are being scaled up and out. Another involves training for hundreds of rural development professionals in the use of a set of tools developed by CIAT, with which rural communities can generate knowledge on which to base decisions about NRM.

The work of CIAT's Tropical Soil Biology and Fertility (TSBF) Institute in Africa similarly indicates that community-based experimentation is an effective way to scale out complex technologies—specifically for integrated soil fertility management (ISFM)—around pilot sites. To spread the general principles involved in ISFM more widely, the Institute has relied on the African Network for Soil Biology and Fertility (Afnet), which links numerous experimental sites in 16 countries.

Those are by no means simple processes, however, and in order for scaling out to succeed, farmers and researchers must overcome several obstacles. One is the inherent difficulty in tailoring knowledge about generic management principles (as opposed to specific practices) to diverse local conditions. Is this knowledge widely applicable or suited only to specific niches? Is it as relevant to female as male members of rural households? The pitfalls are numerous, and to get round them requires careful planning as well as effective monitoring and evaluation.

Tending a tree nursery for reforestation of a hillside watershed at San Dionisio in Nicaragua's Matagalpa Department.

The Mukhombe farmer field school in western Kenya's densely populated Vihiga District seeks better ways to maintain soil fertility in maize and bean crops.



Participatory Research: From Margin to Mainstream

Farmer participation is an eye-catching common thread connecting these diverse cases of scaling out complex technologies. But if it is indeed so critical for success, then how can the Future Harvest centers scale up, or "mainstream," farmer participatory research?

Empirical impact studies

Evidently, some progress has already been made toward that end. According to a survey conducted in 2000 by the CIAT-coordinated Participatory Research and Gender Analysis (PRGA) Program of the CGIAR, the international centers supported by the CG reported a total of 144 projects involving participatory research, with a combined budget of US$65 million.

Claims about the effectiveness of participatory approaches, however, rest mainly on a mass of anecdotal evidence. Few studies of impact are to be found in the literature. Clearly, if these approaches are to persist and spread, institutional decision makers must have reliable evidence indicating which approaches work and why and what impacts they can expect.

In an effort to provide such evidence, PRGA and CIAT economists have conducted empirical impact studies, in collaboration with many partners, dealing with the contribution of farmer participatory methods to scaling out agricultural and NRM technologies. There are different types of participatory methods. And their impact depends in part on the kind of farmer-researcher relationship they involve and on the stage of research at which this relationship begins.

Participatory barley and rice breeding, for example, carried out at a rather late stage, were still shown to complement conventional research, resulting in high farmer adoption of new varieties. In another project, though, focusing on integrated sweet potato management, farmers participated in the entire process, resulting not only in more relevant technologies but in improved human capacity and organizational skills.

Changing institutional culture

Another part of PRGA's effort to mainstream participatory research consists of studies highlighting obstacles to its institutionalization in the Future Harvest centers. Covering three centers, the studies have given mixed results.

On the one hand, fairly wide use of participatory methods has resulted in the development of more appropriate technologies, which farmers have adopted more readily. But, on the other, the effectiveness of those methods is limited by the persistence of a supply-driven, "pipeline" approach to technology development and transfer. That approach was ideally suited to the Green Revolution. But if the centers are now to achieve a doubly green revolution, they must undergo a profound cultural shift toward a more demand-driven, interactive model.

Linking Research to Development

Such a transformation will require, among other things, that the Future Harvest centers adopt new styles of working with a wide range of development partners at the community level. Only then can they translate participatory research into participatory development, generating economic and social benefits on a large scale.

Farmers, extension officers, and scientists plan a new round of farmer participatory research aimed at reducing soil erosion in northern Vietnam.

Learning alliances

One promising approach for reaching that goal proposes "learning alliances" between centers and development partners, particularly large international NGOs. A central purpose of these alliances is to channel the more complex products of collaborative, participatory research into current or proposed development initiatives, with a view to achieving widespread adoption.

