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Special Series on the Organization and Management of On-Farm Client-Oriented Research (OFCOR)

OFCOR–Comparative Study No. 5

STAFF MANAGEMENT ISSUES IN ON-FARM CLIENT-ORIENTED RESEARCH

by

R. James Bingen and Susan V. Poats

April 1990

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International Service for National Agricultural Research

INTRODUCTION TO THE ISNAR STUDY ON ORGANIZATION AND MANAGEMENT OF ON-FARM CLIENT-ORIENTED RESEARCH (OFCOR)

Deborah Merrill-Sands
Study Leader

Introduction

In 1986, ISNAR initiated a major study on the organization and management of on-farm, client-oriented research (OFCOR) in national agricultural research systems (NARS). The study was developed in response to requests from NARS leaders for advice in this area and was carried out with the support of the Government of Italy and the Rockefeller Foundation. The objective is to analyze the critical organizational and managerial factors that influence the way national research institutes can develop and sustain OFCOR programs to realize their specific policies and goals.

What Is OFCOR?

OFCOR[1] is a research approach designed to help research meet the needs of specific clients, most commonly resource-poor farmers. It complements – and is dependent upon – experiment station research. It involves a client-oriented philosophy, a specific research approach and methods, and a series of operational activities carried out at the farm level. These activities range from diagnosing and ranking problems through the design, development, adaptation, and evaluation of appropriate technological solutions. Farmers are directly involved at various stages in the process.

In this study, OFCOR programs are analyzed in terms of the functions OFCOR can perform within the larger research and extension process. We have identified the following seven potential functions as a framework for analyzing the organization and management of a range of on-farm research programs in nine national agricultural research systems. The functions are:

1) to support within research a *problem-solving approach, which is fundamentally oriented toward farmers as the primary clients* of research;

2) to contribute to the application of *an interdisciplinary systems perspective* within research;

3) to *characterize major farming systems and client groups*, using agroecological and socioeconomic criteria, in order to diagnose priority production problems as well as identify key opportunities for research with the objective of improving the productivity and/or stability of those systems;

4) to *adapt existing technologies and/or contribute to the development of alternative technologies* for targeted groups of farmers sharing common production problems by conducting experiments under farmers' conditions;

5) to *promote farmer participation in research* as collaborators, experimenters, testers, and evaluators of alternative technologies;

6) to *provide feedback to the research priority-setting, planning and programming process* so that experiment station and on-farm research are integrated into a coherent program focused on farmers' needs;

7) to *promote collaboration with extension and development* agencies in order to improve the efficiency of the processes of technology generation and diffusion.

1. The designation *OFCOR* has been used as distinct from *farming systems research* (FSR) because the latter has come to have very different meanings for different people.

Why Is the Organization and Management of OFCOR Important?

Over the last 15 years, many NARS have set up OFCOR programs of varying scope and intensity to strengthen the link between research and farmers – particularly resource-poor farmers. While significant attention has been given to developing methods for OFCOR, provisions for fully integrating this approach within the research process have been inadequate and the institutional challenge underestimated. With the accumulation of experience, it is clear that NARS have confronted significant problems in implementing and effectively integrating OFCOR into their organizations. In many cases, OFCOR programs have become marginalized and have not had the intended impact on the research process.

Improved organization and management are crucial to overcoming these problems. Effectively integrating OFCOR within a research system implies forging a new research approach which complements and builds on existing research efforts. This is no small task. It involves establishing new communication links between researchers of diverse disciplines, extension agents, and farmers. It requires hiring people with the right skills or systematically training existing staff. It requires changes in planning, programming, review, and supervisory procedures. It creates increased demands for operational funds and logistical support for researchers working away from headquarters. And, it often involves working with one or more donor agencies. All of these make the management of OFCOR more demanding than that of traditional experiment station research.

This study focuses directly on these issues of implementation and institutionalization. We have analyzed and synthesized the experiences of diverse NARS in which OFCOR programs have been established for at least five years. The intention is to provide a body of practical experience upon which research managers can draw as they strive to strengthen OFCOR as an integral part of their research systems.

Operational Strategy and Products

Our approach has been to learn from the experiences of research managers in NARS. We have built the analysis around case studies of nine countries whose NARS have had sufficient time to experiment with and develop diverse organizational arrangements and management systems for implementing OFCOR. By region, the countries are as follows:

Latin America: Ecuador, Guatemala, Panama

Africa: Senegal, Zambia, Zimbabwe

Asia: Bangladesh, Indonesia, Nepal

The case studies are stand-alone products. Each is a comprehensive analysis developed by a team of national researchers with personal experience in the individual OFCOR programs. The cases provide important insights and lessons on the general issues, as well as specific guidance for research policy and the organization and management of OFCOR in their countries. The cases will be published in 1988. A list of the reports follows.

Comparative study papers providing a systematic analysis across the case studies are a second product of the study. Synthesizing the experience of case study NARS, these papers provide practical advice to research managers on organizational and managerial issues central to the effective integration of OFCOR within their research systems. The themes developed are:

1) Alternative Arrangements for Organizing OFCOR: Comparative Strengths and Weaknesses;

2) Integrating OFCOR and Experiment Station Research: Organizational and Managerial Considerations;

3) Organization and Management of Farmer Collaboration in Research;

4) Organization and Management of Linkages between OFCOR and Extension;

5) Organization and Management of OFCOR Research Process and Decentralized Field Operations;

6) Development and Management of Human Resources in OFCOR;

7) Financial Resource Use and Management in OFCOR;

8) Management of Relations with Donors and External Sources of Knowledge;

9) Issues in the Institutional Development of OFCOR in NARS.

We expect these papers to be published during 1988 and 1989. They are working papers presenting the results of the analysis of the nine concrete OFCOR situations. At this stage, they are intended to stimulate discussion and debate; they are not presented as "state-of-the-art" pieces on these topics.

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OVERVIEW OF THE NINE CASE STUDIES

Deborah Merrill-Sands
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The OFCOR efforts reviewed in the cases vary in scope, the emphasis assigned to different objectives and functions, and the specific methodologies employed. They all conform, however, to the general definition of OFCOR developed for this study. The cases reflect a variety of institutional settings and strategies for introducing and developing OFCOR. They also reflect the broad range of models used in the organization and management of OFCOR. The profiles below highlight the salient features of each case and Table I provides some key descriptive indicators for comparison across cases.

Latin America

Ecuador

OFCOR is conducted by the Production Research Program (PIP, Programa de Investigación en Producción), an autonomous program within the Instituto Nacional de Investigaciones Agropecuarias (INIAP). It has two national coordinators responsible for the highland and coastal macro-regions and 10 regional field teams assigned to different provinces under the administrative auspices of regional experiment stations. Five teams are associated with integrated rural development programs.

Initiated in 1977 with support from CIMMYT, the case is particularly interesting because it allows us to trace the evolution of the organization and management of an OFCOR program from its origins as a pilot project through to its institutionalization as a full-fledged national program.

Guatemala

An OFCOR philosophy pervades Guatemala's 16-year-old agricultural research institute, the Instituto de Ciencia y Tecnología Agrícolas (ICTA). Two units, however, are specifically charged with carrying out OFCOR functions: the Technology Testing and the Socioeconomics Departments. The first is responsible for testing in on-farm trials all technology developed by the commodity programs. The second conducts diagnosis, on-farm monitoring, and special studies.

The 14 Technology Testing Teams are made up of scientists and technicians whose research is coordinated from regional stations but who live and work in designated research areas. The Socioeconomics Department is organized at the national level with representatives in some of the regions. Almost all scientists in the department are agronomists with training in social science methods. Coordination between the two departments is limited.

ICTA's experiences with OFCOR have had a major influence on other countries. What makes Guatemala especially interesting is that OFCOR was not appended onto an existing system. Rather, ICTA was set up from the beginning to incorporate the OFCOR philosophy. Moreover, this case also allows us to examine the organization and management of OFCOR within a regionally organized research system. This is important because a regionalized research system is generally regarded as the institutional setting most compatible with OFCOR's organizational requirements.

Panama

In the late 1970s, the Instituto de Investigación Agropecuaria de Panamá (INIAP) developed a "national plan " through which priority areas for on-farm research were selected. OFCOR is implemented in some of these areas as part of the regular research programs of scientists who also work on-station. In other areas, OFCOR is implemented through projects with full-time staff, developed in collaboration with international agricultural research centers. The projects are variable in organization and operation, and there is no mechanism at the national level for coordinating the diverse OFCOR efforts. What is particularly interesting about Panama's experience is the institutionalization of OFCOR as a research strategy, rather than as a formal program with a discrete OFCOR unit or units.

Africa

Senegal

The Department of Rural Sociology of the Institut Sénégalais de Recherches Agricole (ISRA) initiated an OFCOR program in 1978. It is now part of the Department of Production Systems and Technology Transfer (DRSP, Département des Recherches sur les Systèmes de Productions et le Transfert de Technologies en Milieu Rural), one of the four main research departments established in 1982 after a major reorganization of ISRA under the auspices of a World Bank project. The DRSP consists of a Central Systems Analysis Group (GCAS, Groupe Central d'Analyse Systèmes), three multidisciplinary OFCOR teams located at regional stations, a Bureau of Macro-economic Analysis (BAME, Bureau d'Analyses Macro-Economiques), and a division of thematic research. The case focuses on the OFCOR part of the DRSP, namely the GCAS and the three regional teams.

Senegal is an interesting case because the classic regional team model for implementing OFCOR was modified to include a core multidisciplinary group of scientists, the GCAS, which supports the work of the teams. Also of interest is Senegal's experience blending francophone and anglophone approaches to on-farm research.

Zambia

The Adaptive Research Planning Team (ARPT) conducts OFCOR in Zambia. The ARPT, initiated in 1980, is a national research program under the Research Branch of the Ministry of Agriculture. It is of equal status to and complements the national commodity programs. The ARPT comprises a national coordinator, based at the central research station, and seven teams of scientists and field technicians at provincial experiment stations. Each team is funded by a different donor.

ARPT includes two particularly interesting innovations: the formal integration of sociologists and the inclusion of research-extension liaison officers in the teams.

Zimbabwe

Zimbabwe's Department of Research and Special Services (DR&SS) adopted OFCOR in 1980 as a strategy for reorienting research to meet the needs of small farmers in the communal areas. This was in response to the post-Independence national policy to emphasize agricultural development for this sector.

There is no integrated OFCOR program. Several research institutes and stations and a specialized Farming Systems Research Unit (FSRU) have developed independent initiatives. The case study examines OFCOR in the FSRU and four institutes – the Cotton Research Institute, the Agronomy Institute, the Crop Breeding Institute, and a regional research station. This provides us with an unusual opportunity to analyze the implementation and integration of OFCOR under several distinct models for organizing research, but all within a single institution.

In the institutes, individual scientists carry out both on-farm and station-based research, while scientists in the FSRU specialize in on-farm research. The FSRU consists of a core multidisciplinary team based at the central station and two regional teams staffed by technicians. Their research has had a strong systems perspective emphasizing crop-livestock interactions.

Asia

Bangladesh

The Bangladesh case study concentrates on the on-farm research activities of the Bangladesh Agricultural Research Institute (BARI), the largest unit of the NARS. The On-Farm Research Division (OFRD), created in 1985, has the exclusive mandate for on-farm research in BARI. OFCOR teams are located at 23 stations and substations, from which they direct technicians in 11 farming system research sites and 83 multi-locational testing sites.

The OFRD subsumed four distinct older programs: multi-locational testing of the Soil Fertility and Soil Testing Institute (later renamed the On-Farm Trials Division); cropping system research on the IRRI model; varietal testing and verification of the wheat program; and the adaptive research of the T & V Ex-

tension Research Program. An important aspect of the Bangladesh case study is its analysis of the consolidation of these different approaches to OFCOR under common management.

Indonesia

OFCOR is implemented in Indonesia's Agency for Agricultural Research and Development (AARD) in sub-programs of the commodity institutes, and also in multi-institute projects organized at the AARD level. The case study focuses on two examples of each major type.

The multi-institute projects are an interesting institutional innovation. These projects are staffed by senior scientists seconded from the participating institutes. They maintain contact with their home institutes and return to them at the end of the project. We wanted to examine this arrangement because of its potential for building strong links between OFCOR and station-based specialist scientists, as well as for the long-term integration of the OFCOR philosophy and methodology within the NARS.

The gradual evolution of OFCOR as a research strategy in the NARS is another important aspect of the Indonesian experience. Starting as an informal program of one institute in the early 1970s, OFCOR methods were slowly integrated into other commodity institutes. Specialized teams have only been developed since the early 1980s. OFCOR in Indonesia has been a national initiative which has drawn on a number of approaches to OFCOR, particularly that of the Asian Cropping Systems Network developed in association with IRRI.

Nepal

On-farm research programs of different types have existed in a variety of institutions in Nepal since the early 1970s. Out of the diverse settings of OFCOR in Nepal, we chose five sub-case studies which illustrate the major models of organizing OFCOR:

1) OFCOR implemented through a commodity program – the National Rice Improvement Program;
2) OFCOR implemented through a cropping systems program;
3) OFCOR implemented through a specialized unit – the Farming Systems Research and Development Division (FSR&DD), supported by a separate socioeconomics division;
4) OFCOR implemented as a generalized strategy in two small, externally funded, regional research institutes – Lumle Agricultural Research Centre and Pakhribas Agricultural Centre.

The contrast between the OFCOR programs of the NARS and those of the externally funded institutes make Nepal an especially interesting case.

Table 1
Descriptive Indicators of the Nine OFCOR Studies

Case Studies	National Agricultural Research System		Organization of OFCOR	Years in Operation [3]	Scale of OFCOR: (Scientist Years)	
	Institutional Type	Organization of Research Program			OFCOR as % of NARS Human Resources	Size of OFCOR effort
Ecuador	Semiautonomous institute (INIAP)	Regional research stations/commodity programs	Production Research Program (PIP)[b]. National program with two coordinators and 10 teams based at regional research stations	9	6	14
Guatemala	Semiautonomous institute (ICTA)	Regional research programs/commodity programs	Technology Testing Department with 14 field teams in 6 regions and national socioeconomics department with limited regional representation[c]	14	34	65
Panama	Semiautonomous institute (IDIAP)	Commodity programs/ regional offices	National OFCOR plan identified target regions where OFCOR is implemented through special FSR projects or part-time on-farm research	7	16	24
Senegal	Semiautonomous institute (ISRA)	Multi-commodity departments/ regional stations	OFCOR, located within Department of Production Systems Research and Technology Transfer (DRSP)[d], consists of 3 regional teams and a Central Systems Analysis Group	4	13	22
Zambia	Ministry (MAWD)	Commodity and factor programs	OFCOR program with national coordinator and 7 provincial teams at regional stations	6	20	38[h]
Zimbabwe	Ministry (MLARR)	Commodity and disciplinary based institutes and stations	OFCOR implemented by: - 8 research institutes/stations with combined on-station/on-farm research programs; - Farming Systems Research Unit (FSRU) based at central station with two regional teams	6	18	26
Bangladesh[1]	BARI, semiautonomous institute of larger NARS with council	Disciplinary departments/ commodity programs	On-Farm Research Division (OFRD), with Central Management Unit at headquarters and 24 teams deployed through BARI's network of regional stations, has official mandate for on-farm research. Consolidation of previous OFCOR efforts	9[e]	12	104
Indonesia[2]	Ministry, Dept. of Research (AARD) with multiple institutes and coordinating bodies	Commodity-based regional institutes	Two principal modes of implementation: - Research institutes conduct OFCOR as part of regular programs; - OFCOR projects organized at AARD level with staff seconded from multiple institutes	11[f]	n/a	57[i]
Nepal[2]	I. NARS ministry II LAC and PAC[a] externally funded autonomous institutes	I Commodity programs / disciplinary departments II LAC. Multi-disciplinary research thrusts PAC Disciplinary departments	I - Farming Systems Research and Development Division (FSR&DD) with 6 FSR sites, supported by Socio- Economics Research and Extension Division (SERED); - Commodity programs with multi-locational testing and outreach programs. II LAC and PAC, regional institutes with OFCOR as a generalized research strategy	14[g]	n/a	35[i]

Table 1 (notes)

1. The case study is limited to the Bangladesh Agricultural Research Institute (BARI), the largest of the five institutes coordinated by the Bangladesh Agricultural Research Council (BARC).

