

Linking Research, Extension and Farmers: The Case of Mangrove Swamp Rice Cultivation in Sierra Leone

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Many recent studies have found that one of the major weaknesses in the generation, wider testing, dissemination and adoption of improved agricultural technologies in developing countries is the absence of or chronically weak linkages among researchers, extension staff and farmers (Cernea, Coultler, & Russell, 1985; Chambers, Pacey, & Thrupp, 1989; Compton, 1984; Farrington, 1988; Kaimowitz, 1990; Lakoh & Akinbode, 1981; Merrill-Sands, Kiamowitz, Sayce, & Charter, 1989; Richards, 1985; Rolling, 1986). In spite of the results from these studies, which have suggested the need for formal and direct research-extension-farmer linkages, the achievement of this goal has eluded most developing countries. This paper illustrates the seriousness of this predicament using the case of the cultivation of selected improved mangrove swamp rice varieties in Sierra Leone, West Africa.

This study was conducted in the Great Scarcies Region in Sierra Leone. Rice is the most important staple food in Sierra Leone, providing 48 percent of the daily caloric intake (WARDA, 1989).

Procedures

Data for this study were collected during an eight-month period in 1990-91. An initial two-month diagnostic survey was undertaken. At this time farmers were interviewed both individually and in groups to collect information regarding their rice production techniques and the local and improved mangrove rice varieties being cultivated. This phase of the research was also used for pre-testing the first draft of the farmer interview schedule. The mangrove swamp rice villages (a total of 26) along the Great Scarcies River were listed with information on the number of households that were growing mangrove rice in each village. Ownership of mangrove rice farms was used as the main criterion for determining the

sampling frame with the active household head as the sample unit.

A proportional stratified sampling method was used for this study. This method was used for two main reasons. First, this research was part of a larger study that assessed the diffusion and adoption of improved mangrove rice varieties along the Great Scarcies River. A proportional stratified sampling method was used to ensure that villages in which on-farm trials of improved mangrove rice varieties had been conducted and those villages where such on-farm trials had not been conducted were represented in the sample. Second, this method was used in order to have the sample consist of villages from each of the three major recommended mangrove rice growing domains (short duration, medium duration and long duration) along the Great Scarcies River. These mangrove rice growing domains vary from areas requiring less than four months of salt-free growing period for cultivating rice to those areas requiring more than six months of salt-free growing period based mainly on the distance away from the ocean. A village that is further away from the ocean along the river requires rice varieties with longer salt-free growing period. Eight of the 26 villages along the Great Scarcies River were selected for the study, four on-farm trial villages and four nontrial villages, respectively based on the criteria above. At least two of the selected villages were within each of the three main recommended mangrove rice growing domains.

A proportional stratified random sample of 150 households was drawn from a total of 506 mangrove swamp rice growing households in the selected villages along the Great Scarcies River. Ideally, a sample size of about 217 households would have been the most appropriate for a population of 506 households (Krejcie & Morgan, 1970). Due to the rugged mangrove swamp environment along the Great Scarcies River, a

conscious decision was made to limit the sample size to 150 in order to allow ample time to conduct in-depth face-to-face interviews. One hundred twenty-four household heads (83%) were interviewed. Twenty-six farmers (17%) were unavailable to interview. They were excluded from the analysis. No follow-ups were made to interview the twenty-six household heads who were unavailable because the 83 percent response rate obtained from the first wave of interviews was deemed to be adequate for drawing inferences from the questionnaire survey data.

Rice researchers and extension staff in the study area were informally interviewed during the pre-survey to identify causes of low rice productivity, interactions among systems components and rice research priorities. Researchers and extension staff whose work mandate covered rice were included in the study. Due to their limited number, all the rice research staff (a total of 12) at the Sierra Leone Rice Research Station in Rokupr and the extension staff (a total of 11) from the Sierra Leone Seed Multiplication Project at Mambo10 in the study area were sampled for this study. All the researchers returned the completed questionnaires while seven (64%) of the extension staff returned their completed questionnaires. Of the four extension staff who did not return their questionnaires, two were on leave while the other two did not complete their questionnaires.

