

Linkages
Discussion
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International Service for National Agricultural Research

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Relations Between Agricultural Researchers and Extension Workers: the Survey Evidence

by

Stephan Seegers and David Kaimowitz

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The logo for ISNAR, featuring the letters 'i', 's', 'n', and 'a' in a bold, italicized, sans-serif font, followed by 'r' in a similar style. The letters are black and set against a white background.

International Service for National Agricultural Research

INTRODUCTION TO THE ISNAR STUDY ON THE LINKS BETWEEN AGRICULTURAL RESEARCH AND TECHNOLOGY TRANSFER IN DEVELOPING COUNTRIES

David Kaimowitz
Study Leader

In 1987, the International Service for National Agricultural Research (ISNAR) initiated a major international comparative study on the links between agricultural research and technology transfer in developing countries. Like other ISNAR studies, this study was developed in response to requests from agricultural research managers for advice in this area. It is being carried out with the support of the Governments of Italy and the Federal Republic of Germany and the Rockefeller Foundation.

The objective of the study is to identify ways to strengthen the links between agricultural research and technology transfer systems in order to improve:

- (a) the relevance of research efforts through a better flow of information about farmers' needs for the research systems;
- (b) the transfer of technology to agricultural producers and other users of agricultural technologies.

Why the Study was Initiated

Many sources have noted the problem of poor links between research and technology transfer in developing countries:

"Bridging the gap between research and extension is the most serious institutional problem in developing an effective research and extension system." World Bank, 1985

"Weak linkages between the research and extension functions were identified as constraints to using the research in 16 (out of 20) of the projects evaluated." United States Agency for International Development (USAID), 1982

"All the 12 countries (in which research projects were evaluated) had difficulties of communication between research institutions and extension agencies." Food and Agriculture Organization (FAO), 1984

The serious consequences of this problem is effectively summed up in the following statement by a leading international expert in the field, Monteze Snyder: "The poor interorganizational relations between the extension agency and the research organization almost guarantee that research results will not reach farmers, and if they do, farmers will not be able to use them." Despite this situation, however, no major international study has been dedicated specifically to this issue. While there are a few good evaluation reports and academic studies in individual countries, much of what has been written about research-technology transfer links has been general or anecdotal. The results of the practical attempts which have been made to improve links have been disappointing.

A systematic study is needed to provide a set of simple, but not simplistic, suggestions on how research-technology transfer links can be improved in different situations.

Operational Strategy and Products

The study is to be conducted over a four-year period and has been divided into three stages. The first stage consists of a literature review, the development of a conceptual framework and case study guidelines, the production of 'theme papers' (see page iii) and pilot case study activities

in Colombia. The second stage involves carrying out case studies in six additional countries — Costa Rica, Côte d'Ivoire, the Dominican Republic, Nigeria, the Philippines and Tanzania. In each of these countries the studies will concentrate on specific subsets of the national research and

technology transfer systems. They will also document the links which were involved in the generation and transfer of a small number of specific new agricultural technologies. In the third stage, the various materials which have been developed will be synthesized into one set of concrete applicable guidelines.

Ultimately, four types of documents will be published as part of this special series of papers on research-technology transfer links:

1. *Theme papers* on key linkage-related topics. These have been written by specially commissioned international experts in the field.
2. *Discussion papers* which analyse one or a few major issues emanating from the case studies. About 15 such papers are expected to be produced, written by the case study researchers. They will focus on the most outstanding features of the links observed in the cases

and draw clear conclusions about them for practical use by managers.

3. *Synthesis papers* which present the lessons emerging from the case studies. These are being written by ISNAR staff.
4. *Guidelines* on how to design and manage the links between agricultural research and technology transfer for policy makers and managers concerned with the two activities. These will also be written by ISNAR staff, with input from the case study researchers, managers of national systems, and others.

We expect the theme papers to be published during 1989. Most of the discussion papers will be published during the following year and the synthesis papers and guidelines will probably be available in early 1991. Individual copies of all these papers will be available from ISNAR upon request, at the discretion of ISNAR.

