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Summary Report

A CASE STUDY ON FARMER INNOVATIONS AND COMMUNICATION IN NIGER

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August 1988

Communication for Technology Transfer in Agriculture
(A.I.D/S&T 936-5826)

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COMMUNICATION FOR TECHNOLOGY TRANSFER IN AGRICULTURE PROJECT
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The Communication for Technology Transfer in Agriculture (CTTA) Project is jointly managed and funded by the Offices of Education, Agriculture, and Rural Development of the Bureau for Science and Technology of the United States Agency for International Development in collaboration with Regional Bureau Technical Staff and the USAID Mission at each collaborating site. Technical services are provided by the Academy for Educational Development under Contract No. DPE-5826-C-00-5054-00.

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Summary Report
A CASE STUDY ON
FARMER INNOVATIONS AND COMMUNICATION IN NIGER

A field study on farmer innovations and communication in Niger was conducted in April and May of 1988 by a Communication for Technology Transfer in Agriculture (CTTA) Project consultant team. The activity was made possible by a special grant from the USAID's Bureau for Science and Technology.

Major implications for enhancing the transfer of appropriate agricultural technologies through increased farmer participation emerged from the study. It was found that Nigerien farmers conduct agricultural experimentation with their own resources and they transmit this information to other farmers across informal yet effective channels of communication. The results of the study suggest that USAID and other assistance agencies could rethink their agricultural research and extension strategies and better utilize communication in practical and cost-effective ways to build on existing formal and informal technology development and diffusion processes and capabilities.

The Niger study demonstrates that farmers' own research priorities can be identified, and clues on how to address farm-level production constraints can be gathered, at low-cost. Timely communication of such information to formal agricultural institutions could lead to joint farmer/researcher resolution of common problems. In addition, better understanding of the way in which farmers transmit messages to other farmers can provide practical leads for more effective agricultural extension efforts. By taking indigenous processes and building on them, the adoption of appropriate agricultural technologies can be accelerated. Returns to existing investments in agricultural research and extension can be improved and the quality and quantity of farmer-based research and extension processes enhanced.

Rationale for the Study

In an effort to encourage the development and spread of appropriate technologies, the importance and role of indigenous or farmer-based research and extension efforts need further attention and exploration. Nowhere is this more apparent than in the Sahel of Africa, where rapid climatological change requires farmers to constantly adapt to the environment in order to survive.

The Sahel offers a natural laboratory in which to observe and analyze farmers' adaptive and adoptive processes related to agricultural innovation and change. Sahelian farmers need a continuing supply of appropriate, locally-adapted technologies, and they are dynamic participants in the process of meeting that need. The CTTA team observed that farmers <u>themselves</u> informally do both basic and adaptive agricultural research, and concluded, for example, that

the germplasm found in traditional varieties can reflect generations of systematic selection for particular preferences. This suggests that local materials should not be discarded a priori in favor of exotic introductions, but should be seen instead as an important resource that can be built upon and enhanced. At the same time, the impact of formal agricultural research and extension has been limited in the Sahel, and could be enhanced with increasing information from the farm level. With what ideas are farmers experimenting? What features of their experimental technologies are most important to them? How do farmers complement their indigenous agricultural knowledge and practices with new ideas?

Information flow and the communication or sharing of ideas for a common purpose are critical aspects of successful technology transfer. How do farmers learn of and communicate new ideas? How can formal research and extension structures learn from and build on farmer experimentation and farmer-to-farmer communication? Can farmers assume more leadership in the research and extension efforts critical to their survival?

To address these questions and other concerns related to them, the AID/S&T Office of Rural and Institutional Development planned and funded, through the Communication for Technology Transfer in Agriculture (CTTA) Project, a Case Study on Farmer Innovations and Communication in Niger.

Communication and Technology Transfer

Historically, development communication efforts to support technology diffusion in agriculture tended to be top-down and paternalistic. Early communication models were linear, one-way, and simplistic.

In these approaches, farmers who were exposed to new ideas and adopted them were called opinion leaders and innovators. Farmers who rejected new ideas or technologies were labelled laggards. Little effort was made to determine why the laggards rejected messages they had clearly received and understood.

New ideas and approaches are evolving, although linear modelling and the conception of communication as the production of media products or educational materials continues to pervade thinking in agricultural technology transfer.

