

COMMUNICATION  
FOR TECHNOLOGY  
TRANSFER IN  
AGRICULTURE



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Cover Photo:  
While listening to a CTTA  
radio broadcast, a farm  
family in highland Peru  
follows a project flyer that  
illustrates the recommended  
sequence of actions at  
planting time.

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**E**ffective communication with farmers ensures the successful transfer of agricultural technology. Farmers want and need information that will enable them to take advantage of improved technologies. Similarly, through effective communication, extension agents and researchers learn about the current practices and problems confronting farmers and, therefore, are able to create pertinent and accessible solutions. Ideally, farmers receive relevant information, and researchers and policy-makers receive feedback concerning the successes of and challenges to farmers in using the new technologies. In short, agricultural progress depends upon effective communication.

The Academy for Educational Development (AED), through the A.I.D.-funded Communication for Technology Transfer in Agriculture (CTTA) Project, has developed and tested a comprehensive model for adjusting and transferring—communicating—agricultural technologies to farmers. The approach has been refined at four pilot sites (Honduras, Peru, Indonesia, and Jordan) and through special activities around the world. The model, a generic five-step process, has proven to be highly applicable and adaptable to diverse situations and contexts. Indeed, it has been commended by independent evaluators as being:

- **Participatory**—It integrally involves farmers in the research and extension process.
- **Integrative**—It combines research, extension, and farmers in a continuous, interactive process.
- **Practical**—It focuses on actual problems in farmers' fields; it uses local resources

(staff, equipment, and facilities); and it is low cost.

In the words of the evaluators, "CTTA is much more than just a media effort. It has succeeded in developing a systematic transfer *process* that is highly sensitive to its farmer client groups, integrates research and extension, provides for a high degree of farmer participation, utilizes existing personnel and resources in an orderly and cost-efficient manner, and inspires a surprisingly high level of motivation and enthusiasm among all project participants in country."

The foregoing factors combine to promote the likelihood of the strategy being institutionalized and sustained over the long term. Agencies in two of the three long-term pilot project countries (Honduras and Peru) have already adopted the CTTA process as their extension service policy because it is successful and relatively inexpensive. Moreover, because CTTA trains staff on the job in practical methods, the approach can readily be extended from the pilot regions to other extension offices throughout the country. CTTA is a sustainable approach because local staff know and have worked with it, because it depends on local resources, and because it benefits farmers.

## PILOT SUCCESS STORIES

Each pilot site and activity have provided a distinctly different environment for testing the CTTA technology transfer methodology.

- In Huaraz, Peru, pilot project staff worked with researchers to adapt technologies for more viable extension work in six communities comprising 4,400 farmers. Daily radio programming in Quechua and Spanish

disseminated technologies for potatoes, maize, and wheat. Radio messages and supporting print materials, such as flyers and learning manuals, helped farmers choose carefully adjusted technologies to fit their land conditions and to meet their food and economic needs. The program provided for farmer involvement and feedback to strengthen links between research and extension.

■ In Comayagua, Honduras, CTTA staff worked with the regional agricultural communication department and the extension service to change target farmers' knowledge and practices; to help increase bean, rice, and maize yields; and to promote beneficial soil conservation practices. The project combined a daily radio program, diverse printed materials, and a network of village leaders into a coherent information campaign. It also trained many extensionists in communications skills. The entire process so invigorated extension activities that extensionists became enthused about their job and farmers came to appreciate extension services. As a result, the CTTA process is now being extended to other regions in Honduras.

■ In Indonesia, CTTA worked with the Secondary Food Crops Development Project to introduce and support new basic food crops in Malang, East Java, through the use of agricultural calendars, locally written radio dramas, and puppet shows.

■ In Jordan, CTTA was instrumental in teaching farmers and laborers about pesticide safety, which is a crucial factor in farmer and consumer health and in the marketability of vegetables for both domestic and export markets.

Through this publication, CTTA intends to set forth its experiences and findings with this innovative approach to technology adjustment and transfer. Its methodology may serve as a guide to the professional development community worldwide for designing and implementing projects that incorporate cost-effective use of communication to support agricultural technology transfer among a broad spectrum of target audiences. As a result, it is hoped that agencies will be better able to increase agricultural production, to improve the quality of produce, and to maintain the natural resource base.

## ORIGINS OF THE METHODOLOGY

The Communication for Technology Transfer in Agriculture Project has been jointly developed, managed, and funded by the Offices of Education, Rural and Institutional Development, and Agriculture of the Bureau for Science and Technology, United States Agency for International Development. CTTA initiated activities in 1985 and completed its pilot phase in September 1990.

### CTTA OBJECTIVE:

To devise and deliver appropriate and accessible technical solutions to farmers on a timely basis and as efficiently and cost-effectively as possible.

### SUPPORTING STRATEGIES:

■ Investigate priority problems of farmers, determine alternative solutions available from research, and, as needed, modify and adjust those solutions with the participation of farmers, extensionists, and researchers.

■ Develop, test, and demonstrate integrated, multichannel communication strategies and methods that increase agricultural technology transfer at costs affordable to developing nations. That is, design a coherent, mutually reinforcing media and extension campaign.

■ Help sustain project strategies and methods on a national basis by limiting project activities to a supportive role and by providing extensive and practical in-service training to farmers and technicians.

CTTA provides a systematic communications approach for changing knowledge, attitudes, and, ultimately, behavior. At the same time, it is an adaptive model for technology transfer. The process is based upon—and responds to—local needs and situations.