**LIST OF THEME PAPERS
IN THE SPECIAL ISNAR LINKAGE SERIES
(forthcoming in 1989)**

A Conceptual Framework for Studying the Links between
Agricultural Research and Technology Transfer in
Developing Countries

D. Kaimowitz, M. Snyder and P. Engel

The Agricultural Research-Technology Transfer Interface:
A Knowledge Systems Perspective

N. Röling

Private Sector Agricultural Research and Technology
Transfer Links in Developing Countries

C. Pray and R. Echeverría

The Political Economy of the Development and Transfer of
Agricultural Technologies

H. Sims and D. Leonard

The Implications of On-Farm Client-Oriented Research for
the Relationships between Research and Extension

P. Ewell

Intergroup Relationships in Institutional Agricultural
Technology Systems

P. Bennell

The Effect of Changes in State Policy and Organization on
Agricultural Research and Extension Links: A Latin
American Perspective

R. Martínez Nogueira

Interorganizational Relationships between Agricultural
Research Institutions and Extension Agencies

J. T. Kang (tentative)

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RELATIONS BETWEEN AGRICULTURAL RESEARCHERS AND EXTENSION WORKERS: THE SURVEY EVIDENCE

Stephan Seegers and David Kaimowitz

Summary

Surveys of agricultural researchers and extension workers from eighteen countries are used to analyze the relations between these two groups. Research workers doubt extension's capability and extension doubts the relevance of the research being conducted. In effective systems extension has more input into research decisions, there is

more informal personal contact between researchers and extension workers, and more use of joint field trials. Extension workers find simple publications more useful than research publications. Most crop-related interaction between the two groups concerns varieties and plant protection.

I. INTRODUCTION

The objective of this paper is to describe the communication between agricultural researchers and extension workers and their attitudes towards each other.

To be effective, agricultural research must be relevant to producers' needs and its results, including the necessary inputs and infrastructure, must be made available to producers. This usually requires specific efforts to extend the new technology, although not necessarily a traditional general public extension service. Much technology is transferred to farmers by private-sector companies, non-governmental organizations, and other types of public institutions.

Public agricultural research institutions often have poor relations with extension agencies. In 16 of 20 research projects evaluated by the U.S. Agency for International Development (1982), and in all of 12 projects evaluated by the Food and Agricultural Organization (1984), communication between research and extension was weak. The World Bank (1985:79) says that "bridging the gap between research and extension is the most serious institutional problem in developing an effective research and extension system."

Previous authors noted that extension workers see researchers as working in "ivory towers" and producing technologies that are not applicable to the farmers they work with (FAO, 1984, Samy, 1986). Researchers look down on extension and question extension agents' ability to perform their job (Quisumbing, 1984:68). Both researchers and extension agents avoid the tasks that bridge the two activities, such as adaptive field trials and producing written material for extension agents

(McDermott, 1987). Communication between the two groups is limited. These problems are caused by differences in background, training, experience, responsibilities, status, institutional setting, and physical location, all of which promote competition between the two groups and hinder their ability to understand each other (Bennell, 1989).

Most writing on the topic has been prescriptive or based on anecdotal evidence or individual cases. This paper is the first attempt to bring together the international survey evidence on the subject.

The paper only covers aspects that can be effectively studied using surveys. It forms part of a larger comparative study of research-technology transfer linkages currently under way at the International Service for National Agricultural Research (ISNAR). This study is also using qualitative methods such as case studies and is looking at the broader institutional and structural aspects of the problem (see Kaimowitz, 1990). Even so, surveys can provide unique lessons for future agricultural research and extension policies in developing countries.

The first section presents our methodology. We then discuss the evidence on: (1) extension input into research, (2) different channels researchers and extension agents use to communicate with each other, (3) the subjects they communicate about, (4) the two groups' attitudes towards each other, and (5) how various personal attributes influence the research-extension relationship. Then we summarize the key conclusions.