As partners in learning, the development agencies can do much more than act as an extension service, however. They can also closely monitor the adoption and adaptation of new tools and methods at numerous locations, thus providing valuable feedback to research. The result should be a long-term partnership that improves the effectiveness of both scientists and development professionals through a shared process of institutional learning and change. Forming high-quality partnerships of this sort is by no means easy but rather requires detailed negotiation to reconcile divergent values and develop a common language.

Over the last year or so, CIAT has entered into several learning alliances—with CARE International in Nicaragua and Catholic Relief Services (CRS) in East Africa, for example. The focal point of these partnerships is CIAT's territorial approach to rural enterprise development, which was devised through several years of collaborative research at a half dozen reference sites. With this approach local stakeholder groups learn to identify market opportunities and analyze production-to-market chains, with the aim of capturing more of the value added to key products. The result is a more market-oriented, competitive agriculture that boosts farmer incomes.

Experience so far suggests that there is strong interest among development partners in learning alliances. Within just a year, CIAT's territorial approach for agroenterprise development has been scaled up from 1 to 10 municipalities in Nicaragua and from three to nine African countries.

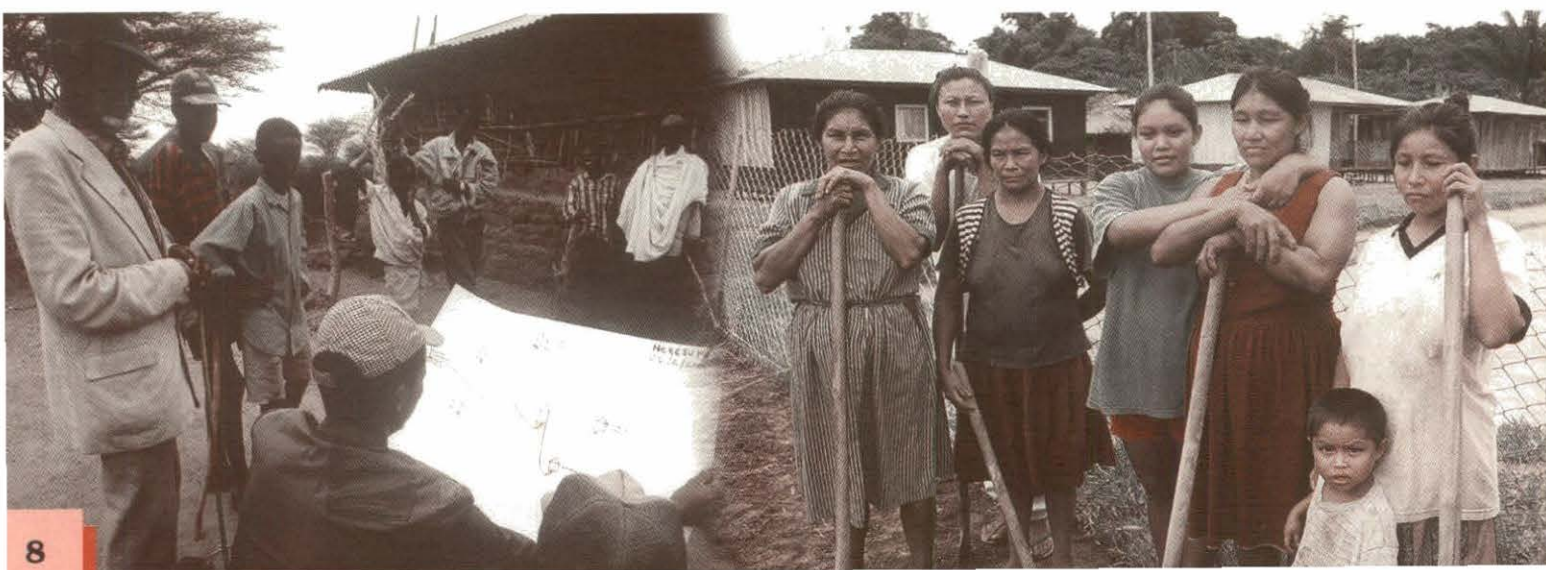
Rural planning

Another approach to provide researchers with a means of catalyzing development centers on rural planning. Directed mainly at municipal governments and other local, territorial organizations, this approach complements the learning alliances described above. Whereas the latter try to compensate for weak national institutions through strong links with NGOs, rural planning acknowledges the continuing importance of those institutions and seeks ways to make them more relevant to rural innovation.