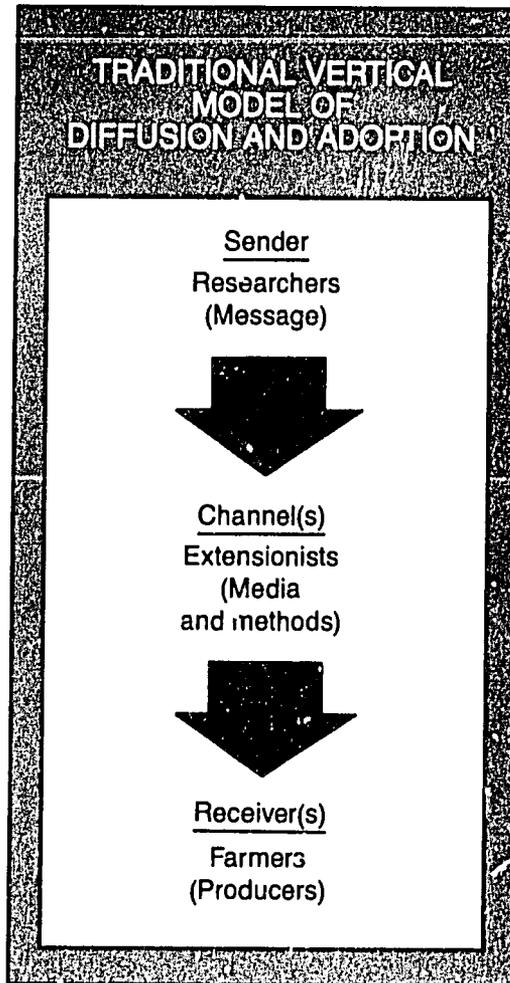
The project originated out of concern that traditional methods for transferring technology were inadequate to address emerging problems. The then current approaches were

ineffective in reaching large and diverse populations scattered across wide land areas with many agricultural characteristics. The traditional model was characterized by top-down, one-way communication from research, through extension, to farmers. It was biased toward technology and not responsive to its clients. Research examined the problems it considered important. Within extension, farmer outreach and communication were viewed as separate processes—extension or outreach as an institutional activity and communication as a collection of media materials. Finally, farmer participation often was not actively encouraged. Because of these characteristics of the traditional model, all synergistic effects among research, extension, communication, and farmers were lost.

The CTTA approach overcomes these problems by incorporating the techniques of social marketing. In essence, social marketing uses a comprehensive consumer-oriented approach for social purposes. The approach holds that customers will “buy” only those products that they want or believe they need. Or, in CTTA terms, farmers will adopt only those technologies that are accessible and adapted to them. CTTA, therefore, insists upon specifying actual problems, identifying technologies available to solve those problems, and modifying those technologies to actual farmer conditions. All of this work is performed by farmers and technicians—researchers and extensionists—in full collaboration.

At the same time, CTTA is designing and field-testing its multimedia campaign. Thus, when the technology has been adjusted, the project can mount an effective information campaign. CTTA is more than just a communications project: it necessarily and integrally involves technology identification and adjustment in the approach precisely because no communications approach alone can sell the farmer a technology that is inappropriate either to him or to her. Together, however, technology and communication prove to be an effective combination for solving farmers’ problems.

Within this framework, CTTA uses the classic marketing model of the four “Ps” for problem-solving and product development. It focuses not only on the **P**roduct (which might be an idea, behavior, technology, or tangible object) but also on **P**lace (the expectations, conditions, and circumstance of the users),



**P**rice (monetary or otherwise), and **P**romotional activities (the information outreach function). To these traditional “four Ps,” CTTA, like several other authors, also adds **P**olitics and **P**olicies, recognizing that these variables influence the environment in which change must occur.

Client-led behavior change is the key to technology transfer. The client—farmer, marketer, input supplier—is, therefore, the focal point of the CTTA approach. Within the model, research remains product oriented but emphasizes user participation in needs assessments and product development. CTTA encourages and promotes two-way communication among all of the players in research, extension, and farmer groups. Although extension is still primarily responsible for promoting new products or technologies, it also is an adaptive and dynamic process. Technologies are tested on site by users and changes are made accordingly. All three partners—

users, extensionists, and researchers—participate integrally in the extension and promotion process.

## THE CTTA MODEL IN ACTION

With this interactive model at its core, CTTA employs a five-step methodology. These steps are not unique to CTTA, but they do constitute a proven, systematic approach to program implementation.