II. METHODOLOGY

The summary tables from twenty-one surveys of individual agricultural researchers and/or extension workers, with information about the relations between the two groups, were collected through an extensive literature review over a three-year period. These surveys came from 18 countries, including seven countries in Asia and Oceania, five in Latin America and the Caribbean, three in Africa, two in the Middle East and the United States. See table 1.

Three of the surveys focus exclusively on research and extension for a single commodity (wool in Australia, coffee in Colombia, and rice in the Dominican Republic). The rest cover multiple commodities. Although the text consistently refers to the surveys by country names, many of the surveys only cover specific regions within these countries.

The samples varied in size from 48 in Sierra Leone and the Dominican Republic (rice) to 988 in Colombia, with a median sample size of 108. Eleven of the surveys were conducted after 1982, ten in the 1970s, and two (Argentina and Taiwan) in the 1960s. The specific conditions in the countries where surveys were conducted some time ago have undoubtedly changed, but there is no reason to believe the general pattern of relations presented in this paper has changed significantly. Half of the surveys come from unpublished doctoral dissertations, the rest from consultants' reports, journal articles, and

books.

Statistically speaking, the surveys are not fully comparable. Each of the surveys had different samples, questions, and objectives. Thus no attempt was made to rigorously test statistical hypotheses. Instead we have sought to present the general pattern of research-extension relations. The lack of strict comparability also made it difficult to present much of the material in summary tables.

We first divided the material into research and extension responses and organized the survey tables by topic. Then we compared the information on that topic between countries and integrated the research and extension responses. For any one specific topic, only a subset of the surveys had relevant information.

We were particularly interested in the differences between research-extension relations in countries or systems often mentioned as having effective extension systems (Australia, Colombia (coffee), Israel, Taiwan, and Argentina in the early 1960s) and the relations in countries with less effective systems. The first group comes mostly from more developed countries or, as in the case of coffee, commodity-specific systems supporting politically sensitive products. Researchers and extension workers have more similar profiles in this first group.

III. THE SURVEY EVIDENCE

1. Extension's Input into Research

Current conventional wisdom says that extension agents can and should help define research problems, provide technical information to researchers, and give feedback on how research-generated technologies perform in the field. Inasmuch as extension input is relatively common, particularly in more-advanced extension systems, the survey data support these ideas. It also shows that although extension input is important, extension workers are not the main source of research ideas, nor are a majority of them directly involved in providing input, in any of the countries studied.

In countries such as Argentina and Colombia (coffee) a significant minority of extension workers provided input into research. In contrast, extension agents in Pakistan, Sierra Leone, and the Dominican Republic (rice) had practically no input. Nowhere did a majority of extension workers report input to research.

Researchers from ten countries reported input or feedback from extension. In Egypt 52.3% of the researchers

surveyed said extension was an important source of new ideas. In Indonesia 61.5% thought extension should help determine research priorities. Feedback from extension workers and farmers was the source of 23% of research projects in the institutes sampled in India.

Yet in all seven countries with data, researchers said most ideas for research problems had come from the research community itself. In Argentina, Colombia, Indonesia, Pakistan, and Tanzania researchers considered farmers a more important source of input than extension. Moreover, in some countries the same researchers who said extension input was important admitted devoting little effort to obtaining it (Taiwan) or found the information extension provided not to be useful (Tanzania).

Extension workers believe they are competent to help determine research priorities and want to do more. This point comes through strongly from Argentina, the