2. The data refer only to the subcase studies unless otherwise indicated; NARS-wide data are not available.

3. Base year for all statistical data is 1986.

a. Lumle Agricultural Centre and Pakhribas Agricultural Centre.

b. Programa de Investigación en Producción.

c. The Spanish names for these departments are Prueba de Tecnología and Socioeconomica.

d. Département de Recherche de Systèmes de Productions et Transfert de Technologies en Milieu Rural.

e. Refers to NARS. Several OFR programs with complex histories operate within BARI. The oldest, the On-Farm Fertilizer Program, dates back to 1957. This program was reorganized in the late 1970s, about the same time Cropping Systems Research was established at BARI. The OFRD was not formally consolidated until 1984.

f. Refers to NARS. In 1973, multiple-cropping research in the Central Research Institute for Food Crops took on a systems orientation and was renamed cropping systems research (CSR). CSR moved onto farmers' fields in 1975.

g. Refers to NARS. Cropping/farming systems research was initiated nine years ago. On-farm rice research is 14 years old.

h. Includes six research-extension liaison officers seconded from extension.

i. Represents totals for subcase studies only. Not directly comparable to other NARS-wide data.

LIST OF OFCOR CASE STUDY REPORTS

— Zambia: Organization and Management of the Adaptive Research Planning Team (ARPT), Research Branch, Ministry of Agriculture and Water Development. (S.A. Kean and L.P. Singogo)

— Zimbabwe: A Case Study of the Organization and Management of Five On-Farm Research Programs in the Department of Research and Special Services, Ministry of Agriculture. (M. Avila, E.E. Whingwiri, and B.C. Mombeshora)

— Sénégal: Organization et Gestion de la Recherche sur les Systèmes de Production, ISRA. (J. Faye and J. Bingen)

– Ecuador: Un Estudio de Caso de la Oganización y el Manejo del Programa de Investigación en Finca de Productores (PIP) en el Instituto de Investigaciónes Agropecuarias (INIAP). (R. Soliz, P. Espinosa, and V.H. Cardoso)

— Guatemala: Organización y Manejo de la Investigación en Finca en el Instituto de Ciencia y Tecnología Agrícola (ICTA). (S. Ruano and A. Fumagalli)

— Panama: Un Estudio de Caso de la Organización y el Manejo del Programa de Investigación en Finca de Productores, Instituto de Investigaciónes Agropecuarias (IDIAP). (M. Cuellar)

— Bangladesh: A Case Study of the Evolution and Significance of On-Farm and Farming Systems Research in the Bangladesh Agricultural Research Institute (BARI). (M.A. Jabbar and M.D. Zainul Abedin)

— Indonesia: A Case Study on the Organization and Management of On-Farm Research in the Agency for Agricultural Research and Development, Ministry of Agriculture. (J. Budianto, I.G. Ismail, Siridodo, P. Sitorus, D.D. Tarigans, A. Mulyadi, Suprat)

— Nepal: A Case Study of the Organization and Management of On-Farm Research in Nepal. (B.N. Kayastha and S.B. Mathema)

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Acknowledgments

This paper is based largely on nine case studies conducted as part of the ISNAR study on the organization and management of on-farm client-oriented research (OFCOR) in national agricultural research systems. The depth and quality of the information and analysis contained in these case studies is exceptional. The cases provide a rich and detailed resource for the analysis of staff management issues in on-farm research, and we gratefully acknowledge the work of the case study authors.

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Glossary of Acronyms

AARD	Agency for Agricultural Research and Development, Ministry of Agriculture, Indonesia
ARPTs	Adaptive Research Planning Teams, Zambia
BAME	Bureau d'Analyses Macro-Economiques (Bureau of Macro-Economic Analysis), ISRA, Senegal
BARI	Bangladesh Agricultural Research Institute
CAPA	Curso de Adiestramiento en Producción Agrícola (Agricultural Production Training Course), ICTA, Guatemala
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agriculture Research and Training Center), Costa Rica
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo (International Maize and Wheat Improvement Center), Mexico
DR & SS	Department of Research and Specialist Services, Ministry of Lands, Agriculture and Rural Resettlement, Zimbabwe
DRSP	Département des Recherches sur les Systèmes de Production et le Transfert de Technologies en Milieu Rural (Department of Production Systems Research and Technology Transfer), ISRA, Senegal
FSR & DD	Farming Systems Research and Development Division, Ministry of Agriculture, Nepal
FSRU	Farming Systems Research Unit, DR & SS, Zimbabwe
ICTA	Instituto de Ciencia y Tecnología Agrícolas (Agricultural Science and Technology Institute), Guatemala
IDIAP	Instituto de Investigación Agropecuaria de Panamá (Panamanian Agricultural Research Institute)
IDRC	International Development Research Centre, Canada
INIAP	Instituto Nacional de Investigaciones Agropecuarias (National Agricultural Research Institute), Ecuador
IRRI	International Rice Research Institute, Philippines
ISRA	Institut Sénégalais de Recherches Agricoles (Senegal Institute of Agricultural Research)
LAC	Lumle Agricultural Centre, Nepal
OFCOR	On-farm client-oriented research
OFRD	On-Farm Research Division, BARI, Bangladesh
PAC	Pakhribas Agricultural Centre, Nepal
PIP	Programa de Investigación en Producción (Production Research Program), INIAP, Ecuador
SERED	Socio-Economic Research and Extension Division, Ministry of Agriculture, Nepal
UACP	Upland Agriculture and Conservation Project, Indonesia
USAID	United States Agency for International Development

INTRODUCTION

Of the various resources for which the managers of on-farm research are responsible, none are more important than the staff who must implement their programs. Yet in spite of the considerable interest shown in on-farm client-oriented research (OFCOR) during the past 15 years, little formal attention has been given to the special staff management problems it raises.

Most of the literature and the debate about on-farm research has centered on concepts, methods and case descriptions of specific projects. Concern with staff management has typically focused on just two issues: the disciplinary composition of on-farm research teams and, to a lesser extent, staff development (Simmonds, 1984; Cernea and Guggenheim, 1985). A few authors, notably Heinemann and Biggs (1985), Dillon and Anderson (1983) and Hildebrand and Poey (1985), have provided a more comprehensive treatment of staff-related issues, but their analyses are drawn from a relatively small number of institutional experiences. Gupta (1987), Ewell (1988) and Chambers et al. (1989) offer practical examples on the overall management of the staff responsible for doing on-farm research.

Drawing on the experiences from ISNAR's study of OFCOR in nine developing countries, this paper analyzes staff management issues in on-farm research. A number of important criteria were used to select the case studies. Among them were the fact that OFCOR programs had been in place for at least 5 years, and that attempts either had been or were currently being made to institutionalize these programs. In addition, the cases were selected to provide a perspective on the organizational diversity of on-farm research. The cases were chosen to provide a balanced regional distribution, but not to be representative of their regions; that is, the three cases from a given region should not be used to generalize about the region as a whole. The case studies are listed in the references, on page 37.

The paper focuses primarily on those aspects of on-farm staff management which differ from the management of staff engaged in more conventional agricultural research. While some features of on-farm research — notably public sector employment regulations, pay scales and career ladders — are common throughout a national agricultural research system, the evidence from the case studies shows that on-farm research also has a number of features that raise management issues peculiar to it alone.

Unlike more conventional agricultural research activities, OFCOR requires managers to recruit and assign staff on the basis of their ability and willingness to collaborate intensively with colleagues from other disciplines and to work directly with farmers and technology transfer workers. Moreover, OFCOR requires its scientists to be committed to the development and deployment of technology rather than to the pursuit of more purely disciplinary concerns — a shift in professional orientation which some scientists find difficult to accept and which must, in addition, bring the scientist out of the laboratory and into the field. As a result, on-farm research often places logistic and travel burdens on its scientific staff that are significantly greater than those placed on other scientists.

This paper is intended for two audiences: on-farm research managers, and other leaders of national agricultural systems in developing countries. For on-farm research managers, it offers practical advice on day-to-day staff management issues. For other leaders, it identifies some of the staff-related factors affecting the role of on-farm research in the national system, and some of the characteristics of successful on-farm research managers, so as to delineate priority criteria for selecting these individuals.

The paper is structured as follows. Chapter 1 outlines the main issues arising in the nine case studies. Chapters 2 to 5 consist of a more detailed discussion, grouping the issues under the following major headings or themes: staff patterns and roles; staff recruitment and incentives; staff development; and scientific leadership. Finally, Chapter 6 offers some recommendations for on-farm research managers and other leaders of national agricultural research systems. The data from the case studies, on which the analysis is based, are given in the Annex to the paper.

CHAPTER 1
STAFF MANAGEMENT ISSUES IN THE CASE STUDIES

The institutional setting of on-farm research, and its major organizational and management features in each country, have been described in the Overview of the Nine Case Studies (*see* pages vii-x).

The country profiles presented in this chapter emphasize the key management issues concerning the themes we identified in the Introduction: staff patterns and roles, recruitment and incentives, staff development, and scientific leadership. Features of the cases that offer useful lessons or comparisons are highlighted. The profiles thus provide a "snapshot" of each country as of 1987, and a background for the comparative analysis presented in Chapters 2 to 5.

Each profile is organized in the same way. We look first at how on-farm research started, its structure, whether this has changed, the nature and location of scientific leadership, and the staffing pattern. This is followed by a brief discussion on the extent of interdisciplinarity, the roles of social and biological scientists, the use of foreign scientists, and any unique incentives or disincentives affecting staff motivation and stability. The profiles end with a description of training activities to develop on-farm research staff.

Latin American Cases

Ecuador

With a loan from the Inter-American Development Bank and training and assistance from the regional office of the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), the Instituto Nacional de Investigaciones Agropecuarias (INIAP) of Ecuador launched on-farm research in the form of a pilot project in 1977. Activities expanded rapidly, and a formal program was established in 1980 — the Programa de Investigación en Producción, or PIP. The program flourished, building research teams in ten regions which, by 1983, accounted for 10% of INIAP's total staff. During this period of significant donor support, the program had comparatively high status, and its scientists received a 50% salary bonus for being outposted in the field.

However, the institutionalization of PIP as a formal INIAP program has not been smooth. The leadership of both INIAP and PIP changed frequently between 1980 and 1986; there were four directors of INIAP and three coordinators of PIP during this 6-year period. Also during this period, the government altered its priorities away from small-scale farming, CIMMYT closed its regional office, and external funding was withdrawn.

As a result, PIP's status within INIAP has declined. Recruitment has been difficult and turnover has been high (one-third of the staff resigned between 1982 and 1986), and this has undermined the benefits of previous training. PIP's scientists now tend to be younger than their colleagues in other programs. They have lower degree levels, and over 60% have less than 5 years research experience.

Relying on agronomists and field technicians, PIP follows the CIMMYT model for conducting national on-farm research in Latin America. The agronomists are trained in the use of social science methods and have broad general responsibilities. No economists or other social scientists are now included in the program. During the pilot project period, CIMMYT scientists and the national coordinators of PIP constituted the socioeconomic component of the program. This component has been gradually lost following the closure of the local CIMMYT Economics Program office, the incorporation of the Departamento de Economía Agrícola within the Departamento de Planificación, and the move of PIP's management out of this department and into a regional research station.

Posted in small teams away from the regional stations, PIP's scientists report to the national coordinator but are under the direct administrative supervision of research station managers or directors of projects under the Programa de Desarrollo Rural Integrado. The high turnover of coordinators and their considerable administrative burden, caused in part by the rapid expansion of the program, has weakened the scientific leadership. As a result, support for PIP's scientists has tended to be diffuse and irregular. Each research station's technical committee regularly reviews PIP's activities, but in the absence of strong scientific leadership the program's more junior scientists find it difficult to defend their projects in the face of criticism from more experienced crop and livestock scientists engaged in traditional research activities.

Many of PIP's outposted scientists enjoy working directly with farmers but feel disadvantaged compared to their

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station-based colleagues, who benefit from health care facilities, opportunities for earning additional income through teaching, and better access to information within INIAP. In contrast to the 1977-82 period, when external funding was available, PIP's scientists no longer receive a 50% field salary bonus, vehicles and equipment are in short supply, and budget limitations restrict scientific exchange and visits.

Both long- and short-term training opportunities for PIP's staff are now infrequent. They tend to be tied to specific development projects. Although training had high priority in the early years, the high rate of staff turnover means that only 20% of the staff in 1987 had received specialized training in on-farm research methods. When PIP became an INIAP program, no other agency took up the training function that CIMMYT had performed in the past.

Guatemala

The Instituto de Ciencia y Tecnología Agrícolas (ICTA), the national agricultural research institute of Guatemala, was founded in 1973, with a philosophy based firmly on client-oriented on-farm research. External financial and technical support was provided from 1974 to 1980 by the Rockefeller Foundation. During this period, ICTA's Socioeconomics Department became established as a principal force in methodology and innovation in on-farm social science research At about the same time, ICTA launched its Technology Testing Department, with responsibility for coordinating the testing of technology developed by the commodity and disciplinary programs through a comprehensive on-farm experimentation program.

Accounting for 34% of ICTA's scientific staff, these two departments represent the core of what was one of the earliest, most comprehensive and most innovative national on-farm client-oriented research efforts. However, staff allocation and management decisions later caused problems in sustaining the quality of on-farm work. Both departments have suffered from problems of scientific leadership. The Technology Testing Department lacked both a head and an overall program perspective until 1986. Likewise, the absence of experienced leadership from a qualified social scientist has hindered the Socioeconomics Department from continuing its research program and limited its contribution to other ICTA research activities.

During its early years, the Socioeconomics Department enjoyed high-caliber leadership from one of its foreign social scientists. At that time 20% of the department's social scientists were expatriates. Because of a national shortage of social scientists, the department trained agronomists to do the limited amount of social science field work, and backstopped them with centrally located social scientists. In 1979 the department's foreign leader left. With the end of the Rockefeller program, the other foreign social scientists also left, leaving the department with agronomists, many of them junior, to conduct all the social science research, in which they had received only limited training.

ICTA has taken an innovative approach to training new recruits in on-farm research. Drawn primarily from the university, the recruits are sent on a 10-month course, the Curso de Adiestramiento en Producción Agrícola (CAPA), before being assigned to specific programs. ICTA's client-oriented philosophy is emphasized throughout the training program, and this has helped develop and sustain a relevant, problem-solving approach throughout the institute. Social scientists are not sent on the course, however.

In addition to the CAPA course, ICTA has pursued external training opportunities in the form of short-term, specialized and postgraduate training, with support largely from bilateral assistance and from international and regional research centers. Short courses in on-farm research methods were organized by CIMMYT and by the Centro Internacional de Agricultura Tropical (CIAT). These forms of training have served to develop the scientific capacity of ICTA's staff as a whole, but the scientists in the Technology Testing Department and the Socioeconomics Department have not had as much access to them as have the institute's commodity scientists. Significantly, fewer scientists in these two departments have postgraduate degrees than in other ICTA departments.

In recent years, budget limitations have restricted contacts with scientists in the international centers and inhibited the growth and maintenance of support services such as the library collection. Scientists in the Socioeconomics Department, in particular, see themselves as having fewer training opportunities, older vehicles and inadequate operating and maintenance budgets.

Panama

Panama's Instituto de Investigación Agropecuaria de Panamá (IDIAP), founded in 1975 to promote research on smallholder food crop production, launched a 5-year, on-farm technology development program, known as the Plan para la Generación y Transferencia de Tecnología Apropiada, in the late 1970s with support from several international and regional foundations and research centers.

On-farm research expanded rapidly in 1979 and 1980, growing from 8% to 20% of the institute's scientific staff. By 1986, there were 16 IDIAP teams conducting on-farm research as part of their duties. These teams consisted mainly of agronomists, many of whom had had limited training in the social sciences. None of the staff was

assigned full-time to on-farm research and all had on-station as well as on-farm research responsibilities. Unlike other institutes in the case studies, IDIAP has no organized program or unit for on-farm research, nor is there a designated on-farm research leader. On-farm experiments are part of many research programs, and no specific approach or set of procedures has been adopted by the institute as a whole. A number of semi-autonomous projects, such as the Caisan Project supported by CIMMYT and the Dual-Purpose Livestock Project sponsored by the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) and the International Development Research Centre (IDRC), are involved as well as IDIAP's commodity programs.

All the on-farm programs are staffed by natural scientists (agronomists and veterinarians). Many of those on the Caisan and Dual-Purpose Livestock projects have participated in short courses, seminars and study tours that covered training in social science methods, among other subjects. An economist was assigned to the CATIE/IDRC project, but the overall role of social science in IDIAP's programs has been marginal, except in the initial planning process when priority areas for on-farm research were identified. Continuing involvement has been limited to that of economists from the international centers in program planning and review. Moreover, IDIAP's Departamento de Socioeconomía, established in 1984, is attached to the institute's Dirección de Planificación, and is therefore concerned largely with project proposal and planning tasks instead of field-level socioeconomic research.