Recently, sophisticated contingency, domain, and system models of technology transfer have appeared. They enlarge the role and importance of communication in technology transfer. Concepts such as social marketing and integrated, participatory planning have been introduced and are challenging communicators to reassess their roles and responsibilities in technology or knowledge transfer.

By working through existing resources and situations, the CTTA

Project seeks to apply state-of-the-art theories and practices from many disciplines to address critical issues surrounding knowledge transfer in agriculture. The CTTA goal is to use communication in creative ways with other resources to increase:

- active farmer participation in technology development and transfer,
- effectiveness of research in designing appropriate agricultural technology for farmers,
- impact of extension in transferring technologies to farmers, and
- contributions of other provider systems and farmers to technology transfer.

CTTA experience at pilot sites in Honduras, Indonesia, Jordan, and Peru reinforces the importance of focussing on farmers as key participants in technology development and diffusion.

Farmer Innovations and Communication in Niger

For the Case Study on Farmer Innovations and Communication in Niger, CTTA focussed on farmers as the central node of the farmer-researcher-extension triangle. Researchers observed and described farmer-to-farmer communication networks in relationship to the transfer of farmer developed and modified innovations. Emphasis was placed upon farmer-to-farmer information flow with related opportunities for greater involvement of research and extension in naturally occurring farmer networks.

The study was organized around a thorough review of literature, three weeks of intensive anthropological investigation within Nigerien farming communities, and an analysis of findings and subsequent recommendations.

Study Sites and Methods

The CTTA team concentrated its fieldwork in western Niger, where USAID/Niger has several agricultural development projects. Team members conducted field research in rural communities, visited national development projects, and worked with USAID and Ministry of Agriculture representatives. The study included communities with and without cooperatives, expatriate projects, and resident extension agents; located on and off roads; and located near to and far from urban areas.

The team used a two-pronged research approach. One team member conducted open-ended, informal surveys and visited all seven communities. He was accompanied by research and extension personnel from USAID projects and by national and local extension agents.

The other team member conducted in-depth research in one village, Wazeye, and concentrated on obtaining detailed case histories of

specific agricultural innovations and communication networks. She chose Wazeye because it seemed to represent the situation of most Nigerien farming communities. Wazeye had little history of project interventions, did not lie on a main road, lacked resident extension agents and cooperative officials, and was far from any urban area.

Each interview began with questions related to the chosen baseline technologies, chemical seed dressings and short-cycle millets. As research progressed, and as the team met to compare and refine findings at the close of each day, questions about other technologies emerged.

The team conducted both individual and group interviews with men and women. Individual interviews were with farmers identified as special: particularly knowledgeable, prolific experimenters or innovators, key communicators or opinion leaders, etc. Groups were as large as 6 or 60, and composed mostly of men 16-75 years old. Women participated in most of the in-depth group interviews in Wazeye, and one day of interviewing there was solely with women.

Several hundred Nigerien farmers were interviewed. The discussions were lively and provocatively insightful, and the team benefited greatly from the participants contributions of time, intellectual energy, and hospitality.

Using these approaches permitted compilation of 20 case studies. In each, at least part of the communicative route an innovation had taken in reaching the study site could be traced. The case studies became thumb-nail life histories of the introduction and adoption of specific agricultural technologies, technology components, management techniques, and tools.

Indigenous Agricultural Knowledge and Innovation

African peoples have farmed for thousands of years, constantly readjusting their cropping and herding systems to social, economic, and environmental changes. They are innovators and a rich resource for agricultural research. They are the source of and communication channels for transfer of indigenous and other agricultural technologies.

Based on a thorough literature review and expert opinions, two technologies were chosen for initial field research: a) use of chemical seed dressings, and b) farmers' experiments with short-cycle millets. The former represents a non-indigenous innovation introduced several decades ago. The latter constitutes an on-going innovation with farmers experimenting with both native and formal research-improved varieties of early millet.

Commercial Seed Dressings

Commercial seed dressings in Niger typically combine a fungicide and an insecticide. Farmers use the dressings to increase germination rates for groundnut, millet, sorghum, cowpea, and vegetable seed. The CTTA team found that diffusion and adoption of seed dressings has taken many routes. In addition to formal services and projects, farmer-to-farmer spread has been important.