Table 1: Summary of Samples in Surveys Used

<i>Country</i>	<i>Author</i>	<i>Year</i>	<i>Research workers</i>	<i>Extension workers</i>	<i>Regions and commodities</i>
Argentina	Rio et al.	1960	35	47	Buenos Aires
Australia	Hargreaves	1976	35	24	New South Wales/sheep & wool
Colombia	Bernal	1987	145	--	national
Colombia	ICA	1984	145	843	national
Colombia	Oliviera	1982	--	175	5 departments/coffee
Dominican Rep.	Doorman	1985	14	34	Bonao, Mao, Nagua/rice
Dominican Rep.	Malkun	1980	--	n.d.	national
Egypt	Samy	1988	98	64	five regions
India	Rao	1972	n.d.	429	Punjab, Tamil Nadu, Andhra Pradesh
Indonesia	Hussein	1986	52	105	West Java
Israel	Elkana	1970	30	56	national/field, crops, cattle, citrus
Jamaica	Alleyne	1975	21	54	national
Nigeria	Akinbode	1974	27	48	Ife
Nigeria	Idowu	1988	18	45	Zaria, Ibaden, Umudike
Pakistan	Malik	1988	50	76	Punjab/wheat and sugar research
Papua N. Guinea	Kern	1985	--	105	four provinces
Sierra Leone	Lakoh	1986	--	48	northern area
Taiwan	Lionberger	1970	122	484	western part
Tanzania	Lupanga	1986	225	677	coastal & southern highlands
Thailand	Dhandhanin	1984	45	--	northeast
Trinidad & Tob.	Alleyne	1975	15	76	national
U.S.	Jain	1970	--	50	Michigan

* More complete information about the samples can be obtained from the authors. We are grateful to Anna Wuyts for compiling this information.

Dominican Republic, Papua New Guinea, and Sierra Leone. While some extension workers, particularly in Colombia (coffee), said they had not suggested topics for research because they did not feel the need to, in three

countries extension workers complained that they did not know how research problems were selected and lacked channels for giving their ideas.

2. Personal Contacts Between Researchers and Extension Workers

Countries with stronger extension systems and with commodity-specific extension specialists have substantially more direct personal contacts between researchers and extension workers. (See tables 2, 3, and 4.) In Argentina, Australia, Israel, Taiwan, and the Dominican Republic (rice in 1980) there were frequent direct contacts. In Colombia (non-ICA), Egypt, India, Indonesia, Jamaica, Pakistan, Papua New Guinea, Sierra Leone, and Trinidad and Tobago such contacts were much less common. In these cases extension workers depend heavily on relations with their superiors within the extension services. The Dominican Republic (rice in 1986), ICA in Colombia, Nigeria, Tanzania, and Thailand are intermediate cases.

On average, wool researchers in Australia had 27.4 direct contacts with extension workers during the year. It is not uncommon for an extension agent to pick up the

telephone and call a research colleague. Almost three-quarters of extension agents in Argentina used personal contacts to find out about research results. In Israel researchers were able to name an average of 12 different extension workers they had direct contact with during the previous two years, and extension agents an average of four researchers. Over 90% of extension agents and adaptive researchers in Taiwan reported personal contacts with each other. Such contacts were the most common means of communication between research and extension. Contact with applied researchers at Taiwanese research institutes was less frequent, but was still important.

In contrast, in Indonesia and Pakistan less than a quarter of researchers had personal contacts with extension workers and on average these contacts occurred less than once per year. Even lower percentages visited farmers'

Table 2a: Average Number of Times Each Researcher Participated in Selected Communications Activities During the Year

ACTIVITIES	Australia	Israel	Indonesia	Egypt	Pakistan	Others
Personal Contact	27.4	6.2	1.8	-	0.7 ¹	-
Meetings	7.5	1.2	0.9	4.4	-	0.7 (Tanzania)
Trainings	-	-	0.2	0.6	0.1	-
Trials & demonstrations	9.1	2.0	0.5	1.5	-	-

1: Not including agricultural extension directors

Table 2b: Average Number of Times Each Extension Worker Participated in Selected Communications Activities During the Year

ACTIVITIES	Argentina	Australia	Israel	Indonesia	Pakistan		Others
					AO ¹	FEW ²	
Personal Contact	-	4.2	9.5	1.5	0.3	0.2	2.4/3.7 (Dominican Republic)
Meetings	-	0.4	5.2	1.8	-	-	(Papua New Guinea)
Trainings	1.5	-	-	-	0.4	0.4	
Trials & demonstrations	0.6	-	3.3	-	0.2	0.1	

1: Agricultural Officer 2: Field Extension Worker

fields with extension workers or helped them identify or solve farmers' problems. In Sierra Leone there had been no personal contacts between the researchers and extension workers surveyed in the previous two years. In Egypt, India, Jamaica, and Trinidad and Tobago less than

a quarter of extension workers had significant direct contact. Extension workers from the Colombian Agricultural Institute (ICA) reported substantial contact with researchers, but only 27% of researchers said they had regular contact with extension agents.