In rural planning the various stakeholders in a given territory's development define a desirable future and specific means by which their collective vision can be made a reality. Compared with a problem-solving focus, this approach offers researchers distinct advantages and opportunities. Rather than rushing to stem a crisis, they can reflect more calmly on community needs with a wide range of actors, using a cross-sectoral systems approach, and then help define appropriate actions, based on careful consideration of multiple options. Because planning reaches across different levels of administration, it also gives researchers a chance to

Through learning alliances in eastern Africa, CIAT and international NGOs are scaling up participatory approaches to rural innovation.

Farmer-researchers like these, near Mitú in Colombia's Vaupés Department, are important stakeholders in rural planning.



deal at an early stage with policy obstacles to local innovation.

CIAT began developing a systematic approach to rural planning during the late 1990s under its longstanding research alliance with Colombia's Ministry of Agriculture. Initially, Center scientists used geographical information systems (GIS), including soil maps and satellite images, to help the municipal government of Puerto López in the country's Eastern Plains define land uses that offer new economic opportunities while reducing threats to natural resources. Later, researchers incorporated the use of GIS-based decision-support tools into a vision-based planning approach involving close consultation with local communities. The results generated a large demand for training in Colombia, where 185 government officials have been trained so far, and the collaboration has been expanded to Ecuador and Brazil.

ICTs and scaling up

Information is an important input for planning, as it is for all the approaches described here. But information is also a key output of those activities, which can be widely shared through effective communications strategies. Based on the extraordinary development in recent years of modern information and communications technologies, or ICTs, are there ways in which we can improve information and knowledge sharing, and thus achieve unprecedented efficiency in spreading technical and social innovations in rural areas?

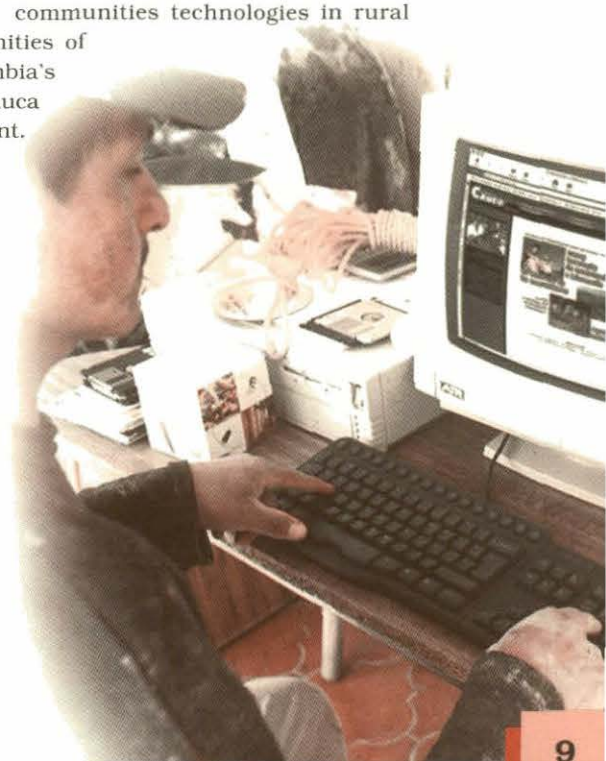
A good place to seek answers is in the research institutions, including the Future Harvest centers, whose job is to generate information and knowledge and disseminate it to the public. The World Wide Web offers us exciting new opportunities to increase the speed and reduce the cost of publishing research results and of interacting with research clients and collaborators. In addition, it has enabled the libraries of our institutions to develop more efficient services, and it has required that they assume valuable new roles—for example, in facilitating access to licensed resources and in providing guidance on matters of copyright and electronic publishing permissions.