Farmers who witnessed the dramatic results of seed coatings usually adopted them quickly. Informants said that only two weeks after planting, fields sown with treated seed were more healthy and lush than those sown with uncoated seeds.

In addition, farmers attributed effects to the dressings beyond their role in seed germination. Some farmers said "they protect young plants from grasshoppers and other insects." Other adopters said, "the dressings work as fertilizer."

Another likely factor in the widespread acceptance of the innovation was that it enjoyed several parallels in indigenous agricultural practice. One informant recalled how the Sarkinoma, the traditional chief of agriculture in Zarma villages, sold powdered seed dressings along with incantations to ensure a good crop. Powders are an ancient and ubiquitous form of magical and medicinal treatments throughout Sahelian Africa.

In adopting this innovation from outside, farmers made their own modifications and innovations. Farmers freely vary recommended applications according to their financial means, often judging that even a little is better than none at all. Farmers also combined the dressings with chemical and natural fertilizers in innovative ways and adjusted the number of seeds planted per hill depending upon the amount of seed dressing they used.

Short-Cycle Millets

Zarma farmers categorize millet as early (short-cycle, 70-100 days) or late (long-cycle, 120 days). They also distinguish varieties by candle length, presence or absence of barbs, and grain size, shape, color, weight, and density. In a normal year, the average farmer plants one variety of each duration. The CTTA team uncovered clear evidence that farmers do systematically modify their millet populations, screening seed stocks to select for locally recognized desirable traits. The breeding criteria the farmers use are often quite distinct from those of the formal cereal breeders. Farmers expressed a keen interest in communicating preferences and working with the national millet program.

Although each set of varieties has advantages, farmers said they are increasing their hectarage and the number of varieties they plant of short-cycle millets. For example, in the past in Wazeye,

farmers planted only one early millet and three varieties of late. Today, they regularly plant 10 short-cycle millets and many are undergoing trials as innovators search for strategies with which to meet their needs in an increasingly difficult environment.

Short-cycle millets mature rapidly and ease the end of the hungry season. They can be planted late, and thus afford a final hope for having some harvest when rains are late. Farmers also said that short-cycle millets grow better than long-cycle millets on "earth that is tired." This is a critical consideration in communities where fallow periods have plummeted from 7-10 years to 2-3 years.

Millet, the subsistence cereal of Nigerien villages, became the subject of many farmer innovations. The CTTA team documented several case studies of innovations, and in the West African tradition, nicknamed the innovators.

Mr. Radio, who the team never saw without a radio in his hand, has experimented with an improved variety of 70-day millet. He got seed of the variety in Tillabery, about 150 km to the north, where he travelled for work. He tried the millet when he returned home. After one year, he said it was "very rapid, but demands heavy fertilizer application." Moreover, "Because it was so early," he said "the birds really went after it." Other farmers in Wazeye have seen Mr. Radio's experiments. They said they would like to try this dramatic new variety during the next two years without fertilizer. If it produces well, the farmers said they might adopt the new variety instead of some of their local, early varieties.

Mr. Researcher, who had a lively scientific curiosity, has been systematically experimenting with different millets. Once, he bought a sack of short-cycle millet to eat. He noted that it was not a local variety and found it especially tasty and that it made a particularly fine, white porridge. He planted it on a typical bush plot, without fertilizer. The first trial was disappointing. The millet heads were short, the grains small, and the yields low. But, Mr. Researcher did not give up. This year he will plant two plots, one with chemical and one with animal fertilizer. Depending upon results, and data from last year, he said he may or may not add this millet to his repertoire of good varieties.

Mr. Johnny Appleseed said he is always looking for new varieties. He keeps a garden of exotic, medicinal, and almost forgotten trees, cacti, shrubs, and other plants. Recently, Mr. Appleseed travelled to Hausa country in Nigeria. He brought back a new short-cycle millet, and also a new type of fonio. He said he would plant both new varieties this year to see if they are useful.

Other Farmer Innovations

The CTTA team identified many farmer innovations in addition to those related to seed dressings and new millets.