3. Publications

Publications are an important channel for researchers to communicate their results to extension workers. In Argentina, Egypt, Indonesia, Pakistan, and Taiwan between 33% and 55% of researchers reported writing articles for extension agents.

Public agricultural researchers in more-developed countries dedicate greater efforts to writing materials for extension. The average annual number of extension publications written by each researcher varied from .42 in Pakistan and .63 in Indonesia to .93 for adaptive researchers in Taiwan and 2.3 in Australia.

Research materials take a long time to be published, and field-level extension agents have trouble getting access to them. In Colombia 93% of researchers said bureaucratic delays in publishing kept them from disseminating their results. Most extension workers in Sierra Leone had trouble obtaining relevant research findings when needed because of long publication delays. Eighty-one percent of Egyptian researchers sent their publications only to extension headquarters, where field agents rarely had access to them. Extension workers in Colombia (coffee), Egypt, Papua New Guinea, and Pakistan complained that publications were difficult to obtain or arrived late.

Extension workers prefer more popular materials such as bulletins, brochures, leaflets, and manuals over scientific research journals. This tendency is greater when extension workers are less educated.

Extension workers from ICA in Colombia were more interested in receiving brochures and handouts than journals. Similarly, coffee extension workers, particularly those with only vocational training, enjoyed technical bulletins more than scientific journals and found them more interesting.

Only 10% of Papua New Guinea extension agents received their Ministry's research journal, and even these did not find it useful. Half the agents received a more popularized Ministry publication, and 90% received a simple publication for farmers, both of which they enjoyed and found useful. The extension workers clearly preferred simple publications, available in the local language.

Taiwanese extension workers regularly used extension materials, adaptive research publications, and farm

magazines. They made less use of research institute publications. They considered extension publications more handy and practical than research materials, although less up-to-date and scientific.

Similarly, in Pakistan, Tanzania, and Nigeria extensionists preferred simple, more practical publications. Only in Australia, where extension workers are highly educated, did they use journals more than research reports and other department of agriculture publications.

4. Training Events and Research-Extension Meetings

Formal training events and research-extension meetings are common in the more advanced systems. (See tables 2, 3, and 4.) Training events were ranked very highly by Australian extension workers as channels for gathering information. Joint research-extension meetings were common in Argentina, Israel, and Taiwan.

These activities are also important in certain countries with weaker extension systems. In Egypt, for example, formal joint meetings were the principal channel for informing extension about available technology. Forty-four percent of researchers and 70% of extension agents participated in at least one joint meeting during the previous year, and most found the meetings useful.

A majority of extension workers in the Colombian Agricultural Institute (ICA) and subject-matter specialists in Nigeria and Indonesia had attended courses or seminars conducted by researchers. In Indonesia, Colombia, and Thailand more than half of the researchers were involved in extension training. Over 70% of the

researchers and extension workers surveyed in Tanzania participated in joint meetings, seminars, conferences, or workshops. More than three-quarters of Pakistani extension workers had received training from researchers.

Demonstrations and field days are other common training events. These exist in most countries, although their importance varies. ICA researchers in Colombia, adaptive researchers in Taiwan, and subject-matter specialists in Nigeria reported high participation in these activities (two-thirds or more participated). Low participation was found among researchers in Egypt, Indonesia, Pakistan, and Taiwan (applied researchers), and extension workers in Egypt, Jamaica, and Trinidad and Tobago.

There is little indication that meetings or training events are frequent or take up much of either researchers' or extension workers' time in most countries. A large percentage of those surveyed in Indonesia, Pakistan, Tanzania, Egypt, and Thailand had only participated once or twice in these events or said they did not participate frequently.