As a result, interdisciplinary collaboration is strongest between natural scientists and weakest with social scientists. The most useful mechanism for encouraging multidisciplinary communication among scientists assigned to different programs has been the field days, which promote frank and open discussion about priorities and serve to orient on-farm research. These are not organized on an ad hoc basis, but are regular and formal institutional occasions.

All IDIAP scientists, and especially those who have confronted the administrative problems associated with the isolated Caisan Project, are attracted by assignments near the capital city and by opportunities to teach and to pursue other part-time employment. However, IDIAP has not had to compete with other sectors by offering special salary bonuses or other incentives to retain its research staff. On-farm research in Panama is neither specially penalized through career disincentives nor specially compensated.

Most of the training in on-farm research has occurred in the context of donor-funded activities. CIMMYT, CATIE and IDRC have provided degree and in-service training to the semi-autonomous projects. Having no national program in on-farm research, Panama has had no compelling reason to develop a coherent national training plan in this area.

African Cases

Senegal

Building on a long tradition of problem-oriented applied research, on-farm (or production systems) research in the Institut Sénégalais de Recherches Agricoles (ISRA) was brought together in the Département des Recherches sur les Systèmes de Production et de Transfert de Technologies en Milieu Rural (DRSP) in 1982 as part of a major reorganization financed by the World Bank, the United States Agency for International Development (USAID) and France.

Some researchers were transferred to the new department from other ISRA departments, but extensive new recruitment and advanced degree training were launched to staff three new regional on-farm research teams. Donor finance and foreign scientists were essential for implementing the on-farm research program, but at the same time the strong donor push to expand the program rapidly in three regions placed a severe management burden on the department.

Starting with one three-person field team in 1982 (a senior and a junior rural economist and a senior agronomist), the department expanded its activities to field three four-person to six-person multidisciplinary teams of Senegalese, French and American scientists by 1985. In view of their large size and broad disciplinary composition, these teams have been characterized as "robust" in comparison with on-farm research programs elsewhere. The inclusion of animal scientists (including animal traction specialists), sociologists and agricultural economists in the teams generated a wider range of research activities than in other case study programs, in which on-farm research teams were founded on a narrower disciplinary base.

To complement the field teams, a multidisciplinary (and multinational) headquarters unit, the Groupe Central d'Analyse Systèmes, was also established during the 1982-85 period. The unit, staffed by senior scientists, was responsible for defining and establishing the department's national on-farm research program. However, administrative, financial and budgetary problems associated with ISRA's reorganization prevented the unit from providing the close scientific guidance and supervision needed by the more junior scientists on the regional teams.

The excellent reputation and vigorous leadership enjoyed and exercised by the director of DRSP gave the department's programs a high profile and helped to attract significant external funding. However, the privileged position of DRSP in the eyes of other departments led to bureaucratic rivalry between them, a problem which is slowly being overcome as commodity scientists and members of the regional teams undertake joint research at the regional stations. Despite the initial tensions, DRSP has successfully fashioned an ISRA approach to on-farm research that is generally accepted by, and is now being adapted to, different research programs throughout the institute.

The DRSP is now staffed largely by newly trained scientists, many of whom have received training in the USA or France. The USAID project provided degree training for 21 people. Most of the training in Senegal has been funded bilaterally; the international agricultural research centers have played a relatively modest role.

The availability of external resources enabled DRSP to sponsor regular workshops dealing with on-farm research approaches, methods and tools. These workshops were attended not only by DRSP's own staff but also by staff from other departments and from technology transfer agencies. Donor funding also permitted the DRSP to equip its scientists with microcomputers and software, giving them access to documentation services and scientific journals, and encouraging the publication of research results.

Zambia

After a colonial history of research oriented towards large-scale, commercial settler farmers, Zambia's Ministry of Agriculture reorganized its Research Branch during the 1970s, forming 16 interdisciplinary Commodity and Specialist Research Teams to carry out on-station research. This was followed during the 1980s by the creation of a national on-farm research program with seven Adaptive Research Planning Teams (ARPTs) based in the provinces.

The ARPTs relied heavily on external financial and technical support, and strong donor interest encouraged a fourfold expansion of scientific staff from 1982 to 1986. Each team, based in a different province, was supported by a different donor. As in other programs in the Research Branch, foreign scientists have played a significant part in the work of the ARPTs.

The two successive national coordinators of the ARPT program have spent considerable time trying to forge a national program from the separate donor-funded provincial teams. Through exchange visits between teams and quarterly staff meetings, they have attempted to coordinate different donor approaches with the national objectives of the ARPT program. They have tried to ensure program continuity as foreign scientists completed their contracts before national scientists returned from overseas training. The high turnover of foreign scientists has made it difficult to build effective teams, maintain continuous data sets and produce regular research reports (Collinson, 1988).

The provincial teams usually consist of agronomists and agricultural economists, as well as technicians and, in some cases, a Research-Extension Liaison Officer seconded from the Extension Branch. They are supported by a small group of specialists based at headquarters, augmented by short-term consultants visiting from overseas. Between them, the group and the consultants provide expertise in rural sociology, anthropology, agricultural economics and human nutrition. The pull of separate disciplines persists within each provincial team, and social scientists initially found it difficult to convince commodity researchers of the value of their contribution. The teams' social scientists and Research-Extension Liaison Officers are nevertheless recognized as having stimulated greater farmer participation in ARPT activities and a stronger client orientation within the Research Branch as a whole.

Most of the ARPT program's national scientists are recruited from the University of Zambia. They are often attracted to the program by the opportunities it offers for donor-funded MSc-level training overseas. The program coordinators encourage various types of relationships with the university, and on-farm research courses and experiences are now being included in the university curriculum. ARPT researchers give lectures, students intern with research teams during vacations, and CIMMYT sponsors a research project for selected students in their final year.

The program's short-term training opportunities have consisted mostly of regional and in-country short courses and seminars organized by CIMMYT. In courses, the "call" system developed by CIMMYT (*see* Chapter 4) has been adapted and used to forge a common national approach to on-farm research. Participation in these courses by all ARPT staff, whether foreign scientists or nationals, has been instrumental in building an integrated program. Since the early 1980s, new staff have also attended the on-farm research training program run by the University of Zimbabwe in collaboration with CIMMYT.

Zimbabwe

Following independence in 1980, the Government of Zimbabwe gave high priority to developing improved technology for farmers in the Communal Areas. The Communal Areas are a legacy of colonial land policy, which authorized private ownership of commercial farm land for white settlers and recognized traditional communal

patterns of land tenure for the African population in the more marginal areas of the country. The Communal Areas comprise about 42% of the country's land area.

In response to the post-1980 emphasis on Communal Areas, many of the research institutes within the country's national agricultural research organization, the Department of Research and Specialist Services (DR & SS), established on-farm research programs in these areas. Funding from the World Bank and the International Fund for Agricultural Development helped several institutes build their programs and orient them towards the government's new objectives. More specifically, IDRC funded a foreign advisor for 3 years to establish and lead a separate Farming Systems Research Unit (FSRU), with a mandate to carry out adaptive research on both crops and livestock.

Each of the small, semi-autonomous research institutes or stations within the DR & SS is largely responsible for conceiving and implementing its own on-farm research program. The recently created Committee on On-Farm Research and Extension facilitates and coordinates the planning, implementation, monitoring and evaluation of these separate programs. Except in the FSRU, which consists of a headquarters interdisciplinary team of scientists and two regional teams of technicians, scientists throughout the DR & SS conduct both on-station and on-farm research. Experienced on-station scientists from various institutes regularly offer technical support to the FSRU and expect it to provide information on farmers' problems and to test technology developed on-station. The focus of the FSRU on mixed crop-livestock farming systems has encouraged significant collaboration between agronomists and animal scientists.

Scientists are recruited primarily from the University of Zimbabwe, and the head of the DR & SS advertizes and conducts interviews on campus. The DR & SS must rely heavily on the university to fill its research positions: offering lower pay than the private sector, it finds it difficult to attract more senior and experienced scientists. Few social scientists are involved in on-farm research and, except in the FSRU, there is no position for a social scientist in the DR & SS.

The integration of on-farm research with on-station research in each institute's program precludes status distinctions or special conditions for on-farm research. When foreign scientists are excluded, on-farm researchers are younger and have lower degree levels than other DR & SS scientists, but staff turnover in those institutes with larger on-farm programs is not significantly higher than that for the DR & SS as a whole. Alternative employment in the private sector is attractive to all DR & SS scientific staff.

The DR & SS has taken advantage of regional training opportunities, sending its staff to the course in on-farm research sponsored by CIMMYT at the University of Zimbabwe. The foreign leader of the FSRU has also trained some researchers. Other organizations, such as the IDRC, the International Livestock Centre for Africa and the International Council for Research on Agroforestry, have provided opportunities to both scientists and technicians to improve their skills through workshops and seminars. However, despite these efforts only a third of the scientists currently conducting on-farm research have received specialized training in the methods used in it.

Asian Cases

Bangladesh

The On-Farm Research Division (OFRD) of the Bangladesh Agricultural Research Institute (BARI) was established in 1984, consolidating several independently funded research programs, some of which were already using a cropping systems or on-farm research approach. The OFRD consists of permanent core staff (mostly agronomists), scientists seconded or reassigned from other BARI research divisions, and temporary staff recruited for specific projects.

Like other research divisions of BARI, the OFRD has absorbed large numbers of scientists who entered the institute during a period of rapid expansion when recruitment criteria were relatively relaxed. These new staff, including career technicians inherited from an earlier soil fertility program, are less well qualified academically than the institute's previously existing staff (Ewell, 1988). Some of them became the OFRD's social scientists.

As a result of this influx of staff, the OFRD is the largest on-farm research department of the case studies. Containing about 100 scientists, it accounts for 12% of BARI's scientific person-years. Two-thirds of these scientists are agronomists; social scientists account for only 13% of the OFRD's research staff. Owing to the difficulty they experience in obtaining permanent positions, the many staff on temporary assignment feel discouraged from making any long-term committment either to BARI as a whole or to its on-farm research programs.

Relative to its large size, the OFRD is short of skilled and experienced senior staff to provide leadership. The few

senior scientists are overburdened by the demand for professional guidance, the lack of which has diminished the quality of the division's research and delayed the analysis and reporting of results. Foreign scientists, who have been used sparingly, have provided some additional leadership during the limited tenure of their contracts.

For several years, both the International Rice Research Institute (IRRI) and CIMMYT have offered short courses, in-service training and assistance in developing research methods for on-farm and cropping systems research. The OFRD has, in turn, organized training courses that have been instrumental in moving BARI scientists away from a cropping systems approach toward a broader farming systems perspective. A scientist from the Indian Institute of Management (Ahmedabad) has helped OFRD train scientists to carry out interdisciplinary research at the farm and village level.

Indonesia

On-farm research in Indonesia has developed gradually as a strategy of the various research institutes that form part of the Agency for Agricultural Research and Development (AARD). With experience that dates from the cropping systems research of the early 1970s and covers more than 50 on-farm projects, Indonesia has a large cadre of researchers, extension workers and technicians who are "literate" in on-farm research. Under the management of AARD, on-farm research is implemented either as a sub-program of a single (usually a commodity) institute or as large multidisciplinary projects involving more than one institute. The latter are known as multi-institute projects.

Commodity scientists in the AARD institutes conduct on-farm research along with their on-station activities, while those seconded to multi-institute projects concentrate on these for a specified period before returning to their permanent research assignment. In the latter case, a joint planning process helps to ensure coherence between the scientists' responsibilities to the project and their jobs at the home institute.

Site-specific field teams are often staffed with university graduates, especially in the multi-institute projects. Teams often comprise five or more disciplines. Extension workers are frequently involved in on-farm testing and the evaluation of results.

Depending on the project and the source of financing, research staff may be eligible for salary bonuses, free housing and other special facilities as an incentive to accept an on-farm research assignment in a remote location. The AARD's generous per diems encourage frequent travel to on-farm research sites. Experience in on-farm research is one of the criteria for deciding whether or not to promote newly recruited scientists to permanent civil service positions.

IRRI, CIMMYT and IDRC have provided short courses and financed study tours to improve on-farm research methods and skills. Many of the country's on-farm researchers have received training abroad, either at the international agricultural research centers or at universities that collaborate in the various on-farm research projects. But training is not exclusively conducted externally: senior on-farm researchers within the country have offered in-service training for junior researchers, university students and extension staff. Such training has facilitated the recruitment of university graduates and has helped to improve the role of extension personnel in on-farm research.

Nepal

The origins of on-farm research in Nepal can be traced to the introduction of japonica rice varieties in the mid-1950s. Many subsequent projects financed by external donors applied an on-farm research approach. Direct encouragement from the government came in 1981, in the form of a directive that all researchers spend at least 40% of their time in "outreach" work on farmers' fields.

Approximately 32 projects in Nepal are funded by external donors. In 1985, the National Agricultural Research Coordination Committee was established to help plan, manage and coordinate agricultural research, and to deal with the differences in salaries, benefits and training opportunities between research staff in externally funded projects and those in non-externally funded national programs.

At the same time, the government established the Farming Systems Research and Development Division (FSR & DD), staffed primarily by agronomists, and the Socioeconomic Research and Extension Division (SERED), employing a number of socioeconomists, as the leading government programs with responsibility for on-farm research. A number of FSR & DD posts in disciplines other than agronomy have remained unfilled since 1985. Almost 70% of the staff in these divisions are either seconded or on temporary hire; in the case of seconded staff, other government offices frequently retain control over staff evaluation.

Two small, externally funded research centers, the Lumle Agricultural Centre (LAC) and the Pakhribas Agricultural Centre (PAC), have relied on on-farm research as part of their general approach to technology development in the complex hill farming systems of their regions. These centers, started by the British, are slowly being integrated into Nepal's national agricultural research system.

Most on-farm research projects in Nepal have adopted the *shamurik braham* or "group trek" — a 1- to 2-week hike to remote on-farm trial sites — as the principal means of encouraging multidisciplinary research and ensuring the relevance of their programs. The idea of the group trek was started by LAC and PAC, and has since been adopted by the FSR & DD. Each trek focuses on a limited target area, defining its farming systems, identifying its problems and discussing possible solutions.

Because of their lower salaries and benefits, staff turnover in government on-farm programs tends to be higher than in projects financed by external donors. Inadequate per diems for visits to research sites are a major constraint inhibiting on-farm research in the national system.

While many Nepalese researchers were sent on training courses organized by the international agricultural research centers during the late 1960s and early 1970s, the government does not have a formal, ongoing training program for on-farm researchers. Training is largely associated with donor projects; LAC and PAC, among other donor-supported entitites, frequently send young scientists overseas for degree training.

CHAPTER 2
PLANNING THE PROGRAM: STAFF PATTERNS AND ROLES

Managers must answer difficult questions as they plan the recruitment and deployment of on-farm research staff. Given the different objectives that on-farm research can meet (Merrill-Sands and McAllister, 1988), they must first clarify the objectives assigned to their program. They must then relate these objectives to the skills and experience of the scientists and technicians they currently have available, before assessing the extent to which they must bring in new people or upgrade existing staff, and the financial and logistic resources required to do so.

Nearly always, the managers of on-farm research face the challenge of supporting a broad and complex research activity with few resources. They have to make difficult decisions on where best to place their few qualified researchers and most reliable technical staff. Pressure from donor agencies to "get the project moving" may place additional strain on resources that are already overstretched.

Drawing on data from the case studies, this chapter aims to help managers tackle these problems. Specifically, it addresses the following issues:

- What factors govern the size of on-farm research programs?
- Does on-farm research require full-time and permanent staff, or will other types of appointment suffice?
- What level of qualifications and experience are applicants for on-farm research positions likely to have, and what are the managerial implications of these levels?
- What is the appropriate balance between natural and social scientists in on-farm research, and how can the contribution of social scientists best be integrated with that of the natural scientists?
- How can managers ensure that foreign scientists, if they are needed, most effectively support on-farm research?
- What role should women scientists play in on-farm research?
- What ratio of technicians to scientists does on-farm research require, and how can the contribution of technicians be enhanced?