For instance, families in two villages said dry season vegetable gardening, for home use and to market, is more important now than before the drought of 1984. Villagers said they learned about gardening from men who worked in city gardens, and from observing gardens in neighboring communities rather than from the formal agricultural extension service. Now, most families keep a garden, which they plant in low-lying areas and irrigate from shallow wells. Crops may include lettuce, carrots, sweet potato, Irish potato, onion, courgette, melon, peppers, radishes, sorrel, eggplant, cucumber, okra, and beans.

Wazeye villagers have always collected and stored mature, dried fruit of the *Acadia albida* tree, and groundnut, sorrel, and cowpea leaves as dry season forage for livestock. However, they did not store stovers or hays "because there was plenty of grass everywhere." That changed during the 1984 drought.

In 1984, two Wazeye men got a new idea from a passing pastoralist who was trailing his animals northward. His herds needed feed, and he said many large, hungry herds were following. Because of the drought, these men's millet fields had not produced grain that year -- "just a lot of stalks." On the pastoralist's advice, they harvested the stalks and stored them in a specially constructed, fenced shed, to later be sold to other passing herders.

Although herds are fewer now, the practice of cutting and storing stover from millet and sorghum fields has caught on, and villagers also are harvesting wild grasses. Villagers report there is a ready cash market for all such feed, both within the village and at the local market.

Some innovations are successful and become widely adopted. The CTTA team also found that farmers try and reject some new ideas.

One group of villagers said they rejected two new cowpea varieties because their traditional varieties were more drought tolerant, grew more leaves, produced larger peas, and yielded well without chemical fertilizers. Other informants described the failure of two new sorghum varieties. Even when farmers followed all the technical recommendations, they said, one variety produced disappointingly small grains. The other was worse. Farmers said the plants grew larger and larger, did not finish growing by the end of the season, and never produced grain.

It is significant to note that these unsuccessful varieties were introduced by the formal agricultural extension service. This underscores the urgency of investigating new and more effective ways to develop and disseminate truly improved and appropriate agricultural technologies consistent with farmer needs.

Analysis of Innovations

Each Nigerien village could likely provide examples of innovative agricultural techniques, but the larger points of the team's findings were that Sahelian farmers:

- are open to, seek out, and apply new agricultural ideas;
- plan, implement, and evaluate informal on-farm research trials; and
- demonstrate a sophisticated understanding of the complex interactions among the many variables that they must manage.

The case studies also show that there is a rich body of local technical knowledge in agriculture that could almost certainly be useful to farmers throughout the Sahel.

The case studies emphasize that whether travelling, working outside the village, receiving visitors, marketing, listening to the radio or watching television, talking at community gathering places, or even entertaining teams of inquisitive anthropologists, Nigerien farmers are always alert to new agricultural ideas.

Indeed, the CTTA researchers were not the only persons conducting interviews. In each study village, farmers eagerly asked questions of the team -- about fertilizer application, plant spacing and thinning, pest control, new millet varieties, etc.

The study showed that farmers not only seek out information, but they also test it, following a scientific method. Farmers gather information before initiating research; select field trial sites based upon established criteria; control for non-experimental variables; run trials, often for more than one year; and monitor, evaluate, and debate the results.

Farmers' thirst for agricultural information and their willingness to share their knowledge among other farmers of the Sahel is both deep and indisputable.

An important question in the CTTA team's scope of work was "What characterizes the technologies that farmers have adopted?" In the 20 case studies upon which the team reported, the following major criteria were identified as important. Successful technologies

- reduce risk,
- generate income,
- are affordable,
- are readily available,
- save labor, and
- fit into farming practices.

The team determined that the technologies also are easy to understand, produce results in reasonable time, meet multiple needs, and are attested by evidence from several sources.

Communication Among Farmers

For the Case Study on Farmer Innovations and Communication in Niger, CTTA focussed on farmers as the central node of the farmer-researcher-extension triangle. Researchers observed and described farmer-to-farmer communication networks in relation to the transfer of farmer developed and modified innovations.

Observation of and interviews with farmers suggested that rich communication networks exist and are tied together with what students of network analysis call the strength of weak ties. Weak ties are bridges between groups, often referred to as linkages, and can be individuals or other groups. The CTTA team also identified other communication channels which are presently used for agricultural information or have potential for use. This kind of information could play an important role in enhancing the effectiveness of formal agricultural extension.

Who Communicates?