5. Research-Extension Field Trials

Joint field trials play a major role in research-extension relations in the more advanced systems. (See tables 2, 3, and 4.) One-third of researchers' contacts with extension and farmers in Australia focused on cooperative trials. Similarly, in Israel a third of research-extension contacts occurred during joint trials. Depending on what commodity was involved, joint trials were the first or second most important setting for extension workers to communicate with researchers. In Argentina 25% of extension workers were asked by researchers to participate in demonstration trials.

The only other countries that reported joint trials were Egypt and Pakistan. Thirty-nine percent of Egyptian

extension workers and 25% of researchers used joint on-farm trials during the previous year, most of which were initiated by research administrators, not individual researchers or extension workers. In Pakistan 37% of agricultural officers and 21% of field assistants were involved, although only 10% of researchers participated, and researchers expressed strong disapproval of extension having adaptive research responsibilities. The average number of joint trials per research or extension person year in Egypt and Pakistan was far below that in Israel. The lack of information on this topic in the other surveys may imply that joint trials rarely occur in many of the remaining countries.

6. Research Information Received or Required by Extension

The most important crop information extension receives from research relates to field crop varieties and plant

protection. Seed varieties and, to a lesser degree, new pesticides and fertilizers, were the dominant type of

technology received by Egyptian extension workers. Varieties and crop protection were the most important themes in the publications sent to coffee extension workers in Colombia. In Sierra Leone varieties were the only type of technology for which researchers are extension workers' primary source of information. For all other technologies they relied principally on their own knowledge. Crop protection was very high among extension workers' priorities in Egypt, Israel, Pakistan, and Colombia (including coffee extension). Fertilization and soils problems are often mentioned but fall far

behind crop protection among extension agents' principal concerns.

Researchers transfer mostly technical information. Extension workers receive little social science information from researchers, and they give these issues low priority.

Information flows more easily when both researchers and extension workers specialize in the same commodity. This comes out clearly in the data from the Dominican Republic, Colombia, and Israel.

7. Researchers' Attitudes Toward Extension

Data from Argentina, the Dominican Republic (rice), Tanzania, Pakistan, Indonesia, and Nigeria support the hypothesis that researchers in developing countries have a poor view of extension. Researchers in these countries felt that extension was ineffective and blamed the problem on insufficient education and training, poor incentives, and frequent staff turnovers (Dominican Republic, Nigeria, Tanzania). They were also unclear about extension's mandate (Argentina, Tanzania).

Most of Argentina's researchers thought the extension agents were incapable or only partially capable of fulfilling their functions. This feeling was shared by rice researchers in the Dominican Republic, particularly with respect to the general public extension service (as opposed to the rice development department). Three-

quarters believed experienced farmers have more knowledge about rice than recent graduates working in extension.

Tanzanian researchers said that extension workers did not appreciate the complexity of research (65%), were not well trained (54%), and did not know much about farming (49%). A majority of researchers in Indonesia, Pakistan, and Tanzania considered extension ineffectiveness a major cause of non-adoption.

In none of the six countries just mentioned did researchers see the limited applicability of their own results as a major cause of low adoption. Those who did not blame extension mostly said poor adoption was due to farmers' traditionalism or poor agricultural policies.

8. Extension Workers' Attitude Toward Research

Extension workers do not question the researchers' technical competence, but many complain that not enough research is being conducted, the research carried out does not meet their needs, and not enough is being done to communicate results to extension (Argentina, Papua New Guinea, Pakistan).

Large majorities of the extension agents in the Dominican Republic, Sierra Leone, and Tanzania had strong doubts about whether the research being conducted was relevant to farmers' needs. A minority from Argentine expressed similar concerns.

The agents gave various explanations for the lack of relevance. Researchers make technical recommendations

without considering their profitability (Argentina).

Funding sources with research agendas that are not relevant to extension have excessive influence (Sierra Leone). Researchers do not interact enough with extension agents (Sierra Leone) and know little about farmers' problems (Tanzania).