### STEP 1: ASSESSMENT (DEVELOPMENTAL INVESTIGATION)

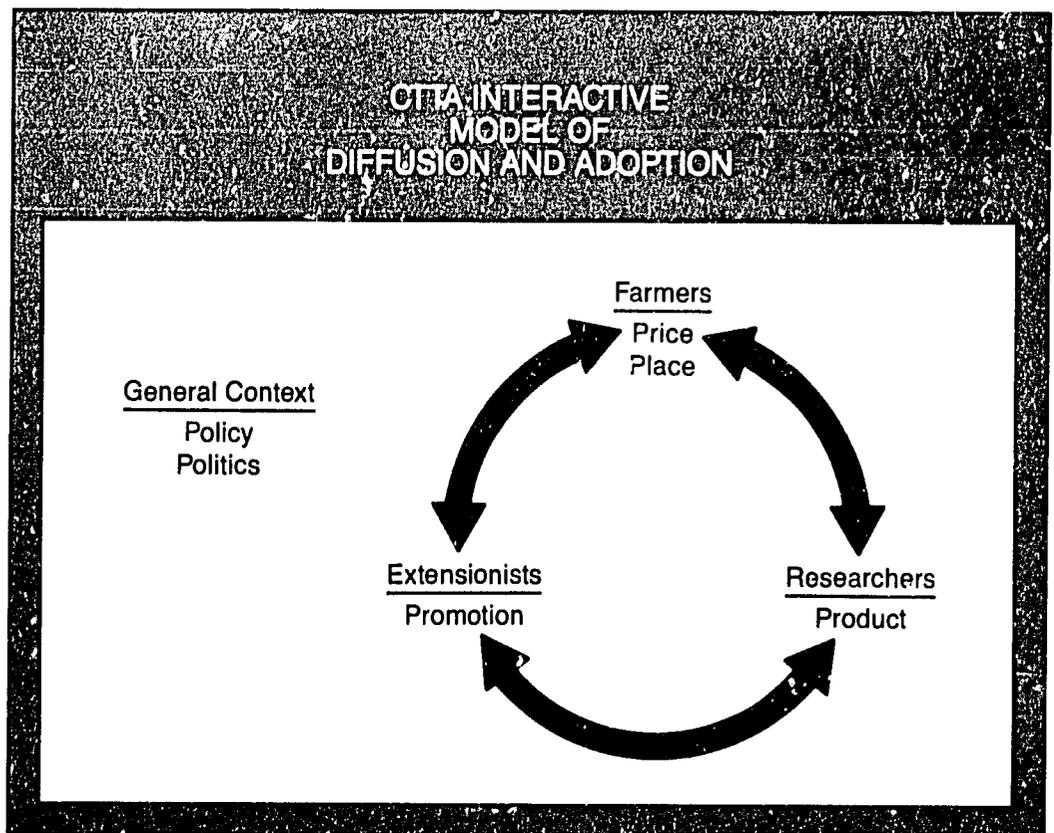
Assessment involves a variety of research methods to discover farmers' most critical problems, study local practices, and select or adapt alternatives available from research. It examines available media, personnel, and other resources to ensure that technologies and strategies are relevant to the local situation. Further, developmental investigation is the first step in integrating research and extension staff because both organizations provide staff for the studies. This initial assessment thus provides a basis for selecting technologies that address the actual needs of the

farmer clients and for designing communication messages appropriate to the users.

### EXAMPLE—PERU

In Peru, CTTA operated for two years in Huaraz, in the high northern Andes. Developmental investigation used rapid reconnaissance survey methods. These methods included focus groups with farmers, researchers, and extension agents, where the groups were asked to identify major technical problems in the pilot area. Because farmer priorities did not always match researcher priorities, members from each group were subsequently brought together to discuss differences and to negotiate a common understanding of problematic areas.

The assessment used various research methods in addition to focus groups. Central intercept interviews conducted in marketplaces provided insight from community members and client groups. Behavior observation was also crucial for linking what people said they did with what they actually did. The combination of assessment techniques proved especially effective in identifying cultural beliefs and constraints. The com-





bination also helped to identify gender roles and to determine how children participated in farming. More specifically, the assessment confirmed the traditional link among women, fertility, and the soil, thereby guiding researchers in the design of solutions appropriate for planting technologies.

The assessment identified the three staple crops for strategy development—potatoes, corn, and wheat. The project then sought ways to enhance production of each crop. The strategy involved identifying problems at key points in the cropping calendar and then assessing available technical solutions. CTTA thus worked on a sequence of problems affecting each crop. By way of example, CTTA focused on ways to control the potato worm (*papa-kuru*), to improve maize plant spacing, and to fertilize wheat.

#### EXAMPLE—NIGER

During the past decades, Nigerien farmers have faced rapidly encroaching desertifi-

cation. To avoid starvation, therefore, they have had to make constant adjustments in their farming practices. A CTTA team traveled to Niger to explore farmer innovation and communication patterns. The team observed and recorded farmer behavior pertaining to specific agricultural technologies. Findings confirmed that many farmers experiment with fertilizer, pesticide, and herbicide application and new plant varieties. Moreover, indigenous agricultural knowledge and practices strongly affect farmers' decisions about adopting new technologies.

The CTTA assessment identified farmers who brought home new millet seeds and new methods that they had collected during wage-labor sojourns. It also studied farmers who, through experimentation, had developed better varieties of drought-resistant seed than were available from researchers.

One unique series of experiments has led farmers to plant sesame with the millet to serve as a striga trap. Striga is a common

During the developmental investigation, CTTA uses field teams composed of agronomic researchers and extension agents to talk with farmers in their fields about their problems.

and damaging parasitic weed. When sesame and millet are planted together, striga first attacks the sesame, thereby giving millet a chance to grow strong enough to withstand a later striga attack. The assessment team discovered this farmer practice and shared the information with researchers who subsequently established plots to investigate the scientific basis for planting striga traps.

The team also identified indigenous communication networks that were dominant interpersonal channels for distributing information about agricultural innovations. Researchers and extensionists could use these networks for cost-effective distribution of materials and information about farming. Further, many places where people congregate were found to be reliable distribution points for disseminating information. Mosques, marketplaces, threshing sites, water wells, and village community houses were among the indigenous sites identified.