As a result of such initiatives, the supply of potentially useful information is rapidly improving. But this raises questions about the demand side of the equation. How quickly are local researchers, development professionals, and innovative farmers gaining access to electronic sources of information? And as they do, is a more abundant supply of information necessarily translating into the development of knowledge, leading to effective action?

The problem of ICT access is gradually being resolved through the proliferation of privately run Internet cafes and other telecommunications services as well as socially progressive connectivity programs implemented by governments and NGOs in rural areas. Moreover, some local organizations are finding creative ways to reach the more isolated rural households by linking the use of ICTs with conventional communications media (such as community radio) and more traditional modes of information exchange.

Nonetheless, better access to ICTs provides no guarantee that rural people will use them to seek and obtain new technology. Training and follow-up support will be needed to build computer literacy, foment a local culture of knowledge and information discovery, and create relevant local content. That, in turn, will require much the same combination of farmer empowerment and organizational commitment that is central to most of the strategies presented in this article.

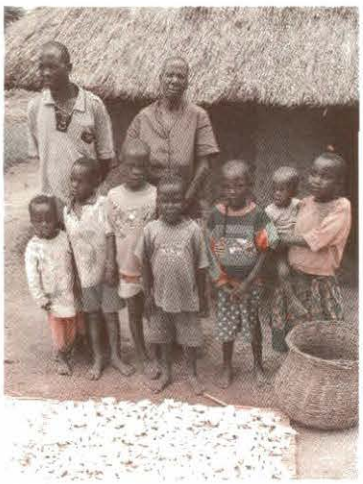
Thus, there are no shortcuts to scaling up—only a winding pathway of learning and change.



Introducing modern information and communities technologies in rural communities of Colombia's Cauca Department.

NOTES OF INTEREST

Improving Human Health Through Biofortification



The CGIAR's new Challenge Program on crop biofortification, called *HarvestPlus*, was officially launched at a press conference held in Washington, D.C., on 14 October. The Bill and Melinda Gates Foundation announced at the event its decision to provide a grant of US$25 million in support of the research.

Micronutrient malnutrition, especially lack of iron, zinc, and vitamin A, currently afflicts about half the world's population. Women and children in sub-Saharan Africa, tropical America, and South and Southeast Asia are especially at risk. HarvestPlus aims to enhance the content of naturally occurring vitamins and other essential micronutrients in major food crops through plant breeding. Biofortified crops will complement more conventional measures, such as distribution of vitamin and mineral supplements and commercial fortification of processed foods.

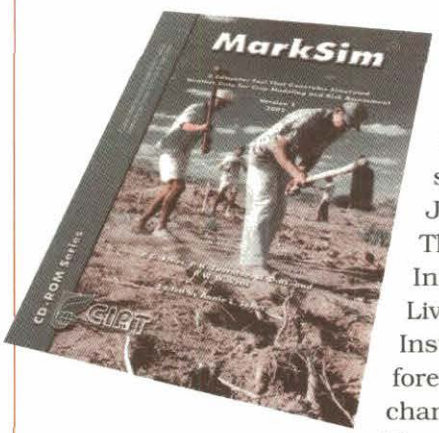
The priority crops of the new program are common beans, cassava, maize, rice, sweet potatoes, and wheat. New funding from the Gates Foundation will allow the work to be scaled up, and it will support micronutrient enhancement of other important plant species. CIAT and the International Food Policy Research Institute (IFPRI) are joint coordinators of this global research program, with CIAT's contribution focusing on beans and cassava.

For more information see the article entitled Seeds of Health in the 2001-2002 issue of *CIAT in Perspective* (www.ciat.cgiar.org/newsroom/annual_2002/report2.htm#seeds) or download the research theme paper from the Web site of the International Food Policy Research Institute, or IFPRI (www.ifpri.org/themes/grp06/grp06_biofort.htm).