The view from Jamaica was mixed. Researchers were thought to perform well on: (1) choosing appropriate problems for research, (2) making practical recommendations for farmers, and (3) being committed to solving small and medium farmers' problems. They received lower marks on providing resource materials to extension, and following up on research recommendations.

Table 3a: Percentage of Researchers Involved in Different Communications Activities

ACTIVITIES	Argentina	Taiwan		Colombia	Indonesia	Egypt	Pakistan	Nigeria	Other
		(1)	(2)	(3)	(4)		(4)		
Personal Contact	60	39	81	27	12-21	-	12-16	15	-
Meetings	40	5	34	77	0-25	44	10	7	62
Trainings	-	18	43	87	0-29	26	12-46	31-40*	Tanzania 3 Thailand
Trials & demonstrations	-	14	66	64	0-29	25/18**	10	-	-

1: Experiment Station technicians.

2: Research Institute technicians.

3: Researchers from the Instituto Colombiano Agropecuario (ICA).

4: Range of percentages involved in activities with subject matter specialists, agricultural officers and field extension workers.

* The first number refers to training events, the second to seminars.

** The first number refers to trials, the second to demonstrations.

Table 3b: Percentage of Extension Workers Involved in Different Communications Activities

ACTIVITIES	Argentina	Taiwan		Colombia		Indonesia	Egypt	Pakistan		Nigeria	Tanzania	Other
		(1)	(2)	(3)	(4)			(5)	(6)			
Personal Contact	62	60	43	0-72	0-30	59	34	11	10	-	36	(7)
Meetings	42	28	74	57-68	30-36	53	70	-	-	4	34	
Trainings	86	95	95	64	27	-	-	76	79	58	16	-
Trials & demonstrations	25	96	96	-	-	-	39/16*	21	37	65	-	-

1: Improvement Station technicians.

2: Research Institute technicians.

3: ICA extension workers receiving information from ICA researchers. The range of percentages reflects different types of meetings and contacts.

4: ICA extension workers receiving information from non-ICA researchers. The range of percentages reflects different types of meetings and contacts.

5: Agricultural officers

6: Field extension workers

7: Dominican Republic 20%, India 41% general extension officers, 31% specialist extension officers.

* The first number refers to trials, the second to demonstrations.

9. The Effect of Personal Attributes

Various surveys examined the correlation between the researchers' and extension workers' personal attributes and their communication patterns and attitudes. The results, however, are inconclusive.

Age seems to have a positive effect on research-extension relations. Age was positively correlated with the number of physical and material objects researchers transferred to extension in Egypt. Older researchers in Australia and Tanzania were more receptive to extension communication. Older extension workers in Tanzania were more inclined to feel that joint field days,

extension also become more negative (Tanzania). The number and frequency of contacts declined with length of service for both research and extension staff in Nigeria and for extension workers in Israel. Length of service had no effect on the reception of new technologies by Egyptian extension workers or the propensity of Tanzanian researchers and extension workers to contact and respond to each other.

For several other variables the results were mixed. More formal education increased the popularity and intensity of communication between researchers and extension

Table 4a: Performance of Researchers and Extension Workers from Countries with Effective Extension Systems in Various Communication Channels

	Argentina	Australia	Israel	Taiwan applied research	Taiwan adaptive research
Personal Contact	high	high	high	medium	high
Meetings	medium	medium	high	low	medium
Trainings	low	high	-	medium	medium
Trials	low	high	high	medium	high

Table 4b: Performance of Researchers and Extension Workers from Countries with Ineffective Extension Systems in Various Communication Channels.

	Colombia ICA	Colombia non-ICA	Egypt	Indonesia	Nigeria	Pakistan	Tanzania	Others
Personal Contact	medium	low	low	low	low	low	low	(1)
Meetings	medium	low	high	low	low	low	low	-
Trainings	medium	low	low	low	low	low	low	low(Thailand)
Trials	low	low	medium	low	low	low	low	low (T&T)

1: low: Sierra Leone, India, Jamaica, Trinidad and Tobago (T&T)
medium: Dominican Republic (rice, 1986), Papua New Guinea

conferences, seminars, and workshops are useful. No correlation was found between age and other variables studied in Australia, Nigeria, Tanzania, and the United States.