Successful manpower planning for on-farm research depends greatly on the policy context in which it takes place, and especially on the status of on-farm research within the national research system. The commitment of policy makers and agricultural directors is vital, since the provision of human resources to on-farm research can follow only the relative priority accorded to this type of research. A central feature of all planning should therefore be the generation of high-level support for on-farm research. Without this support, the best-made plans will remain no more than plans.

Size of Program

The appropriate size of an on-farm research program depends on the objective of the research, the stage it has reached, and the geographical coverage required. Managers may well find that coverage is best enhanced not by expanding the program's size but by pursuing links with other efforts, such as non-governmental organizations.

In the case studies, there was no single recipe for the size of an on-farm research activity. Size varied widely, from 14 scientists in Ecuador to 104 in Bangladesh. The on-farm research community comprised, on average, 17% of the total scientists in the national agricultural research system, ranging from 6% in Ecuador to 34% in Guatemala (*see* Figure 1 and Annex Table 1).

Size varied over time. Staff levels and activities fluctuated according to the availability of external funding, program reorganizations and policy changes, among other factors. Many programs grew too large too fast. Too rapid an expansion, following early success or in response to donor pressure, can easily compromise the quality of research and disrupt the balance between programs, despite the improved geographical coverage achieved.

In Ecuador and Bangladesh, the push to expand on-farm research led to the recruitment of less qualified staff, compromising the quality of the research. In Senegal, donor pressures to start with five on-farm teams was resisted, but even so the additional administrative burden imposed by building only three teams stretched the ability

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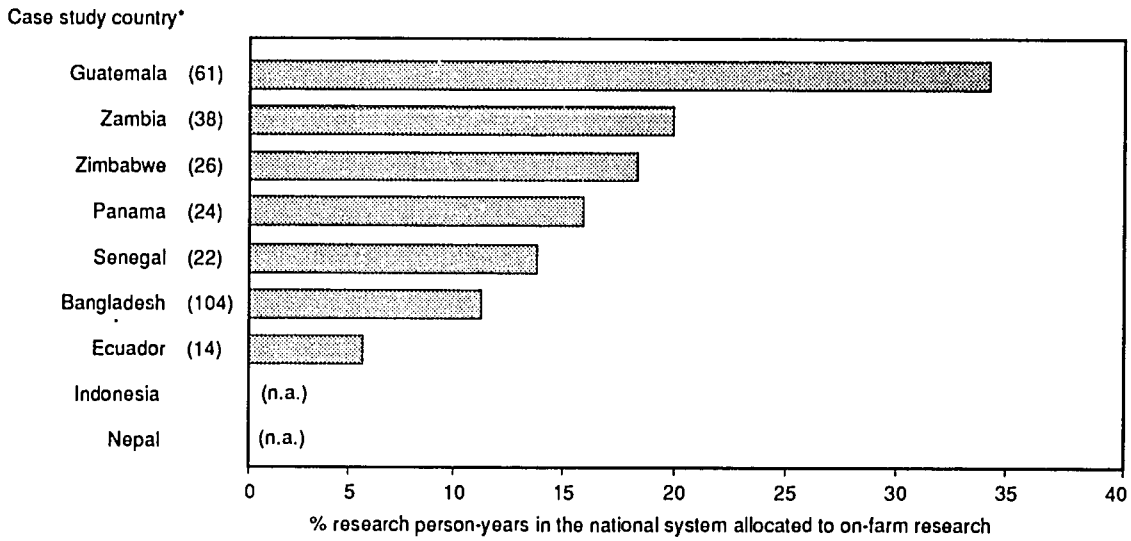
Figure 1. Percentage allocations of scientists to on-farm research in national agricultural research systems



* Figures in parenthesis denote number of scientists allocated to on-farm research.

Source: Annex 1

of management to provide scientific leadership, thereby threatening an otherwise scientifically sound program.

The pressures to expand rapidly are difficult to resist, especially when managers may have spent most of their professional lives trying to secure adequate budgets and personnel. The willingness of donors clearly places many on-farm research managers in a novel position! They must weigh the benefits of enjoying abundant resources in the short term against the possible costs, which may include the scientific soundness that a program is more likely to achieve in the long term if it is built slowly.

Type of Appointment

Many on-farm research efforts in the case studies relied on the temporary hire of scientists and technicians. The uncertainty associated with temporary appointments sometimes had a negative effect on scientists' performance: instead of concentrating on research, temporary employees in Senegal tended to become preoccupied with bureaucratic bargaining to secure a permanent position; in Nepal, temporary staff spent much of their time seeking alternative employment. In contrast, a permanent position brought the benefits usually associated with a civil service appointment. In Nepal, for example, only permanent scientists were eligible for training.

In all except three of the case studies, on-farm researchers worked full-time in on-farm research. In Indonesia, Zimbabwe and Panama, researchers were responsible for both on-farm and on-station work. Part-time arrangements may help to promote closer links between on-farm and on-station activities, but they also reduce the time that can be spent in the field with farmers and technology transfer workers (Merrill-Sands et al., 1989).

Most on-farm researchers in the Latin American and African case studies were hired from outside the national agricultural research system. Most of those in Asia, on the other hand, came from within the system. In response to rigid recruitment regulations and ceilings on new appointments, managers in Asia built on-farm research by seconding or reassigning staff.

The Indonesian multi-institute farming systems projects relied entirely on seconded staff. In these projects,

seconded scientists regularly consulted their colleagues in the home institute, and the time spent on a multi-institute project counted heavily in staff evaluations and the prospects for promotion. Visits to the home institute provided an opportunity to encourage other station-based scientists to participate in on-farm research.

The use of secondment as a way of involving extension staff in on-farm research has been more problematic. In Zambia, for example, it was difficult for research and extension to reach agreement on a job description for liaison officers, who consequently struggled with the problem of reporting to two bosses at once. Secondment on a project basis, with a strict time frame, is probably easier to implement than more open-ended arrangements.

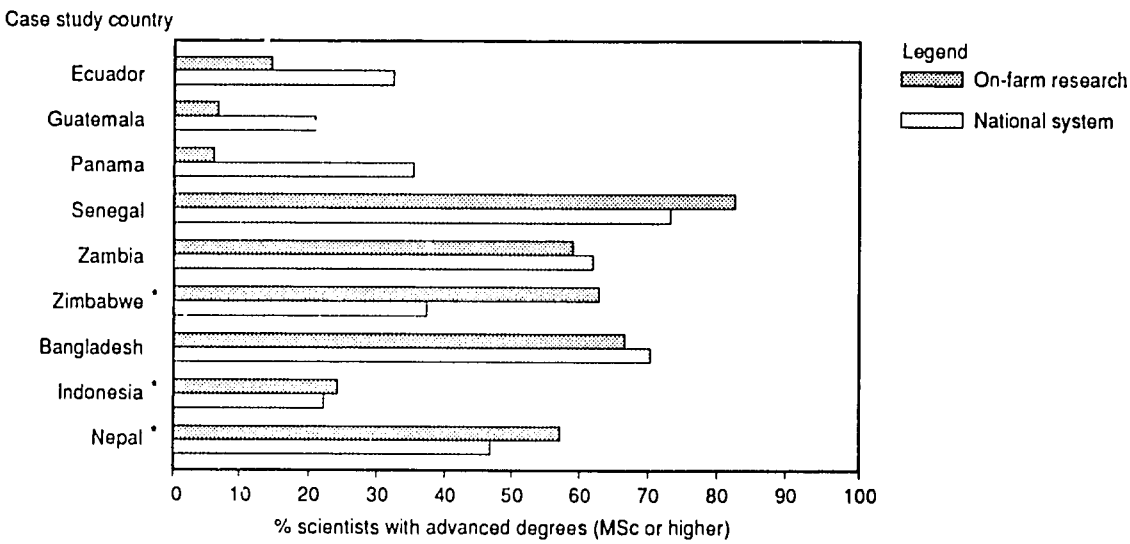
Reassignment represents another staffing option. In the case of the OFRD in Bangladesh it provided an opportunity to build a much larger program than would otherwise have been possible. However, successful reassignment often depends on providing training and backstopping to ensure that reassigned staff, especially those in mid-career, absorb and apply new approaches and methods. As the case of the FSRU in Zimbabwe illustrates, managers may find it easier to establish on-farm research by reassigning younger staff who see such research as a way of advancing their careers.

Obviously, a full complement of new positions is not always necessary when building on-farm research. As national systems increasingly confront the need to reduce their size and stay within well-defined hiring limits, managers may wish to consider secondment and reassignment as useful ways to build on-farm research. Although the opportunity costs of such appointments need to be carefully assessed, they represent a feasible alternative to the large, donor-funded multidisciplinary team — a model that frequently proves unsustainable in the long term.

Formal Qualifications and Experience

As in the national agricultural research system as a whole, many on-farm researchers did not have postgraduate degrees (*see* Figure 2). However, the proportion of on-farm researchers with advanced degrees varied considerably across the case studies. The presence of foreign scientists strongly influenced the degree pattern: degree levels were

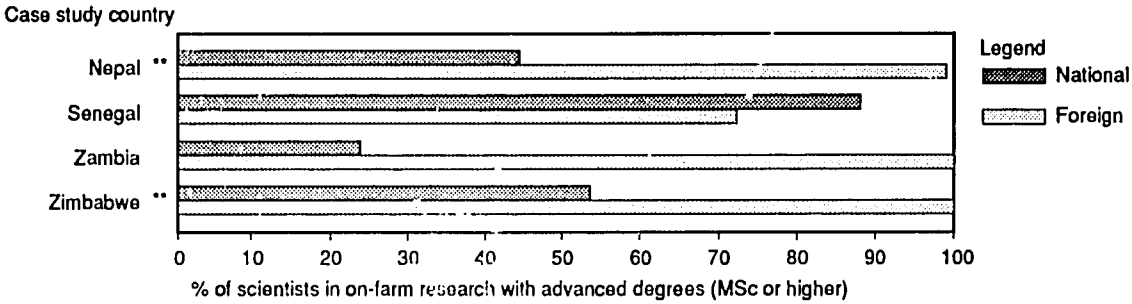
Figure 2. Percentage of scientific staff with advanced degrees employed in on-farm research and in the national agricultural research system



* Data for sub-cases only, not for system as a whole.

Source: Annex 1

Figure 3. Percentage of national and foreign scientists with advanced degrees*



* Limited to those countries with significant foreign scientist involvement.
** Data for sub-cases only, not for system as a whole.

Source: Annex 1

lowest in the three Latin American cases, where foreign scientists no longer played a leading role in on-farm research, but higher in those countries where they were still important (*see* Figure 3 and Annex Table 1).

The lower degree levels in the cases studied in Latin America help to explain the relatively low status attached to on-farm research in those countries — leading to problems for on-farm researchers in influencing research priorities, as well as a tendency, on the part of other scientists, to relegate on-farm research to a testing role.

The on-farm researchers from the nine case studies tended to be in their mid-30s. Most of them had started their careers in agricultural research in their late 20s or early 30s, and had spent at least half, and sometimes all, of their professional lives in on-farm research (*see* Annex Table 1). On average, they had about 4 years of experience in on-farm research. In at least four of the case study countries, scientists in on-farm research were less experienced than those in the national agricultural research system as a whole. Again, the presence of foreign scientists strongly influenced this pattern: in both Zambia and Zimbabwe, foreign scientists had many more years of experience than did national scientists (*see* Figures 4 and 5).

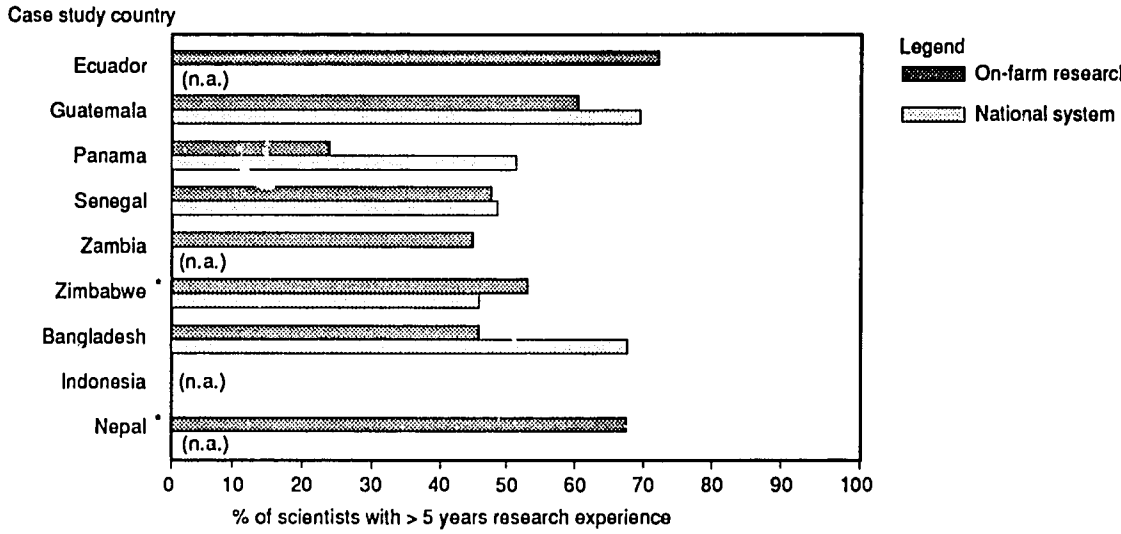
These staffing patterns raise concerns about the institutional sustainability of donor-funded on-farm research. In all the Latin American case studies, on-farm research declined rapidly after the departure of foreign scientists. As donor projects proceed, managers must make the building of national on-farm research capacity their top priority if they are to prevent such a decline.

If on-farm researchers have lower qualifications and less experience, it is all the more important to be clear about the objectives of on-farm research. Where on-farm research is designed to play a simple testing or service role in support of on-station programs, it may be possible for managers to rely on relatively inexperienced scientists and minimum guidance from more senior colleagues.

However, where research problems and potential solutions are less well understood, such that on-farm research must play a more sophisticated diagnostic and adaptive role, managers must ensure that there is more involvement on the part of senior scientists. More sophisticated programs of this kind accounted for nearly two-thirds of the case studies, with Indonesia providing the most advanced model. If managers fail to provide support from more experienced researchers in such cases, there will be a tendency for their programs to lapse into a technology testing and service role (*see* Chapter 5).

Nevertheless, reliance on junior and relatively inexperienced scientists need not be a disadvantage for on-farm client-oriented research programs. Junior scientists are commonly very interested in working directly with farmers. Provided that these scientists receive guidance and encouragement from a more senior colleague, it is possible that their dedication and enthusiasm would outweigh the greater experience that a more senior scientist might bring to the task (Biggs, 1988).

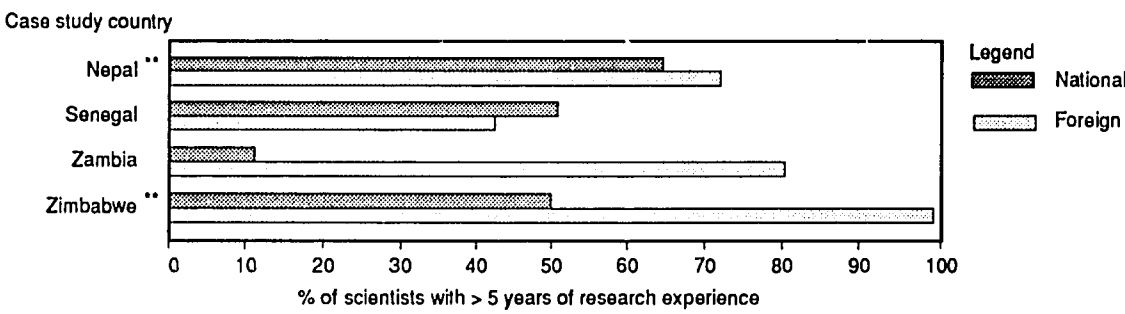
Figure 4. Research experience of scientists in on-farm research and in the national agricultural research system



* Data for sub-cases only, not for system as a whole.

Source: Annex 1

Figure 5. Research experience of national and foreign scientists*



* Limited to those countries with significant foreign scientist involvement.
** Data for sub-cases only, not for system as a whole.

Source: Annex 1

Type of Research Staff

The availability of staff with formal qualifications and experience is by no means the only criterion managers should consider when planning their staff needs. The potential contribution of different types of staff should also be considered — natural or social; national or foreign; female or male; enumerators or senior technicians.

Natural and social scientists

Early critics of on-farm research claimed it was dominated by social scientists. The origins of this view lay partly in the fact that many of the initial discussions of on-farm research were led by economists. Unfortunately, this

accusation is still levelled against on-farm research by die-hard supporters of the "station only" approach to research.