New Monograph on Common Bean

A lavishly illustrated monograph entitled *Taxonomy, Distribution, and Ecology of the Genus Phaseolus in North America, Mexico, and Central America* is now available from the Botanical Research Institute in the USA. Written by George Freytag and CIAT scientist Daniel Debouck, this is the most comprehensive botanical treatment of beans to date. It should be a valuable resource for bean researchers, botanists, taxonomists, conservationists, and natural history enthusiasts. To order a copy, consult the Botanical Research Institute's Web site (www.brit.org/index.htm).

Study on Impact of Global Climate Change



In an article published in the journal *Global Environmental Change*, CIAT scientist Peter Jones and Phil Thornton of the International Livestock Research Institute (ILRI), forecast that climate change could lead to a 10 percent drop in maize production over the next 50 years in Africa and Latin America. Their findings are based on results from a CIAT computer tool called *MarkSim™*, which simulates site-specific daily weather for risk assessment, based on data collected by thousands of weather stations around the world.

For further details, see the article in *Nature* magazine's on-line Science Update (www.nature.com/nsu/030512/030512-6.html), the news feature on the Future Harvest Web site (www.futureharvest.org/news/maize_model.shtml), and the background article entitled Tracking the Impact of Global Warming in the 2001-2002 issue of our annual report, *CIAT in Perspective* (www.ciat.cgiar.org/newsroom/annual_2002/report.htm#tracking). To order a copy of *MarkSim™* on CD-ROM, see our Product Catalog in CIAT's Web site (www.ciat.cgiar.org/catalogo/producto.jsp?codigo=P0220).

Workshop on Territory and Sustainable Development

An international workshop aimed at identifying best practices for rural planning in Latin America was held at CIAT headquarters in Cali, Colombia, on 17-20 June 2003. Participants evaluated a wide range of participatory approaches to territorial planning, based on their effectiveness in promoting sustainable, equitable development.

The event, organized by the UN's Food and Agriculture Organization (FAO), France's Institute of Research for Development (IRD), and CIAT, represented an important step toward the formation of an action research network dealing with "Territory and Sustainable Development."

Whitefly-Resistant Cassava Variety


ECOVIDA

En el Tolima siembran un tubérculo inmune a la palomilla

Una súper yuca derrota a la mosca blanca

Más de 20 años de investigación redundan en beneficio para los agricultores y los consumidores de la deliciosa y popular raíz.

A cassava variety resistant to one species of whitefly—apparently the first variety of any food crop with resistance to this pest—has been released by the Colombian Corporation for Agricultural Research (CORPOICA). Named 'Nataima-31', the variety is based on a cross made at CIAT between a clone from Ecuador and another from Brazil. The variety's resistance to the whitefly species *Aleurotrachelus socialis* Bondar will enable cassava growers in northern South America, where this species is a major pest, to lower pesticide applications. In the tropics a total of 43 whitefly species have been reported, damaging a wide range of food and cash crops through direct feeding or transmission of viruses.

For more information, see the Web sites of CIAT's Integrated Pest and Disease Management Project (www.ciat.cgiar.org/ipm/index.htm) and of the CGIAR Systemwide IPM Program's Tropical Whitefly IPM Project (www.tropicalwhiteflyipmproject.cgiar.org/wf/).

New Booklet on Tropical Forages for Central America

CIAT's Tropical Forages Project has recently published (in Spanish only) a booklet entitled *Especies Forrajeras Multipropósito: Opciones para Productores de Centroamérica* (Multipurpose Forage Species: Options for Central American Livestock Producers). It is designed to help producers select appropriate forage species according to local climate and soil conditions. The booklet contains easy-to-understand information on the most widely used forage species in Costa Rica, Honduras, and Nicaragua.