#### STEP 2: PLANNING STRATEGY DEVELOPMENT

On the basis of findings that resulted from the developmental investigation, CTTA staff and counterparts develop a comprehensive plan of action, beginning with audience identification. Once the target audiences are clearly in mind, appropriate media for reaching each audience and delivering each message are identified. Moreover, at the same time that the technologies or products are being refined, CTTA plans dissemination of preliminary materials to test formats and channels for future use.

#### EXAMPLE--PERU

In Peru, strategy development included visits by CTTA staff and local researchers to the target farms to test and observe trial recommendations for new practices. As each new technology or practice was introduced, its reception and adoption by farmers were evaluated in the field.

To standardize plant spacing for better and more even growth, experiment station specialists recommended that farmers abandon their usual practice for planting maize, in which a woman follows behind the plow and drops a continuous stream of seeds into the furrow. Instead, they suggested that farmers plant three seeds each in pockets spaced at

60-centimeter intervals along the sides of furrows spaced 80 centimeters apart. The new recommendation, however, also involved using a pick ax or spade rather than the indigenous hoe and thus shifted the job to men, who would be strong enough to lift the implement repeatedly at 9,000 feet elevation.

On-site experience demonstrated that the new practices were inappropriate to the environment and that removing women from a role which traditionally linked them to the earth's fertility would be unsuccessful. Researchers, therefore, devised an alternative approach, a simple spacing bar. Farmer feedback also helped to refine the revised recommended practices. In accord with farmers' suggestions, the specialists translated 60 centimeters into "three hands" and 80 centimeters into "four hands." They urged farmers to cut light staffs three-hands long for women to use as measures between seed drops and to place a four-hands' stick behind the plow to mark the appropriate distance between furrows. This approach preserved women's traditional role in agriculture, required no additional labor or monetary cost, and improved plant spacing.

At the outset of the CTTA campaign, less than two percent of all farmers in the area planted corn seed with any regular spacing within or between rows. Within six weeks of promoting the tested recommendations, almost two-thirds (61%) of all farmers had heard the recommendations and approximately one-half (44%) reported having acted on those recommendations.

#### EXAMPLE--HONDURAS

The Honduran extension service was traditional, with a bureaucratic organization and a vertical orientation. Each year field agents received instructions from the central extension office in the capital city regarding what they were to do—how many contact farmers to work with, how many demonstration plots to plant, and how many field days to hold.

Overall, the service was ineffective and agents were poorly motivated, thereby limiting technology transfer and reducing potential agricultural production. CTTA's primary objective in the Comayagua pilot area, therefore, became that of transforming the extension service into an efficiently functioning system that could serve farmers' needs and

coordinate effectively with researchers in designing the most appropriate and accessible technology for the farmers' situations.

To support this goal, activities emphasized institutionalization—in-service training—during the planning stage. The program instituted large-scale training-of-trainers (extension workers) to assist with Honduras' goal of reinvigorating its extension service. CTTA assisted with site selection, audience identification, technologies, messages, and media, within the framework of the agricultural calendar and the government timetable for improvement.

During their own training, extension workers began to apply their new knowledge to working with client farm families. They were supported with mass media and other educational materials through a coordinated agricultural information campaign that was planned to respond to farmer problems and needs.

CTTA operated in Honduras for three years. Because the project used local resources, emphasized in-service training, cost very little, and was successful in changing practices, the Government of Honduras adopted the CTTA approach in its Unified Methodology for all extension activities in the nation. The plan is largely based upon the CTTA technology-transfer and extension-training process.

### STEP 3: MATERIALS PREPARATION AND MESSAGE DELIVERY

Because agricultural production is a multistage process, messages must follow the agricultural production cycle in a clear and relevant way. Further, because in many countries agriculture is a family affair, information must be reinforced through varying channels that meet the needs of the different audience members. All materials are carefully pretested and revised according to input from members of the relevant target groups. The specific situation—audience, message, medium—guides the method of distribution. Finally, print, broadcast, and interpersonal instruction are integrated and mutually reinforcing, and messages are consistent from medium to medium and are coordinated to reinforce the information.

### EXAMPLE—PERU

In Peru, the communication plan was designed to reach across long distances and difficult



A woman farmer in highland Peru weeds her corn field in a manner and at the time recommended by CTTA.

terrain and to reinforce messages through several channels. Developmental investigation showed that radio programs and printed materials, combined with group training and demonstration plots, would be the most effective means for reaching the target audience.

Graphic materials, including flyers and posters, were carefully pretested in focus group discussions and individual interviews. The illustrations, which broke down each technology into a sequence of simple steps, were designed to be understood by farmers who were unable to read. The radio programs, in a combination of Quechua (the local language) and Spanish, explained each illustration in the sequence shown in the graphics, and extension agents were trained in the use of these materials before each broadcast. This integrated, multichannel approach helped farmers to learn about the technologies in their own homes before going to till their individual plots. Indeed, the quick success of the maize-spacing intervention, for example, owes much to the careful technology adjustment and information planning that were carried out by CTTA before mounting the actual campaign.

#### EXAMPLE—INDONESIA

In Indonesia, CTTA's objective was to provide cost-effective alternatives for information delivery to communities outside the formal research and extension systems. The pilot site in East Java included three ecological environments inhabited by two ethnic groups. Studies of predominant languages, therefore, provided an important basis for media development.