The data from the nine case studies (*see* Figure 6) challenge the assumption that on-farm research is the domain of social scientists. Natural (plant and animal) scientists comprised 80% of total on-farm researchers. In fact, the real bias was among the natural sciences themselves: the dominant role of agronomists led to an emphasis on field crops and varietal testing, at the expense of subjects such as horticultural crops, disease and pest control, crop-livestock interactions, soil and water management, and agroforestry.

Social scientists were lowest in numbers in the Latin American case studies. The Asian and African cases had more social scientists, with an emphasis on agricultural economists rather than rural sociologists or anthropologists. Only in Zambia and Senegal did social scientists outnumber natural scientists, but the margin was small. (These are also the countries which had made the greatest efforts to include rural sociologists and anthropologists in addition to agricultural economists).

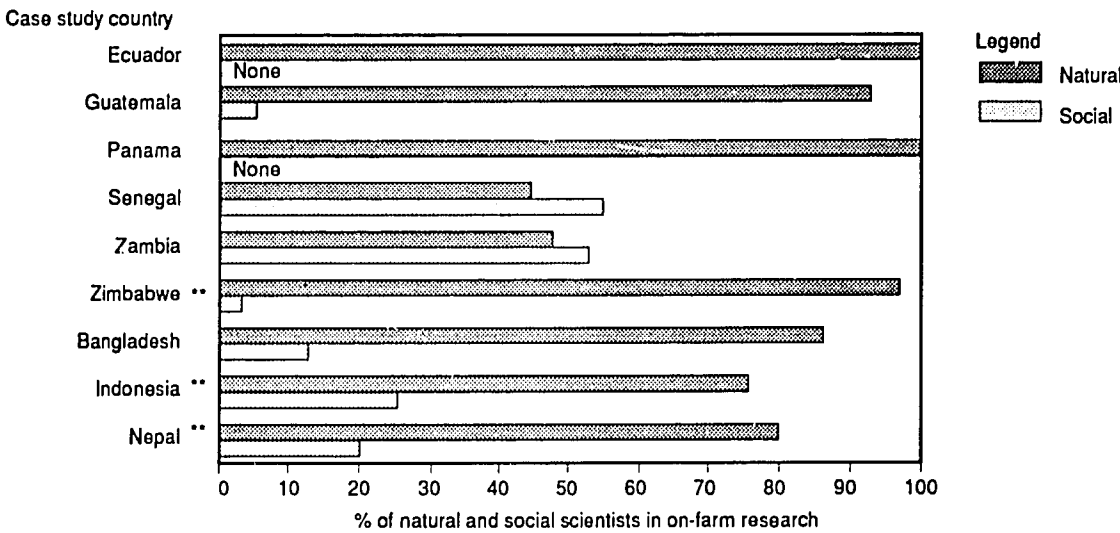
The type of on-farm research favored by the donors and international agricultural research centers influenced the disciplinary make-up of the programs they supported. CIMMYT, in Latin America, and IRRI, in Asia, had favored programs that relied mainly on agronomists and, to a lesser extent, animal scientists. These scientists had been trained in the basics of field surveys and farm budgeting, and were supported when necessary by other specialists, usually agricultural economists.

Providing agronomists with some of the analytic tools of the social sciences can enrich multidisciplinary on-farm research, but when such training is limited to the techniques of farm budget analysis it is no substitute for the range of skills offered by a social scientist specializing in on-farm research (Ewell, 1988). Moreover, such training fails to meet the needs for social and economic analysis in other areas, such as animal science and integrated pest management.

In some cases, such as Senegal, a tradition of social science in the national agricultural research system preceded the establishment of an on-farm research program. In others, particularly in Latin America, institutional, political and academic barriers still discouraged efforts to undertake cross-disciplinary programs. Such barriers may help to explain the difficulty in obtaining approval for the establishment of new social science positions in Zambia and Zimbabwe.

However, the acceptance of social scientists in on-farm research teams requires more than a mere tradition of social

Figure 6. Percentage of natural and social scientists in on-farm research*



* Extension staff assigned to on-farm research excluded.
** Data for sub-cases only, not for system as a whole.

Source: Annex 1

science in the national system. It also requires the recognition, by natural scientists and research managers, that the relevance of agronomic and livestock research can be improved if there is a better understanding of the social and economic factors influencing farmers. Some managers found it difficult to imagine how social scientists, with their theoretical and political orientation to development problems, could contribute effectively to on-farm research.

Merely attaching social scientists to on-farm research teams ensured neither their acceptance by natural scientists nor their effective contribution to the research. However, social scientists who had a good technical knowledge of agriculture appeared to be better integrated and more successful than those who lacked such knowledge. If they are to be truly interdisciplinary, on-farm research teams must not only include experienced social scientists but must also ensure that these scientists are equipped with a basic knowledge of agricultural science.

A disciplinary "home" in the national agricultural research system, such as the Socioeconomics Department of ICTA in Guatemala or the SERED of the Ministry of Agriculture in Nepal, can help to improve the quality of social science. However, such structures may also set up organizational barriers by acting as a "refuge" in which the social scientist can "take shelter" from interdisciplinarity. And the same is true for disciplinary groups in the natural sciences.

There is no magic number of disciplines needed to launch an on-farm research program successfully. The number of disciplines needed, like the size of the program, is related to the objectives of the research and the stage it has reached.

Even when a relatively wide range of disciplines is required, not all of them have to be posted to field teams. Too many disciplines in large regional teams, as in Senegal, can lead to the formation of factions, which inhibit interdisciplinarity. The case studies indicate that a better alternative is to field smaller teams which draw on specialized support as needed from headquarters. The ARPTs in Zambia were backstopped by a central team consisting of sociologists/anthropologists and a nutritionist. This alternative is particularly appropriate in smaller national systems, where certain disciplines may be either very scarce or not represented at all.

If managers choose the option of a specialized headquarters team, they must ensure that the team is not seen as a supervisory, administrative body — as it was in Senegal, for example — but as an advisory, supportive group of colleagues. This is crucial if conflicts are to be avoided.

Foreign scientists

In the case studies, foreign scientists accounted on average for the same proportion (14%) of total scientists in the on-farm research programs as they did in the national agricultural research systems as a whole (*see* Figure 7). There were, however, important variations between countries. In Bangladesh and in all three Latin American cases, the scientists in on-farm research were now all national, whereas in Zambia nearly 50% of the scientists in on-farm research were still foreign scientists.

Foreign scientists had played important roles at the outset of on-farm research in all the case study countries, but their numbers decreased over time as national scientists were trained to replace them. Predictably, the countries with more recent experience (early 1980s) of donor-funded projects — Senegal, Zambia, Zimbabwe and Nepal — still had relatively large numbers of foreign scientists in those projects.

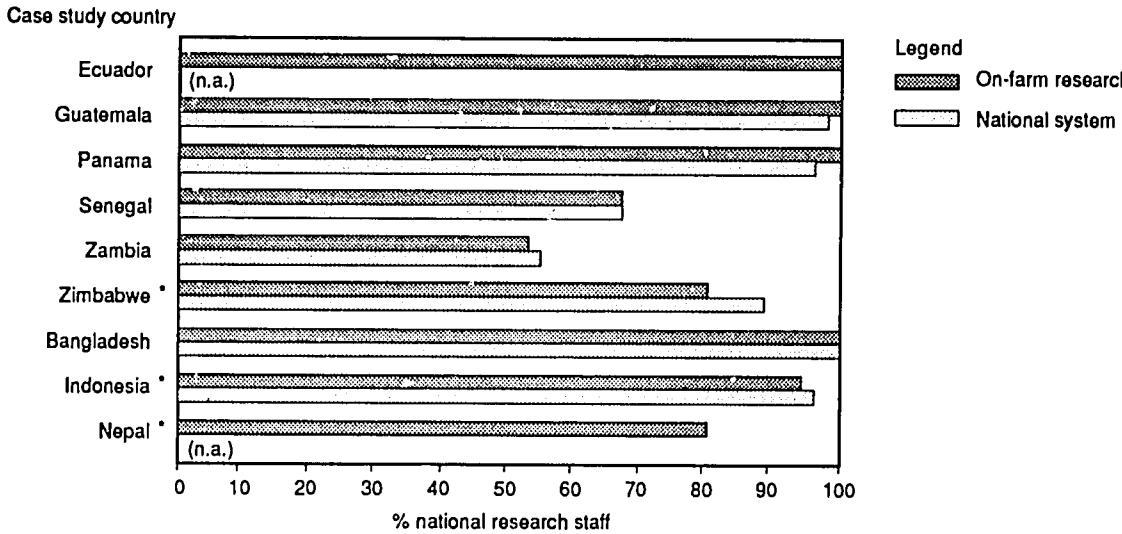
In these countries, between 20 and 45% of the foreign scientists were social scientists. Given the difficulties of retaining national social scientists in on-farm research in some countries (Senegal) or of establishing new positions for social scientists in others (Zambia and Zimbabwe), managers may need to continue to rely on foreign social scientists for the foreseeable future.

In many of the case study countries, foreign scientists played important support roles to on-farm research, in biometrics, data processing and other areas. For example, although it had no foreign scientists in the field, the on-farm research program in Bangladesh relied heavily for the analysis of fertilizer trial data on the foreign scientists assigned to BARI by the Food and Agriculture Organization.

In most of the case studies foreign scientists had made vital contributions to on-farm research, but they had also posed management problems. In some instances, foreign scientists had pursued their own research interests, which had not been consistent with national priorities. In others, they had expropriated data belonging to the team as a whole. And in nearly all countries the large differences in salaries and benefits between foreign and national scientists had created resentment, complicating staff management.

There is no easy cure to any of these problems, but the first two are to some extent amenable to prevention. Donor agencies should demand accountability to national scientists on the part of the scientists they fund. More effective screening at recruitment is perhaps the best remedy (*see* Chapter 3). A contractual commitment to data sharing and joint authorship is another possible solution, but enforcement is difficult.

Figure 7. Percentage of national and foreign scientists in on-farm research and in the national agricultural research system



* Data for sub-cases only, not for system as a whole.

Source: Annex 1

Some managers had found it difficult to ensure the continuity of research as one foreign scientist was replaced by another or by recently trained national scientists. Too often, foreign scientists on short-term contracts had left before the return of their national counterparts or before the latter had become fully involved in the program. This not only affects the speed with which a newly trained scientist can "learn the ropes"; it also disrupts the smooth relationship that on-farm research must maintain with farmers and with other scientists in the national system.

Choosing foreign scientists who have both the commitment and the skills needed to work directly with farmers and with national scientists is an important management responsibility. In some cases, donor hiring practices and contractual procedures prevented local managers from exerting their rightful influence not only on the selection of foreign scientists but also on the role they were to play and on the conditions under which they were to work. The case studies suggest that donors to smaller on-farm research projects invite more and earlier participation by managers in project decisions, especially in the selection and assignment of foreign scientists.

As short-term consultants, foreign scientists can offer valuable advice to field teams on methods and data analysis. However, in the case study countries consultants had too often been used as a substitute for national capacity rather than as a means of building it. Their visits were scheduled more in response to project timetables than to the real needs of scientists and their programs. Consultants were used more for project design and evaluation than for the provision of ongoing technical assistance. And managers frequently failed to make full use of the broader advisory and training roles that consultants can play if they are encouraged to do so.

Managers could look to the international agricultural research centers for examples of how to make better use of foreign consultants. In the case studies, the examples provided by CIMMYT in Ecuador, Zambia and Zimbabwe, and by IRRI in Indonesia, show how managers could design their own programs using foreign consultants who visit their programs periodically for short periods to give technical advice, with a view to building national capacity in the longer term.

Managers have two critical responsibilities when a foreign scientist collaborates in on-farm research: even if the conditions of employment differ, they must ensure that foreign scientists and nationals are treated as equals in the team; and they must see to it that foreign scientists accept and meet the conditions of partnership with their national colleagues, including joint publication and/or appropriate acknowledgment of other scientists' contributions. Placing foreign scientists in line positions, as in the cases of

Guatemala and Senegal, is one way of encouraging their accountability.

Women scientists

The staff of on-farm research programs in the case studies were overwhelmingly male (*see* Annex Table 1). In nearly half the cases (Ecuador, Guatemala, Panama and Nepal) there were no women on the staff. The percentage of women employed in the other cases varied widely, but at a low level, ranging from 2% in Bangladesh and Senegal to 15% in Indonesia. Overall, there was only scanty information in the case studies on women in on-farm research, as in the national agricultural research system as a whole.

The fact that so few women are employed in on-farm research raises concern over its effectiveness. Introducing new technology has sometimes had a negative impact on the welfare of women. Recognition of this has increased the interest of researchers in gender issues in recent years. In addition, experience points to a strong positive relationship between reaching women farmers and having women scientists on a research team (Poats et al., 1988). In some societies it is impossible for male researchers to have direct contact with women farmers. This poses special problems for on-farm research, which relies heavily on the interaction between scientists and clients.

On-farm research managers have sometimes found that efforts to recruit women scientists are unsuccessful. Few women apply, and those who do lack the necessary experience and training. In Senegal and Zambia, the women brought into on-farm research did not stay long. Because there are so few women in the system as a whole, the effect of the few losses is magnified.

Women on-farm researchers face several problems to which managers must be sensitive. First, travel is difficult for women because, in addition to leading a professional life, in most cases they are still responsible for domestic tasks, including the raising of children. Second, professional women are likely to be part of a two-career household: when husbands are transferred, wives are expected to move with them. The reverse expectation is considerably rarer. Third, a woman scientist - - often the only woman on the research team — is usually the only person assigned to deal with gender issues or asked to "represent women" in addition to her other responsibilities. This can further marginalize her contribution in the eyes of male colleagues.

Managers can exercise several options to encourage women to join and to stay in on-farm research. When women are not part of the permanent staff assigned to on-farm research, women scientists from other units of the institution can be brought in on temporary assignments, as was done at BARI in Bangladesh. If women researchers are in short supply in the institution as a whole, women from other institutions, especially universities, can be employed and trained in on-farm research. This will not only meet staffing needs, but might also generate interest among women students in pursuing on-farm research. Managers could also make more use of women extensionists trained in home economics. Such women often have good community organization skills that are very useful in developing farmer participation in on-farm research. However, as Gupta (1989) observed, although the contribution of women scientists at BARI was perceived as important, they were not included in the analysis of research data or in the design of follow-up household studies. When foreign scientists are needed on the program, managers could make a more deliberate effort to recruit women. Managers should be prepared to deal with two-career households as the rule, not the exception. And lastly, they could assign the responsibility for gender issues to *all* team members, not just the women in the team.

Managers seeking to make their programs more effective in meeting clients' needs must give increased recognition to gender issues. Acknowledging the issues is the necessary first step. In so doing, managers can begin to demolish the overt and subtle barriers that are persistently maintained against women on-farm researchers.

Technicians

The technicians employed in on-farm research, like the scientists with whom they worked, were mostly in their mid-30s. The qualifications of technicians varied considerably, from BSc levels in the Asian case studies to technical secondary or post-secondary levels in the other case study countries.

The ratio of technicians to scientists also varied considerably across the case studies (*see* Annex Table 1). In part these differences reflected different concepts of the nature and requirements of on-farm research. When the role of on-farm research was limited to the testing of new technology, fewer scientists spent time in the field and technicians assumed more of the responsibility for conducting trials. When on-farm research fulfilled a broader need for adaptive research and feedback from farmers, more scientists were involved. In general, the ratio of technicians to scientists was higher in more hierarchical, centralized national systems. Programs built around a significant proportion of BSc-level scientists generally had a relatively low ratio of technicians to scientists. Reliance on technicians can also vary over time: in Guatemala, for example, senior technicians became more important as the technology testing program became established.

In most of the case study programs, the technicians were the principal field staff, responsible for day-to-day contact

with farmers. As such, their role was quite different to that of their on-station counterparts. They had more independence and, being less closely supervised, had to take more decisions on their own. The case studies suggest strongly that technicians have more responsibility than the current status of their jobs inclines their managers to believe they have — they are not mere implementors of other people's decisions. Given this level of responsibility, the recruitment and training of technicians is an area requiring far more attention by managers than it is currently getting. In view of the close contact technicians have with farmers, it will be important to recruit and train more women technicians.