Professionals' length of service may partially counterbalance the age effect. The longer researchers were in one location the less receptive they were to communication with extension (Australia) or participating in joint meetings (Tanzania). Their attitudes toward

workers in Israel, but had no impact on researchers' attitudes toward extension workers in Australia. Coming from a farm background had a positive effect on Egyptian researchers' transfer of technology to extension, but no effect on the frequency, intensity, or popularity of research-extension communication in Israel or the number of technologies Egyptian extension workers receive.

There is also contradictory evidence on the effect of organizational rank and status.

IV. CONCLUSIONS

Researchers and extension workers communicate with each other through meetings, training events, publications, joint participation in trials and demonstrations, and direct personal contact. Those who work in more developed systems and commodity-specific systems communicate with each other more. In particular they communicate more informally and place greater importance on joint research-extension trials.

New varieties and crop protection are the major focuses of research-extension interaction with respect to crops. Crop protection is key because extension workers and producers concentrate their demands on research on problems they perceive as urgent. They rarely emphasize long-term or less-obvious problems.

The more effective extension services have input into determining research problems. Researchers in most countries have some doubts about such input but are willing to give the idea qualified support. Extension workers actively want input and feel competent to provide it.

Still, the potential for extension input should not be exaggerated. Evidence from the more developed systems suggests that extension will probably never replace the research community as the primary source of research ideas, and only a minority of extension agents is likely to be involved.

One major reason researchers and extension workers communicate less in developing countries is the negative attitudes they have about each other. Researchers doubt whether extension agents are competent and motivated to work, and extension agents question whether the research being done is relevant.

Extension workers want researchers to put more effort into communicating their findings. They also want simpler, more timely and applicable materials, written in their local language, and greater efforts to give field-level workers access to such publications. Research journals are not an effective means of communicating with extension.

To improve relations between the two groups in developing countries, researchers will have to perceive extension agents as competent. In many countries this can only happen if extension staff receive more training and greater incentives. For its part, research will have to

become more relevant, through a greater emphasis on farmers' constraints, more on-farm research, and greater input from farmers and extension.

Clear channels and procedures are needed if extension input is to increase. To produce research materials appropriate for extension will require more resources for research communication departments and incentives for researchers to dedicate more time to their extension audience.

Informal direct person-to-person communication is probably essential for an effective flow of information. This is not surprising, given evidence from communications research elsewhere. It does, however, represent a major challenge to most developing countries, where extension services are organized along hierarchical lines, extension workers have limited education, and there are greater differences between researchers and extension workers.

Footnotes

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- 1) Rice extension in the Dominican Republic has also been said to have been effective. This is reflected in our 1980 Dominican Republic data. However, by 1986 the system was in a state of decline. Moreover, the 1986 data were drawn from regions where rice extension has traditionally been weak.
- 2) Preference for publications in local languages was also important for extension workers in Pakistan.
- 3) Pakistani extension workers reported high participation in demonstrations; 70% of agricultural officers and 55% of field assistants said they used them often. Yet it is not clear if they were referring to joint demonstrations with research or simply extension demonstrations for farmers. The extension workers made some use of field days, but not often, and many of those who participated questioned their usefulness and the completeness of the information presented.
- 4) Field trials were the most important setting for citrus and the second most important for field crops and cattle.
- 5) The Tanzanian data are contradictory. Researchers also agreed with the statements: (1) "for helping small farmers, the extension worker is more important than the researcher" (74%); (2) "extension workers have a lot to extend to farmers" (85%); (3) "it is not a waste of time for researchers to consult extension workers" (94%); and (4) "abolishment of extension in Tanzania would not go unnoticed" (80%).
- 6) The evidence from Tanzania on how researchers' age affected their attitudes about extension is contradictory. Older researchers were more inclined not to blame extension workers for poor adoption. They were also more likely to believe extension workers were poorly trained and had little to extend.

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