Developmental investigation showed that the target audiences would appreciate technical information presented in entertaining formats. The project produced a series of four-minute radio mini-dramas designed to convey general agricultural messages through short storylines. For example, a mini-drama about pesticides featured a farmer getting sick after drinking water from a pesticide can. A total of 23 scripts were written, 16 of which were recorded in both Bahasa Indonesia and in Javanese. To help ensure the relevance of these materials to farmers, villagers participated in developing the storyboards, and gifted farmers even acted out the parts for the taping of the programs. This approach focused attention on actual farmer problems and ensured that language, vocabulary, and intonation were those of everyday speech in the target village.

Research also showed that calendars which

can be displayed in the home are a popular form of decoration. The project created large, full-color calendars with timely agricultural information for each extension region. The design and content of the calendars were developed in a workshop attended by local participants. More than 6,000 calendars for each region were distributed on market days, through farmers' groups, and directly from the project vehicle as it drove through villages.

Two photonovels were developed, each addressing a specific need—pesticide use and soil conservation. To design the books, project leaders met with farmers to identify the images that best conveyed the desired messages. Indigenous communication media, such as puppets, helped farmers have input into how the messages should be constructed and, later, how the images should be sequenced into storylines. Villagers posed for the photographs that illustrated the final scripts, thereby giving the products a distinct local flavor.

#### STEP 4: IMPLEMENTATION

Implementation is the carrying out of activities designed, developed, and tested during planning and materials preparation. Radio programs are aired, training sessions are conducted, and printed materials are distributed. Target audiences begin to change their knowl-

Traditional shadow puppets are being used to develop, with farmers, a storyline for a photonovel about production practices.



edge, attitudes, and practices related to the technologies being transferred. The CTTA process encourages constant feedback and monitoring to ensure that activities reflect changing client needs.

#### EXAMPLE—PERU

In Peru, the proposed information campaign involved the distribution by extension workers of fact sheets and posters throughout the pilot area and the simultaneous broadcasting of radio spots. The technologies to be introduced had already been tested and adjusted to local needs and accommodated to reflect community and traditional practices. Nonetheless, poster production proved to be too expensive for the national implementing agency to sustain. Posters were, therefore, eliminated, and the integrated multichannel campaign was adjusted to compensate for this change.

Group training helped refine extension worker techniques for teaching new practices and provided a forum for discussing problems and finding out about farmer concerns. These opportunities for direct communication built a system of continuous feedback which helped communicators, extension workers, and researchers to continually adjust technology recommendations to meet specific circumstances. Information collected



during group training was immediately fed back to—and responded to—in radio programs.

Finally, demonstration plots were managed using the technologies that were being promoted. They provided an opportunity to put into practice each new technology and to demonstrate the results of their implementation.

#### EXAMPLE—JORDAN

In Jordan, CTTA implementation began with a mass media campaign. Television and

In accord with CTTA recommendations, a farmer (left) applies a systemic insecticide to prevent corn shootfly. He wears a glove and deposits a tiny amount of the substance (the purple dot at the end of the spoon) directly into the seed pocket.



Agricultural technicians in Peru record a radio program in their offices for broadcast the following day.

An extension agent speaks with a Jordanian fruit farmer about his crops.



radio were identified as the most effective channels for reaching a variety of audiences with general information concerning agricultural pesticide safety. Audiences included land owners and managers, large numbers of migrant laborers, government and extension workers, and farming communities. Broadcast material was reinforced with detailed printed information tailored for specific groups. Extension workers were trained to use portable video equipment and other communication materials for reaching migrant laborers. Finally, print materials were prepared for distribution through village schools.

#### EXAMPLE—HONDURAS

In Honduras, where CTTA emphasized institutionalization, implementation focused on interpersonal activities, especially the training of extension workers. Training not only focused on the CTTA model and the components of successful technology transfer but also sought to give agricultural technicians a more holistic perspective on the farming practices and environmental realities of farmers in the region.

At the same time, CTTA/Honduras mounted an integrated multimedia information campaign combining printed materials and radio broadcasts. Small-sample surveys helped adjust this program during implementation. For

example, the radio program used Mexican *rancheras*, a musical form, at the outset. Farmers, however, mentioned the possibility of using local songs as background music. The project, therefore, obtained the services of talented village musicians who played local guitar music on a voluntary basis. This shift from taped “foreign” music to live local music was but one of the adjustments to program development that brought about greater farmer involvement in the entire CTTA process.

#### STEP 5: EVALUATION

Both formative evaluation (or monitoring) and summative evaluation (or impact analysis) are important components of the CTTA process. Formative evaluation, conducted at intermediate points in the intervention, helps program managers to fine-tune technology transfer and training activities as they develop. Summative evaluation seeks to quantify the impact over time of technology transfer activities. It also seeks to analyze which aspects of an activity have succeeded or not and to discover the reasons why.

#### EXAMPLE—FORMATIVE EVALUATION, PERU

In Peru, formative evaluation was used extensively to trace the distribution, uses, and

effectiveness of individual communication materials and to drive necessary changes in programming. Radio programming on agricultural subjects had always been in Spanish, and CTTA conformed with this predilection of the national extension communications unit. CTTA formative evaluations, however, indicated that farmers would understand more in the local language, Quechua. Subsequent CTTA broadcasts were, therefore, made in Spanish and Quechua. Later, however, formative evaluation showed that farmers preferred hearing all of the information in the local language. The radio programming was adjusted accordingly. Subsequent monitoring showed that more than 70 percent of the farmers listened to the CTTA broadcasts.