Compared with the on-farm researchers, the technicians had almost twice as many years of experience in agricultural research (9 years) and slightly more experience in on-farm research (5 years) (*see* Annex Table 1). Yet despite their longer field experience and more intimate knowledge of local conditions, technical staff had little opportunity to professionalize their experience or bring it to bear on the formulation of research programs. Technicians are a more permanent reservoir of knowledge than their more mobile senior colleagues in research, but national systems have yet to find ways of systematically tapping this reservoir.

Zambia, Zimbabwe and Nepal had gone further than some other countries in developing the professional responsibilities of technicians. In Zambia, village-level trials assistants seconded from extension implemented all on-farm field trials. The on-farm researchers solicited observations from the field technicians, and some ARPTs had recently begun to involve them in research planning and review. In some provinces researchers valued the work of technicians highly and were loath to let them return to the extension duties originally assigned to them. In Zimbabwe, the FSRU systematically involved technicians in the research planning and review process. In Nepal, the technicians responsible for managing LAC's on-farm research sites returned to headquarters for monthly research programming meetings.

As on-farm research programs develop ways of involving farmers more systematically in the research process, on-farm research managers will need to redefine the role of technicians in relation to both research scientists and farmers. Already, a growing number of programs are beginning to look more to local farmers for technical support in the field. Farmers hired as field assistants played a key role in all the on-farm activities studied in Nepal, and those working with the LAC received special training and participated in the on-farm research bi-monthly planning and review meetings. Rural leaders recruited from the farming community acted as an important link between farmers and the research and extension services in Guatemala. In Senegal, one on-farm research team hoped to completely replace technical field staff with farmers.

The increased use of farmers acts as an added pressure on technicians to move further upstream. Managers in nearly half the case studies had provided some form of training in on-farm research methods for technicians. In Zimbabwe, senior technicians attended the CIMMYT/University of Zimbabwe training course in on-farm research methods. However, more could still be done to increase the formal training opportunities for technicians, to design "apprenticeship" relationships with scientists, and to identify more situations in which decision making could be decentralized to technicians possessing the necessary expertise. Offering career ladders and other incentives that will persuade more able technicians to stay with on-farm research programs will be especially important in programs where the turnover of scientists is high.

CHAPTER 3
GETTING AND KEEPING STAFF: RECRUITMENT AND INCENTIVES

How to select staff for on-farm research who will be successful team members, and how to retain them, are two of the problems most commonly encountered by research managers. This chapter discusses the following questions:

- Should there be special criteria and procedures for recruiting on-farm research staff?
- What can managers do to increase the supply of potential candidates for on-farm research?
- What incentives can be used to attract and retain staff?
- What level of staff turnover is acceptable?

The issues of recruitment and incentives highlight the importance of the policy context of on-farm research. Where on-farm research enjoyed strong political support and a good reputation, managers found it easier to recruit new staff and to provide appropriate incentives. In Zimbabwe, experienced research staff were willing to transfer to the new FSRU, not only because donor support guaranteed the availability of funds for research but also because the unit's research contributed to the the government's priority of assisting resource-poor smallholders in the Communal Areas. The same was true of the on-farm programs of the LAC and PAC in Nepal, as well as in Senegal and Zambia.

Successful recruitment may require making some bold administrative decisions. Government regulations that cramp the career opportunities available to on-farm research staff may need to be changed, or at least waived in certain circumstances.

Recruitment Criteria and Procedures

Most training in the agricultural sciences brings with it a body of disciplinary knowledge and a set of skills that those trained can be expected to hold. These provide the disciplinary criteria used by managers to recruit scientists for conventional research programs. The knowledge and skills required for on-farm research are less easily defined. While disciplinary qualifications and achievements are still important, they are not sufficient: additional criteria are needed.

Possession of a BSc or MSc degree or its equivalent was the standard criterion used to recruit scientists in the case studies. This criterion was fairly rigidly applied, owing to government regulations, but most managers also made some effort to apply additional criteria.

Special skills and personal qualities were sought after. The PAC in Nepal gave preference to young local farmers when recruiting its district agronomists and agricultural superintendents. In Zambia, academic and research caliber, a concern for field work with farmers and an interest in being part of an interdisciplinary team were three essential criteria. If the ARPT coordinator could not find candidates who met them, on-farm research vacancies went unfilled.

Similarly, the project leader and research coordinator of the Crop-Livestock Systems Research Project in Indonesia sought scientists with team skills, while the project leaders of IDIAP in Panama applied three criteria: a talent for communicating with farmers, technical qualifications, and the ability to collaborate with on-station research and extension staff. Managers at IDIAP also looked for evidence of a candidate's ability to adapt to rural life, assessed his or her level of creativity, and considered various personal skills thought necessary to conduct on-farm research. They have found that candidates trained as agricultural generalists rather than disiciplinary specialists have made more effective on-farm researchers.

Similar criteria are needed for the selection of foreign scientists, but applying them is more difficult. The examination of a curriculum vitae may reveal little about a foreign scientist's ability to work in an on-farm research team, yet the cost of air-fares may preclude first-hand evaluation. When a candidate has previous overseas experience, a performance evaluation should be requested from his or her manager in the country concerned. When funds are available, managers can insist that long-term assignments be preceded by a short-term consultancy mission. This procedure, successfully applied in Senegal, permits a two-way evaluation between the candidate and the rest of the team. If in-country visits and interviews are too expensive, other, less satisfactory opportunities to meet and interview proposed candidates can be pursued through

international on-farm research meetings and networking activities.

The disadvantage of recruiting foreign scientists is that they will often be unfamiliar with the agroecological zone in which they are to work, and with the languages of its farmers. The advantage is that they may have experience and specialized skills not yet developed by the national team. Under these conditions, a willingness to exchange knowledge, by both teaching others and learning from them, may be the key criterion on which to base selection. Good communication skills will be a vital asset.

The justification for recruiting a foreign rather than a national scientist must lie in the potential of the foreign scientist to strengthen national capacity. A proven track record in the training of national scientists will be the most important criterion for selection.

Government procedures covering the recruitment of new staff may offer little room for maneuver and sometimes cause excessive delay. Skill in dealing with bureaucracies, often from a distance, is a quality much needed by the on-farm research manager seeking to appoint new staff.

The recruitment procedure for ISRA scientists in Senegal was carefully designed to ensure that only well-qualified candidates filled positions approved within the institute's budget. However, new positions, including those for the new on-farm research department, had to be approved by two ministries. Since these approvals were commonly delayed, candidates were recruited and hired on a temporary basis. During this period salary payments were frequently delayed, leading to the resignations of some highly trained researchers, despite management's best efforts to retain them.

When on-farm research was part of a larger agricultural development project managed by another government agency, managers faced special difficulties in having their say in the recruitment of foreign scientists. Project objectives related to development tended to take precedence over research objectives, and extra bureaucratic procedures made it complicated for managers to ensure that the interests of the research program were considered.

Because few experienced scientists are available for hire, and because turnover in on-farm research programs is high, managers must expect the recruitment process to be a management-intensive one. Under these circumstances, anything that can be done to simplify or shorten the process will significantly lighten the very considerable administrative burden placed on managers (*see* Chapter 5).

Time pressures, often imposed by externally funded projects, frequently forced managers in the cases studied to modify both recruitment procedures and selection criteria. In Bangladesh, pressure from USAID and the World Bank to find staff for an on-farm research effort led managers to lower the standard requirement for an MSc degree and accept candidates with a BSc instead, with the stipulation that their MSc degree work should be completed on the job. This compromised the quality of the subsequent on-farm research.

The case studies revealed the importance in the recruitment process of clearly defined job descriptions. The preparation of a job description can be a useful planning tool in itself, since it forces managers to define how staff will meet program objectives. When candidates are short-listed and interviewed, a detailed job description is an invaluable aid to decision making, for it enables a candidate's previous experience to be carefully checked against the tasks he or she will be expected to perform. It can also help candidates to assess the opportunities the job offers and to understand management's expectations of them. Donors commonly stipulate the jobs required to meet the objectives of the projects they fund. When they do so, they should be careful to involve local managers in the process.

The use of job descriptions, coupled with rigorously applied formal recruitment procedures, including the use of candidate lists, solicited recommendations, the review of academic records and structured candidate interviews, has been successful in Zambia, Senegal and several other cases.

Probationary periods can act as a useful safety valve after the recruitment process, allowing management time in which to change its mind after observing how a new recruit settles in. A 1-year probationary period was in use in Senegal.

Supply of Potential Candidates

The availability of suitably qualified candidates in different disciplines is usually very uneven. With one or two exceptions, agricultural economists, rural sociologists and applied anthropologists were difficult to recruit in the case study countries. Few university courses in social science focus on agricultural research, and those that do have modest numbers of graduates. This was a common problem across the case studies, and is one reason why the Latin American programs opted to train agronomists in basic social science instead of trying to hire degree-level social scientists and train them in agronomy. In Guatemala this approach enabled junior agronomists to conduct basic

socioeconomic research tasks, but without senior social science guidance there was little methodological innovation and the socioeconomic research soon stagnated.

Competition for qualified on-farm research candidates varied widely. In Nepal, the annual supply of eligible university graduates far exceeded the demand for on-farm researchers. In Zimbabwe too, the university graduated a large number of qualified candidates each year, but there were more private sector opportunities available, and these were better paid. Similarly, the private sector in Guatemala and international and regional research programs in Senegal offered competitive alternatives for researchers, especially those with US training. In Zambia, the ARPT program faced stiff competition from the commodity research programs in filling its on-farm research positions.

Financial and professional support from the international agricultural research centers had helped to attract candidates to on-farm research in several cases. The opportunity for scientific collaboration with CIMMYT scientists and for training encouraged IDIAP's own researchers to participate in the Caisan Project, while the financial incentives provided by CIMMYT attracted INIAP's scientists to PIP. Involving the international centers in an on-farm research program is clearly beneficial for recruitment.

Managers can increase the supply of potential candidates through "conditioning". This term, as currently used in the management literature, refers to efforts to establish the preconditions necessary to evoke a change or acquire access to some resource (McDermott and Andrew, 1989), in this case university graduates. In several case study countries (Zambia, Zimbabwe and Guatemala), a more or less regular relationship had been established between the national agricultural research system — on occasion, the on-farm research program itself — and the relevant university departments, for the purpose of attracting new recruits. In addition to telling students about on-farm research through lectures, managers can arrange visits, study tours and research internships with on-farm research programs for interested students.

Students at Indonesia's Gajah Mada University visited the Kandangan research site to gain first-hand knowledge of the on-farm research activities of the Upland Agriculture and Conservation Project (UACP). Likewise, researchers from the Malang Research Institute for Food Crops participated in workshops and seminars at Brawijaya University to present and discuss the results of their research. In addition, research papers from the on-farm maize program were sent to various agricultural training institutes to be used for teaching purposes. The strength of these and other links between the academic and on-farm research communities was one reason why staff recruitment was not a problem in the Indonesian system.

In the long term, the most effective means of improving recruitment to on-farm research — and, indeed, of building the quality of such research and its status within the national system — will be to include on-farm research in the university curriculum. This step has already been taken in Indonesia, and to some extent in Zimbabwe and Zambia. Managers may find it easier than they expected to influence changes in the university curriculum. Many scientists and managers already teach at universities on a part-time basis, providing them with a good opportunity to introduce new topics, including those related to on-farm research. Managers should encourage both national and international agricultural research centers to support university on-farm research training programs.

Incentives

The case studies suggested strongly that managers need to pay more attention to the issue of providing adequate incentives to the scientists who are engaged in on-farm research. The achievements of conventional disciplinary research are easily defined and hence more easily rewarded, whereas the payoffs from on-farm research may be less visible. As a result, on-farm scientists are at greater risk professionally than are their station-based colleagues. In addition, because they are subject to the rigorous demands of intensive teamwork, they have less autonomy; and they have to spend more time on coordinating their work with that of others. Once results have been achieved, the credit for them is more likely to be shared between several scientists, with the result that any material rewards must also be shared. Lastly, on-farm scientists need to be compensated for working in isolated locations and for the heavy travel burden that this imposes.

Material incentives

The managers of most of the public sector on-farm research programs in the cases studied offered a package of salary and benefits which were in line with government regulations. In cases where external funding was provided, institutes had more flexibility in negotiating salary and benefits packages. In the long term, however, government regulations are likely to prevail as donor funding is withdrawn.

Government regulations normally stipulated the conditions for career advancement. The usual procedure was to promote staff according to seniority when established positions became vacant. In government programs, merit was under-used as a criterion for promotion.

Three additional factors seriously affected the promotion prospects of on-farm research staff: the relatively "flat" hierarchy of positions, the low turnover of senior staff and the relatively small size of programs. Consequently, the more able junior on-farm research staff often became frustrated and sought more attractive positions elsewhere.

Without additional incentives, on-farm research salaries, like those in the national agricultural research system as a whole, were generally considerably lower than those paid to equivalent staff in the private sector. In Zimbabwe, the DR & SS faced stiff competition from relatively high-paying private sector employers for experienced scientists and technicians. In Senegal and Zambia, trained social scientists could frequently choose among numerous attractive alternatives outside public sector agricultural research. In Zambia, competition for agricultural research staff also occurred within the Research Branch, as on-station scientists generally enjoyed better employment conditions than their ARPT colleagues.

Material incentives can be used to encourage scientists to accept positions in remote locations. These benefits can also help outposted staff overcome their feeling of being at a disadvantage compared to station-based scientists. In Indonesia, Senegal and Nepal (LAC and PAC), field scientists received free lodging. Other benefits available to Indonesian scientists included a hardship allowance and paid visits to their home institute during their on-farm research assignment. Generous per diem levels were used to encourage senior scientists to make regular technical backstopping visits to less experienced scientists on field teams. These incentives promoted closer contact with farmers and collaborative relations with on-station colleagues. Incentives such as opportunities to attend meetings or participate in international networks may also be important for attracting better-quality scientists on secondment.

Despite this positive evidence, before introducing new incentives managers must consider whether they can be sustained in the longer term. Favorable packages are undoubtedly useful for persuading staff to move when launching a new program, but when incentives have been dropped, apparently successful programs have faltered. The termination of salary bonuses for PIP staff in Ecuador, for example, led to high staff turnover and made it difficult to replace scientists. The continuation of donor funding for the LAC and PAC in Nepal, on the other hand, has so far enabled these physically isolated centers to maintain their own competitive levels of salaries and benefits and to continue to attract highly qualified scientists.

Given the severe financial constraints facing most governments in developing countries, managers are unlikely to be in a position to introduce more competitive packages for on-farm research in the foreseeable future. Yet if they rely on donors to provide additional material incentives, they become dependant on a source of funds that is subject to considerable uncertainty. Nevertheless, it is clear that on-farm researchers have to be adequately rewarded for work in the field. Under these circumstances managers must do all that they can to increase the non-material incentives available to their staff.

Non-material incentives

Job satisfaction can be just as great a motivator as financial compensation or career advancement. In fact, for on-farm researchers it may well be the more important of the two. On-farm research, with its emphasis on teamwork and client orientation, offers opportunities for job satisfaction that more conventional scientists in commodity programs enjoy only to a lesser degree.

Opportunities to teach, publish, attend conferences, train or be trained emerged in nearly all the case studies as important sources of job satisfaction. Except in some of the Latin American countries, most on-farm researchers were able to take advantage of these opportunities. In particular, both short- and long-term training opportunities appeared as a powerful means to attract young on-farm research staff.

There was no evidence that it is more difficult for on-farm researchers than for other scientists to publish the results of their research. However, there was a tendency for biological scientists to prepare and distribute "gray" literature rather than publish the results of on-farm research in the standard disciplinary journals. In Indonesia the number of scientific publications was a criterion for selecting staff to participate in advanced training.

Staff Turnover

High staff turnover can severely disrupt an on-farm research program. Knowledge of specific regions and farming systems, trials determining the long-term effects of new technology, animal experiments and a socioeconomic

understanding of the farm household all require continuity. Continuity is equally important for maintaining collaborative links between on-farm researchers and other researchers, extensionists and farmers.

While managers must do all that they can to reduce staff turnover, it will always be difficult for on-farm research programs to retain the more able members of their comparatively young staff. Rather than seeking in vain to overcome this problem, managers should learn to make the best of it, allowing for the fact that some of their best young scientists will leave sooner rather than later, regardless of the incentives they can offer. Paradoxically, it may be this very prospect that attracts "upwardly mobile" young scientists to join on-farm research programs in the first place: Zambian university graduates, for example, were attracted to the ARPT program because of the post-graduate training opportunities it offered, with the prospect of later moving on to more remunerative employment. Assignments in on-farm research were also viewed positively in Senegal and Zimbabwe.