The CTTA researchers categorized individuals with special impact on farmer-to-farmer information flows within communities as innovators, key communicators, influentials, and others. The full report describes the characteristics of each category in detail.

The CTTA team also identified groups that would likely be involved in agricultural change, and found a rich network of them. These represent obvious communication channels to build upon to enhance the development and diffusion of appropriate technologies.

Cooperatives played a significant role in transferring agricultural technology and information in several study villages. Cooperatives were particularly important in spreading innovations like seed dressings, short-cycle millets, and new vegetable crops.

Women merit special mention as a group. Although female informants said they obtained most of their information about production aspects of farming indirectly, from husbands or male relatives, they appeared to freely exchange information about preparing and consuming agricultural products among themselves, with female relatives often serving as the catalyst for innovation.

Other groups which stood out as potential paths for disseminating agricultural information were the Samaria, or young people's association, and the group of all Marabouts in a community, headed by a chief of marabouts. These Moslem holy men are part of a formal Nigerien/African communication network. Marabouts are not only religious and moral leaders but also scribes. Presently, neither

the Samaria nor the Marabouts are particularly active in specific networks of agricultural communication. However, individuals within these groups often are.

When and Where?

Studies worldwide have shown the importance of "farm talk" in spreading the news and reality of innovative agricultural technology. The team identified locales and occasions where farm talk happens.

Informants said marketplaces were one of their main sources of information about prices for agricultural products. Farmers named many known and trusted merchants as key information providers.

Villagers said workparties, social events, ceremonies, and travel were events for exchanging information and ideas, particularly at planting and harvest. Informants agreed that travel is an important way for acquiring farming information. They cited as examples trips within and outside Niger to do wage labor, visit relatives, attend agricultural fairs, and trips to pursue Koranic studies.

Farmers regularly meet and talk at mosques and other community gathering places. Men customarily gather at the village mosque well before prayer time to share news. Cooperatives and blacksmiths' shops are other locales of farm talk for men. Women exchange news while drawing water or pounding or milling grain. These locations could be targeted as natural exchange points for certain key agricultural messages.

Mass media, folk media, and other channels also are paths for information sharing. Niger has a well-established mass media infrastructure, and the farmers who visited with the CTTA team seemed receptive to using such channels, of which radio is the most accessible. Nigeriens also were enthusiastic about television. Informants said television has two advantages over radio: a) it is more accessible to women because it is a community institution, and b) because watchers can see how something is done. Many informants said they discuss new agricultural techniques disseminated by radio or television before they apply them. They also urged that programs be broadcast before the rains. Then, farmers said, the new crop or technique can be tried on small plots in dry-season gardens to see if it works.

Although the CTTA team did not investigate the present and potential uses of folk media for agricultural communication, many countries in Africa, Asia, and Latin America have found traditional media extremely useful in conveying agricultural, health, and other information, either alone or with modern mass media. Folk media might include drama and griots (village musicians/towncriers/historians), etc, but focussed research would be required to identify a concrete role for folk media, and other possible channels, in

disseminating agricultural information in Niger.

Research and extension are the institutions with formal mandate for transferring agricultural technology in Niger. The average Nigerien farmer's main contact with these institutions and systems is through local field extension agents. But, communication between farmers and agents in Niger is plagued by characteristic problems of formal extension in the Sahel. Agents are thinly spread over the country, with each responsible for 30-40 villages, leading to farmer complaints about agents' infrequent visits. Agents also are burdened with multiple data gathering, reporting, and other tasks beyond their duties to technology transfer. Moreover, they often lack technical training, sometimes treat clients with disrespect, and often have little to extend that farmers consider workable. Although this study did not directly address research-extension linkages in Niger, documents and interviews with USAID personnel indicate that connections between the two are quite weak.

Implications of this Research

This field research in rural Niger points to some rich possibilities for enhancing development and transfer of appropriate agricultural technologies through increased farmer participation. It suggests ways in which USAID and other assistance agencies could begin to profitably rethink their agricultural research and extension strategies, giving more emphasis to communication as a catalytic element in technology development, as well as diffusion. CTTA's innovative perspective emphasizes two-way flows of information, and, while recalling some of the basic goals of farming systems research, uses a practical and cost-effective methodology for building on existing capabilities.