Despite security risks that prevented CTTA expatriate advisors from traveling to the Huaraz pilot site after the fall of 1989, local agricultural staff continued to produce the weekly radio show and distribute new communication materials. That activities were sustained in the absence of project staff reflects the strong commitment of agricultural extensionists and researchers, as well as farm families, to a process that was considered helpful and relevant to their needs.

#### EXAMPLE—FORMATIVE EVALUATION, INDONESIA

In Indonesia, formative evaluation helped monitor the effectiveness of several media, including photonovels created for two extension regions. Approximately 100 men and women in each region were invited to participate in a pre- and post-test to measure their retention of information in the booklets. A set of ten multiple-choice questions was developed for each of the two photonovels and administered to participants both before and a month after they received copies of the booklets. The results showed that in both regions there was a statistically significant increase in correct answers in the post-test for each of the ten questions asked. Knowledge about pesticide safety increased an average of fourfold.

#### EXAMPLE—SUMMATIVE EVALUATION, PERU

Evaluation of the CTTA Project in Huaraz, Peru, focused on the knowledge, adoption, and correct application of 17 technologies that had been promoted for potatoes, maize, and wheat. On average, 64 percent of the farmers surveyed knew about the recom-

A focus group of farmers in East Java, Indonesia, discusses a CTTA photonovel.



mended technologies; 77 percent of these farmers (that is, 49% of all farmers) used them correctly.

To cite but two examples, the evaluation showed that 50.4 percent of farmers were using proper fertilization techniques for maize, whereas surveys conducted two crop cycles earlier had shown that only 1.8 percent of farmers applied fertilizer correctly. Similarly, the evaluation indicated that 63.7 percent of farmers made the recommended two applications of fertilizer, whereas two cycles earlier only 2.4 percent of farmers had followed the recommendation.

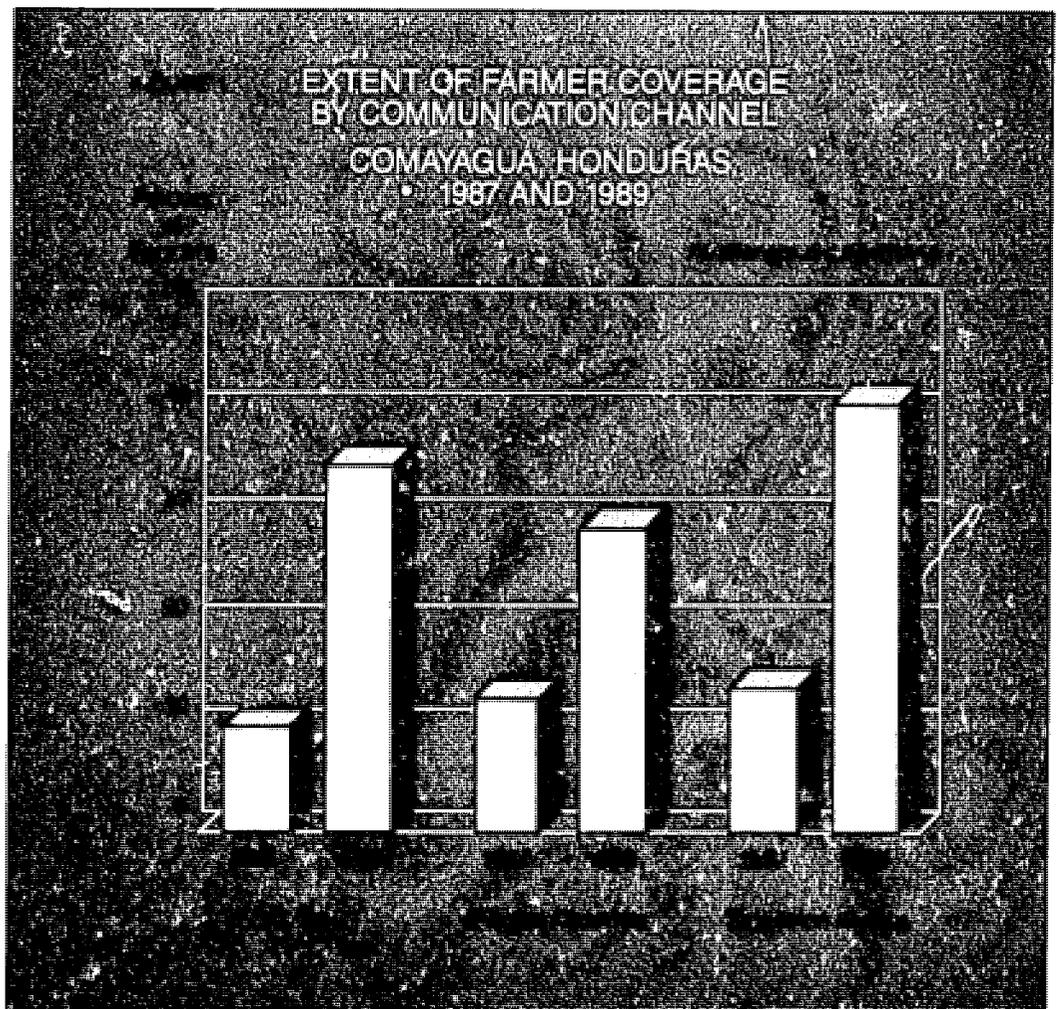
#### EXAMPLE—SUMMATIVE EVALUATION, HONDURAS

In Honduras, summative evaluation measured project impact at the farm level. The farmer impact study demonstrated how institutional changes during CTTA had a positive

impact on farmers' knowledge, practices, and productivity.