Managers should not forget that scientists leaving on-farm research may eventually return to it, having benefited considerably from a wide range of experience gained elsewhere. Provided they are retained in the national system, scientists leaving a specific program can help to spread the on-farm research philosophy to other parts of the system. Too high a degree of staff mobility is certainly preferable to the opposite problem of intellectual stagnation caused by insufficient staff turnover. If on-farm research comes to be seen as a quiet backwater for the mediocre, few able young scientists will wish to join its programs.

One way of accommodating frequent staff changes at junior levels is to turn posts in which turnover is considered too high into internships, meeting the needs of a succession of young scientists in search of field experience. This saves both on salary costs and on the administrative costs incurred by constantly having to advertize and fill vacancies. However, strong and continuous scientific leadership is required if this solution is to work.

CHAPTER 4
IMPROVING RESEARCH CAPACITY: STAFF DEVELOPMENT

On-farm research managers in each of the nine case study countries recognized the importance of training for launching and sustaining viable on-farm research programs. However, the successful use of training to build national programs varied considerably from country to country.

This chapter addresses the following questions:

- What are the training opportunities in on-farm research?
- How can managers improve the contribution of training to on-farm research?

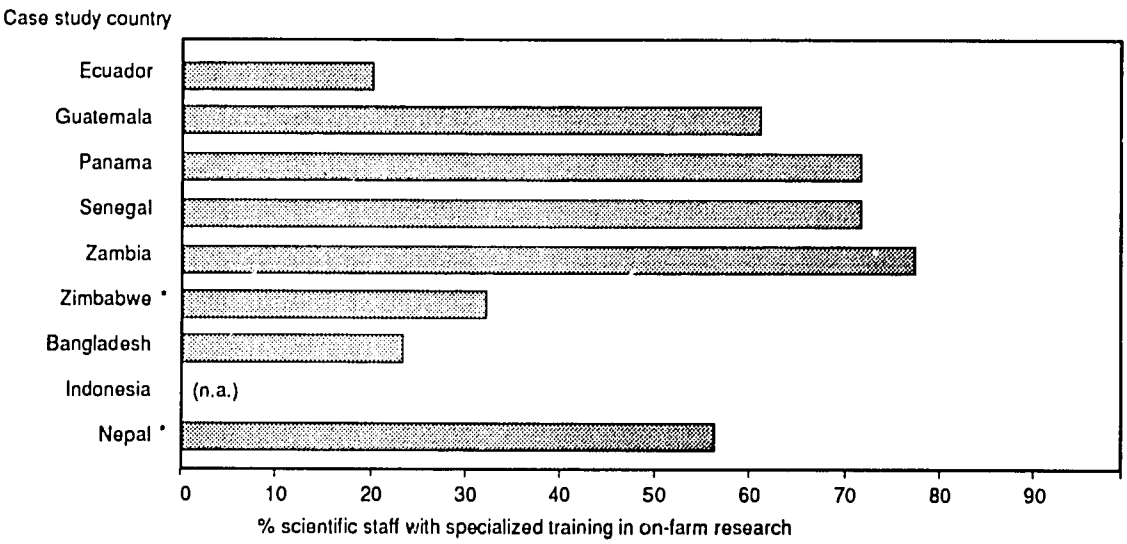
Access to Training Opportunities

On-farm research managers were generally committed to training, but the degree to which it had been successfully institutionalized differed significantly among the case study countries. The training objectives and strategy of on-farm research were not always well understood and accepted elsewhere in the national system.

In both Guatemala and Ecuador, the national agricultural research system had undertaken a vigorous training program, but commodity scientists had benefited far more than on-farm and social scientists. A major reason cited in both cases was the limited courses available that taught on-farm research, with the result that, in Guatemala, only one social scientist had been sent for graduate training overseas. A further factor in Guatemala was that for several years the Technology Testing Department had no director, and hence no-one to press its training needs. Turnover in leadership and the end of external funding led to a similar problem in Ecuador. The cases of Guatemala and Ecuador also illustrate the difficulty frequently experienced by on-farm researchers in gaining access to advanced degree training.

As shown in Figure 8, many on-farm researchers had received some type of special training in on-farm research, even though the level varied considerably across the case

Figure 8. Percentage of scientific staff with specialized training in on-farm research



* Data for sub-cases only, not for system as a whole.

Source: Annex 1

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studies. The highest levels of special training were provided in Zambia, Senegal and Panama, where over 60% of the scientists currently employed in on-farm research had received such training.

Access to training was closely linked to donor-funded projects, and to the networking and collaborative research activities of the international agricultural research centers. Such training may be broad or narrow in scope: in Zambia and Senegal, training in a wide range of on-farm research skills and methods had been used to build national programs; in Indonesia, postgraduate degree training through the USAID-funded Small Ruminants Collaborative Research Support Program had addressed the more limited objective of developing specific skills needed to meet the program's objectives.

The wide availability of US scholarships in the applied, rural social sciences creates an impression of American dominance in this area, but in fact the origins of the degrees held by on-farm research staff were fairly diverse. Donor funding heavily influenced both the country of training and the pace at which it was supplied, such that many managers often felt that opportunities provided by donors, rather than a staff development plan, were the driving force behind on-farm research training activities.

The international agricultural research centers had significantly increased the access of young scientists to training opportunities through their short-term training activities. In only one case, Panama, the national research institute appeared to have relied on training inputs from the international agricultural research centers as a substitute for a more formal national training program in on-farm research. In all other cases, national in-country training courses with back-up from the international centers and donor agencies were increasingly being used to complement the international training courses hosted at the centers themselves.

Contribution of Training

In order to maximize the contribution of training to program development, on-farm research managers need to play a much more active role in manpower planning. It is their responsibility, not donors', to assess their staff needs and identify appropriate in-service and degree training opportunities.

Degree training

Managers can take a variety of measures to ensure that individual postgraduate programs contribute to the development of the on-farm research effort as a whole. They can encourage in-country thesis research, visit trainees and their advisors, and organize special short courses that bring trainees together during their postgraduate work. Such arrangements can easily be funded through most training programs and, as in Senegal, they can be highly effective in helping to build the program.

Lack of strong scientific leadership can lead directly to a failure to realize the benefits of degree training. In two cases, several junior scientists returning from overseas graduate training programs had found no approved research positions in their national institute and had subsequently left for jobs outside the national agricultural research system. Managers must be in a position to justify new and more responsible positions in their programs for returning trainees. This will depend critically on their standing, and that of their programs, within the national system as a whole.

In-country training

Meeting training needs may become easier as a cadre of researchers, trained as trainers, grows within a country: while a "first generation" of trainees must often be trained overseas, subsequent generations can usually be trained through in-country or in-service courses.

Most of the on-farm research programs relied on donor funding to provide in-service training in the form of seminars and workshops for their staff. In Senegal, for example, the USAID project financed several workshops on farming systems research, on-farm trials, on-farm livestock research and the more effective use of microcomputers in agricultural research.

Also with support from donors, several research institutes, programs and universities had organized special in-service training to supplement that provided by the international agricultural research centers. The OFRD in Bangladesh had designed a short course to reinforce and reorient the skills of its scientists in field operations. The UACP in Indonesia had organized a similar 3-week course for researchers who had attended the IRRI training courses in farming systems research. The University of Zimbabwe offered a short training course for in-service trainees. This consisted of two sessions over a period of 1 year. The first session lasted about 3 weeks and covered diagnostic survey methods and the design of on-farm trials; the second took a further 2 weeks, during which the results of trials designed during the first phase were analyzed.

Government-funded in-service training opportunities were comparatively rare. The CAPA course at ICTA, in Guatemala, was the only instance of a full-scale training program funded entirely by government. As such, it provides an excellent model. The CAPA course was the keystone of ICTA's staff development program, acting as a firm basis on which ICTA's managers could plan additional training.

Launched in 1976 to train the institute's newly recruited, university-trained agronomists in on-farm research methods, the 10-month course helps to develop a common set of research skills and to foster a shared philosophy among ICTA's researchers. The "training plot" is used as the key exercise in teaching researchers about the risks associated with new technology and about the need to adapt textbook recommendations to local conditions. CAPA trainees must personally bear the production costs on their plots, and as a result they quickly learn that advice from neighboring farmers can improve their chances of making a profit. Managers and researchers alike feel that the CAPA course creates a certain esprit de corps among each cohort of trainees, as well as imbuing new recruits with a practical vision of what constitutes good research, with on-farm work as its core.

Strangely, social scientists recruited to the Socioeconomics Department within ICTA do not participate in the CAPA course. This represents a missed opportunity to ensure a more integrated on-farm research program.

The CIMMYT "call" model of training is one that might prove adaptable to national in-service training programs. In this model, widely used in Ecuador as well as in Zambia and Zimbabwe, training activities take place in step with the on-farm research actually in progress, rather than being taught in the classroom. Each "call" lasts from 1 to 2 weeks, and completing the training through the various stages of farming systems research can require up to 2 years. This system represents an excellent means for promoting constructive scientific exchange between junior and more experienced scientists (Tripp and Wooley, 1989).

Scientific apprenticeship

The effective use of the knowledge and skills acquired through degree programs will depend for several years on the periodic support of senior scientists. This tutored field experience, or mentoring, is especially important for on-farm researchers in order to develop their familiarity with the methods of on-farm research, which are only rarely taught in the classroom or in traditional disciplinary programs. Managers must make sure that such relationships are subsequently provided, if their programs are to reap the full benefits of previous training.

Mentoring relationships of this kind were found in several of the case study countries In Indonesia, Nepal, Senegal and Zambia, they were encouraged through formal organizational structures and mechanisms, including headquarters-based groups and policies to encourage field visits.

Just as important as the formal scientific support system is the informal one. Managers need to ensure that papers are read and criticized, that individual activities are reviewed, and that discussions and seminars are held. All the case studies suggested managers could think more creatively about building the scientific life of on-farm research.

Managers must pay special attention to mentoring junior women scientists if their contribution is to be integrated with that of the rest of the team. In the absence of such extra support, a junior woman scientist may be marginalized, as occurred in Senegal (*see* Chapter 2).

Role of foreign scientists

As noted in Chapter 2, nearly half the case study countries still relied heavily on foreign scientists to staff on-farm research. The evidence from these cases suggested that few managers are getting the most out of foreign scientists in terms of building a solid national on-farm research program. This was especially true when foreign scientists were funded for short, 1- to 2-year assignments under bilateral projects. Training needs were better met in longer-term projects involving the international agricultural research centers, in which strengthening national programs is a specific objective.

Demanding, and getting, a more systematic training contribution from senior foreign scientists, especially through south-south exchanges, is essential when experienced national scientists are not yet available. Foreign scientists on bilateral projects should have mentoring responsibilities written into their job descriptions. At the very minimum, they should be asked to assume more responsibility for the supervision of in-country thesis research, a task to which little attention appeared to have been given in all the cases studied except Senegal. When funds are available, foreign scientists can also be asked to organize training workshops and seminars. As already noted, a proven track record in the training of national scientists should be among the criteria used to recruit foreign scientists and to evaluate their performance.

Perhaps the most important challenge for managers lies in moving beyond an ad hoc acceptance of all training opportunities offered by donors and toward the formulation and implementation of a sound national on-farm research staff development plan.

CHAPTER 5
RUNNING THE ON-FARM SHOW: SCIENTIFIC LEADERSHIP

Most OFCOR programs in national systems are launched through external, donor-funded projects. Whether or not they are sustained beyond the duration of these projects is determined to a large extent by the quality of the leadership they get. Without good leadership even the most dedicated researchers are liable to lose interest and look for other opportunities, thereby jeopardizing the institutional sustainability of OFCOR.

On-farm research differs from conventional research, posing a number of special challenges to its leaders. Forging the new approaches required by on-farm research requires special attention to building interdisciplinary teamwork and to guiding the program's younger scientists. Dealing with multiple donors and operating in a decentralized part of the national system, on-farm research managers need to be good administrators as well as good scientists.

This chapter therefore addresses the following questions:

- What qualities make a good leader of on-farm research?
- What special challenges face the leaders of on-farm research?

Leadership Qualities

The on-farm research manager has many responsibilities: dealing with donors, negotiating with government agencies, building field teams, organizing collaboration, and coordinating the writing up of research results. Being a gifted "all-rounder" is one important leadership quality.

Without strong leaders, on-farm research programs are especially vulnerable because they are often peripheral in national systems, in terms of their physical location if not also in terms of their status. Perhaps the most important quality to look for in a prospective leader of on-farm research is his or her ability to represent and defend the interests of the on-farm program within the national system as a whole. A consensus in favor of on-farm research among the leader's senior colleagues in the national system is a vital ingredient in the mix of conditions necessary if on-farm research is to prove institutionally sustainable in the longer term. It is the leader's responsibility to build this consensus. He or she will find it easier to do so if the on-farm program is seen to be collaborating well with other programs in the national system.

Some of the more important criteria for selecting an on-farm research leader are disciplinary openness, on-farm research skills and experience, and the ability to foster collegial relationships. Evidence of these characteristics are publications co-authored with scientists outside the candidate's own discipline, and research in other multidisciplinary teams.

Managers in the cases studied came from a wide range of disciplinary backgrounds, ages, and research experience, but they were all male. Those who were most successful had a good working knowledge of disciplines other than their own, and were able to maintain good interdisciplinary working relationships. They appeared to practice management by "wandering about": they took a keen interest in, and frequently visited, their program's field sites and experiments. They had earned the respect of, and demonstrated their respect for, the other scientists in their programs.

The more successful managers identified in the course of the case studies generally had good on-farm research skills drawn from their on-the-job experience and complemented by training. They themselves had lived in the field and worked with farmers.

A good leader not only improves the competence of a program's scientists, but also inspires their commitment. In other words, successful on-farm research leaders are people of vision. According to Nickel (1988), they are "almost boring" in the degree to which they use every opportunity and instrument to make staff members aware of their program's mission and the importance of their tasks. Their sense of purpose and commitment will be directly reflected in the performance of the team as a whole. And it will help them to champion the cause of on-farm research beyond their program, and so generate increased support for it.

While ultimate responsibility must be taken by the on-farm research leader, scientific leadership is a role that should be shared with a core of other experienced scientists. Scientific leadership may be shared through formal structures, by setting up a central group of more

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experienced scientists, as in Senegal and Zimbabwe, or informally, as in several of the Latin American and Asian case studies. In Zambia, the national coordinator decentralized leadership by giving more scientific and administrative responsibilities to provincial team leaders, a solution which seems to have worked well.

Training of future leaders

Most of the on-farm research leaders in the case studies, whether national or foreign, had had no formal training in management. Instead, they had been trained as scientists. For many, the job as an on-farm research manager was their first managerial one.

The experiences of the case study countries suggested that more could be done to train on-farm researchers to become good managers. Institutions providing short-term training to on-farm researchers could include the study of administration among the topics covered. Greater use could be made of national and international management institutes to provide management training in agricultural research. Overseas graduate degree programs should also be designed to include attention to research management.

Mechanisms through which on-farm research managers can communicate with each other would help improve their skills by allowing them to share experience. Finally, mentoring — pairing a novice on-farm researcher with an experienced scientist or manager — is a good way of handing down management expertise from one generation to the next.

Management of transitions

Turnover among the on-farm research managers in the case studies was not excessive. However, in some cases managing the on-farm research program had been the springboard to other managerial appointments in the national system, belying the myth that on-farm research management is a dead end.

In all three African countries, when on-farm research managers had left, the transition had apparently been well managed, with a period of overlap being planned so as to allow the new managers to "learn the ropes" before they took over. In Zimbabwe, a 1-year period of overlap had been written into the original project for the FSRU. This kind of provision is unusual. Most transitions are unplanned, hasty and thus not very productive. Senior managers in Latin American and Asian countries would do well to emulate the African example.

Many on-farm programs enter a difficult phase when there is a transition from foreign leadership to national leadership. The financial and technical resources that were available to the foreign scientist may not be available to the new national leader. As a result, the status of the on-farm program suffers, and this leads to a further reduction of the resources which are made available. If a spiral of neglect and decline is to be avoided, directors of national systems need to be aware of this danger and work actively to support the new national leader.

Leadership Challenges

The leaders of on-farm research face many challenges. We deal here with two issues that appear central to us, and which arose frequently in the case studies.

Promotion of teamwork

In on-farm research, good team work is the touchstone of successful leadership. Getting a group of scientists to diagnose and solve problems together, as a team, is one of the qualities that sets the on-farm research manager apart from other managers in the national system. What makes them do so?