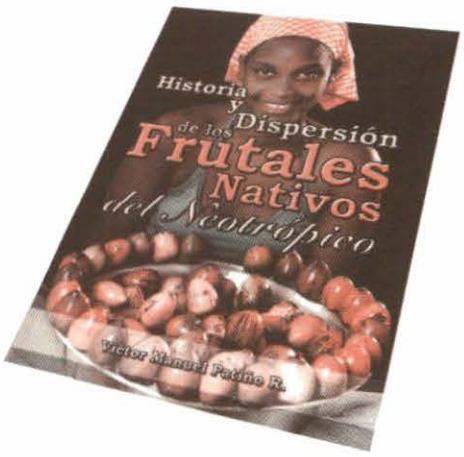
The booklet was developed under a project entitled Participatory Agricultural Research in Action: Selection and Strategic Use of Multipurpose Forage Germplasm by Small Farmers in Hillside Production Systems in Central America, which is being financed by the German government. To order a copy, see our Product Catalog in the CIAT Web site (www.ciat.cgiar.org/catalogoproducto.jsp?codigo=p333).

New Book on Cassava

A comprehensive book now available from CIAT (in Spanish only) offers a wealth of up-to-date information about all aspects of an important, but neglected, tropical crop. Entitled *La Yuca en el Tercer Milenio: Sistemas Modernos de Producción, Procesamiento, Utilización y Comercialización* (Cassava in the Third Millenium: Modern Systems for Production, Processing, Use, and Commercialization), the book was prepared to inform technicians, researchers, and others about a wide range of new technical options that can help fulfill the huge potential of cassava for improving rural livelihoods. The book is accompanied by an illustrated field guide on the management of cassava diseases, pests, and nutritional deficiencies. To order a copy, see our Product Catalog in the CIAT Web site (www.ciat.cgiar.org/catalogo/producto.jsp?codigo=p327).

NOTES OF INTEREST

New Book on Neotropical Fruits



The posthumous work of Víctor Manuel Patiño Rodríguez (1918-2001), *Historia y Dispersión de los Frutales Nativos del Neotrópico* (Neotropical Fruits: Their History and Dispersion), is now available (in Spanish only). The book was copublished by CIAT and the Colombian Association of Horticulturists and Fruit Growers (Asohofrucol), which provided funds for printing.

The author, a self-taught Colombian ethnobotanist, devoted his life to the study and protection of plant genetic resources in the Neotropics. He discovered *borojó*, a promising fruit tree of the Pacific region—whose scientific name (*Borojoa patinoi*) contains the Patiño surname—as well as other useful species mentioned in the book.

This work underscores the value assigned to both plants and animals by the inhabitants of America's equatorial region over five centuries. To order a copy, see our Product Catalog in CIAT's Web site (www.ciat.cgiar.org/catalogo/producto.jsp?codigo=p326).

Linking Small Farmers with Production Chains

The international course, entitled Linking Small Rural Producers with Production Chains: Designing Strategies for Improved Competitiveness, was held for the second time from 29 September to 10 October at Turrialba, Costa Rica. It was organized by the Center for Research and Higher Education in Tropical Agronomy (CATIE), with support from CIAT.

Coordinated by CATIE's Dietmar Stoian and Mark Lundy of CIAT, the course covered concepts and methods for a microregional approach to rural development; selection of promising production chains within a microregion; identification of market opportunities; identification and analysis of the production chain, using a participatory approach; designing a comprehensive strategy to improve production chain competitiveness; and negotiations, alliances, and trade agreements. For more information download the course pamphlet from the CATIE Web site (http: webbeta.catie.ac.cr).

New Booklet on Participatory Research in Southeast Asia

CIAT scientists have just released a booklet on participatory approaches for helping small farmers tackle problems of low-input agriculture in remote upland areas of Southeast Asia. Designed primarily for development professionals, the booklet provides a wealth of ideas, practical tips, and basic tools for getting started.

This is the latest in a series of publications on developing forage technologies with farmers in the region. Other titles available are *How to Select the Best Varieties to Offer Farmers in Southeast Asia* and *How to Grow, Manage, and Use Forages*. For more information about these publications, see the CIAT Asia Web site (www.ciat.cgiar.org/asia/rfd_series.htm).