Impact was measured through a longitudinal investigation of a random sample of farmers who represented the major target audiences of the Ministry of Natural Resources' extension programs—basic grain producers. Several points emerged from this study. First, the number of farmers reached by project-supported activities tripled from 1987 to 1989. Moreover, as Figure 1 illustrates, the coverage of each of the extension channels—radio, printed materials, and extension agents—increased threefold during that period.

Second, significantly more people heard, learned, and applied correctly the project's recommendations (Figure 2). Exposure, knowledge, and adoption of recommendations concerning soil conservation practices and corn and rice cultivation all increased markedly within two years. Among the 476





A farmer in highland Peru reads a flyer that illustrates the sequence of recommended actions that is also broadcast on the project's Quechua radio program.

corn growers queried, for example, farmers remembered three-to-four times as much technical information in 1989 as they did in 1987, and nearly 10 percent more farmers were carrying out the recommendations correctly. Similar results were obtained among farmers for other crops as well as for natural resources management practices.

Third, the investigation established a clear and expected relationship among exposure, knowledge, and practice: greater exposure leads to increased knowledge which, in turn, fosters improved practices and productivity. In other words, more people heard the messages in some way than remembered them correctly, and more people learned the recommendations than actually carried them out. This natural drop-off pattern appeared in both years, but more people heard, learned, and adopted in 1989 than at the outset of the CTTA program in 1987. In short, the longitudinal sociological survey—conducted independently of the project to assess overall impact—conclusively demonstrated that CTTA had the intended effect of reaching more farmers more effectively and hence of increasing yields and production in a cost-effective and timely manner.

## PROJECT RESULTS

The measure of any social marketing program is not only how much a target audience

learns but also how that knowledge affects behavior and whether positive results can be sustained over time. Success is also reflected in the degree to which the CTTA model for solving problems is adopted by and institutionalized in relevant groups—extensionists, researchers, and farmers.

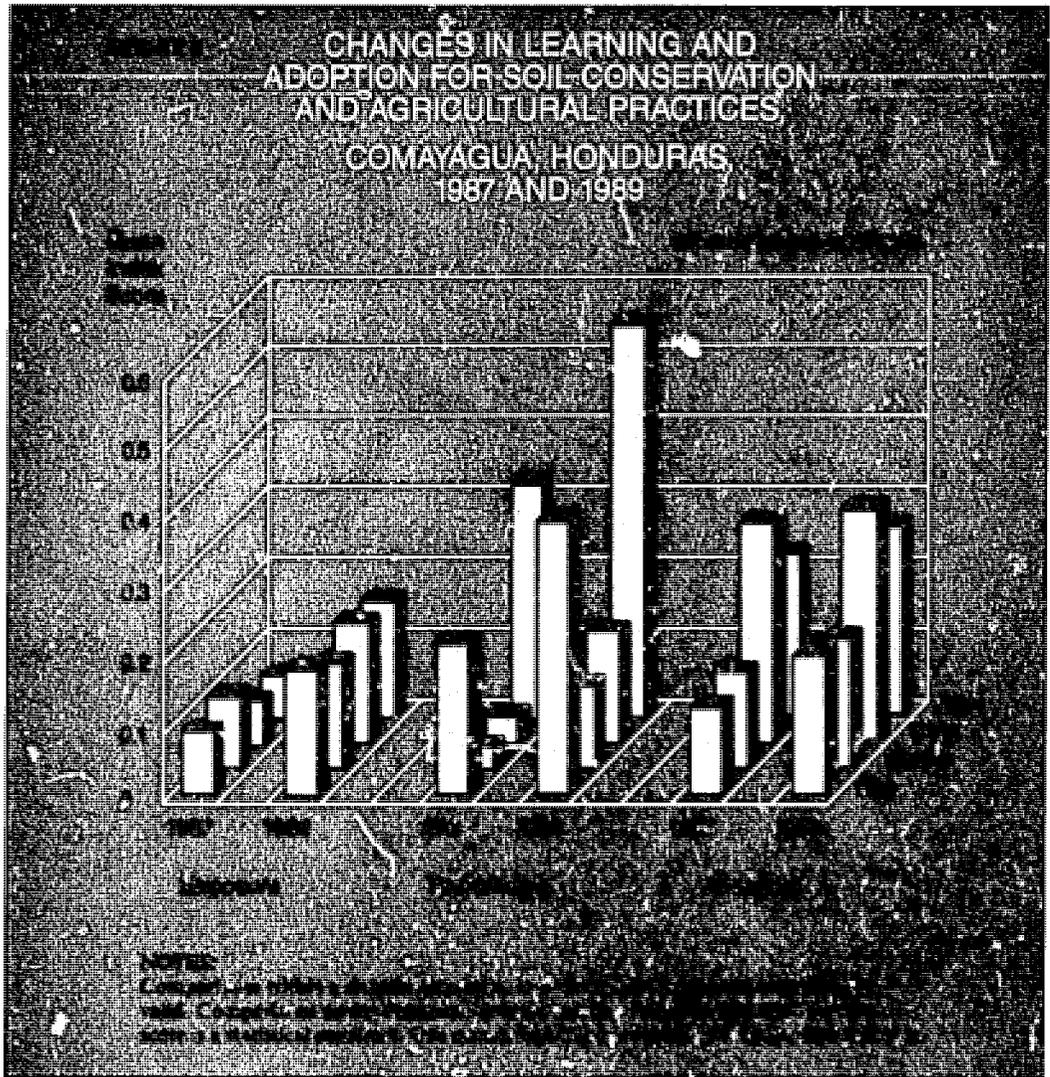
In brief, CTTA demonstrated at each pilot site the viability of an agricultural technology transfer model based upon principles of audience research and feedback.