Promoting research that is truly interdisciplinary is management-intensive. The leader of the FSRU in Zimbabwe devoted considerable time to team building, introducing training in interdisciplinary research and interdisciplinary planning and review procedures. Compelling scientists in different disciplines to review and plan their work jointly was found to be a particularly effective mechanism. The result was a strong systems perspective throughout the unit's research.

Demanding jointly authored reports, rather than separate papers stapled together, is a useful mechanism for promoting collaboration within on-farm research teams. Other mechanisms include workshops on field methods (Senegal), field days (Panama), or the group trek (Nepal). Freed from the physical and intellectual confines of the research station, staff on field days and treks enjoy more informal interaction, leading subsequently, it is hoped, to closer collaboration. The encouragement of competition between different on-farm research teams may also help to build stronger collaboration within them.

Traveling seminars — moving individuals from one team to another for presentations — can stimulate

interdisciplinary understanding and enhance the communication between teams. Mutual monitoring of field activities by different teams, and workshops that involve several teams, can also forge improved interdisciplinary relationships (Gupta, 1986).

As we have already seen (Chapter 2), social scientists trained in agronomy are likely to make a more useful contribution to the team's objectives than those who are not. In general, training scientists in disciplines other than their own helps to broaden their objectives, freeing them from the relatively narrow definitions of success imposed by their earlier disciplinary training. In addition, it can be a cost-effective way of expanding the disciplinary skills of the on-farm research team without expanding the number of staff.

Replacing individual "career" objectives, such as publishing in an international journal, with institutional task-oriented objectives, such as developing and promoting a new technology, is another important means of promoting interdisciplinary team work. It is vital that all members of the team share a common objective, one that is firmly centered on the needs of its clients.

Good teamwork needs a constant input of new ideas, but too many staff arrivals and departures can be disruptive. In Senegal, where new recruits and newly trained scientists seemed to join the program or return to it almost continuously, making the group into a team was difficult. New team members likened the experience of joining the team to "catching a moving train".

Some activities can be identified as directly counter-productive to good team work. In Senegal, for example, a post-degree research paper had to be prepared and defended before a new scientist could be recommended for a permanent position with ISRA. Preparing this paper forced the new scientist to concentrate on individual research at the expense of team work. While such tasks must frequently be accommodated within the team effort, managers must ensure that they do not dominate an individual's activities.

The on-farm research manager must be prepared to invest considerable time and energy in ensuring the involvement and commitment of seconded and/or foreign scientists. With loyalties lying elsewhere, they are less likely to identify closely with the on-farm team.

Guidance of junior scientists

The typical on-farm researcher with 4 to 5 years of experience would normally expect to begin designing and implementing his or her own research projects, under the "apprenticeship" of a more senior scientist (Bennell and Zuidema, 1988). Given the shortage of these more senior scientists in the national agricultural research system as a whole, most junior on-farm researchers miss this opportunity.

There are several ways in which managers can provide guidance to inexperienced field staff. Outposting senior scientists to regional stations is often more feasible than posting them at the field site itself. Staff at regional stations are closer to on-farm activities, yet not too far from the amenities available in smaller towns near the regional stations. Schooling and employment opportunities for spouses with careers are major issues for outposted staff. The need to continue fulfilling teaching or administrative duties may also be an important consideration. When the remoteness of an assignment precludes the satisfactory fulfillment of these obligations, managers must identify other supervisory mechanisms that can provide the required backing, but from a distance.

Regular visits to field teams by station-based senior scientists can be encouraged through adequate per diem levels and non-restrictive travel regulations. Alternatively, visits of outposted staff back to the home institute can help prevent isolation. Both these mechanisms were found to work well in Indonesia.

Such mechanisms work best when the scientific relationship is perceived to be one between equals. On-farm researchers, especially those in more remote areas, often feel inferior to on-station scientists. The tendency of more experienced scientists to disregard the views of their juniors reinforces this perception. In order to overcome this problem, the management of BARI, in Bangladesh, organized annual on-farm research planning meetings, giving junior field staff a voice in setting research priorities. The creation of disciplinary groups across the on-farm teams, as in Senegal, represents another possible solution.

One important lesson emerges clearly from the case studies: managers must take the initiative in establishing supportive relationships for inexperienced on-farm researchers. No-one else will do so for them.

The administrative burden

The heavy administrative burden was a problem for on-farm research leaders in nearly two-thirds of the case study countries: Ecuador, Guatemala, Senegal, Zambia and Bangladesh. Administrative demands were especially severe when multiple donors were involved, and when projects were expanding rapidly. Much of the burden is associated with the task of recruitment (*see* Chapter 3). Coordination is another area requiring constant attention.

One of the most difficult administrative challenges facing the leaders of on-farm research in the case studies was that of ensuring that adequate operating funds were available in a timely manner to their programs. Meeting recurrent costs is critical to the success of OFCOR, especially once donors have withdrawn their support. Effective and efficient on-farm research must be adequately provided with vehicles that work, fuel and spare parts, field equipment and such simple necessities as rainwear and boots.

When managers have to spend too much time on administration they cannot be expected to provide adequate scientific leadership, and will be less able to spend time on fulfilling their broader responsibilities. Senior managers need to recognize and deal with this tension.

CHAPTER 6
RECOMMENDATIONS

This final chapter is devoted to 25 recommendations distilled from the experiences of the case study countries. We offer advice first to the managers of on-farm research, then to those who must appoint them. Our final recommendation, however, applies equally to both parties.

To on-farm research managers...

1. Start small and do not expand rapidly. Resist donor pressure to launch a large program unless your national system has the human and financial resources to sustain it.

2. Build a program with approved permanent staff positions for on-farm research. Try to secure the positions before recruiting new staff or sending them overseas for training.

3. Negotiate with other institutions or programs when new positions for on-farm researchers are unlikely to be approved. Secondments and reassignments may provide experienced field scientists and can help to build inter-institutional relationships.

4. Offer special incentives to temporary and seconded staff to compensate for holding a position that is not permanent.

5. Provide your on-farm research staff with incentives to overcome the hardship and isolation of working in the field. Donor-funded incentives are not sustainable, so look for alternatives that are within national means.

6. Use incentives to prevent the loss of good staff as far as possible, but accept that some staff turnover is inevitable and even beneficial.

7. Prepare to deal with high staff turnover through continuous recruitment procedures by keeping a roster of replacement candidates, and by developing in-house training capacities.

8. Write clear descriptions of jobs in your program, and of the qualifications and qualities required to perform them. These are critical for finding the right scientists for on-farm research.

9. Provide your on-farm research team with disciplinary breadth. In many areas, expertise can be supplied by headquarters-based specialists backstopping more than one on-farm effort.

10. Involve senior scientists in the on-farm research effort. When posting senior scientists to the field is impossible, ensure frequent field visits and regular support (including the review of field reports) from headquarters.

11. Plan the use of foreign scientists carefully, defining their role in terms of program needs, not donor stipulations. Above all, make them accountable to the team and its leader. Use experienced foreign scientists as trainers and mentors for junior national staff. When foreign scientists are to be replaced by national scientists, a period of overlap is essential.

12. Make special efforts to recruit and train women scientists, and to expand the future supply of professional women to agricultural research by encouraging women to study agriculture. Involve the institution's existing women scientists whenever possible.

13. Find ways of making better use of technicians. An under-used resource in on-farm research, they often have more local knowledge and more program experience than do scientists. With proper support and guidance, technicians can play a greater role in analysis and interpretation, and in on-farm research planning and programming.

14. Condition the supply of candidates to work in on-farm research. Form links with universities and other educational institutions so as to familiarize their students with your program; second your staff to teach part-time; and offer student projects or internships with your program.

15. Ensure program continuity by coordinating long-term training and the employment of substitute scientists (foreign scientists or seconded national scientists). Use the secondment of senior scientists as an opportunity for the in-service training of more junior staff.

16. Use training as an incentive, but ensure that any training offered to program staff complies with an overall staff development plan.

17. Do not allow training to end with the completion of course work. Junior scientists need continued guidance from their seniors in order to put their previous training to good use. Other in-service training opportunities, such as internships or visits to scientists in other on-farm programs, should also be pursued.

18. Make training part of the job description of all on-farm scientists. Look for and cultivate each individual's training and mentoring potential. Screen foreign scientists carefully for their willingness and ability to train. Allow your scientists enough time in which to plan and conduct training activities.

19. Include technicians in your plans for in-service and short-term training.

20. Don't be a loner: share the task of scientific leadership with other experienced scientists.

21. Don't allow on-farm research to be seen as a "separate" activity. Training in the concepts and methods of on-farm research is good for *all* scientific and technical staff in the national system. Not all scientists and technicians need to be specialists in on-farm research, but this approach should be part of the normal conduct of good agricultural research throughout the national system.

And to those who must appoint them...

22. Choose as program leader a person who is both an experienced on-farm researcher and a competent manager. Broad disciplinary knowledge and skills in developing collaborative links both within and beyond the team are especially valuable leadership qualities.

23. Provide your on-farm research managers with administrative support. Administrative overload can compromise scientific leadership.

24. Give the person responsible for launching a new on-farm research effort the same status as other program leaders or department heads within the national agricultural research system.

25. Remember: an on-farm research leader must inspire staff, create esteem for the program, and champion the cause of on-farm research.

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Annex: Data on on-farm research staff

Table 1. Profile of on-farm research staff

Country	Ecuador	Guatemala	Panama	Senegal[a]	Zambia[b]	Zimbabwe[c]	Bangladesh[d]	Indonesia[e]	Nepal[f]
Scientific staff									
Total no. of on-farm research scientists	14	61	24	22	38[7]		104	(57)[8]	(35)[8]
Total scientific person-years drawn from national system	14	61	21	22	32	26*	104		(26)[8]
% of national scientific person-years in on-farm research	6	34	16	14	20	18*	12		
Degree level (% by final degrees)									
BSc	85[1]	93	94	18	41	37	33	76	43
MSc	15	7	6	50	47	44	61	19	46
PhD	0	0	0	32	12	19	6	5	11
% scientists with specialized training in on-farm research	20	62	72	72	78	33	24		57
Average experience level (years)									
All research	7.2	4.7[3]	4.2	5	6	7.9	6.8	7.7	7.4
On-farm research	3.9	4.7[3]		5	4	3.5		3.5	3.7
% of scientists with < 5 years experience	29	41[3]	78	54	56	48	55		34
Average age of scientists	34	32	33	36	32	34	33		36
Gender (% female)	0	0	0	2	9	11	2	15	0
Nationality (% national)	100	100	100	68	53	81	100	94	80
Disciplinary composition (%)									
Natural scientists	100	93[4]	100	45[5]	39	93	87	76	69
Social scientists		7	0	55[5]	45	7	13	24	17
Extensionists	0	0	0	0	16	0	0	0	14
% of on-farm research staff who are scientists	78	79	54	42	68	39	19	57	37
Technical staff									
Total technical person-years in on-farm research	4	16	18[5]	30	17		449	(43)[8]	(65)[8]
Total technical person-years drawn from national system	4	16	18[5]	30	2		449	(43)[8]	(59)[8]
% national technical person-years in on-farm research	5[2]	34	36	10	8	25	17		
Ratio of technical to scientific staff in on-farm research	0.3	0.3	0.9	1.4	0.5	1.6	4.3	0.7	1.8
Average experience level (years)									
All research		5.7[3]	8.7				14.4		7
On-farm research		5.7[3]		6.9	3.1				4
Average age of technicians		37	34	33	37				30

Notes

a) On-farm research = DRSP, excluding thematic research and BAME.
b) Degree level, average years of experience, gender, and nationality do not include the six research-extension liaison officers seconded from the Extension Branch.
c) Based on 5 sub-case studies, unless otherwise indicated (*).
d) Data refer only to BARI. Data on scientists are 1987 data, except for degree level, average years of experience and age, which are from January 1988. Data on technicians are 1987 data, except average years of experience and age, which are January 1988. Technicians include clerical staff.
e) Data for 4 sub-case studies only; overall national data not available. Degree level inclusive of administrative staff with BSc or above.
f) Data for 4 sub-case studies only; overall national data not available.

1) 1985 data.
2) 1985 data.
3) Number of years with ICTA; considered to be a proxy for years of research experience.
4) Social scientists includes only 2 of the 11 people performing social science functions, as only they had social science degrees.
5) Assumes that all technicians are full-time.
6) Refers to Central Systems Analysis Group and to regional teams only. Does not include the 7 social scientists from BAME or the 16 natural scientists from thematic research.
7) Includes the 6 research-extension liaison officers seconded from the Extension Branch.
8) Represents totals for 4 sub-case studies only. Not directly comparable with other data for the national system as a whole.

Table 2. Comparison of national and scientific staff working in on-farm research[1]

Country	Senegal[2]		Zambia[3]		Zimbabwe[4]		Nepal[4]	
	National	Foreign	National	Foreign	National	Foreign	National	Foreign
Degree level (% by final degree)								
BSc	13	29	76	0	45	0	54	0
MSc	67	14	24	73	45	40	39	71
PhD	20	57	0	27	10	60	7	29
Disciplinary composition (%)								
Natural scientists	40	57	35	44	95	80	74	43
Social scientists	60	43	50	39	5	20	11	43
Extensionists	0	0	15	17	0	0	15	14
Average experience level (years)								
All research	5	4	3.9	8.3	5.9	18.2	8	5
On-farm research	5	n.a.	3.7	4.3	3.3	4	3.5	4
% of scientists with < 5 years experience	50	57	88	20	50	1	36	28
% of scientists with specialized training in on-farm research	72	72	87	67	36	20	57	57

Notes

1) Includes only the 4 case studies with significant foreign participation in on-farm research. All data are 1986.
2) Refers to Central Systems Analysis Group and to regional teams only. Does not include the 7 social scientists from BAME or the 16 natural scientists from thematic research.
3) Includes the 6 research-extension liaison officers seconded from the Extension Branch.
4) Based only on sub-case studies.

Table 3. Comparison of scientific staff working in on-farm research and in national agricultural research systems

Country	Ecuador		Guatemala		Panama		Senegal[a]		Zambia[b]		Zimbabwe[c]		Bangladesh[d]		Indonesia[e]		Nepal[f]	
	O*	N*	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N
Degree level (% by final degree)																		
BSc	85[1]	68	93	79	94	64	18	27	41	38	37	62	33	29	76	78	43	53
MSc	15	30	7	20	6	29	50	50	47	44	44	30	61	65	19	15	46	44
PhD	0	2	0	1	0	7	32	23	12	18	19	8	6	8	5	7	11	3
Disciplinary composition (%)[g]																		
Natural scientists	100	100	93	94	100	89	45	87	47	89	93	99	87	95	76	91	80	n.a.
Social scientists	0	0	7[2]	6	0	11	55	13	53	11	7	1	13	5	24	9	20	n.a.
Average experience level																		
Research (years)	7.2	8.8	4.7[3]	5.8	4.2	6.4	5.0	6.0	6.0	n.a.	7.9	6.8	6.8	9.1	7.7	n.a.	7.4	n.a.
% with < 5 years experience	29	n.a.	41	32	78	50	54	53	56	n.a.	48	55	55	34	n.a.	n.a.	34	n.a.
Ratio of technicians to scientists	0.3	0.4	0.3	0.3	0.9	0.4	1.4	1.2	0.5	1.6	1.6	0.6	4.3	3.0	0.7	n.a.	1.8	n.a.
% of staff who are nationals	100	n.a.	100	99	100	96	68	68	53	54	81	89	100	100	94	95	80	n.a.

*O On-farm research *N National research system as a whole

Notes

All data are 1986 unless otherwise indicated.

a) On farm research = DRSP, excluding thematic research and BAME.

b) Degree level, average years of experience, gender, and nationality do not include the 6 research-extension liaison officers seconded from the Extension Branch.

c) Based on 5 sub-case studies, unless otherwise indicated (*).

d) Data refer only to BARI. Data on scientists are 1987, except for degree level and average years of experience, which are January 1988. Data on technicians are 1987. Technicians include clerical staff.

e) Data for 4 sub-case studies only; data for national system as a whole not available. Degree level inclusive of administrative staff with BSc or above.

f) Data for 4 sub-case studies only; data for national system as a whole not available.

g) Refers only to national research system personnel; extension staff in on-farm research not included.

1) 1985 data.

2) Social scientists includes only 2 of the 11 people performing social science functions, as only they had social science degrees.

3) Number of years with ICTA; considered to be a proxy for years of research experience.