It is certain that farmers in Niger are, indeed, carrying out agricultural experimentation with their own resources. It is equally certain that they regularly transmit this information to other farmers across informal, yet quite effective, channels. These are on-going, dynamic, low-cost, and eminently sustainable processes, and ones that could be enhanced with improved communication. At the same time, these processes are parallel to (and are independent of) the more formal government-sponsored research and extension services. This leaves untapped the potentially great gains that might be realized with a close coordination between these two technology streams, encouraging both to work toward the joint resolution of common problems. Improved communication would be a cornerstone in such efforts.

Although only preliminary, the research in Niger has demonstrated that an analysis of informal farmer experimentation can clearly identify, at low cost, farmers' own research priorities. It can also offer important insights into how to address these key farm-level production constraints more effectively. Communicating this information to formal agricultural research institutions could go

far in making those efforts more responsive to the needs and capabilities of client farmers, greatly increasing probabilities for developing appropriate technologies that will be adopted. Similarly, a careful assessment of who, how, where, when, and why farmers transmit agricultural messages to other farmers can provide striking leads for more effective agricultural extension. This underscores the wisdom of analyzing communication processes at <u>various</u> levels of the technology generation, transfer, and use system, and how these operate in particular social and agroecological contexts. With this information, we can enhance and build upon these processes more effectively, making better use of their powerful and indigenous capabilities to speed adoption. At the same time, this would improve returns to existing investments in agricultural research and extension. This seems eminently desirable, from agronomic, economic, social, and institutional perspectives.

The limited information collected by the team during in-depth and survey research does suggest several conclusions:

- very few technologies offered by research and extension are deemed appropriate by farmers, and

- farmers do a lot of reinventing of technologies coming from formal research, but there appear to be very poor feedback loops to research and extension that show how farmers are thinking about and changing these technologies.

This listing and brief discussion of communication channels available and used by Nigerien farmers again highlights, as did the case studies, Sahelian farmers' thirst for agricultural information. They actively, but critically and differentially, use multiple information sources -- individual and group, interpersonal and mass, government and private sector, and informal and formal.

Recommendations

The <u>Case Study on Farmer Innovations and Communication in Niger</u> began with the assumptions that in Sahelian Africa, farmers are a logical group in which to look for alternative directions and approaches to technology generation and transfer.

The CTTA team reviewed literature, both about communication and technology transfer in general and about agricultural communication in Niger; surveyed farmers in several Nigerien communities; spoke with representatives of research, extension, and donor agencies; and analyzed its findings. Following are recommendations:

- institutionalize an active farmer role in the design, implementation, and evaluation of on-farm trials of new technologies;

- provide farmers better opportunity to communicate the results

of their experimentation to other farmers and to extension and research;

- create simple, inexpensive, interactive radio and television farm talk programs, with farmers to determine agrotechnical content;

- use such series and other mass media to disseminate findings and practices that have been useful to farmers in other parts of the Sahel;

- disseminate agricultural messages at the appropriate times within the agricultural cycle;

- devise better feedback loops to expose research and extension to farmers, and to reflect farmer concerns in research designs;

- use marketplaces for extension presentations and farmer discussion groups;

- mobilize women's and young people's associations to participate in on-farm experimentation;

- cultivate cooperatives as major conduits of agricultural information;

- find ways of exploiting rural Nigerien's frequent travel; and

- investigate potential uses for technology transfer of radio clubs, rural networks of scribes, folk media, and tape recorded agricultural messages.

Each of these recommendations builds upon the CTTA team's findings and seeks to enhance the quality and quantity of farmer experimentation and innovation, of farmer-to-farmer and farmer-research-extension communication, and of research and extension responsiveness to farmer needs and capabilities.

The approach used in the Niger study is strongly supported by CTTA's substantial experience and expertise in the fields of communication and technology transfer in agriculture. The next step would be a follow-up study to design a custom-made communication program to serve Nigerien farmers. More information is needed about the communication typology and networks identified in the current study. Next, information about the communication system needs to be joined with a more complete understanding of the specific agricultural messages that would be most useful to farmers. In addition, a thorough inventory of existing resources to help in communicating to and with farmers about agricultural technologies needs to be made. From this, a farmer-focussed communication program would be designed for Niger.