## FARM-LEVEL RESULTS

■ CTTA expanded coverage in the Honduras target area from a base of 2,200 to 32,000 farmers in three years, and in Peru from 4,400 to 21,000 farmers, at little additional cost in both cases.

■ More farmers learned and adopted more technologies. The increases were as great as thirtyfold, as, for example, in the instance of maize spacing in Peru. As mentioned, the summative evaluation in Honduras found similar large improvements in farmer knowledge and practices for both agricultural production and soil conservation techniques.

■ In Peru, despite restricted advisor travel to the pilot area, local staff continue producing weekly radio shows and distributing supporting communication materials. More than 70 percent of the farmers listen to the CTTA broadcasts. Indeed, the listenership to the



CTTA radio program is so extensive and faithful that, when the government could no longer pay the station to carry the broadcasts, the station continued the program free of charge because it could recoup the costs from advertisement slots before and after the program.

■ In Indonesia, CTTA successfully demonstrated the cost-effectiveness of its model for reaching audiences that were isolated from agricultural extension and research services. The project used a mix of radio talk shows and mini-dramas, publications, calendars, and posters to significantly increase farmer access to agricultural information.

#### INSTITUTIONAL RESULTS

■ In Honduras, CTTA revitalized the extension service in Comayagua. As extension agents focused on farmer problems, they

came to understand the goal (or nature) of their job better. They received personal and professional satisfaction from the work. And, most tellingly, farmers came to value extension services and the extensionists. In short, the entire extension system was transformed.

■ In addition, through the Government of Honduras' Unified Methodology for the Delivery of Extension Services, CTTA principles are being implemented across all extension regions in the nation.

■ In Peru, 12 extension regions are adopting the CTTA process, and several private-sector extension groups are incorporating CTTA principles.

■ In Jordan, CTTA successfully linked eight governmental agencies and agricultural cooperatives, two A.I.D. programs, and six media groups to address pesticide safety through nationwide media interventions.



Effective communication provides farmers with pertinent technical information designed to increase their production.

## LESSONS LEARNED

Lessons and results from one place and context help to understand the processes of communication and technology transfer elsewhere, but the process cannot be applied wholesale and without modification to different environments. Agricultural conditions, natural resources contexts, and national policies and politics differ and influence what types of technology transfer programs will be successful and useful for local clients. CTTA's adaptive mechanisms allow for necessary adjustments and accommodations to occur within a systematic process based upon local realities.

Through experience in pilot projects and special activities, CTTA has drawn the following lessons that are key to the success of agricultural technology transfer programs:

❑ The CTTA process depends on local resources. It uses local staff, local facilities, and local equipment. It works within a national agency to facilitate organizational implementation of CTTA rather than setting up a parallel structure within that agency. The project, therefore, involves a great deal of in-service training. It is important to note that the project has not sent anyone abroad for a specialized degree. This approach to institution building has proved to be a central element for future sustainability.

❑ The process clearly identifies target audiences of clients or farmers. The need is to identify and segment the audiences, to determine their problems, and to study their media preferences. CTTA defines problems in terms of client interests and helps key audiences to become stakeholders in the technology transfer process.

❑ The process must involve researchers. They can understand farmers' problems—when these are made a priority concern—and they know the technical options available to solve those problems. Because, however, their research may be inappropriate, it is mandatory to work with researchers, extensionists, and farmers to adjust and adapt the available stock of technology.

❑ CTTA can empower extension workers by helping them to identify people as their first priority and giving them technology transfer tools to work with. Training is a critical activity. It reorients technicians and equips them to address the needs of their target audience.

❑ It is significant that all CTTA field directors have been communications specialists rather than agriculturalists. They deepened their knowledge of agriculture by working in the fields with farmers, extensionists, and researchers. These people—the farmers and the technicians—were in a real sense the teachers of the CTTA just as much as the CTTA staff

were facilitators for communication in this participatory, collaborative approach.

■ The CTTA process rightly stresses an integrated, multiple-channel strategy in information dissemination. Through this process, the channels reinforce each other when used properly, and the mix of media will shift over time as farmers become more attuned to the relevance of the program.

■ The CTTA process is flexible. The five-step process is an idealized scheme. In fact, one can start—and CTTA has started—almost anywhere in the cycle. The principal element in those instances is in-service training, which can be introduced into a continuing program. This approach allows for refinement of the program as it evolves.

When the transfer of technology is approached in this way, appropriate recommendations for improving agricultural production and natural resources management can readily be diffused to farmers. As the

project evaluations document, the proportion of farmers who learn about—and adopt—the recommendations doubles, triples, or quadruples within months.

Moreover, CTTA demonstrates that institutionalization and sustainability are achievable ends if the project works within, rather than parallel to, the existing agencies. Simply put, the key is to adjust the information dissemination campaign to the resources and abilities of the agency.

This, then, is the success of CTTA: by combining technology adjustment and informational campaigns in a participatory, integrative manner, technicians find value in their work and farmers find value in their recommendations. In a word, CTTA greatly enhances the value of the investments already being made in agriculture and natural resources management and by so doing contributes to its own success, institutionalization, and sustainability.

Farmers benefit directly from CTTA recommendations that are tailored to meet their specific needs.