Three separate research instruments, directed at farmers, rice researchers and extension staff, respectively, were used to generate the data for this study. Three researchers from the N'jala Agriculture College, University of Sierra Leone, and two extension agents from an Agricultural Development Project in the study area were selected to pre-test the questionnaires designed for rice researchers and extension staff. Comments and suggestions from the pre-test were considered and incorporated into the final version of the questionnaires. Questions in the pre-test questionnaire were modified or changed if responses to the questions showed sharp disagreements or raised further questions. In this case clarifying questions were added or the lead questions were modified or dropped.

The two-month diagnostic pre-survey was also used for pre-testing and revising the farmer questionnaire to ensure that the instrument was

eliciting information relevant to the study and the clarity and consistency of the questions asked. The nature and extent of research-extension-farmer linkages were assessed through four basic research questions: 1) What major sources of ideas do researchers use for setting research priorities, and what major sources do farmers use for obtaining farming information and improved mangrove rice varieties? 2) Do researchers, extension staff, and farmers participate in these selected linkage activities, namely, a) on-farm trials, b) farmers' training programs, and c) joint research-extension staff meetings? 3) Are researchers and extension staff aware of, and do they possess correct knowledge of, farmers' best local mangrove rice varieties; and are farmers aware of the major recommended improved mangrove swamp rice varieties? and 4) Are researchers, extension staff and farmers congruent in terms of their perceptions of the critical factors limiting farmers' adoption of improved mangrove rice varieties?

Results

Characteristics of the Respondents

Of the 124 household heads interviewed, only 2 (1.6%) were females, indicating that most of the households were headed by men. The farmers had an average of 25 years of mangrove rice farming experience. Only nine percent of the farmers had formal education.

All the researchers and extension staff surveyed were males because there were no females on the staff of the rice research station and the seed multiplication project included in the study. Researchers and extension staff had an average of 12 years each of working experience. All of the extension staff were from farming backgrounds, whereas only 42 percent of the researchers had farming backgrounds prior to their formal agriculture training.

Major Sources of Ideas Used by Researchers and Extension Staff for Setting Their Work Priorities, and Sources Farmers Use for Obtaining Information and Improved Rice Varieties

Researchers and extension staff were asked to indicate the sources they often use for ideas to set their work priorities. Researchers reported that more than 80 percent of their research ideas come from the research community itself, including

fellow research staff members (24%) and research objectives determined by their research institute (58%). Only one (8%) of the researchers surveyed perceived farmers as a source of ideas for setting their research agendas. The extension staff surveyed were more balanced in their use of their institutes' program objectives (29%), fellow extension staff members (29%), farmers' opinions (29%) and other sources (13%) as the major sources of ideas for setting their work priorities.

The two most common sources mentioned by farmers regarding information about mangrove rice varieties were fellow farmers (64%) and family members (25%). About 57 percent and 34 percent of the farmers reported that they used fellow farmers and family members, respectively, as sources for obtaining seed rice for planting.

Participation of Researchers, Extension Staff and Farmers in Selected Linkage Activities

Participation in on-farm trials. Sixteen percent of the researchers reported that they had carried out some form of on-farm trials in 1989-1990. All the extension staff surveyed claimed that they had conducted on-farm trials during the same period. These on-farm trials were mainly researcher- or extension-managed trials, with no farmer input in the design and management of the trials. Only seven percent of the farmers claimed that they had participated in on-farm trials with an extension or research staff in 1989-1990. The results indicated that only 6.4 percent and 4 percent of farmers had any contact with extension staff and researchers, respectively. The farmers noted that the contacts usually took place at annual research field days organized by the rice research station at which researchers demonstrated new rice technologies to extension staff and farmers.

Participation in farmer's training programs. Fifty-seven percent of the extension staff claimed to have been involved in farmers' training programs, whereas only half of the researchers had participated in such programs. None of the farmers surveyed reported being a participant in any farmer training program in 1989-1990.

Attendance at joint research-extension meeting. Over half of the researchers (64%) had attended joint research-extension staff meetings, whereas only 29 percent of extension staff indicated that they had attended such meetings.

While all the extension staff acknowledge that linkage with researchers was necessary for the success of their work, most of the rice researchers noted that linkage with their extension counterparts was not critical to their work. Researchers indicated that linkage with extension staff was not part of their mandates, but rather an operational extra to be undertaken only if their on-station research schedules permitted.

Researcher and Extension Staff Awareness and Correct Knowledge of Farmers' Local Mangrove Swamp Rice Farming Practices

To determine whether researchers and extension staff were really knowledgeable about farmers' local mangrove rice farming practices, they were asked to respond to questions related to farmers' practices that were perceived to be intriguing and better than some of the recommendations from the rice research station, and to indicate the best local mangrove rice varieties that were rated highly by farmers. Eighty percent of the researchers claimed to be aware of local mangrove rice farming practices that were superior to some of the practices recommended by their research station. When asked to name at least two local mangrove rice varieties that farmers rated highly, no researcher correctly mentioned any such varieties. All the extension staff claimed that they were aware of local mangrove rice farming practices that were better than some of the recommendations from the rice research station. Over half of the extension staff (57%) had correct knowledge of at least two of the best local mangrove rice varieties which farmers rated highly.

Perceptions of Researchers, Extension Staff and Farmers About the Critical Factors Limiting Farmers' Adoption of Improved Mangrove Swamp Rice Technologies

Researchers, extension staff and farmers were requested to comment on what they perceived to be the major factors limiting farmers' adoption of improved mangrove rice technologies in Sierra Leone. Researchers and extension staff mentioned these as the three most limiting factors: 1) the lack of improved seed rice, 2) the lack of credits for farmers to purchase needed farm inputs, and 3) chronically weak extension services. The farmers for their part indicated that labor shortage and the lack of awareness of "superior" improved mangrove rice varieties were the most critical

factors limiting their adoption of improved mangrove swamp rice varieties. Due to labor shortage a substantial number of mangrove rice farmers were gradually shifting away from the official recommended transplanting method perceived by farmers to be vary labor-intensive to the direct seeding (broadcasting) method which requires less labor and also requires less quantity of seed rice for planting per unit area.

Perceptions of Researchers and Extension Staff A out Factors Limiting: Their Close Working Relationship with Farmers

Cognizant of the fact that every research and extension system functions within unique contextual factors, researchers and extension staff were asked to indicate, based on their professional experience, the most critical factors limiting their contacts with farmers. Both groups of respondents were unanimous in citing lack of transportation as the primary factor limiting their working closely with farmers. Other limiting factors mentioned included inadequate funding, lack of incentives, lack of effective dialogues between researchers and extension staff, and poor road networks. These results are consistent with those of other studies that have examined similar issues in other developing countries (Sigman & Swanson, 1983).

Conclusions and Implications

The results of this study indicate that the influence and participation of farmers and extension staff in the generation and wider testing of new mangrove swamp rice technologies have been very minimal. The infrequent contacts among rice researchers, extension staff and farmers do not provide adequate opportunity for feedback of information from farmers to researchers.

The findings of this study suggest the need to modify the current top-down research approach that exists in Sierra Leone so as to encourage more active participation by farmers and extension staff in the process of developing mangrove rice technologies. This means that the rice research station may have to establish policies that require its researchers to assume limited extension duties, and to cultivate a work ethos that places more emphasis on the practical value of research related to farmers' real concerns and needs rather than one that emphasizes mere research publications.

Appropriate evaluation criteria may have to be established that evaluate and reward researchers not only on the basis of their research publications, but also on the basis of their involvement in adaptive on-farm trials with farmers and extension staff. Such an approach may require the training (or re-training) of researchers and extension staff in methods of planning and implementing on-farm trials, particularly when the objective is to include farmer-managed trials. The training will have to be focused on strategies that researchers and extension staff can use in learning from farmers taking into consideration the socio-economic context of the farmers. A variety of innovative approaches to planning and implementing on-farm trials have been suggested in the literature (Ashby, 1986; Hildebrand & Poey, 1985; Matlon, Cantrell, King, & Benoit-Cattin, 1984). Selection of specific approaches will ultimately depend upon the objectives of the research station as well as the experience of individual researchers and extension staff in working with farmers.

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